TOWARDS SUSTAINABLE FOOD CONSUMPTION[1]

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ABSTRACT

The awareness of environmental problems has pervaded society at large. Sustainable food production, marketing, and consumption are important in maintaining or, preferably, improving the quality of the environment and natural resources. *Sustainability also implies energy consciousness* and economical use of raw materials. In addition, social elements - animal welfare, poverty in developing countries, the social life in rural areas - may be associated with sustainability. Six socio-economic developments relevant to sustainable food consumption are discussed. A diffusion model is proposed that is used to describe the way in which sustainable consumption penetrates four consumer groups differing in attitude towards sustainable food consumption: Searchers, Avoiders, Learners, and Indifferent consumers. The model of the penetration process is then used to predict the isolated impact of market forces, consumer information, and government regulation in three scenarios.

Consumers, consumer organisations, pressure groups, the government, producers, traders, and industrial companies can all play an active role in improving the sustainability of food consumption. When sustainable consumption is encouraged by market forces only, no more than 20% of the consumers will consume sustainably grown products. When consumers are educated and informed about the consequences of their current consumption patterns and the way in which these should be changed, 70% of the consumers could switch to a sustainable consumption pattern. However, this process will advance very slowly and some consumers will remain selective users. When government regulations try to control the consumption process, 100% sustainability can be achieved in theory. However, such a scenario is not socially and economically viable.

It is concluded that realistic policies on sustainable food consumption should combine elements from all three scenarios in order to develop an optimal, cost-efficient and ecology-saving, strategy.

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[1] The present paper is largely based on the report 'De consument van duurzaam geproduceerde voedingsmiddelen in het jaar 2010' by H.N.J. Schifferstein and M.T.G. Meulenberg. NRLO, The Hague, 1993.

Introduction

After the Second World War, food consumption increased substantially in the Western world, both in terms of quantity and quality. Agricultural productivity also increased and, in more recent years, the Common Agricultural Policy of the European Community has further stimulated the production of a number of specific agricultural commodities. In the post-war period between 1945 and 1970, Western consumers enjoyed the increasing welfare without reservation. However, very soon the prophets of doom appeared, warning of the consequences of an unconstrained increase in consumption: Packard's attack on advertising drew public attention in 1957 with his book Hidden Persuaders; Galbraith's (1958) discussion of 'public poverty and private opulence' in The Affluent Society and Carson's (1962) Silent Spring created a major impact.

From the 1970's onward and particularly since the appearance of the Club of Rome Report (Meadows, 1972), there has been a continuous stream of criticism directed at the Western system of production and consumption. After the publication of the Brundtland Report in 1987, the concept of sustainability began to receive considerable attention. This is a concept which is also relevant to the production and consumption of food products.

In spite of the consensus which exists in Western society about the urgency of environmental problems, there is a great deal of confusion about how to create a system of production and consumption which can guarantee a sustainable society. Among the reasons for this confusion is the fact that the concept of sustainability is hard to define. It is also difficult to evaluate the environmental damage caused by food production and consumption precisely. In addition, there is the conviction that a sustainable society should be based on a proper balance between economic and environmental development. Notwithstanding these problems there is a widespread belief in Western societies that food consumption should become more sustainable.

A great many studies have been made about socially responsible and environmentally friendly food consumption. These studies are often concerned with specific issues such as consumer decision making with respect to consumption of specific products, like organic food. As far as we are aware, little attention has been given to the question of how sustainable food consumption can be introduced into the society at large. We address this topic in our paper. We conceptualize the road to securing sustainable food consumption here as a process of diffusion. In this process, discrete consumer groups, with different attitudes and value systems, consecutively adopt a sustainable food consumption pattern. On the basis of the proposed diffusion model, different scenarios towards sustainable food consumption are developed.

Our paper is organized as follows. After a short discussion of the concept of sustainability, the potential impact some demographic and socio economic trends may have on sustainability in food consumption is reviewed. A diffusion model is then proposed. This model is used to analyze the way in which sustainable food consumption penetrates society. On the basis of this diffusion model, three different scenarios discussing the penetration of sustainable food consumption are elaborated.

The concept of sustainability

In line with the so-called Brundtland Report Our Common Future (1987) we define sustainable food consumption as 'a way of food consumption which guarantees the preservation of natural resources such that present consumers' needs can be fulfilled without endangering the needs of future consumers'. In reality, the concept of sustainability is interpreted and used in different ways by planners, politicians and Green lobbyists. Sustainability - in a broad sense - can include the following three elements:

First, the quality of the physical environment - soil, water, and air - is a core element in sustainability. This means that the concept of sustainable food consumption should be conceived in its broadest sense, i.e. food consumption should be related to all stages of food production, marketing, and waste removal.

