USING VALUE PRIORITES TO EXPLAIN DIFFERENCES IN ATTITUDES TOWARDS GENETICALLY MODIFIED FOOD

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Abstract

During the last few years the public has become in general more ambivalent towards new technologies and while expecting technological innovation to make their life better, they still hold concerns about possible adverse effects deriving from the use of these technologies. The present paper offers a comparative approach on two European member countries concerning attitudes towards genetically modified food. The paper focus on values because previous research has shown that socio-economic factors can only partially explain differences in attitudes towards genetically modified food. Strong national differences lead to the idea that cultural differences should also be taken into account. Following the approach of Schwartz, the scope of this research paper is to analyse cultural priorities concerning genetically modified food at the individual level. Using data collected in Germany and Greece, the suitability of values to express continuous processes of cultural and individual changes is explored in relation to genetically modified food.

Introduction

The uses and applications of modern biotechnology have increased rapidly over the last 20 years, stimulating a fierce debate concerning the usefulness of its introduction in different domains of everyday life. Especially the issue of genetically modified food is becoming more popular and attracts media coverage, while topping the research agenda of scientists with different backgrounds.

The public (and groups in the public) influence decisions around modern biotechnology, not only politically through democratic channels or interest groups, but also as consumers via the market. Understanding the public's range of views on biotechnology is important for decision makers to be able to anticipate potential acceptance problems, or, one step further, to take consumer or public desires and concerns into account in the development of applications. During the last few years the public has become in general more ambivalent towards new technologies and while expecting technological innovation to make their life better, they still hold concerns about possible adverse effects deriving from the use of these technologies. Modern biotechnology is a central issue in the public debate. Claims about benefits for society are not accepted without criticism.

The starting point for the present paper steams from previous work conducted from the same research group. Analysing attitudes towards genetically modified food in the European Union, it is evident that there are important differences among european countries. Trying to specify the importance of socio-economic and informational determinants of a potential defender of genetically modified food by estimating the partial effects of age, gender, education, income, family status, size of household and knowledge on genetically modified food in an attitude multivariate model, the research findings were interesting. Emerging differences in attitudes towards genetically modified food have not been explained adequately in most cases using only socioeconomic variables. Strong national differences lead to the idea that cultural differences should also be taken into account.

The present paper offers a comparative approach for two European member countries (Germany and Greece) concerning attitudes towards gmfood. The aim is to describe the status quo of gmfood specific attitudes in Greece and Germany while trying to explain the differences of those attitudes focusing on values. Following the binary comparison approach of Dogan & Pelassy (1984, pp. 115), Germany and Greece are going to be compared as cases of high socio-cultural contrast.

Literature review

A review of literature shows that consumer attitudes towards genetically modified food are mainly focusing on the level of knowledge and socio-demographic status. Gloede, Bechmann and Hennen (1993) hypothesised that the overall attitude towards genetic engineering is determined by socio-demographic factors such as age and education. Although refusing the hypothesis, that attitudes towards genetic engineering are only related to a general attitude towards technology, they did not find any significant differences between the socio-demographic groups.

Hamstra (1995) investigated acceptance of Dutch consumers with regard to genetic modification of foods in three studies in 1991, 1993 and 1995. She examined product and consumer characteristics as determinants of consumer acceptance and found that demographic factors had only little explanatory power, whereas the subjective perceptions of product characteristics were more important. Miller (in Jaufmann & Kistler 1990, pp. 54) reported gender and "science knowledge" as the main factors influencing attitudes towards genetics. According to his results, based on US data, women reject GM of food more than men. People with low educational attainment also show higher rejection rate. But Jaufmann

and Kistler (1990) found that people in Europe with higher educational attainment are more negative towards the use of genetic engineering for food production.

In other studies, the general effect of knowledge and information about biotechnology and its applications on the acceptance rates seems to be relatively low (Urban 1998; Urban & Pfenning 1999; Marlier in Durant 1992). The same finding is confirmed by Frewer et al. (1994) who found a negative correlation between knowledge and attitude towards genetic engineering, especially towards the evaluation of risks. This finding is supported by Pfister et al. who (Hampel & Renn 1999) stated that attitudes towards genetics are not rooted in knowledge. They found only a weak correlation between knowledge and genetically modified food acceptance rate.

