

INTERNATIONAL COMPARISON OF CONSUMER DEMAND FOR FRUIT AND VEGETABLES

by

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1. Introduction

In this paper we intend to discuss international developments in consumption of fruits and vegetables on the basis of statistical data and research about the markets for fruits and vegetables. In the first part of the paper actual developments in consumption and some projections about future consumption of fruits and vegetables will be reviewed. The second part will be concerned with various factors, including economic, social and behavioral, influencing demand. Our review of actual and future developments in consumption of fruits and vegetables will first of all pay attention to worldwide consumption of fruits and vegetables in toto.

We will elaborate our discussion by paying attention to consumption in various regions and countries and to consumption of some specific products.

The analysis of factors influencing consumption of fruits and vegetables will be concerned first of all with the impact of income and prices on demand. Much research has been done in this field. An evaluation will be made of some significant results in estimating price and income elasticities of demand for fruits and vegetables. In addition, attention will be paid to social and behavioural factors influencing consumption of fruits and vegetables. It seems that knowledge of the latter factors is extremely important in order to stimulate demand for fruits and vegetables.

It will appear from our review that consumption of fruits and vegetables will increase at a steady but modest rate only because of autonomous developments in population and disposable income. Therefore demand for fruits and vegetables will have to be stimulated by marketing programs which fit the needs, wants and purchasing power of consumers. Only in that way will horticulture be able to tap the available market potential. We conclude our paper by elaborating this point.

2. Actual and future developments in consumption of fruits and vegetables

Developments in consumption of fruits and vegetables world wide have been studied extensively by F.A.O. From that agency's statistics it is observed that the average annual production of vegetables world wide has increased by 27% during the period 1970-1979 (F.A.O., 1981). Average annual production of fruits world wide has increased by about 23% during that period. Production growth has kept up with population growth. In fact, per capita available production, world wide, has increased substantially for vegetables during the period 1970/1979, from 73.8 to 79.6 kg., and slightly for fruits, from 61.7 to 64.3 kg. Growth of production was, according to F.A.O., lower in developed countries than in other countries (Table 1). Production of vegetables per capita in developing countries has, on a volume basis, not reached yet the level of developed countries. For fruits there is also a substantial difference. Consumption per capita will differ even more since quite a few developing countries export considerable quantities of their fruit production, e.g. bananas.

Table 1: Change in average annual production of fruits and vegetables in the period 1969-1980, worldwide *)

Period	Average annual production 1000 M-tons			Average annual production/caput kg		
	World	Developed market economies	Other countries	World	Developed market economies	Other countries
Fruit excl. melons						
1969-1971	226,776	92,900	133,876	61.68	128.01	45.37
1978-1980	278,815	103,778	175,037	64.31	133.04	49.23
Vegetables + melons						
1969-1971	271,419	83,040	188,379	73.82	114.42	63.84
1978-1980	345,218	95,092	250,126	79.62	121.90	70.35

*) Source: F.A.O. (1981)

Will per capita demand for fruits and vegetables increase in the near future? Systematic projections of world consumption of agricultural products and consumption by separate countries in 1985 have been made by F.A.O. since 1967 (F.A.O., 1967). In the study from 1967 it was projected that

per capita world demand during the period 1975-1985 will increase by 14.9% for fruit and by 6.5% for vegetables, under optimistic projections about the development of gross domestic product per caput. In developed countries per capita demand for fruits was expected by F.A.O. (F.A.O., 1967) to increase by 11.2% and per capita demand for vegetables by 5.2% over the period 1975-1985, under optimistic assumptions about rises in income. The projected increase of demand for fruits and vegetables was relatively larger for developing countries over the period 1975-1985, namely 17.6% for fruit and 14.5% for vegetables. Also, centrally planned economies were projected to have larger growth rates than worldwide over that period, viz. 20.8% increase of per capita consumption of fruit and 11.5% increase of per capita consumption of vegetables. F.A.O. published in 1971 comprehensive projections of demand for fruit and vegetables for 1980 which were based on larger income elasticities of demand (table 2). This revision of elasticities suggests that the projected growth rate of demand in the 1967 study of F.A.O. is a conservative estimate.

