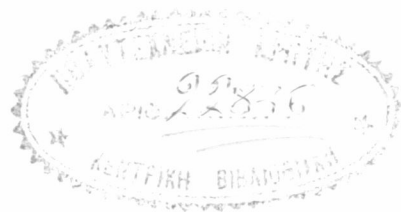


TECHNICAL UNIVERSITY OF CRETE



AGRICULTURAL PRODUCT DESIGN METHODOLOGY: THE CASE OF OLIVE OIL

BY
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Thesis submitted for the degree of DOCTOR OF PHILOSOPHY

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A B S T R A C T

Agricultural marketing has not taken full advantage of methodological advances employed in general marketing and particularly food marketing, keeping thereby its own individuality. This research attempts an innovation in the field by introducing an agricultural product design research methodology based on a large - scale consumer study. Several data analysis and multicriteria preference analysis models incorporated into an already developed Decision Support System have been utilised. This interactive, integrated, consumer-based methodology provides a systematic procedure for the design, development and market entry of the examined agricultural product. Consumer behaviour and market analysis were feasible through the use of the employed marketing Decision Support System. Consumer preferences, tendencies and potential market shares forecasting were implemented for the olive oil product in Paris, France. Market simulation methods evaluate alternative market penetration strategies.

KEYWORDS: Agricultural Marketing, Marketing of new products, Consumer behaviour

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INTRODUCTION

The drastic changes occurring in the European community towards the actual establishment and realisation of a single integrated European market bring up new opportunities and threats to firms with respect to their product, price, promotion and placement policy. Agribusiness industries face a stiff competition originating mainly from the EC trade barriers' removal and the rapidly changing marketing environment of the single European market.

Unfortunately marketing of agricultural products has not yet taken full advantage of the methodological advances in behavioural sciences, economics and quantitative areas. This is mainly attributed to farmer involvement in downstream marketing activity where his/her only contact is with a handler or processor performing some of the services of preparing the farmer's produce for consumption. A certain need has been identified towards the development and proper utilisation of updated market research tools and methodologies in the field of agricultural marketing.

Management and marketing information systems have been created, adopted and integrated in agribusiness firms' philosophy and environment to a very small extent. In particular, at present, the management decision making is based on sporadic and widespread information and less on systematically collected and processed data. As a result, the recommended market penetration policies lead quite often to a dead end.

This thesis will try to develop and test an agricultural product design methodology employing consumer based models. Multidimensional data analysis and multicriteria techniques will be utilised in determining market trends and introducing new market products. The following areas will be examined:

- new product development by determining the attributes and the criteria by which agricultural products are perceived;
- identification of market segments;
- formulation of the best communication strategy by precisely measuring consumer attitudes and beliefs.

The olive oil product is emphasised by this study because the oil industry has recently undergone profound upheavals regarding production, pricing and consumption. The consumption increase of vegetable oils (olive oil's main rival) and the upgraded role of olive oil in EC, have placed an additional weight on olive oil's marketing approach and strategies.

An illustration of the design methodology for developing new olive oil brands for Greek agricultural co-operatives is proposed in this thesis.

Chapter one presents a historical perspective of the marketing of agricultural products; agricultural marketing mix; product's characteristics, price formation, promotion and distribution are presented in detail. The constantly evolving single European marketing environment and the emerged ultimate Euroconsumer are analysed in this first chapter.

Research methodologies employed so far in this field and more particular the methods, models and techniques retrieved from the behavioural sciences, economics, statistics and computer-related areas, are outlined in chapter two.

Market analysis and new product development research methodology are presented in chapter three. A detailed elaboration is showed on the approaches and methodologies adopted for the analyses of market environment, consumer behaviour, market trends and market shares forecasting.

The olive oil product's attributes, the domestic and international market, the EC economic policies, regulations and the international trade standards applying to oils are displayed in chapter four. A case study on the Greek olive oil market is included.

A consumer based survey with respect to the olive oil products conducted in Paris, France, is outlined in chapter five. Data analysis, such as principal components and correspondence analyses, multicriteria analysis and market shares estimation techniques were utilised in this study. Market penetration strategies and policies were obtained through these analyses.

The thesis finally concludes with some required improvements on the utilised Marketing Decision Support System, further recommendations and new research issues.

CHAPTER 1

EVOLUTION OF THE MARKETING OF AGRICULTURAL PRODUCTS

1.1. Introduction

The rise of real consumer income during the post-war period, the increase in the production capacity of the industry, the high degree of product specialisation, the expansion of international trade and other factors have resulted in the transformation of markets from product-oriented to consumer-driven. The focus of marketing has experienced several phases, from a commodity phase (agricultural products, manufactured goods, services), to institutional (producers, marketing intermediaries), to functional (buying, selling, promoting, distributing, pricing), to managerial (analysis, planning, organising, controlling) and to social (market efficiency, product quality, social impact) (Kotler, 1972).

Ritson and Hutchins (1991), identify five overlapping phases in interpreting the factors that influence the changing patterns of food consumption during the time period 1940-90: wartime austerity and rationing, return to "normal diets", effect of income growth, price instability and the "consumption" revolution.

The advent of quality thinking and individualism alongside generalist behaviour are two developments that have fundamentally changed consumer behaviour (Riensema *et al.*, 1991).

Numerous definitions of marketing have been suggested, falling into two broad categories: micro-marketing and macro-marketing. Micro-marketing is "the process of planning and executing conception, pricing, promotion and distribution of ideas, goods and services to create exchanges that satisfy individual and organisational objectives" (McCarthy and Perreault, 1990). Linneman and Stanton (1991) argue that in the real business world, the terms micromarketing, market segmentation, target marketing and niche marketing have been adopted as implicit expressions, for serving and satisfying the unique demands and expectations of small market segments. Macro-marketing is a "social process that directs an economy's flow of goods and services from producers to consumers in a way that effectively matches supply and demand and accomplishes the objectives of society" (McCarthy and Perreault, 1990).

According to Kotler and Armstrong (1987), the major actors in a company's microenvironment consist of:

- suppliers that provide the resources for the production of goods and services;
- marketing intermediaries such as middlemen, distribution firms, marketing services, agencies, financial intermediaries;
- customer markets which include the consumer, industry, reseller, government and international markets;
- competitors who are also trying to satisfy the needs of the same customers;
- public forces, such as financial, media, government, citizen action, local, general and internal.

They also argue that a company's macro environment is affected by these forces:

- demographic, which include the changing age and family structure of population, constant population geographic shifts and the ever-changing working environment of blue and white collar workforces;
- economic, affecting the income distribution and the consumption patterns of the population;
- natural, providing all the inputs and therefore supporting the marketing distribution system;
- technological, dealing with the creation of new products and taking advantage of the market opportunities;
- political, embracing all legislative actions enacted by government and public interest groups;
- cultural, influencing consumer perceptions and consumption habits.