Some recent studies (i.e. by Bredahl, 2001) went beyond the national perspective starting to examine attitudes towards genetically modified food in different countries. Bredahl's research focuses on four European countries (Denmark, Germany, Italy, and the United Kingdom), investigating attitudes towards genetic modification in food production and purchase decisions with regard to genetically modified yogurt and beer. In relation to national differences the general conclusion that in Northern European Countries there is lower rejection rate than in Southern European Countries, is reached. The lower rejection in the Northern countries might be due to the fact that "the entire debate on genetic modification is more advanced and more in focus in northern European countries than in many southern countries" (Bredahl 2001).

In Greece, until recently, biotechnology was an issue that drew relatively less coverage in the press compared to Western Europe and controversies surrounding the applications of modern biotechnology were in large part restricted to the scientific community. The public has remained partially uninformed of the ethical, environmental and health issues surrounding modern biotechnology and public awareness remains low. In these circumstanves, people tend to confront modern biotechnology as a technology of the future, which may affect individuals in other parts of the world but certainly not their own lives.

In a study based on data from Eurobarometer surveys, Greeks were found to be the least informed among all Europeans on issues surrounding biotechnology (Eurobarometer, 1999, 2001, Papastefanou et.al., 2003). This view seems to be consistent with that of other authors, who interpret these differences as reflections of a cultural cleavage between the northern and southern european countries (Hamstra 1991; Hoban and Kendall 1992). In many respects, Germanic countries show similar attitudes about the facts of life as Romanic countries do. Irish attitudes strongly mirror those found in Southern Europe, as do Greek attitudes. Finnish attitudes, however, can be quite different from Scandinavians.

It seems to be fruitful to try and clarify the skewd relationship connecting cultural factors with attitudes towards genetically modified food especially as common variables like socio-demographic factors have failed to fully explain attitudes and attitude differences towards genetically modified food.

Measuring culture

Nowadays a wide range of theories and models have been developed and can be applied in cross cultural research For the present paper the approach of Schwartz was chosen for measuring culture on an individual level. Shalom Schwartz (1992) defines a value as a transsituational goal that varies in importance as a guiding principle in one's life, and developed a theory about the internal structure of the value domain that received empirical support in over 60 countries (Schwartz & Sagiv, 1995). Schwartz has included in his study also countries that have been influenced by socialistic regimes, such as China, some Eastern European countries and Zimbabwe. Schwartz was able to use data collected in 63 countries including more than 60000 individuals . In contrary, the value dimensions of Schwartz are included in the latest ESS (European Social Survey). Schwartz & Sagiv (1995, p.109) summarise their findings as follows:

The empirical findings regarding the revised theory show that (a) There is substantial support that 10 motivationally distinct value types are recognized across cultures and used to express value priorities; (b) These value types form a system of compatible and conflicting motivations that are arrayed on a motivational continuum in most cultures. Two basic dimensions that organize value systems (Openness to Change vs. Conservation and Self-Transcendence vs. Self-Enhancement) are virtually universal; (c) 44 specific values have highly consistent meanings across cultures. They can be used to form cross-culturally comparable indexes of the importance attributed to each value type.

In order to understand the conceptual organization of the value system, Schwartz has developed a theory of the dynamic relations between the value types. He assumed, that actions, carried out as succession of a value type, have psychological, practical and social consequences, which either accord or compete actions following other value types. Thus, a model emerges taking into account the relation among different value types. Incompatible values are arranged opposite to each other, supplemental, values, which support similar aims lie nearby on a circular model. Ten different value types, each characterised by their own motivational goal, were identified: Hedonism, Stimulation, Self-Direction, Universalism, Benevolence, Tradition, Conformity, Security, Power, and Achievement. According to Schwartz (1992), these value types can be organised in a two dimensional circular circumflex structure based on a theoretical analysis of the compatibilities and conflicts between their respective motivational goals. Value types with compatible goals are positively related and emerge adjacent to one another in the two-dimensional representation. Value types with conflicting goals are negatively related and are situated opposite one another.