For various countries and regions of the world more recent studies of future supply and demand of fruits and vegetables are available. In the developing countries, exclusive China, per caput domestic production of fruit and vegetables available for food will according to F.A.O. increase over the period 1975-1990 by 21.7% for vegetables, by 13.0% for bananas and plantains, by 14.7% for citrus fruit and by 25.6% for other fruit. Similar projections over the period 1975-2000 amounted to an increase of per caput domestic production available for food by 43.2% for vegetables, by 23.5% for bananas and plantains, by 31.6% for citrus and by 50.9% for other fruit (F.A.O., 1979). These recent projections, which compare well with earlier F.A.O. projections for the period 1975-1985, suggest a modest but steady annual growth in consumption of fruits and vegetables. In a recent E.E.C. study a future demand for fresh fruits of 65.3 kg in 1985 is projected compared with a consumption of 58.9 kg in 1975/76 (Commission of the European Communities, 1981). Per capita demand for vegetables is projected to increase from 112 kg in 1975/1976 to 118.2 kg in 1985. In particular, per capita demand for citrus is expected to increase substantially, viz. from 23.4 kg in 1975/1976 to 27.3 kg in 1985. The general trend of these more recent projections for E.E.C. compared well with F.A.O. projections. Their absolute values are somewhat larger. On the basis of these forecasts on future supply and demand, self sufficiency for fresh fruits in E.E.C. is expected to decrease from 80% to 78% over the period 1974 to 1985 and for citrus fruits from 43% to 42%. Self sufficiency of the E.E.C. for vegetables will decrease from 94% to 83% over the same period. It must be stressed

that these figures concern the E.E.C. of the nine countries, without Greece, Spain and Portugal.

Also actual developments of consumption of fruits and vegetables in various countries until 1980 suggest that F.A.O. forecasts of consumption over the period 1975-1985 from 1967 have tended to be conservative. For instance, the per capita consumption of vegetables in the United States was projected to increase by 3% over the period 1975-1985, while actually civilian per capita consumption increased already by 6.6% over the period 1975 to 1980, namely from 220.6 pounds to 236.3 pounds (U.S.D.A., 1981). These facts make it clear that it is important to dispose of forecasts based on recent market developments.

Also for specific products recent projections have been made by F.A.O. on a world scale. A 1978 study on supply and demand of bananas projected a basic annual growth rate of world demand of 2.5% and, under supplementary assumptions, of 2.9% over the period 1977-1985 (F.A.O., 1978). This growth rate is expected to be lower in developed countries - 2.3% and 2.6% respectively - and higher in developing countries - 4.8% and 5.5% respectively. For citrus fruit a recent F.A.O. study projected a basic annual growth rate of 2.8%, and under supplementary assumptions, of 3.3% over the period 1972-1974 to 1985 (F.A.O., 1979). Also for citrus fruits the growth rate of demand is lower in developed countries than in developing countries, 2.3% to 2.7% versus 3.6% to 4.4%. Both studies for citrus and bananas state that demand is not strong enough to stimulate supplies at remunerative prices: ".....the main problem for the world citrus economy will be to avoid surpluses and maintain a balance in the international market at prices which are remunerative to producers" and "the main problem confronting the world banana economy remains how to achieve a balanced growth of banana production and consumption at prices remunerative to producers but which at the same time are still acceptable to consumers in importing countries...".

Keeping in mind that market supply can be increased by improvements in efficiency of storage and transport and by higher yields per ha, it seems that the conclusions on the future citrus and banana market will become relevant for many more fruits and vegetables. So there does not seem so much shortage of supply but a shortage of demand in the fruit and vegetable markets of the near future.