The factors determining a company's micro and macro environment are illustrated in Fig. 1.

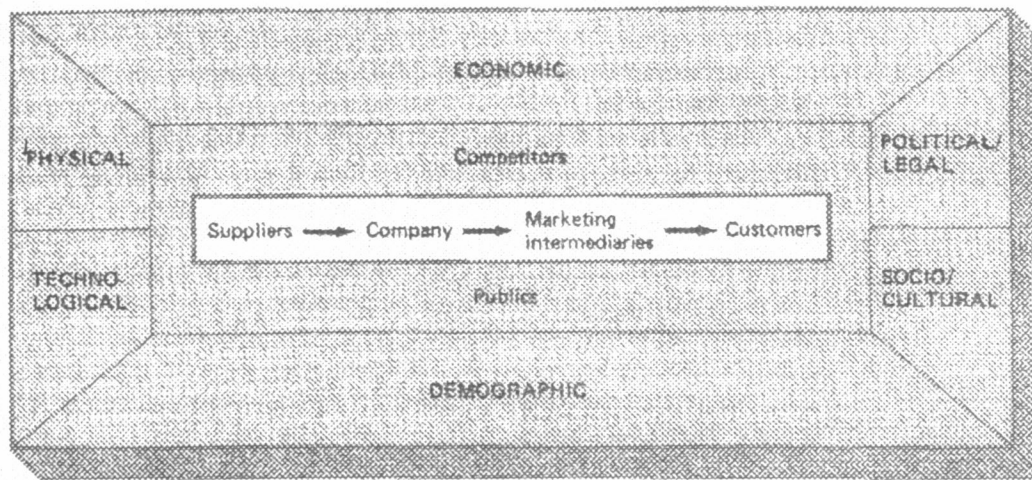


Fig. 1. Micro and macro marketing environments. Source: Kotler (1991)

The ultimate effectiveness of marketing has recently been under considerable criticism. Demands have been raised that marketing should be able to deal more efficiently with today's important and vital problems raised by ecologists, humanists, social critics and consumerists (Howard *et al.*, 1991).

Up to the early post-war period the evolution of agricultural marketing was similar to that of general marketing theory. Since then, it has developed somewhat differently from mainstream theory. Several reasons have been proposed to explain what has prevented agricultural marketing from using the multidisciplinary approach followed by marketing, thereby keeping its individuality, of which the two predominant ones are that:

1. marketing is mainly concerned with business decisions and objectives, while agricultural marketing has been developed primarily as a policy subject concerned with governmental intervention (Bateman, 1976);
2. the structure of farming consists of thousands of small businesses where individual farmers have little contact with the final consumer and are characterised by a limited capacity to manage the agricultural marketing mix (product, price, promotion and distribution) (Meulenberg, 1986; Ritson, 1986).

1.2. Agricultural marketing mix

1.2.1. Special product characteristics

Compared to industrial products, agricultural products are distinguished by their biological nature, bulk and perishability. While other industries processed and adapted their products to consumer wants and needs, agricultural output was considered finalised and ready to be

processed for consumption. External factors such as weather and susceptibility to diseases and pests have significant effects on the output and quality of agricultural produce, whose attributes of taste, aroma, colour, age, shape, moisture, nutritional value and chemical composition define their quality. The sorting procedure, in which agricultural products are classified according to standardised grades, differentiates them from industrial products. Top grades are processed directly to the consumer whereas lower ones are treated as raw materials.

A competitive disadvantage is often created in domestic markets with respect to the supply of similar agricultural products from abroad, which can mainly be attributed to limited production capability and quality deterioration. A lesser variability in the quantity and quality of agricultural produce can be ensured by quality control and special post-harvest methods. The similarity in the appearance of agricultural products supplied to the market often creates confusion and difficulties for consumers who prefer product differentiation adapted to a balanced and nutritious diet. Quality, taste, convenience, nutrition, wholesomeness and value are the main attributes that consumers look for in food products (Senauer, 1989).

1.2.2. Price formation of agricultural products

As Kohls and Uhl (1990) point out, the forces affecting agricultural prices can be identified as:

- supply, depending on farm production decisions, weather, disease, harvested acreage, and food imports;
- demand, determined by income, taste, preference, demographic factors and exports;
- food marketing sector, based on value-adding activities, cost behaviour and procurement strategies;
- government policies, through price support, supply control, trade or other general policies.

Among the factors influencing the agricultural prices are periodic expansions and contractions in supply, seasonality of demand and production and consumption patterns. Both economic and behavioural concepts must be taken into account in agricultural product price formation, as prices follow the general pattern of inflation and deflation. Farm prices have always been the focus of agricultural marketing. Low farm prices are considered to be associated with the inefficiencies created by the channel distribution system, resulting in government intervention by establishing institutions such as marketing boards, leading to policy orientation in the marketing of agricultural products.

1.2.3. New product development

Kotler (1988) argues that three levels of product design should be considered: the core product is the most fundamental, that is, what the consumer is buying; the core product is then turned into a tangible product of specific quality, features, styling, brand name and packaging; the additional services and benefits that may be offered constitute an augmented product.

For example, the core product for wine is the primary factor on which consumer selection over a number of alcoholic and non-alcoholic beverages (soft drinks, mineral water) is based. The retrieved benefits are taste, aroma, social, physical and psychological effects caused by its consumption.

International wine regulations separate wine into two main categories: table wines and appellation of origin wines, with certain *a priori* restrictions applied to the latter. The natural factors of cultivar, soil and climate, combined with the techniques used during cultivation and wine making, produce a wine's qualitative characteristics. The tangible product is then created with the use of proper and efficient marketing procedures and techniques.

Product design. Wine branding should differentiate itself by quality, grape type and region of origin. Unique wine attributes such as flavour, bouquet and colour must be adjusted to perceptions and expectations of specific market segments. A preference for medium white wines has developed in western countries. Selection among wines is still considered complicated, mostly with dry wines. Rose wines are considered fairly new in the market and further effort and promotion should be made to educate and inform consumers.

Product packaging. Bottling must be designed for high quality wines. Styling is necessary for variety, wine making and vintage. Glass carafes or bottles of suitable colour, size and weight are widely accepted as the proper containers for good wines. Recently, wine boxes have appeared on the market, and eventually wine cans are expected to claim a large percentage of the packaging sector. Packaging should never remain static but should constantly be open and sensitive to the continuous changes and developments of consumer consumption habits with special consideration focused on young adults.