These ten value types con be ordered into four higher order value types. Stimulation, self-direction and part of hedonism are combined to a value type called openness to change. Self-enhancement combines the remaining part of hedonism with achievement and power. Located on the opposite side of the circle lies the value type of conservation consisting of security, tradition and conformity. The last higher order value type is self-transcendence and consists of universalism and benevolence. In case specific values don't have the same meaning in different cultures, comparisons are insignificant. This problem can be solved by figuring out the exact meaning of those values within a given culture in order to examine their conceptual equivalence towards other cultures afterwards. Schwartz reflects the holistic approach and he defines culture as a complex, multidimensional structure and not as a single categorical variable. He searches for universal applicable value dimensions, in order to take account for human variety and divergence in various cultures. Schwartz value dimensions are included in the latest ESS (European Social Survey).

Why studying values in order to understand cultures?

Studying values and value priorities of a society has two determining advantages; both at the individual and the societal level. Predominating value priorities in a society are key elements to the social formation, while individual value priorities represent the central targets of an individual and are connected to his/her behavior.

Values are suitable to explore continuous processes of cultural and individual changes depending on historical and social changes. They are directly influenced by the individual's daily experiences in a constantly changing socio-political environment and can be used to define differences between various cultural and sub-cultural groups in a given society. Values are comparatively abstract and general in relation to attitudes and behavioral patterns, which are tied at specific situations and are therefore unsuitable to formulate regularities over cultures.

Schwartz & Bilsky (1987) define "values" by using the main characteristics of existing definitions: "Values are beliefs. They are not objective ideas but are always connected with human feelings. Values refer to desirable goals in life and to behavior that makes the goals come true. Values apply across all situations. Values serve as standards of orientation to

evaluate people and events. Cultures and individuals can be characterised by the system of their value priorities".

It should be noted that the behavior of individuals in certain circumstances has been found to be inconsistent to their stated value system. This fact has evoked skepticism on the usefulness of value priorities as far as research on cross-cultural psychology is concerned. Although more research is needed to shed light in these interrelationships, recent scientific research argues for the consistency between value priorities and behavioral action.

Data collection

The data analysed in this paper were collected with the use of questionnaires during the first half of 2004 in Germany and in Greece (N=433). Using random sampling, 206 people in Germany and 229 people in Greece took part in the survey. Data collection took place in Thessaloniki, Greece and Frankfurt/ Mannheim, Germany. The questionnaire included questions approaching attitudes towards genetically modified food, product and process characteristics as well as items measuring knowledge. A short version of the Schwartz value system, which consists of only 28 values (instead of 56 values in the original Schwartz questionnaire) was introduced in order to query the 10 value dimensions.

Overview: Measuring values (Resemblance, 4-point-scale)

It's important to him/her to make his/her own decisions.
It is important to him/her to be very successful.
It is important to be better than the others.
He/she likes to do things in his/her own special way.
It is important to him/her to enjoy life.
He/she avoids everything what could threat his/her safety.
It's very important to him/her to help the people around him/her.
He/she tries to help people that he knows.
He/she is always looking for adventures.
It is important to him/her to do enjoyable things.
It is important to follow traditional customs.
He/she seeks every chance he/she can to have fun.
It is important to him/her to live in secure surroundings.
He/she thinks that all people, irrespectively of their race or nation should live in harmony.
It is important to him/her to be always polite.
It is important to take the leadership and tell others what to do.
He/she wants to plan his/her activities on her/his own.
He/she always wants to make the decisions.
It is important to be ambitious.
It is important to live in safe surroundings.
He/she likes taking risks.
He/she tries to avoid disturbing others.
It is important to him/her to be responsive to the needs of his/her friends.
It is important to him/her to have an exciting life.
He/she thinks that is best to do things in a traditional way.
It is important to him/her to bring forward peace between all groups in the world.
It is important to behave always in a good way.
He/she likes to be in the leading position.