A second element of sustainability is efficient use of the sources of energy and raw materials. Food consumers should be energy conscious and economical in their use of energy and raw materials. They can contribute to the efficient use of raw materials, for example, by choosing environmentally friendly food packages and by participating in waste recycling programs. Theoretically, it is possible to recycle all waste provided that there are unlimited sources of energy. However, energy is not abundant at low cost. Therefore, energy conscious consumers are important if the present standard of living is to be maintained/improved. Efficient waste recycling is also particularly important in this respect.

Thirdly, social elements can be integrated into the concept of sustainability. Actually, many food consumers include an awareness of animal welfare, poverty in developing countries and the social life of workers in rural areas, in their understanding of the concept of sustainability.

The concept of sustainability lacks a certain clarity, partly because of the multidimensional nature of the concept, and partly because of the problems associated with assessing the impact of pollution on the physical environment. For instance, there is considerable difference of opinion on the impact energy use has on global warming and the policies which are desirable in this respect.

In this paper, sustainable food consumption is understood as a general behaviour with respect to food consumption. It is seen as originating from the consumers' concern for the physical environment and the scarcity of energy and raw materials. We do not discuss the social elements of sustainable food consumption in this paper, because attitudes and opinions on these matters differ both within and between countries.

Socio economic developments in society relevant to sustainable food consumption

Six socio economic developments relevant to sustainable food consumption are discussed below:

Growth of world population

A world population growth of 1.7% in the period 1985 - 1990 (United Nations, 1992) is perhaps the most important reason why the physical environment has been put under pressure in recent decades. Western countries differ from the rest

of the world in this respect. For example, while a substantial increase of the world population is forecasted, the population of the EC is expected to remain stable. In 1990 there were 340 million people in the EC and it is predicted that there will be 339 million in the year 2000 (CMA, 1992).

Greying population, smaller households

In 1980 the percentage of the population in the age group 60+ was 19.3% in the German Federal Republic and 19.2% in the German Democratic Republic. Projections for the year 2000 suggest that this percentage will rise to 30.9% (CMA, 1992). In the Netherlands, an increase was recorded from 15.6% in 1980 to 17.4% in 1991 (AGB, 1992). For older people in particular, food quality is associated with nature and health. Increasing quality consciousness among the elderly (Steenkamp, 1992) might stimulate the demand for products grown in a sustainable way. Especially when a food product is regarded both healthy and sustainable, sustainable food consumption is expected to increase (Senauer et al., 1991).

Household size in Western countries is decreasing. In Germany, the average size of households decreased from 2.51 persons in 1980 to 2.41 in 1990 and is projected to decrease to 2.40 in the year 2000 (CMA, 1992). In the Netherlands, this figure was 2.98 in 1980 and 2.44 in 1990. The projection for 2000 is 2.26 (AGB, 1992). Smaller households tend to purchase smaller units, which implies more packaging and more purchase efforts per unit of food purchased.

More education and information make consumers, in principle, more sensitive to environmental problems

More people receive higher education today. The percentage of people having secondary higher education or university education in Dutch households, for example, increased from 20.2% in 1986 to 23.1% in 1992 (AGB, 1992). Higher educated people are better able to understand the gravity of environmental problems. Research has shown that the consumers who systematically select organic food are often better educated than the average consumer (e.g. Wierenga et al., 1983).

Zimmermann and Borgstein (1993) report that 5% of the Dutch population are regular buyers of organic foods, and approximately 1% of the Dutch population are heavy users. In Germany, the percentage of the population who considered protecting the environment against pollution to be one of the most urgent national problems increased from 9% in 1980 to 57% in 1988, but decreased to 32% in 1990 (CMA, 1992). The percentage of West German people sensitive to environmental problems, however, increased consistently from 42% in 1985 to 62% in 1990 (CMA, 1992).

Concentration of labour force in the age-group 20 to 50 years and increasing participation of women in the labour market

The proportion of people of 50 years and older in the labour force is decreasing in many countries as a result of special retirement schemes aimed at creating jobs for young people. The number of people of 20 years or younger in the labour force is also decreasing because of increased and longer participation in secondary and higher education. Consequently, a smaller group of workers has to take care of an increasing group of non workers. Another important development is the increasing number of women in paid employment (SCP, 1992).