Product labelling. The label usually appears at three locations on a bottle: the neck label gives special information; front and back labels explain the branding, the type of wine, the appellation of origin status and the vinification. Often labelling is informative, describing the factors contributing to a high quality wine. Part of this informative aspect is the explanatory card which is usually displayed on the shelf in front of a wine and which

describes the general subdivision of wine types. Wine buyers are not simply buying an alcoholic beverage but benefit from and take advantage of additional services offered with the product. Spawton (1991) claims that these extra benefits include price, outlets where the product is sold, the image of the winery, the personality of the wine maker, the respectability of the agent or distributor and the communication mix, which consists of the word of mouth, wine journalism, sales promotion and advertising.

Quality is an intangible characteristic for many consumers. According to Edwards (1989), quality can be communicated through perceived value, prestige pricing, upmarket branding, quality packaging and labelling, varietal and/or regional accreditation and prestige promotion through upmarket media. The benefits offered with a product should be complementary and differentiate the product from its competitors. Spawton (1991) has illustrated the benefits spectrum for wine (Fig. 2)

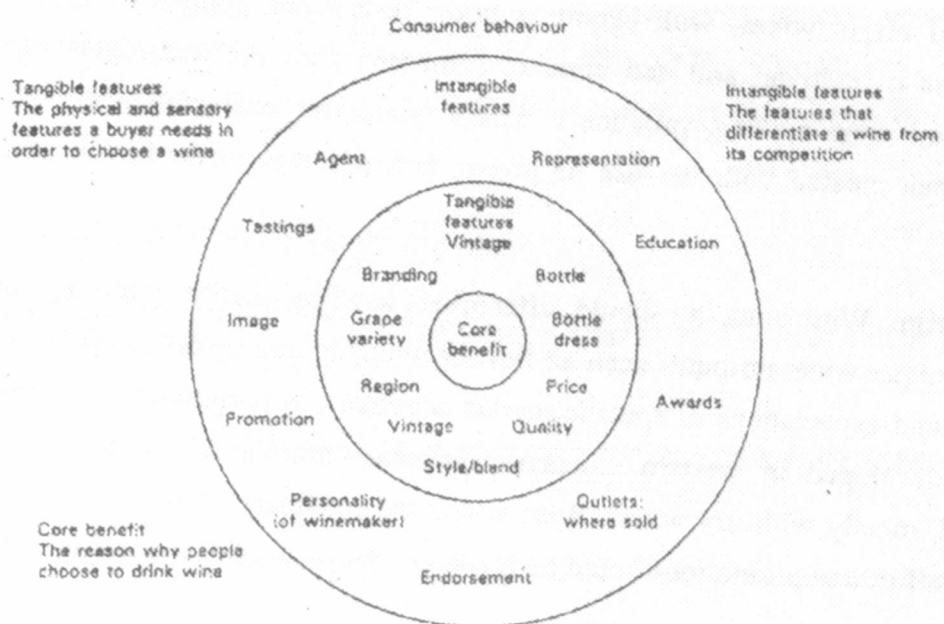


Fig. 2. The benefits spectrum for wine. Source: Spawton (1991)

1.2.4. Promotion of agricultural products

A great proportion of the food industry budget is allocated to product promotion and advertising, in order to develop awareness and perception among consumers in the expectation of further demand expansion for a product; these range from simple promotional activities by major food manufacturers and retailers to the promotion of generic products by agricultural commodity groups. Modern food industries attempt to differentiate their products, by brand and/or regional identification, with emphasis on the non-substitutability of a product's attributes. The major marketing tools in increasing and

strengthening brand loyalty are product design, packaging, labelling, quality control, advertising, sales promotion, publicity and public relations.

Several studies (Goddard and Amuah, 1989; Liu and Forker, 1988; Powers, 1989), examine the effectiveness of generic and brand promotional programs for oranges, liquid milk, oil and fats. A positive relationship with the consumption effect has been revealed. Overall, the promotion of highly differentiated products has been more effective than that of generic products.

Kohls and Uhl (1990) report that two marketing strategies are frequently followed by food firms:

- product differentiation, seeking to find a product's unique features which set it apart from its competitors; increased brand loyalty with a less elastic demand is expected;
- market segmentation, concerning the development of unique product variations that will be better perceived by different consumer classes and market segments.

Agricultural product design and promotion is based on distinct factors such as attributes of the particular variety, possible health effects and region of origin. Promotional strategies and activities in general should pay great attention to the nutritional content and to the overall product contribution toward a healthy diet. Capewell and Penn (1986) report that studies conducted in the U.K. indicated that while few consumers are health addicts, many are becoming aware of the link between diet and health, although this feeling is weaker amongst the elderly and low income earners. Petroni (1991) identifies an increase in consumer preference which has recently been created for natural foods without ingredients that can affect the organoleptic properties of the product or harm health.

According to Farris and Mark (1980), advertising can be classified into two segments:

1. persuasive communication tools which affect consumer preferences and tastes, change product attributes and help to identify product differentiation; the consumer becomes brand loyal and less price sensitive;
2. informative aids of product attributes to the consumer without distorting the facts; the consumer becomes more sensitive and buys best value.

A significant difference has been distinguished by Frohn (1991) in the EC countries in food advertising distribution between the two large media groups. In Portugal, Greece and Italy, electronic media prevail, while in Denmark, the Netherlands, Germany, France and Great Britain, printed media are the prevailing forms of advertising.

1.2.5. Distribution, processing, wholesaling, retailing, transport and storage

Four routes are usually utilised for channelling, distributing and delivering fresh agricultural products to the consumer (Fig. 3).