Measuring knowledge (True/False)
Enzymes are used in all foods.
All bacteria found in food is harmful.
Ordinary tomatoes do not contain genes while genetically modified tomatoes do.
"Natural" does not necessarily mean healthy.
All processed foods are made using genetically modified products.

We eat DNA everyday.
There are no laws or regulations on the use of gene technology in food production.

Knowledge groups were constructed following Urban & Pfenning (1996: 132) as the expectancy value for random responsiveness is 50% because of the dichotomous categories. Low knowledge group corresponds to up to 50% correct answers; medium knowledge to 50-75% correctly answered questions and high knowledge to 75% or more correctly answered questions.

Results

Value priorities in Greece and Germany

By arranging the value priorities from the collected data in the circular model of Schwartz the following graphical representations (Diagrams 1 to 4) can be used to approach the prevailing value priorities in each country. The first two diagrams refer to the 10 value types as proposed by Schwartz, while diagrams 3 and 4 present four higher order value types, which were derived after ordering the ten initial variables.

Diagram 1: Value Structure - Germany - 10 value type solution
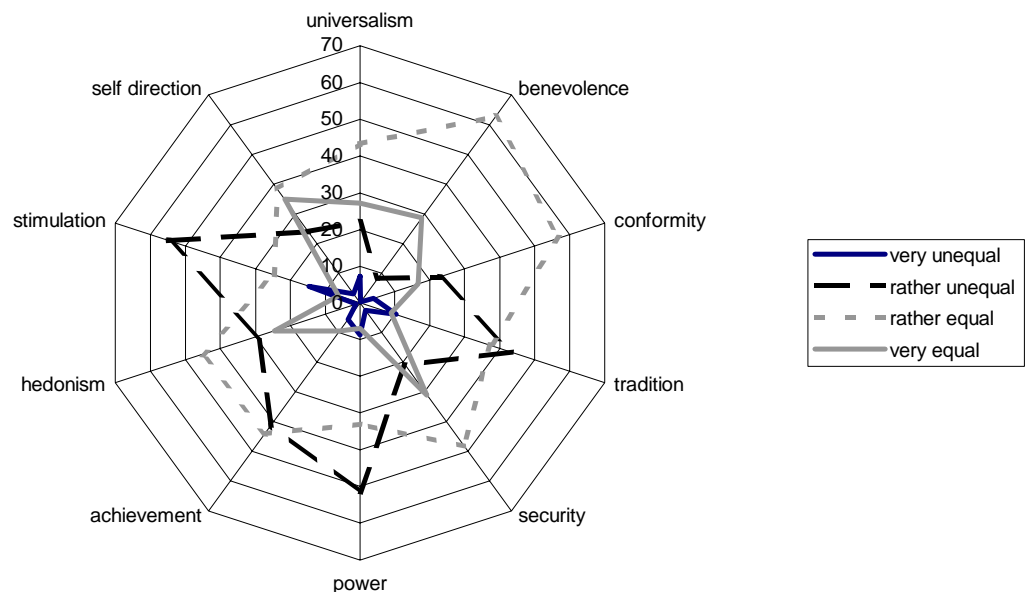
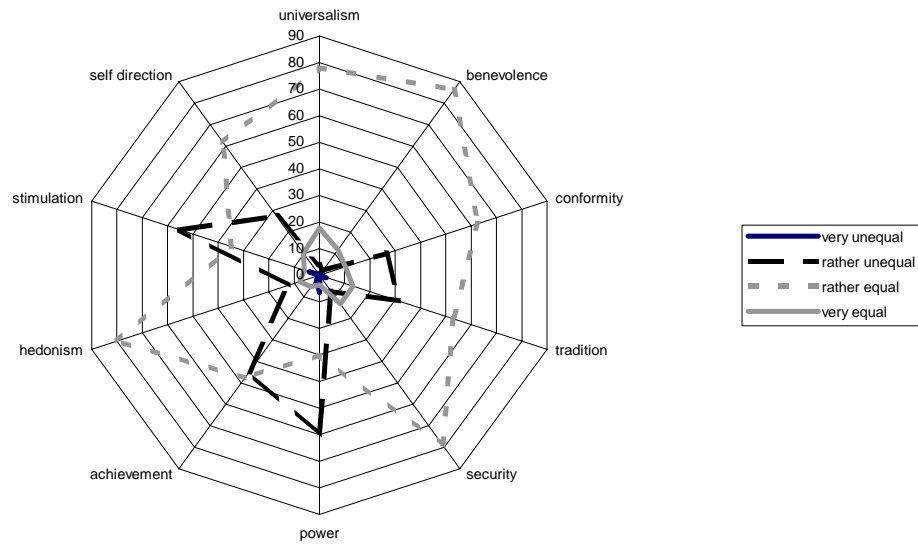Diagram 2: Value structure - Greece - 10 value types solution