Development of demand will have to be the pushing power in the market to bring demand in balance with production potential. The question to be answered is to what extent consumers are willing to expand demand and whether

they have sufficient purchasing power in order to expand consumption of fruits and vegetables. Therefore it seems useful to find out in more detail what factors influence demand for fruits and vegetables. A great many factors have been analysed. Income and prices are the classic variables in economic analyses of consumer demand. Gradually, however, other factors like demographic socio-economic and behavioural ones, seem to become relevant to stimulate consumption of fruits and vegetables. Development of demand will not only depend on developments in income and population but above all on appropriate marketing policies. For that reason we will devote our next section to factors determining demand for fruits and vegetables, both on overall demand and on demand for selected specific products.

3. The influence of economic factors on the demand for fruits and vegetables

Economic factors such as income and price which influence demand have been analysed extensively. A great many econometric studies have been made to measure the effect of these variables on the consumption of fruits and vegetables. We will discuss some major results in this field in order to give a picture of the potential influence of income and prices on future consumption of fruits and vegetables. Our discussion will be based on estimated income and price elasticities. As is well known, elasticity coefficients are stable only in the case of a double logarithmic demand function. Nevertheless in case of other demand functions, elasticity coefficients at the midpoint offer structural insight too.

3.1. Income. Estimates of income elasticities for fruits and vegetables are numerous. A selection of estimates is presented in table 2. It appears that income elasticity of vegetables in toto is small. Even for developing countries the overall income elasticity of 0.43-0.45 is modest. Recent studies of the E.E.C. (Commission of the European Communities, 1981) and of the United States (Salathe and Buse, 1979) report income elasticities for vegetables of 0.12 and 0.15, respectively. For fresh vegetables in toto income elasticities are slightly higher; recent estimates in the U.S.A. vary between 0.17 and 0.19 (Salathe, 1979 Smallwood and Blaylock, 1981); in the United Kingdom an income elasticity of 0.20 was found in 1979 (Ministry of Agriculture, Fisheries and Food, 1981). Income elasticities of demand appear to be higher in developing countries and in centrally planned East European countries. This appears not only from F.A.O. studies (F.A.O. 1967,

Table 2: Some income elasticities of demand for fruit and vegetables in terms of expenditure (E) or volume (V)

	(1)	(1)	(1)	(1)	(2)	(3)	(4)	(5)	(6)
	World	Deve- loped coun- tries	Deve- loping coun- tries	Centr. planned coun- tries	U.S.A.	E.E.C.	U.K.	Bel- gium	Hun- gary
Exp./Vol.	V	V	V	V	E	V	V	E	E
Year	1961 - 1965				1972- 1978	1975	1979	1973- 1977	1974
<u>Vegetables</u>									
Total	0.17	0.21	0.43	0.24	0.15	0.12		0.28	
Fresh vege- tables	0.35	0.46	0.45	0.45	0.19 0.17 0.18		0.20		0.64
Toma- toes					0.29 0.22 0.09		0.29		0.60
Lettuce					0.41 0.33		0.52		0.54 (14)
Processed vegetables					0.15 0.10		0.12		0.99 (15)
Frozen vegetables					0.43 0.34		0.86(8) 0.95(9)		0.98
<u>Fruit</u>									
Total	0.42	0.40	0.51	0.54	0.30			0.19	
Fresh fruit	0.55	0.54	0.62	0.62	0.27 0.26 0.24	0.20			0.98 (16)
Citrus	0.60	0.59	0.78	0.68	0.12 (7)	0.66	0.48 (10)		
Bananas	0.49	0.58	0.56	0.56	0.10(7) 0.26		1.09(11)		
Apples	0.45	1.06	0.23	0.68	0.06 0.07		0.35		
Others	0.64	0.40	0.71	0.71	0.22 0.18		0.44		0.54
Processed fruit	0.24	0.32	0.65	0.57	0.43 0.41		0.74		
	0.55	0.54	0.60	0.60	0.30 0.28		0.30(12) 2.38(13)		

(1) Source: F.A.O. 1967, The first figure; F.A.O. 1971, The second figure;
 (2) Source: Salathe, 1979, Smallwood and Blaylock, 1981, Salathe and Buse, 1979;
 (3) Source: Commission of the European Communities, 1981; (4) Source: Ministry of Agriculture, Food and Fisheries, 1981; (5) Source: Viaene, 1979;
 (6) Source: Burger, 1978; (7) Oranges; (8) Frozen peas; (9) Frozen beans;
 (10) Oranges; (11) Other citrus; (12) Canned peaches, pears, pineapples;
 (13) Frozen fruits; (14) Cabbage/lettuce; (15) Tinned vegetables; (16) Citrus fruits and tropical fruits.