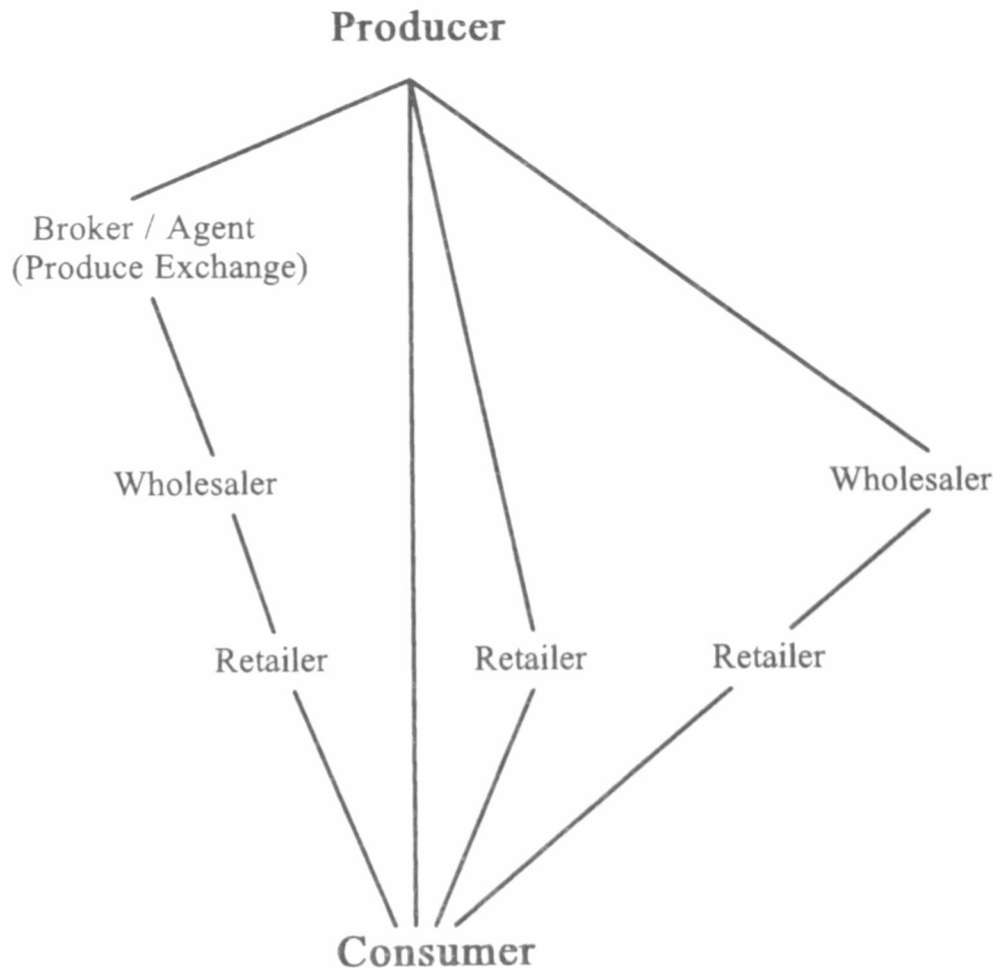


Fig. 3. Fresh product distribution
Source: Baker (1990)

At the farm level, the sale of the raw products either to agricultural co-operatives or to food processing companies is mainly based on factors such as available information, convenience and price. At the food processing stage, a study of European companies showed that the production of greater technological value is necessary to respond to the changing needs of the consumer; in fact a general ageing of the population occurs in the major industrialised countries as well as an increasing sensitivity towards food quality and safety (Petroni, 1991).

Food processing adds form utility to raw agricultural products by transforming them into more storable, transportable and marketable products. This is mainly

accomplished through product design, new product development, packaging, labelling and branding.

Wholesaling provides basic marketing functions useful to food processing and retailing. These usually consist of buying, selling, grading, assorting, storing, transporting, crediting and providing current market information. Spatial and possession utility is added to food products by these wholesale functions.

Retailing is the main partner of wholesaling in food marketing, offering all activities involved in selling processed food to the consumer. Marketing functions such as buying, selling, promoting, advertising, and own-branding are performed by food retailers, a sector presently dominated by chain stores, supermarkets, super-stores and speciality shops. The display and positioning of a product, an effective marketing tool, is controlled by the retail sector.

Direct marketing methods such as telephone, direct mail and electronic shopping through cable television stations are currently used to a limited extent but in the near future, food marketing firms are anticipated to explore and take full advantage of them. Particular attention is expected to be paid to the cable television network in the single European Market, as inter-Community trade barriers are eliminated.

Food retailing has significant effects on food wholesaling, processing and farming. The relationship that exists among processing, wholesaling and retailing is complex, interdependent and concentrated. The highly competitive retail environment coupled with the demand for high quality produce has contributed to the changing nature of the business relationship between retail buyers and fresh produce suppliers (Knox and White, 1991). To control factors such as timing, delivery, price, quality, packaging and own-labelling, food retailers have often reached back to the beginning of the marketing distribution channel. According to Davies (1990), retailers have become far more proactive in their dealings with suppliers and in their control over distribution. Their role is that of a product marketer for the supply chain.

Transport and **storage** procedures are also part of the food marketing distribution system; both occur at each stage. While the transport function creates both time and place utility, storage creates only time utility. The bulk, perishability and production characteristics of agricultural products require transport and storage facilities equipped with new technology. Transportation and storage are of great importance in agricultural marketing since raw products are seasonally produced but consumed throughout the year. The balance of adjustment between supply and demand for agricultural products can be

attributed to these two functions. The framework of the marketing distribution of agricultural products is shown in Fig. 4.