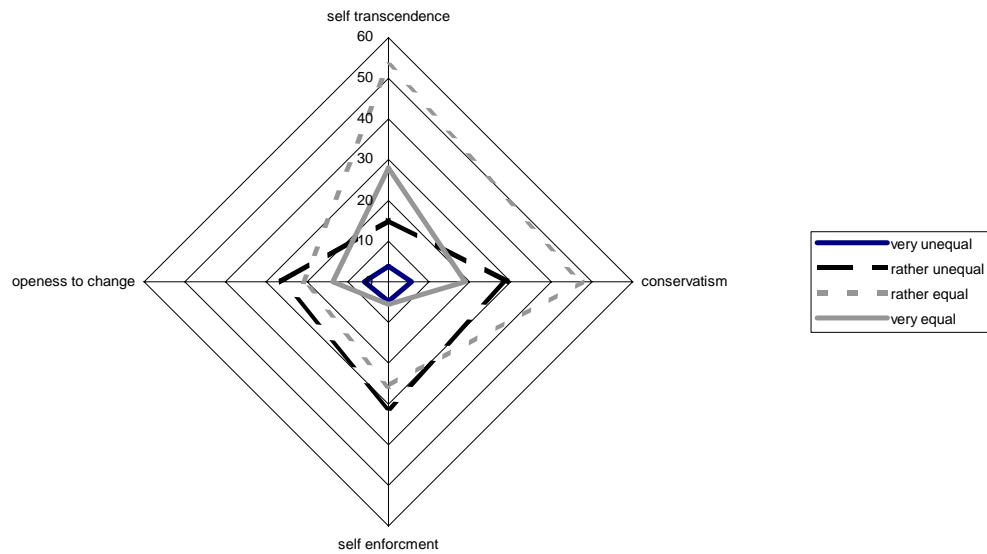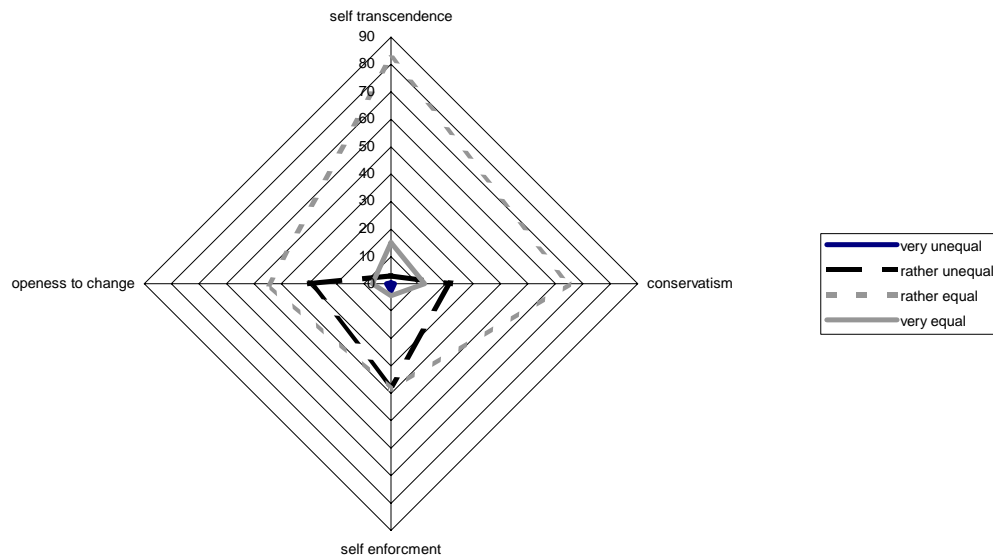Diagram 3: Value Structure of Germany - 4 value types-solution