These factors increase the time pressure on food consumers in the age group

between 20 and 50 years, at least during the week, and therefore stimulate the demand for convenience in food preparation and food packaging. In Germany, for example, the packaging of fresh potatoes in small units increased from 26% of total fresh consumption in the period 1980-1982 to 34% in the period 1987 - 1990 (CMA, 1992). Food consumption away from home is also increasing. In West Germany an increase in the amount of food consumed away from home is projected: in 1985 27% of all food was consumed away from home, in 1995 this will be 33% and in the year 2000 36% (CMA, 1992).

Homogenizing and individualizing

Consumers in the urban centres of the Western world adopt roughly similar buying and consumption patterns in supermarkets and cafeterias. In reaction to this trend towards homogeneity in consumption, consumers try to distinguish themselves from the mass in search for identity and self-actualization. These two tendencies have different impacts on the environment. Increased homogeneity in consumption offers opportunities for energy saving because of economies of scale in production, whereas increased differentiation in consumption - variety, preparation, branding - enhances the reverse development.

Changing life styles and value systems

Increasing concern about the environment encourages environmentally friendly behaviour in consumers. However, changes in life style, like increasing mobility and more holidays, affect the environment adversely.

Sustainable food consumption as a fundamental way of life should be rooted in basic consumer values. The VALS study in the United States identified only one life style, Societally conscious, covering 8% of the population, which probably implies appreciation of sustainably grown foods (Mitchell, 1983).

Schwartz and Bilsky (1987, 1990) proposed seven domains of the universal structure of human values. The following domains seem particularly important for a sustainable food consumption pattern: prosocial - concerned with the protection and improvement of the welfare of others; security - related to the security, harmony and stability of society; restrictive conformity - putting restraints upon actions and impulse behaviour which can harm other people; and maturity - appreciating, understanding and accepting oneself, others and the environment. Particularly relevant for sustainable food consumption seems the ideal of a beautiful world, which is one of the values identified in a study among citizens from four EC countries (Steenkamp, 1992). Whereas the product attributes healthy and free from contaminants are highly regarded in the northern countries of the EC, the attribute natural is highly appreciated in southern EC countries (Steenkamp, 1992).

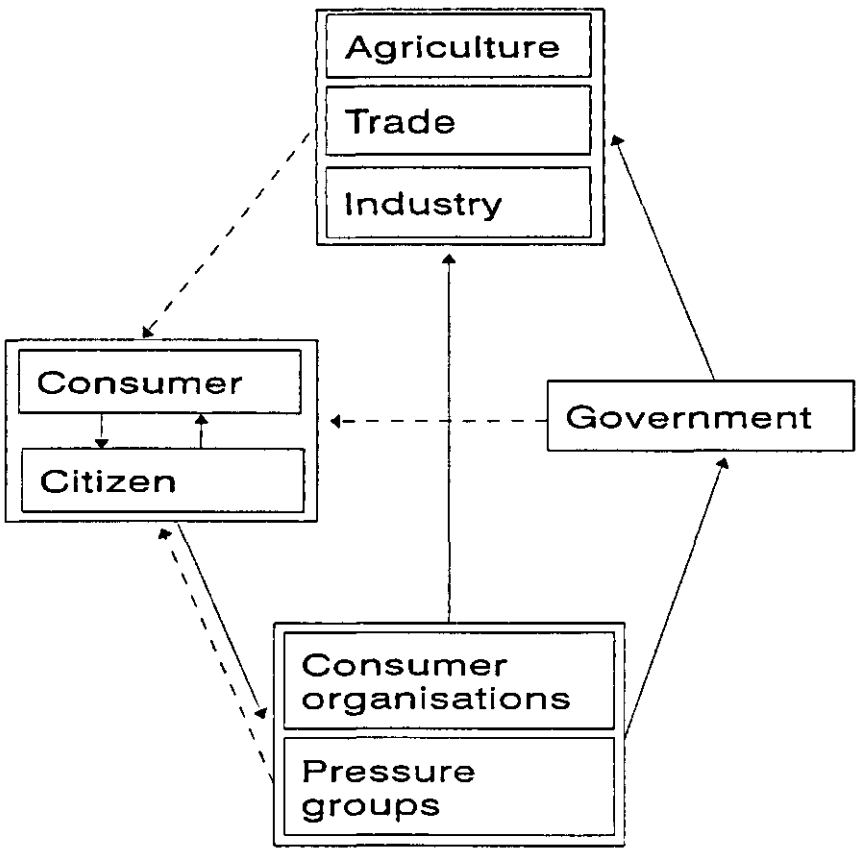
Diffusion of sustainable food consumption, a model