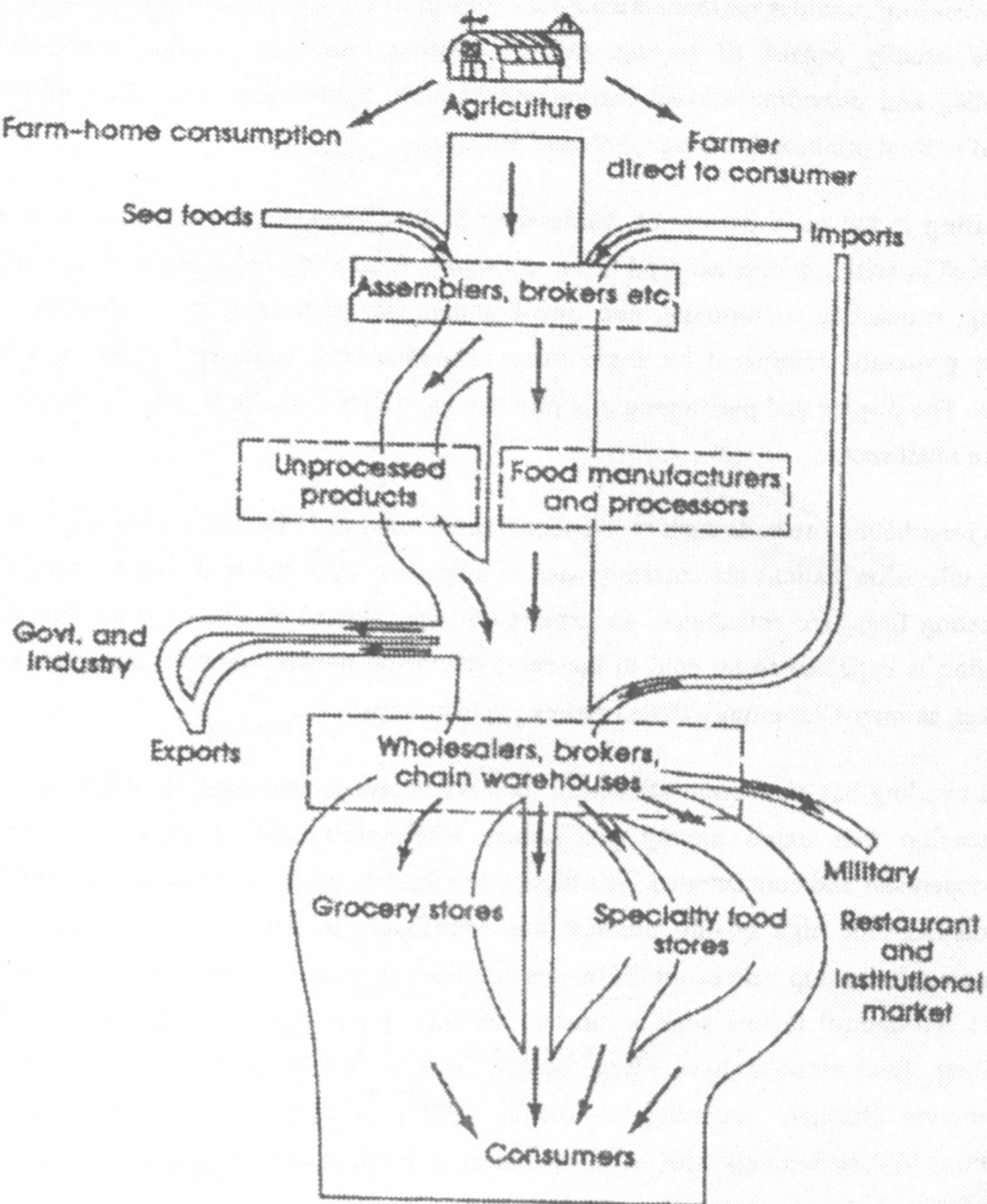


Fig. 4. Flow and distribution of agricultural products
Source: Kohls and Uhl (1990)

Certain agricultural regions are characterised by the fact that a large percentage of the local agricultural production is controlled, processed and marketed by co-operative organisations. Recently there has been an increase in the quantity handled by these firms.

The domestic marketing system channelled through agricultural co-operatives is presented in Fig. 5.

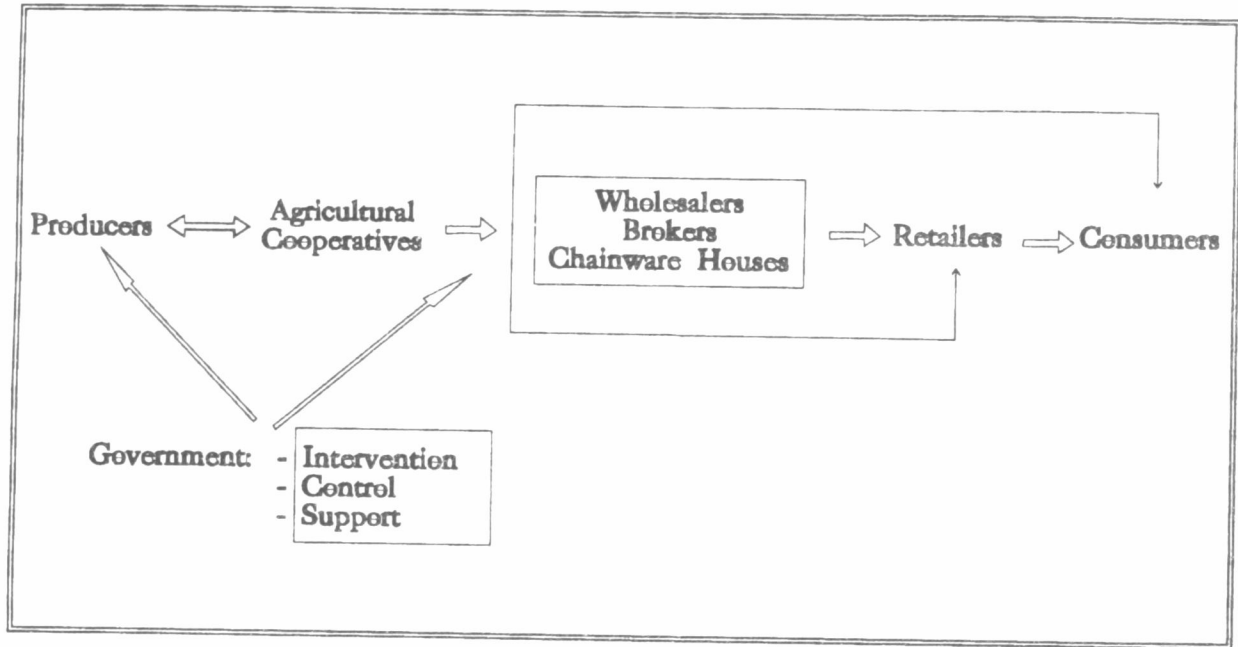


Fig. 5. Marketing process through agricultural co-operatives

According to Lucey (1990), the development of a marketing strategy for a co-operative consists of five steps: develop specific goals, set the operational objectives, select a major market, set the policies and courses of action to implement the goal and assemble and implement the marketing program.

1.3. The implications of EC integration on the marketing of agricultural products

For the agricultural sector, the Single European Market implies the free movement of goods, the eventual elimination of barriers to trade, common prices and effective health protection legislation. For supply, a greater potential for new market development is expected, and for the consumer greater product choice and price range. A common agricultural strategy was implemented through the Common Agricultural Policy (European Documentation, 1987) to increase productivity to ensure a fair standard of living for the agricultural community, to stabilise markets, to assure the availability of supplies and to guarantee reasonable prices for consumers. The CAP's ability to achieve the objectives of the Treaty of Rome and to adapt to the constantly changing circumstances has been subject to considerable criticism.

Most Greek agricultural production (90%) is in one way or another affected by CAP, according to the Agricultural Bank of Greece (1989), suggesting that to establish effective and efficient marketing strategy for Greek agricultural products, attention must be paid to EC agricultural policies and to their underlying implications in the context of European integration.

A study of the EC fresh fruit market (Martinez and Quelch, 1991) revealed that European markets differed significantly in per capita consumption, taste and preference for varieties, sizes, quality and colour. There is a broader distinction between consumers in Mediterranean countries, where excellent quality fruit is produced, and where there are strong preferences for size and quality, and the northern European consumers with less demanding tastes. A similar conclusion was reached by Henson and Loader (1991) in examining food consumption patterns in Europe, recommending a predictable split between southern and northern countries.