Diagram 4: Value Structure - Greece - 4 value types solution

Greek respondents tend to avoid extreme positions compared to the German ones. Trying to briefly describe the different cultural contexts as specific profiles of the cultural dimensions, Germany seems to be a society with a comparatively more individualistic orientation (see the high percentage of self transcendence), whereas Greece is characterised by more collectivistic orientation.

People in Greece tend to consider relatively more important values associated to stability, certainty and social order. Greeks also show less openness to change than Germans. These are features of a society with more traditional patterns of orientation. From a socio-cultural point of view, these cultural dimensions provide social effective criteria for orientation and evaluation of individual behavior, influencing thus attitude formation and attitude structuring processes in various domains of everyday life, including food issues. Accordingly in a traditional culture one may expect, that people, when forming their attitudes towards important issues like GM food, would mainly rely on beliefs and perceptions, which carry on family norms and traditions.

Knowledge in Greece and Germany

The survey results were consistent with findings from previous research and as expected, the average number of correctly responded knowledge questions was smaller in Greece, compared to Germany. As shown in Table 1, although percentages are similar for the medium knowledge group, there is a divergence concerning low and high knowledge groups. Whereas in Greece every fifth person knows little about biotechnology in general, the same argument is true in Germany for every tenth person.

Table 1: Knowledge groups (Greece and Germany)

	Greece	Germany
Low knowledge	22,3 %	10,1 %
Medium knowledge	41,5 %	42,7 %
High knowledge	36,2 %	47,2 %

Source: own calculations

Attitudes towards genetically modified food in Greece and Germany

In order to analyse the collected data, a linear multiple regression approach was used. Z-Standardization was applied before analysing the data in order to convert all values from the sample into measurements of standard deviations above or below the mean. The distribution resulting from this process will always have a mean of zero and a standard deviation of one making variables with different units of measurement or different scales of measurement directly comparable. Additionally, the weighting of the values in many statistical procedures may be inappropriate. Standardising all variables render the unit of measurement for each variable the same and the weighting factor is not biased.

Socio-economic variables are contrasted to variables concerning values trying to analyse their relative importance for explaining existing differences in attitudes towards genetically modified food. As shown in Table 2, socio-economic variables can only partially explain differences in attitudes towards genetically modified food. This is especially true in the case of Greece, where none of the socio-economic variables in the equation is significant and the explained variance in total reaches only 0,5%. For the German sample some of the variables are significant but the proportion of explained variance remains small. German women tend to be far more negative towards genetically modified food than German men. High income group compared to low income and having a partnership compared with living alone seem to lead to a relatively more positive attitude towards genetically modified food. The results from the current survey are consistent with previous analysis based on secondary data.

Table 2: Importance of socio-economic variables in attitude formation towards genetically modified food

	Greece	Germany
Socio-economic variables	$R^2 = 0.05$	$R^2 = 15.7$
male		
female		-1.040***
Age 18-25		
26-35	-1.04*	
36-45		
46-55		
56-65		
66 and more		
income very low		
low		
high		
very high		1.96**
Education-low		
Education-medium		
Education-high		
No partner		
With partner		.90**
Number of household members		
Number of kids under 18		

Source: own calculations, ***=1%-Niveau, **=5%-Niveau, 10%-Niveau
Italic=reference group

The next step in the analysis involves controlling for the relative important of values in explaining the divergence in attitudes towards genetically modified food. As shown on Table 3, values obviously have much more explanatory power than the socio-economic variables. This result is true both for Germany and Greece, but the proportion of explained variance in Greece is higher (26%) than in Germany.