The consumers' concern for the environment

Some models dealing with sustainable patterns of consumption distinguish between consumers' concern for environmental problems, consumers' feelings of responsibility in this respect and the consumers' perception of their ability to make a sensible contribution to a better environment (e.g. Pieters and Verhallen, 1986). At present, consumers give high priority to environmental problems. Consumers rank environmental problems as either the main or second most important threat to society in Northern Europe. Environmental concern is somewhat less in the

Southern European countries (IRIS, 1993). Actual environmental behaviour often does not correspond to the consumer's environmental concern. Only a small percentage of food consumers - in Germany and the Netherlands less than 5% - consistently purchase organic food. The actual problem facing society is not how to increase environmental concern, but how to make actual food consumption more sustainable.
Here we will deal with the expansion of sustainable food consumption as a diffusion process. First, we identify the actors involved in this diffusion process and we specify their relationships. Subsequently, a diffusion process for sustainable food consumption is proposed. A structure for the interaction between producer, retailer and consumer in the penetration of sustainable food consumption is put forward, and three different scenarios concerning the penetration of sustainable food consumption are developed.

Figure 1.
The food system relevant to sustainable food consumption*



* Drawn lines indicate how consumers affect the process. Dotted lines indicate how consumers are affected.

Actors in the food system

Actors in the food system, responsible for a more sustainable way of food consumption, are portrayed in Figure 1. Consumers are the ultimate decision makers in the process involved in achieving sustainable food consumption. According to the neo-classical economic theory, consumers try to maximize utility from purchased goods. However, it is argued by various authors that not only pleasure but also moral values guide consumer behaviour (e.g. Etzioni, 1988). We will not enter into a debate on consumer goals, but suggest, in Figure 1, that a consumer may be schematically seen as a two tier system: there is the consumer who derives utility or pleasure from purchased goods, and there is the citizen who tries to improve society in accordance with his/her norms and values. Among these values, the desire for a sustainable world is becoming increasingly important. However, there may be inconsistencies when these two roles are combined in one consumer: while supporting organizations lobbying for a sustainable society, the consumer may continue to consume in an environmentally unfriendly way. Other elements of the system portrayed in Figure 1 seem straightforward and are not discussed further.

Diffusion of a sustainable way of consumption

All actors in the food system represented in Figure 1 can contribute, positively or negatively, to sustainable food consumption. We will model the diffusion of sustainable food consumption in the tradition of well-known diffusion models such as those developed in marketing theory (e.g. Mahajan, Muller and Bass, 1993). In the Bass (1969) diffusion model, it is assumed that those who adopt an innovation can be categorized either as innovators - those who are influenced by mass media communication (external influence) only - or imitators - those who adopt an innovation because of word of mouth communication (internal influence). In the absence of external influences, penetration can be described by a logistic curve, and in the absence of word of mouth communication, penetration can be portrayed by a convex curve - the model of Fourt and Woodlock (1960). The Bass model has similarities with the Rogers (1962) model, which classifies the consecutive adopting consumers either as Innovators, Early Adopters, Early Majority, Late Majority or Laggards.

In our model we suggest that a certain level of sustainability in the food system will be realized through internal influences. The impetus towards sustainability will be given momentum by external influences coming from the government and/or pressure groups. We will follow the Rogers model in suggesting that food consumers can be classified into four groups, and each group has a decreasingly positive attitude towards sustainable food consumption. Our classification is conceptual and has not been tested in a real life situation. Nevertheless some findings relating to consumer behaviour with respect to organic food and, in fact, environmentally friendly consumer behaviour in general support the plausibility of the following classification:

- Searchers: those who are very conscious of environmental problems and practise sustainable food consumption systematically in order to improve the environment. According to Zimmermann and Borgstein (1993), 5% of the Dutch population regularly buy organic food and approximately 1% of the Dutch population are heavy users. In 1988 between 4 and 5% of the German population were systematically consuming organic food (CMA, 1992). Innovators in Rogers' diffusion model account for 2.5% of the total population. On the basis of these figures we

suggest that, at best, Searchers account for 5% of the population.