1981) but also from more recent studies for separate countries. For instance, income elasticity of demand, in terms of volume, for fresh vegetables in Hungary was estimated to be 0.33 in 1974 (Burger, 1978) and varied in Poland in the period 1958-1976 between 0.15 and 0.65 (Krusze, 1978). Although income elasticities for fruits in toto are higher than for vegetables, demand nevertheless is not truly income elastic; the pattern of variation between developed and developing countries is the same as for vegetables. Obviously, some types of vegetables have much higher and others have much lower income elasticities than all vegetables combined. For instance, of the vegetables with a major share of the market, lettuce has a substantially higher income elasticity than overall vegetables, namely 0.41 in the United States, 0.52 in the United Kingdom and 0.54 in Hungary (Table 2). Cabbage has a substantially lower elasticity, with coefficients of 0.07, in the United Kingdom in 1979 and 0.06 in Hungary in 1974. Apart from some major products there are a great many minor products, like fresh mushrooms which have relatively high income elasticities. Also, some types of fruits have high income elasticities while others have modest or low ones. In the United States vitamin rich fruits have higher income elasticities than the overall group of fresh fruits (Smallwood, Blaylock 1981). These two coefficients were 0.53 and 0.24 in 1977-1978. The high income elasticity of some minor fruits might be a reason for the increase of per capita annual consumption of "other fresh fruits" in the United States from 36.6 lb in 1966 to 41.9 lb in 1980 ("other fresh fruits" comprise, amongst others, apricots, avocados, bananas, cherries and figs). Over the same period, per capita civilian consumption of apples remained stable, 16.0 lb in 1966 compared with 16.7 lb in 1980, and per capita consumption of fresh citrus fruits decreased slightly from 29.2 lb in 1966 to 28.7 lb in 1980. Also in other countries variation in income elasticity of demand can be observed for various fruits. It is interesting to notice the variation in elasticities between countries; in 1974 income elasticity of expenditure was 0.98 for citrus in Hungary (Burger, 1978), 0.53 for oranges and 0.90 for other citrus fruits in the United Kingdom (Ministry of Agriculture, Food and Fisheries, 1981) and 0.10 for oranges in the United States in 1973 (Salathe, 1979). In view of the low income elasticities of demand for total fruits and vegetables it is worthwhile to know whether consumers are prepared to spend more money for quality and for built in services. This appears from differences between income elasticity of expenditure and income elasticities of quantity.

In the United Kingdom estimated income elasticities of consumption, measured in volume in 1979, appeared to be systematically smaller than income elasticity of consumption, measured in expenditure; in a group of 44 fruits and vegetables income elasticity with respect to expenditure appeared to be higher than income elasticity with respect to volume for 34 products (Ministry of Agriculture, Food and Fisheries 1981). Also in Hungary (Burger, 1978) and Poland (Krusze, 1978) income elasticities of expenditure for various fruits and vegetables are higher than income elasticities of quantity consumed. Estimates for these countries suggest that products having high income elasticities show less difference between income elasticities of expenditure and of volume than products with medium and low income elasticities. These results suggest that quality and service are appreciated in particular for products having a lower rate of growth of demand.

Appreciation by consumers of built in services can be concluded also from high income elasticities for processed fruits and vegetables in various countries (Table 2). This can be observed in countries like Hungary and Poland. In the United Kingdom and the United States this holds true only for frozen fruits and vegetables, but not for canned fruits and vegetables; some canned vegetables had even a negative income elasticity of demand.