In 1989, an extensive survey was conducted on behalf of the French Centre for External Trade to identify and compare consumption patterns and perceptions of wine consumers in eight major European countries (FAO, 1991). European wine consumers were classified into three consumption models:

the Latin model with the traditional wine producing countries where high per capita wine consumption occurs, with red wine served regularly at meals and consumed by all social classes;

the North European model with non-producing countries (Switzerland, Belgium, Denmark) where wine is a luxury commodity and sporadic consumption of red wine is mainly at social occasions;

the German, British and Dutch model with a predominant consumption of white wine in Germany and U.K. and a balanced red/white wine ratio with a tendency toward white by new consumers in the Netherlands. Wine is mainly consumed at meals and outside the house for relaxation.

1.3.1. Organic products: a new market prospect?

A recent demand has risen for agricultural products produced either organically or without the use of synthetic chemicals (Lampkin, 1990; Ophuis, 1991). Community regulations legislate the production, preparation, marketing, labelling and inspection of organic products, thus improving their credibility in the eyes of consumers and helping

these products achieve a more distinctive profile (Council Regulation, 1991). Different names have been adopted in different parts of the world for organic products; some of the common ones are, biological, natural, ecological and alternatively - produced products. The process of the alternatively - produced products is shown in Fig. 6.

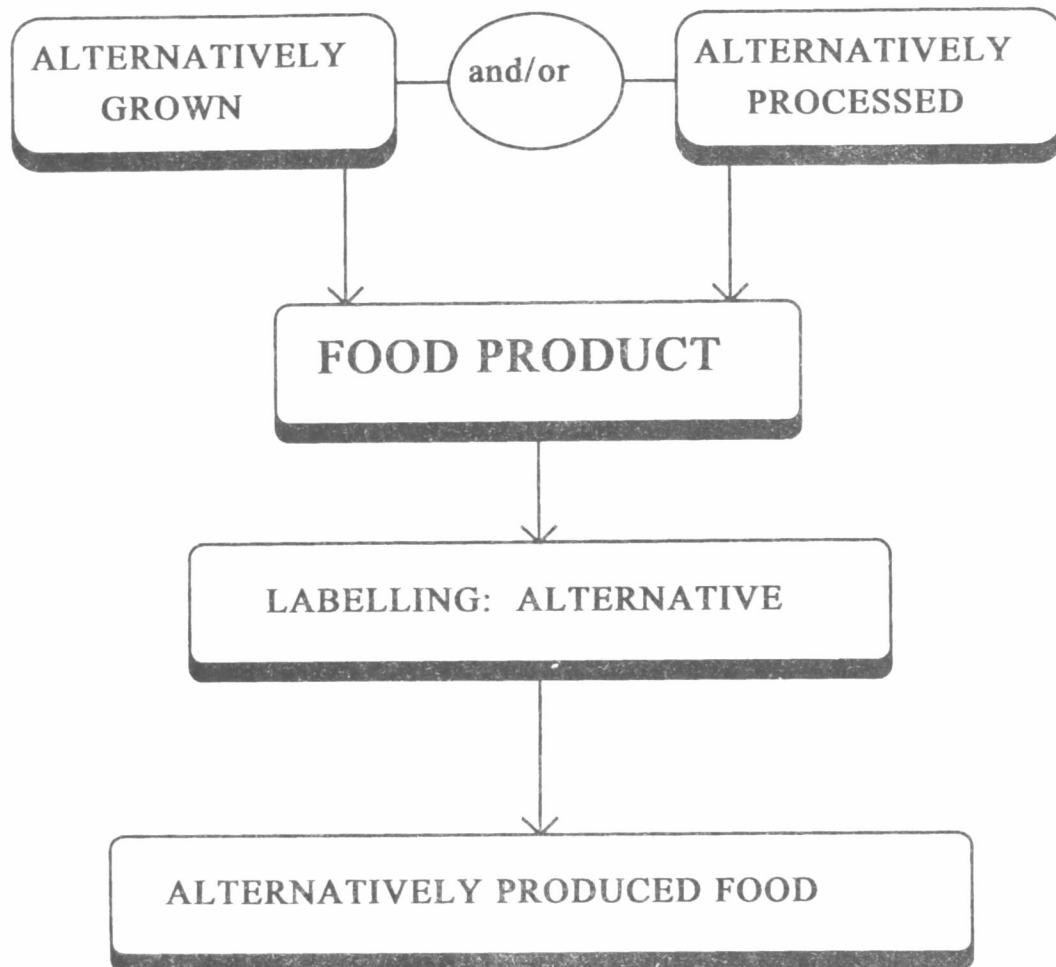


Fig. 6. Key elements for alternative foods
Source: Ophuis (1991)

Certain policy measures have been implemented not only by the European Community but also by individual EC countries to prevent possible fraud or misunderstanding. In the U.K., an organisation for the register of Organic Food Standards has been established, sponsored by the government; organic standards organisations have their own symbols (Fig. 7).





Organisation	Full organic status symbol	In-conversion status wording or symbol	Number of farms in Britain (1989/90)	Symbol(s) used on imported produce?
Soil Association		SOIL ASSOCIATION APPROVED ORGANIC CONVERSION	450	Yes
Organic Farmers & Growers Ltd		OF&G symbol plus wording 'IN TRANSITION'	200	Yes
Permaculture Agricultural Association	 Biodyn		15	Yes
United Kingdom Register of Organic Food Standards		None	Not fully operational	No

Fig. 7. Organic standards organisations in Britain (1990).
Source: Lampkin (1990)

1.3.2. The Euroconsumer: a possible reality or a myth?

The new marketing environment of the single European market is a challenge for many food marketing firms, an opportunity for a greater product and market development; others regard the business merger wave and the constantly increasing market power of the main wholesale and retail associations as a threat to their survival. Exogenous factors such as health, environment and resource use are of great importance to most European consumers. Therefore special effort is awaited by the agribusiness firms for these factors to be integrated in their marketing approach. The use of biodegradable packaging, for example, is one of the many required.

Consumer wants and needs are the focus of marketing strategy. Preferences and trends in the EC are difficult to predict. Henson and Loader (1991) concluded that the Euroconsumer does not yet exist but distinctive segments across the continent do and that consideration should be paid to identifying and servicing them. A similar conclusion for

the Single European market was reached by Uhl (1991), who tested a hypothesis of market convergence for the EC and the US.

A slow but continuous homogenisation of European markets was predicted by Martinez and Quelch (1991). The free movement of workers, easier travel across borders development and an increasing concentration of pan - European television and other media, are among the factors that may indicate further similarities among European consumers.