- Avoiders: those who are very health conscious and avoid food products which have a poor health connotation. For Avoiders, the dominant motivation influencing their readiness to purchase sustainable food products is the healthy image these products derive from their natural characteristics.
  Our definition of Avoiders implies that they are more numerous than Searchers. However, there is no statistical evidence on this. A tentative estimate can be made on the basis of related and analogous research. In the Netherlands, health conscious consumers account for 29.1% of all consumers (Oude Ophuis, 1992). When 5% Searchers are subtracted from this percentage and bearing in mind that not all health conscious consumers can be classified as Avoiders, the Avoider group will account for no more than 20% of the population. It must also be kept in mind that the Early Adopters in Rogers' model (1962), analogous to the Avoiders in our model, account for 13.5% of the population. On the basis of these research results we tentatively estimate Avoiders as being equal to 15% of the total population.
- Learners: those who have a broad interest in many aspects of consumption. While being environmentally conscious they trade off the pro's and con's of sustainability with other product attributes such as taste, convenience and price.
  Learners are a substantial class of consumers. An indication of the size of this group relative to the Dutch consumer market can be deduced in the following way. In surveys it has been established that 70-75% of the Dutch population is environmentally conscious. A fair estimate of the proportion of Learners might be 50% to 55%, i.e. 70% to 75% -5% Searchers -15% Avoiders. Making an analogy with the Majority-class in Rogers' model is more difficult. Rogers divides the Majority class into two groups: Early and Late Majority.
- Indifferent consumers: those who do not care about environmental problems. They will choose sustainably grown products only if these products are preferred because of non-sustainable product characteristics or when they choose a product at random.
  A fair guess as to the size of this group in the Netherlands is between 25% and 30% of the total population: these are not environmentally conscious consumers.

We suggest that these four classes of consumers successively adopt a sustainable food consumption pattern. Given the structure of the food system and assuming no government intervention, the adoption of a sustainable pattern of food consumption is based primarily on imitation. In real life, however, government and pressure groups influence the system: external influences and innovation reinforce the shift towards sustainable food consumption (Figure 1).

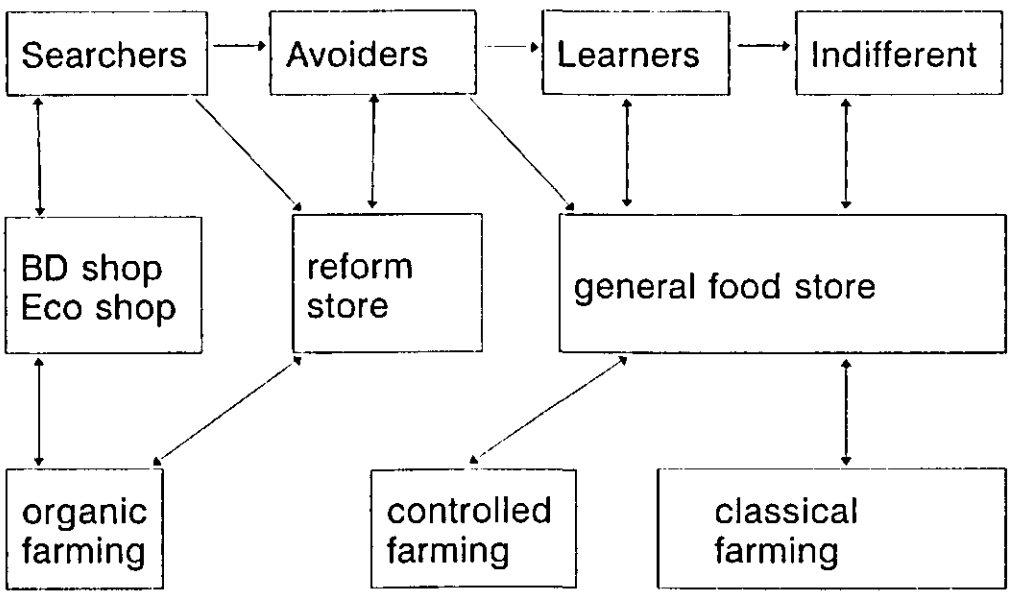
It should be noted that the Bass diffusion model is a first purchase diffusion model for durable products, whereas we are interested in repeat buying. However, this discrepancy does not necessarily undermine the similarity between our model and the Bass model. The adoption of a sustainable consumption pattern as a consistent way of behaviour may be considered similar to the purchase of a durable good.