There is much variation in income elasticities between countries and products. Consequently producers should concentrate on products having large income elasticities of demand. It must be admitted that not all products having high income elasticities of demand have a great future market potential. Some products are speciality items with limited market potential. High income elasticities are a sign that market for the product might be attractive but more marketing elements have to be considered to evaluate the available market potential. Price is one of these elements.

3.2. Prices. There is no comprehensive and systematic analysis of the effect of prices on demand for fruits and vegetables as has been made by F.A.O. for income. However, in a great many countries price elasticities of demand and flexibility coefficients have been estimated for various fruits and vegetables. Earlier surveys of price elasticities of demand estimated for fruits and vegetables demonstrate that there is much difference between countries (Meulenbergh, 1978). Some recent estimates of price elasticities of demand in the United Kingdom and Belgium support this conclusion (Ministry of Agriculture, Fisheries and Food 1980, Vertessen a.o. 1979, Viaene 1979). Only a very few fruit and vegetable commodities have a price

elastic demand, but for many fruits price elasticities of demand are in the range of $-0,5$ to $-1,0$. Consequently price-changes have a moderate influence on demand. The variation in estimated price elasticities of demand originates to a certain extent from various factors, including differences in estimation procedure, the level of marketing channel with which the analysis is concerned and the period of the year to which the data refer. This may be illustrated by various analyses of the U.S. market for apples, fresh oranges and some other fruits. Fourteen econometric studies of the U.S. apple market on the basis of time series data over about the same time period (1947-1967) produced price elasticities of demand varying from $-0,23$ to $-1,85$. One study using monthly data over about the same years generated price elasticities of demand varying from $-2,8$ in October to $-14,2$ in August (Nuckton, 1978). Burger (Burger, 1979) established price elasticities of demand for apples in Hungary which varied from $-0,20$ in December to $-16,4$ in August. A survey of studies on the U.S. orange market using data over the period 1947-1970 reported price elasticities of demand varying between $-1,36$ and $-3,42$ (Nuckton, 1978). The, generally speaking, moderate price elasticities of demand suggest that price is a less attractive instrument to increase demand for fruit and vegetables.

Gradually research is increasing which analyses demand for food on the basis of a set of demand equations. Such a system of demand equations offers the opportunity to measure the interrelatedness of demand for various food products. For instance Heien (Heien, 1982) recently analysed the structure of food demand in the United States from which it appeared that the elasticity of substitution between the groups of goods "fresh fruit, processed vegetables, and fresh vegetables" was rather weak. The intragroup elasticity of substitution, however, was substantial.

3.3. Conclusion. One may expect for the future a modest increase in demand for fruits and vegetables as a consequence of price and income influences.

These influences will be stronger in developing countries, in particular in those which are reaching the stage of substantial growth in income (Mellor, 1982). In developed countries and a number of developing countries a stagnation of income in the near future will weaken the effect of income on consumption. So it seems to us that demand for fruits and vegetables will have to be stimulated increasingly by marketing programs which use all elements of the Marketing Mix - product, price, promotion and distribution - in order to tap the available market potentials for fruits and vegetables. Product policy, promotion and distribution seem as important in

this respect as adequate pricing. For that reason better knowledge of socio-economic and behavioural aspects of consumer behaviour is necessary. We will address this subject in the next section.

4. Social and behavioural aspects of consumer behaviour with respect to fruits and vegetables

Fruits and vegetables are food products with many attractive features to the modern consumer. They are a low calorie-food, rich in vitamin content and tasty. Recently an expert panel of the National Academy of Sciences of the U.S.A. in an overview of the relationship between cancer and nutrition advised Americans to eat more vegetables and fruits, in particular fruits and vegetables rich in vitamin C and in betacarotene, a precursor of vitamin A (International Herald Tribune, June 18, 1982).

Whether consumers will increase consumption of fruits and vegetables for these reasons will depend, amongst others, on consumers' knowledge and attitudes. Nutritional information, education and marketing programs are helpful in this respect. These activities should be based on a thorough understanding of social and behavioural elements of consumer behaviour. Analyses of these elements become increasingly important therefore. Some research in this area will be reviewed not in order to present definitive conclusions, but to illustrate developments in research on consumer behaviour.