Table 3: Important values for attitude formation towards genetically modified food in Greece and Germany

	Value dimension	Germany	Greece
		$R^2 = 19,8\%$	$R^2 = 26\%$
It is important for the person…			
1 to make his/her own decisions	Self direction	-.96**	
2 to be very successful	Achievement	.72**	
7 to help the people around him/her	Benevolence		1.76***
15 to be always polite	Conformity	.65**	
19 to be ambitious	Achievement	-.69**	.55**
21 He/she likes taking risks	Stimulation		.62**
23 to be responsive to the needs of his/her friends	Benevolence	-.90**	-.1.33**
25 to do things in a traditional way	Tradition		-.74**
26 to bring forward peace between all groups in the world	Universalism		-1.14**
28 He/she likes to be in the leading position	Power		.71**

Source: own calculations, z-Standardization, ***=1%-Niveau, **=5%-Niveau, *=10%-Niveau

Interestingly, only two out of the 28 values that have been used in order to explain attitudes towards genetically modified food are similar in Germany and in Greece. The other values that are presented in Table 3 seem to have a country-specific orientation. In Greece value dimensions that are related to negative attitudes towards genetically modified food include universalism, benevolence and tradition. Benevolence also seems to have a similar impact in Germany, while results concerning achievement do not provide a clear picture. Individual value priorities influence directly attitude formation allowing to build stable attitudes even for objects for which the individual has no direct experience.

Concluding remarks

The results presented at the diagrams refering to the ten value types as proposed by Schwartz and the four higher order value types as well as the regression analysis that followed allows for some general comments on the potential of using divergence in value orientation in order to explain differences in attitudes towards genetically modified food.

In countries where relationships are especially regulated by social norms, one would expect, that people, when forming their attitudes towards important issues like genetically modified food, would mainly rely on beliefs and perceptions, which carry on family norms and traditions. Additionally, prominence towards security can be related to higher uncertainty that surrounds all revolutionary technological leaps including modern biotechnology, further explaining existing differences in attitudes towards genetically modified food. In countries where, in general, lower significance is put upon these values influence from significant others should be weaker in attitude formation. Instead, other, non-social factors, like scientific knowledge on biotechnological processes should get more prominent in differentiating approving or disapproving attitudes towards genetically modified food.

In cases where a construct of value types associated with the promotion of the welfare of close and distant others is negatively associated to genetic engineering, it is fair to expect that it would be more significant in attitude formation in countries where strong importance is attached to this value type. In other words, the perception of genetic engineering as being unnatural or harmful for the environment would play a more important role in forming negative attitudes in countries where value types associated with the promotion of the welfare of close and distant others are valued high.

Giving priority to relationships considering the needs of the others, even when there is no benefit for the individual, may lead to differing attitudes towards modern biotechnology. The direction of these attitudes will depend on a number of factors. Thus, while rationality presupposes the careful calculation of the advantages and the disadvantages associated with a given relationship before any action is taken, prioritising personal goals over in-group goals may lead to actions that neglect the needs of future generations and /or the environment. It is not a great conceptual leap to link this notion to attitudes directly associated to genetically modified food. Companies investing in food biotechnology belong to a great percentage at the private sector and the way that the alleged benefits will be shared to those who need them is left partly indecisive. Thus a cost-benefit analysis valuing the introduction of a new genetically modified variety would be a pre-requisite for its introduction but a positive result on the benefits side would not constitute a panacea. Individuals strongly orientated towards universalism would oppose the introduction of new technologies even when clear-cut benefits are estimated, as long as the analysis is static, does not allow for the calculation of externalities and does not guarantee decent benefit sharing.

Self direction and stimulation as opposed to tradition, security and conformity, lead to a calculation of associated costs and benefits before any attitude is formed. When a given culture is in general values prioritising personal autonomy, idiocentric individuals will not base their opinions on others and as already stated may well depend in a great extent, upon scientific knowledge in order to form their attitudes.

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