In our model we do not differentiate between sustainable food consumption as far as different types of food products are concerned. It seems to us that the process

of adopting sustainable food consumption can vary between:
- Animal versus non-animal food.
  Human concern for animal welfare is, for many consumers, a specific argument for the adoption of sustainable food consumption;
- Fresh food versus processed food.
  Environmental aspects of production and marketing are sometimes more difficult to communicate in the case of processed food, like coffee or bread, than in the case of fresh agricultural products. In the case of processed food, packaging and processing methods are specific aspects of sustainability.

We will not elaborate on these refinements and we confine ourselves to sustainable food consumption as a general concept.

Figure 2.
The diffusion process of sustainable food consumption, with respect to fresh foods in particular



The penetration of sustainable consumption: a systems approach

The penetration of sustainable food consumption in society is an outcome of joint efforts made within the food system. The relations between producers, traders and consumers, which seem most relevant to the diffusion process are portrayed in Figure 2. The structure proposed seems particularly realistic for fresh produce. The diffusion process has the following characteristics:

- The penetration of sustainable consumption will proceed, consecutively, through the different consumer groups (see 4.3).
- In the Netherlands, retail trade in sustainable food products is divided over three types of shops:
  The bio-dynamic and eco-shop, selling organic food only,
  The reform shop which focuses on health products whilst carrying some organic food as well.
  The general food store, carrying a complete assortment of food. The general store will only carry sustainably produced food products if these products are profitable, either directly - because of their contribution to profits, or indirectly - by reinforcing the store's image and client traffic.
- Methods of food production can be distinguished on a 'sustainable' - 'non-sustainable' continuum.
  At one extreme is modern high-tech farming which aims at yield maximization by using fertilizers, pesticides, etcetera.
  At the other end of the continuum is bio-dynamic and ecological farming: cultivating in a natural way and abstaining from artificial means of production. It should be borne in mind that sustainability in food production can also be accomplished by using high-tech, sustainable production methods based on modern technology, such as biological plant protection and energy saving biotechnology.
  An intermediate position between these extremes is so-called controlled production where less fertilizers, pesticides and insecticides are used than in today's high-tech agriculture. In the Netherlands, most of the controlled production is carried out on the basis of contracts between agricultural producers and retail companies.

Bio-dynamic and ecological agriculture have been practised for a considerable time, but their market share in total food supply remains very small - in the Netherlands, for example, estimates vary between 0.4 and 0.8% (LEI, 1990). High costs of production and distribution, sometimes even lack of quality and poor marketing, have prevented these products realising a substantial share of the market. Apart from some commendable examples, the high-tech approach towards sustainable food production is, as yet, in its infancy. Present intensive agriculture will have to shift gradually towards a more sustainable agriculture. Experience and innovation have to be built up in order to make sustainable production methods more efficient and economically viable.

Figure 2 suggests a process of diffusion where sustainable food consumption spreads through various consumer classes and is accompanied by the penetration of sustainable production and marketing in the agricultural and retail trade sectors. The starting point of this diffusion process is ecological and bio-dynamic agricul-

ture. The products of this agriculture are sold through special Eco-shops and these stores are frequented by Searchers. The demonstration effect Searchers have on other consumers is not a strong one, since they are frequently perceived by others to be a peculiar, idealistic, and unworldly type of consumer.
Searchers also frequent health shops (reform shops), stimulating these shops to carry organic products too. As a result Avoiders, being loyal clients of health shops, are also exposed to organic food. Gradually, they will become regular consumers of organic food because these products have strong health connotation.
The practice of sustainable food consumption by Searchers and Avoiders can create an adequate market for some products and this may encourage some regular food stores to take a commercial interest in organic food. Retail chains may carry organic food because they want to create an image of being socially responsible. Learners will thus be exposed to sustainable food products by visiting regular food retail outlets and by interaction with Avoiders. Some Learners will develop loyalty to sustainable food consumption. This loyalty may be reinforced by better methods of producing and marketing sustainable food. One consequence may be that sustainable food products will pervade substantial sections of the food economy. Eventually, some Indifferent consumers may also purchase the sustainable food products which will then be regularly stocked by supermarkets.
Clearly, the hypothesized penetration of sustainable food consumption will be more successful if sustainable food products can compete more effectively with regular food products both in their price and such general quality attributes as taste and convenience. Consumers should also be easily able to recognize sustainable food products. Environmental labels could be effective in this respect.
In the Netherlands organic food products are often between 30 and 100% more expensive than classic food products (Ministerie LNV, 1992). Twenty-five percent of Dutch consumers are prepared to pay 20% more for organic food (CBL, 1992). For Western Germany this figure is 19%, for the United Kingdom 7%, and for France some 4% (LEI, 1990). High prices seem to be a bottleneck for the penetration of sustainable food consumption.