There are various approaches to analyse the consumer from the behavioural point of view. The most extensive models structure consumer behaviour as a problem solving process in which economic, social and commercial stimuli are transformed into a buying decision. The stages of such a problem solving process are problem recognition, internal search, external search, evaluation and decision by the consumer.

In these models a great many so called intervening variables, which transform the incoming stimuli into decisions to purchase or non purchase, are introduced. Consumer attitudes are important variables in these models. There are more specific models about consumer behaviour (Engel, Blackwell, 1982). Some models consider information processing the main activity of consumer behaviour (Bettman, 1979). Other models stress learning in consumer behaviour or concentrate on the degree of involvement of consumers. The relevance of such models depends to a certain extent on the type of product and on the experience of consumers. For instance, fruits and vegetables are perishable commodities which are purchased by consumers on a basis of

relatively high frequency. Consequently search and evaluation will not require much efforts from consumers; purchase will be a routine process. To our knowledge such models seldom have been applied to consumer behaviour with respect to fruits and vegetables. Until now behavioural analysis of consumer behaviour with respect to fruits and vegetables is mainly concerned with registration of the influence of demographic, socio-economic and behavioural variables. We will discuss some research on that matter to demonstrate its relevance for stimulating consumer demand for fruits and vegetables.

Demographic and social variables. There is substantial difference in consumption of fruits and vegetables in relation to demographic and social variables. For instance, in Belgium it was found that income elasticity of demand for vegetables was substantially smaller in the Brussels area than in north or south Belgium (Viaene, 1979). It appeared also that income elasticities of demand for vegetables were positively correlated with age and that independents had lower income elasticities than other social classes in Belgium. Salathe and Buse concluded for the United States that socio-economic and demographic variables are very important in explaining variations in household food expenditure behaviour (Salathe, Buse 1979). For instance, they found that households having more than sixteen years of education had higher income elasticities for vegetables than other households. Also black households had higher income elasticities for vegetables than white households and unemployed people had higher income elasticities than employed. Vertessen a.o. concluded for Belgium that "female adults affect household expenditure on fruit 1.43 times that of male adults" (Vertessen, a.o., 1979). Annual surveys on food expenditures in the United Kingdom show much variation in consumption of fruits and vegetables in relation to social and demographic variables, too (Ministry of Agriculture, Fisheries and Food, 1981). Atkins (Atkins, 1970) found social class to be a statistically significant variable in explaining the consumption of oranges.

One can not easily generalize about consumer behaviour from research results of this type. Hopefully they demonstrate that it is useful for every country to dispose of information on these aspects of consumer behaviour. Household panel data and/or annual surveys of consumer behaviour are indispensable sources of information in this respect. Market research of that type has to be extended.

Behavioural variables. Variety seeking is a characteristic of consumer behaviour which seems to have much relevance for fruits and vegetables. It will be stimulated by consumers' satiation with respect to consumption of fruits and vegetables. There may be as well an autonomous drive for variety. Consumers can pursue novelty and change as a goal in itself. Some authors have tried to develop consumer models which explicitly pay attention to variety seeking in consumption of vegetables (Wierenga, 1982). We must admit, however, that, generally speaking, research on variety seeking for fruits and vegetables is, to our knowledge, in the descriptive stage yet. For instance, per capita consumption of fresh vegetables in the United States over the period 1966-1980 has increased percentagewise most for products like peppers, garlic, broccoli and cucumbers which comprise a minor share of total consumption (U.S.D.A., 1980). It must be admitted that in the United States also consumption of some fresh vegetables having already substantial market-shares in 1966 has increased over the period 1966-1980. These items include lettuce and escarole, tomatoes, onions and shallots and cabbage. In fact, lettuce and escarole had in absolute terms the largest increase in per capita consumption over that period. Also, in the United Kingdom cabbage, carrots, onions, shallot and leeks, and tomatoes remained the dominating vegetables over the period 1966-1979, notwithstanding the fact that demand for cabbage and fresh green vegetables in toto decreased substantially (Ministry of Agriculture, Fisheries and Food, 1981). Also it must be pointed out that, within the classical products many changes in assortment and type of product have been brought about during the past. The evening out of seasonal supply has gone along with variation in consumption too (Dressler, 1979).