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CHAPTER 2

RESEARCH METHODOLOGIES IN AGRICULTURAL MARKETING

2.1. Introduction

For several decades, research in agricultural marketing had not taken full advantage of methodological advances in behavioural sciences, economics, statistics and computer-related areas. The literature on research methodologies employed during the 1980's and early 1990's however reveals that the major developments have had a major impact on agricultural marketing research (Tuorila, 1987; Lee *et al.*, 1989; IOOC, 1990; Grunert and Kristensen, 1992). Innovations and techniques adopted by agricultural marketing range from simple statistical models to advanced econometric models, and from traditional behavioural models and techniques to information systems such as Decision Support Systems (DSS) and Expert Systems (Fig. 1).



Fig. 1. The interdisciplinary approach to agricultural marketing

Research methodologies in agricultural marketing are mainly based on:

- Statistical, econometric and data analysis methods and techniques;
- Network, causal, multidimensional, heuristic and behavioural modelling.

2.2. Statistical methods

The most common statistical techniques used are frequency distributions, cross tabulations, Anova, factor analysis and discriminant analysis. All were used in a market segmentation study conducted on behalf of the International Olive Oil Council (IOOC) in 1990 in the United States of America. This study identified consumer market segments for olive oil, described consumption patterns, perceptions, habits, demographic factors and evaluated possible increases in olive oil sales (IOOC, 1990).

Cluster and factor analyses were employed in an effort to group the EC countries and identify the variables contributing toward consumption similarities. This study, by Henson and Loader (1991), showed that groups of EC countries had certain consumption similarities for specific food products. The groups were West Germany - Denmark, Portugal - France - Italy, Greece - Spain and France - U.K. - Portugal.

As a result two alternative strategies can be adopted by food marketing firms in EC countries: a uniform approach, adopted for the European market as a whole, or a marketing tactic focused on specific market segments throughout Europe. Decision-making about food consumption is primarily based on the theory of utility trees, according to which at the first level consumers determine the income portion that is to be distributed to food. Thereafter factors such as kind of food, brand, and packaging are involved.

Factor analysis was applied in a study to establish beer drinkers' attitudes to certain aspects of the beer market and revealed two factors by which drinkers perceive beer: masculinity and experience, and physical and social effects (Ness, 1986).

This procedure was also used in a survey examining the role of health and environment as product attributes, their relationship to other product characteristics and their mutual relationship in the perception and preference of food products using a conceptual model for health and environment as product attributes (Oude Ophuis *et al.*, 1992). Perceived product quality was composed of the position of a product with respect to a number of quality attributes. To avoid great variability, lettuce was the model food product. An estimation of an individual regression equation explaining preference by environmental and health effects was also made. Four groups of undergraduates from four related departments took part in this survey. The students held significantly different attitudes concerning health and environment in relation to food products, which were in accordance with their academic disciplines. Health and environment attributes used could not be identified as underlying constructions; taste was more significant.

The Kolmogorov-Smirnov technique and the McNemar test were used in a study examining the main factors affecting the export marketing of Cyprus wines in the U.K. (Morgan and Sarris, 1991). Consumer perceptions and attitudes toward taste, purchase cost, labelling, packaging, reputation and chemical composition were studied. The main reasons for not purchasing and stocking Cypriot wines were price and low awareness by consumers. It was estimated that improvements in the product offer would act positively in changing the purchasing intentions of respondents. The improvements recommended by the respondents were greater capital investment, intensive promotional and advertising campaigns, and more emphasis paid to light and dry wines. Two assumptions were made in the study: the sample of the key respondents represents the market values of consumers efficiently, and attitudes and perceptions towards improvement in Cyprus wines, reflect true intentions.

The analysis of variance (**Anova**) method was used in a survey to evaluate the level of agreement/disagreement with attitudinal statements related to food choice (Marshall *et al.*, 1992).

A recent study in Japan clarified latent characteristics of housewife clusters of attitudes toward cooking (Okuda and Funamoto, 1992). Time series data for three consecutive years were collected, with emphasis on items such as nutritional value, Japanese culture, tradition, health aspects and social effects. Principal component technique and clustering technique were also used. As a hierarchical method for clustering technique, the Ward method was employed and as a non-hierarchical method, the re-allotted method was used. The estimates indicate that Japanese housewives maintained their interest in cooking, through external conditions, food chemical additives and environmental pollution.

2.3. Econometric methods

The basic relationship of retail demand to generic advertising of processed grapefruit and the movement of grapefruit juice prices were examined by Lee (1981). An estimate of retail demand for grapefruit juice was based on the advertising effect on the consumer. Advertising effectiveness is estimated by its impact in increasing either dollar sales or quantity sales. Two hypotheses were made: that the positive demand response to advertising decreases as advertising increases, and that the outcome of a given advertising effort is distributed over time. The retail demand for grapefruit juice, in addition to its dependence on generic advertising, varied according to income, population, price of grapefruit juice and prices of close substitutes. Overall generic

grapefruit juice advertising expenditures had a significant positive effect on retail sales for a three-quarter period following the quarter when the advertising took place. The main contribution of generic advertising was identified during the advertising period, followed by a decline. The own price elasticity of demand was estimated to be -2.44 while the cross-price elasticity was 1.14, indicating that the grapefruit juice retail market was price elastic and that orange juice was a strong substitute at the retail market level.

A switching regression analysis was performed to examine the effect of a coupon promotional program on coupon redemption behaviour by the Florida Department of Citrus (Lutz and Brown, 1985). The model used was:

$$Q_{1t} = X_{1t}b_1 + \varepsilon_{1t} \quad \text{iff } I_t^* \geq 0$$

$$Q_{2t} = X_{2t}b_2 + \varepsilon_{2t} \quad \text{iff } I_t^* < 0$$

$$I_t^* = Z_t\gamma - \varepsilon_t$$

where, Q_{1t} is the purchase rate of frozen concentrated orange juice (FCOJ) during month t for a household redeeming coupons; Q_{2t} is the purchase rate of FCOJ for a household not redeeming coupons; I_t^* is an unobservable index which determines whether to redeem coupons or not; X_{1t} , X_{2t} , and Z_t are vectors of exogenous variables; b_1 , b_2 , γ are the parameter vectors; and ε_{1t} , ε_{2t} and ε_t are normally distributed disturbance terms. The results showed that the coupon promotion program increased the likelihood of households using coupons and that the special price discounts for both coupon users and non-users explained more variations in the demand for frozen concentrated orange juice than did the price variable.