Sustainable food consumption: scenarios

In the previous sections, the structure and operation of a food system as it evolves towards sustainability has been worked out. The question was raised as to whether sustainable food consumption could be achieved within an acceptable period of time if there are only internal influences to stimulate sustainability. Government and pressure groups have to intervene in the food system if a state is to be reached where sustainable food consumption is the rule rather than the exception. Three scenarios have been developed below. They differ both in the type and the extent to which they involve intervention in the food system:

- the Market Scenario: the market process should lead to a society characterised by sustainable food consumption;
- the Persuasion Scenario: consumers are persuaded by education and information to adopt a sustainable pattern of food consumption. Government, consumer unions and other pressure groups are instrumental.
- the Prescription Scenario: government enforces constraints on production, marketing and waste management in the food system.

We will briefly describe these three scenarios here. It must be stressed, that these scenarios are pure abstractions. In real life, elements of all three scenarios will be implemented together. It must also be stressed that, because of lack of empirical data and because of the general character of our discussion, the quantitative outcomes of the scenarios are only indicative.

The Market Scenario

It is assumed that neither government, consumer unions nor pressure groups intervene in the market. The penetration of sustainable food consumption is determined solely by market forces. We assume that all consumers, except the Indifferent, are concerned about the environment. As a result, sustainably produced food will appeal to consumers. However, this food is expensive because it is produced and marketed, particularly in the early stages of the product life cycle, by a limited number of small specialised firms which are often more idealistic than commercial.

In this scenario, Searchers will adopt sustainable food consumption, since they are strongly involved in environmental problems. They are served by Eco-shops. Health food shops will also carry some sustainably produced food products in order to serve the Searchers among their clients. In consequence, Avoiders exposed to sustainable food products in health shops, will buy these products too. Even though Avoiders have a positive influence on Learners, this will not generate sufficient momentum for the great breakthrough to sustainable food consumption. Learners will stick mainly to the classic food products, since prices of organic food remain very high. We estimate that the retail prices of sustainable food will continue to be about 30% higher than the classic products. At such price levels regular food shops will, in general, refrain from carrying sustainable food products. Eventually, Searchers will be intensive users of sustainable food products, Avoiders will become regular buyers and Learners will become incidental buyers. The market share of sustainable food consumption will become at best 20% (5% Searchers, 10% Avoiders and 5% Learners).

The Persuasion Scenario

Consumer unions, pressure groups and governments are engaged in extension, information and education aimed at sustainable food consumption. In contrast to the market scenario, both imitation *and* innovation stimulate the diffusion process. Avoiders in particular are triggered by information, extension, and education. As a result, they are more inclined to buy sustainably produced food products. Learners too will purchase more sustainably produced food, because of both innovative and imitative behaviour. As a result, food retail chains become more interested in carrying sustainably grown products, which will stimulate Learners and Indifferent consumers to become sustainable food consumers to a far greater extent. The resulting increase in sales will lead to economies of scale in production and marketing, which in turn have a positive effect on sales.

Ultimately, we expect 70% of consumers (5% Searchers, 15% Avoiders and 50% Learners) to adopt sustainable food consumption, fully or partially. In particular Learners will remain selective in sustainable food consumption. It is important, however, to remember that education is a long term process and that it will take many years before the final stage of this persuasion scenario is reached.

The Prescription Scenario

Government and other public bodies issue rules and regulations, which put

constraints on food production and marketing. Government can, for example, restrict the use of pesticides and fertilizers, issue emission rights or impose specific methods of waste recycling. Less strict government policies are levies and taxes which aim at stimulating sustainable methods of production, marketing and consumption.
In theory, 100% sustainability can be realized by government measures, but the system of measures necessary to realize this objective would probably put such a burden on the economy and on consumers' welfare, that the welfare society will break down. Economic feasibility and the social acceptability of the environmental regulations taken are crucial to this approach.