Shopping behaviour is another aspect of consumer behaviour of utmost importance. Many marketing agencies have done research in order to know where a consumer is shopping for fruits and vegetables. We are less well informed about the reasons why a consumer buys fruits and vegetables at a specific outlet. Trotter and Brewer (Trotter, Brewer, 1977) concluded from research in a town of Pennsylvania that consumers patronize a specific store for buying apples because of convenient store location, price, fruit quality, good selection and variety. In a survey on purchasing of apples in the Netherlands it was found that 65.6% of housewives purchased apples at least once a week, 33.8% of housewives placed fresh fruits on a shopping list when they were intending to buy fruit and 13.6% of housewives were specifying the type of fresh fruits, say apples or pears, on their shop-

ping list; only 9.5% specified the quantity to be bought and 3.6% the variety, say Golden Delicious (Meulenberg, 1971). Such facts about shopping behavior illustrate the vast area in which retailers may be able to influence consumer behaviour.

For producers it is very important to know consumers' attitudes towards fruits and vegetables. Much research on that matter is done by using attitude-scales where consumers are invited to score a product, say apples, on various items of a scale. In this way Trotter and Brewer (Trotter and Brewer, 1977) found that flavor (taste) was the principal reason for variety preference. For the Netherlands it was found that by using a Stapel-scale, taste and health were main arguments of consumers to purchase fruits. Oranges scored higher on these two criteria than apples, pears and grapes. In particular, with respect to health, oranges were far ahead of other fruits (Meulenberg, 1971). Research of this type has been done in many countries. A potential weakness of this method of research on consumer attitudes and perceptions is that respondents have to choose reasons from a predetermined set of items like taste, health, value for money, etc. This might induce specific answers. A research method which avoids this problem is multidimensional scaling. In this method consumers are asked in an interview to judge similarities between various products, say various types of fruits. From these similarity judgments perceptual dimensions for that product class, say fruits, can be derived by some mathematical device. Wierenga (Wierenga, 1982) derived, by multidimensional scaling, factor analysis and discriminant analysis, three perceptual dimensions for a group of fifteen vegetables comprising amongst others endive, asparagus, cauliflower, mushroom, cucumber, and sweet pepper. He described these dimensions as: (1) distinction; (2) energy and (3) microcomponents. We expect such types of research to gain importance as a technique for understanding how consumers perceive products. This seems of paramount importance, in particular for research and development with respect to new products.

5. Conclusions

Overall consumption of fruits and vegetables showed a modest but steady growth during the past fifteen years in developed countries. In developing countries and centrally planned countries the rate of growth was somewhat higher. Also, for the coming five years this growth is projected to continue. Stagnation of disposable income might slow down this growth. At the

level of specific products and varieties dynamics of supply and demand are much greater. For some products, like bananas and oranges, it is expected that great marketing efforts will be required to sell prospective supplies at remunerative prices. Despite likely dim prospects for a few commodities, it seems that the market potential for fruits and vegetables is large because of product features such as being low in calories, contributing to good health and taste. In order to tap this market the knowledge and attitude with respect to fruits and vegetables of consumers must be improved. Also, marketing has to be improved with respect to product quality and product variation. Communication and distributive activities, like storage and transport are also areas where it is essential for improvements to be registered. The marketing of fruits and vegetables will have to become a more completely integrated system from producer to consumer.

In order to perform this marketing job well, our knowledge about consumer behaviour will have to be improved. First of all, we have to acquire consistent and continuous budget data covering various socio-economic and demographic groups of consumers. Consumer panel data are very useful in this respect.

Alongside economic research, market analysts and planners must interrelate and increase their use of research using sociological and psychological concepts, in order to improve our knowledge of consumer behaviour. The analysis of consumer behaviour with respect to fruits and vegetables must become really interdisciplinary.

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