Summary and conclusions

In this paper the penetration of sustainable food consumption has been conceived of as a process of diffusion within the food system. For our purpose we have classified consumers, retailers and producers into specific segments on the basis of their specific attitude to sustainable food consumption. The proposed model promises to be helpful in understanding the penetration of sustainable food consumption and can be useful in scenario-writing. In the Market Scenario, i.e. market forces only determine the penetration of sustainable food consumption, only 20% of the consumers at best will become systematic sustainable food consumers. In the Persuasion Scenario, i.e. consumers are educated and informed about the need for sustainable food consumption, the percentage of sustainable food consumers will be higher, at best and in the long run about 70%. Some of these consumers, however, will remain selective users. While a Prescription Scenario can, in principle, lead to 100% sustainability, such a scenario is not realistic since it puts far too severe a social and economic strain on a society.
It can be concluded that a mix of the influences identified here - the market, persuasion and prescription - is necessary in order to realize a sustainable food system in the future. Our analysis and the scenarios described here will hopefully provide additional insights into the role which various policy instruments can play in such a mixed strategy.

REFERENCES

AGB, 1992. Jaargids 1993, Kerncijfers voor marketing- en beleidsplannen, Dongen.
Bass, F.M., 1969. A new product growth model for consumer durables. Management Science, 15, 215-277.
Brundtland, G.H. World Commission on Environment and Development, 1987. Our Common Future. Oxford University Press, Oxford.
Carson, R., 1962. Silent Spring. Houghton, Mifflin, Boston.
CBL (1992) Consumententrends 1992. Research performed by AGB Fresh Foods.
CMA, 1992. Kompendium für Lebensmittel-Marketing. Behr's Verlag, Hamburg.
Etzioni, A., 1988. The moral dimension: toward a new economics. The Free Press, New York.
Fourt, L.A. and J.W. Woodlock, 1960. Early Prediction of Market Success for New Grocery Products. Journal of Marketing, 24, October, 31-38.
Galbraith, J.K., 1958. The Affluent Society. Cambridge University Press, Cambridge.
IRIS, 1993. NSS Marktonderzoekpeilpunten, 5, November 1993, 4.
LEI, 1990. Produktie en afzet van BD- en EKO-produkten. Band 1. LEI Mededeling 425, the Hague.

Mahajan, V., E. Muller, and F.M. Bass, 1993. New-Product Diffusion Models. In Eliashberg, J., and G.L. Lilien (Eds.) Marketing, Handbooks in Operations Research and Management Science, Vol. 5, pp. 349 - 408.
Meadows, D. Club van Rome, 1972. Rapport van de Club van Rome: de grenzen aan de groei (4th. ed.) Het Spectrum, Utrecht.
Ministerie LNV, 1992. Biologische land- en tuinbouw. The Hague.
Mitchell, A., 1983. Nine American Lifestyles. Who We Are and Where We Are Going. MacMillan, New York.
Oude Ophuis, P.A.M., 1992. De Europese markt voor alternatief geproduceerde voedingsmiddelen. In Steenkamp, J.E.B.M. (Ed.) De Europese consument van voedingsmiddelen in de jaren '90. van Gorcum, Assen/Maastricht, pp. 31-47.
Packard, V., 1957. The Hidden Persuaders. David McKay Co., New York.
Pieters, R.G.M. and T.M.M. Verhallen, 1986. Milieuvriendelijk aankoopgedrag door consumenten, Tijdschrift voor Marketing, July, 2-10.
Rogers, E.M., 1962. Diffusion of Innovations Free Press, New York.
Schwartz, S.H. and W. Bilsky, 1987. Toward a universal psychological structure of human values. Journal of Personality and Social Psychology, 53, 550-562.
Schwartz, S.H. and W. Bilsky, 1990. Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. Journal of Personality and Social Psychology, 58, 878-891.
SCP, 1992. Sociaal en Cultureel Rapport 1992. Rijswijk.
Senauer, B., E. Asp, and J. Kinsey, 1991. Food trends and the changing consumer. Eagan Press, St. Paul.
Steenkamp, J.E.B.M., 1992. Europees consumentengedrag ten aanzien van voedingsmiddelen. In Steenkamp, J.E.B.M. (Ed.) De Europese Consument van Voedingsmiddelen in de Jaren '90. van Gorcum, Assen/Maastricht, pp. 3-22.
United Nations, 1992. Demographic Yearbook 1991, 43th Ed., New York.
Wierenga, B., P.S. van Heuzen, and D.M.M. Schols, 1983. "Andere" voedingsmiddelen: een marktsegment met perspectief? Economisch Statistische berichten, 68, 1028-1035.
Zimmermann, K.L. and M.H. Borgstein, 1993. Strategisch marketingplan voor de afzet van biologische levensmiddelen. LEI-DLO mededeling 481, the Hague.