A study by Menkhaus *et al.* (1988) identified factors with a significant impact on consumer purchase and reorder decisions of a branded low fat fresh beef product. An estimation of logic functions relating the probability of beef purchase and reorder decisions to consumer demographic characteristics, meat purchase behaviour factors, beef product characteristics, and post-usage test product appeal was made. One dependent variable of interest was the consumer's decision to purchase a branded lean fresh beef product (Y_1). A secondary binary choice was whether a consumer repurchases after the initial purchase (Y_2).

$$Y_1 = f_1(DC_1, \dots, DC_L)$$

$$Y_1 = f_2(MPB_1, \dots, MPB_J)$$

$$Y_1 = f_3(PC_1, \dots, PC_K)$$

$$Y_2 = f_4(DC_1, \dots, DC_L)$$

$$Y_2 = f_5(MPB_1, \dots, MPB_J)$$

$$Y_2 = f_6(PC_1, \dots, PC_K)$$

$$Y_2 = f_7(PPA_1, \dots, PPA_L)$$

where:

DC_i , $i = 1, 2, \dots, I$	consumer demographic characteristics;
MPB_j , $j = 1, 2, \dots, J$	meat purchase behaviour;
PC_k , $k = 1, 2, \dots, K$	perceived product characteristics of the test product at the initial purchase;
PPA_l , $l = 1, 2, \dots, L$	post-usage product appeal.

The implications of these estimates were that demographic characteristics had an insignificant impact while product differentiation and health related factors were important in purchasing and reordering the test product.

Non-linear squares, Box-Jenkins' procedures and Gauss-Newton numerical methods were employed in a study conducted by Liu and Forker (1988). This study had three objectives concerning the effectiveness of generic fluid milk advertising: the estimation of the advertising impact on consumption through a fluid milk demand equation for New York City; cost- benefit evaluation of the advertising program; and examination of the optimality of fund allocation utilising a dynamic simulation on the demand equation.

The fluid milk demand equation uses fluid milk sales as the dependent variable. The retail fluid price, the cola price index, average weekly earnings of production workers and media expenditures were the independent variables. To estimate the supply response due to the price effect of advertising, equations for cow numbers and production per cow were estimated. The number of cows was based on the expected milk price, feed cost and cow slaughter price. Production per cow depended on milk price and feed cost. The results showed that the fluid milk advertising program led to higher consumption. On the supply side, the impact was insignificant. This program was cost effective but a reduction in advertising expenditure would have been appropriate. A significant impact of advertising on milk consumption was identified on a study with respect to estimating patterns for milk consumption (Mitsostergios, 1994).

An empirical analysis of the Canadian fats and oils market (butter, margarine, shortening and vegetable oils) determined the own and cross commodity effects of advertising expenditures on each good (Goddard and Amuah, 1989). The model was based on a two-stage optimisation process, which assumed that consumers allocated their budgets in two stages: determination of aggregate consumption of fats and oils, and determination of consumption of individual fats and oils. A significant effect on the demand for individual fats and oils was found by lagged advertising expenditure levels, habit persistence, time trend, price and expenditure.

According to Lee *et al.* (1989) advertising impact occurs in two forms: a necessary exposure required before a consumer decides to buy, and a sales impact for an extended period of time. The restriction that the consumer faces is the selection of goods and services best satisfying his needs and wants within his budget restriction. The maximisation of utility function subject to a budget constraint can be written as:

$$\begin{aligned} \max \quad u &= u(q_1, q_2, \dots, q_n, k) \\ \text{s.t.} \quad \sum p_i q_i &= m \end{aligned}$$

where

p_i and q_i are the price and quantity of commodity i and m is the consumer budget. The variable k indicates a consumer knowledge about goods and services and is affected by current and past advertising. The quantity of each commodity purchased is expressed as a function of its price, prices of other commodities, income and knowledge.

Based on demand theory, the single equation approach focusing on the distributed lag structure for advertising has two major limitations: substitution and complementary effects originating from advertising of other related commodities are mainly ignored, and there is insufficient flexibility to estimate the impacts of different advertising programs.

The two-stage least squares (TSLS) method was used in a study of demand response to weekly advertising of fresh California - Arizona navel oranges (Powers, 1989). Weekly demand for fresh navels was determined by:

$$QNAV_t = b_0 + b_1 \{1/ADS\} + b_2 \{1/ADSL1\} + b_3 \cdot PNAV_t + b_4 \cdot PAPPLE_t + b_5 \cdot INC_t + b_6 \cdot XMAS_t + b_7 \cdot JF_t + b_8 \cdot MAM_t$$

where

QNAV: the quantity of fresh oranges entering domestic use;

ADS: the advertising index;

ADSL1: the advertising index with one week lag;

PNAV: the free-on-board (f.o.b.) price of fresh oranges;

PAPPLE: the consumer price index for fresh apples;

INC: the US per capita disposable income;

XMAS :

JF: binary variables equal to one or zero, depending on the week time of the year

MAM:

b 's: the estimated coefficients;

t 's: the week.

The two-stage least squares method was used to estimate the coefficients since the aggregate quantity of fresh oranges supplied by handlers, the aggregate quantity of fresh oranges demanded by grocers and the price, were determined simultaneously. The estimated length of the carryover effect from grocery advertising lasted only one week after the initial advertising week, with the peak response of demand occurring during the initial week.

Multiple regression and Box-Jenkins time series techniques were employed in a study with respect to factors affecting the demand for olive oil, the examination of the effect of price and income elasticity and consumer price forecasting (Escribano and Mili, 1990). The results indicated that the consumption of virgin olive oil and olive oil was seasonal and depended on price, personal disposable income and the time trend. The price of sunflower oil had an impact on olive oil consumption alone.

To estimate a demand system for meats in EC countries, an econometric model, the linear approximate almost ideal demand system was utilised (Canali, 1991). The estimates obtained from the econometric analysis explained changes in consumer behaviour in EC countries. Among the results were meat expenditure elasticities for selected periods, the compensated own price elasticities for all countries and information about substitutability or complementarity between meats and changes with time. In six EC countries, Belgium, Luxembourg, Denmark, France, Greece and Ireland, beef was considered a luxury. Several EC countries had the same attitude toward pork, while a strong movement in favour of poultry occurred in most EC countries. Consumption of lamb varied from one country to another which is mainly attributed to cultural differences.

2.4. Conjoint analysis

Product development, market segmentation and marketing communication require identification and detailed examination of consumer perceptions and attitudes with respect to agricultural and food products. According to Steenkamp (1987), conjoint measurement is used to study consumer quality evaluations and it is based on the assumptions that:

1. a produce can be described according to levels of a set of attributes and
2. the consumer's overall judgement of the product is based on these attribute levels.

An additive model specifies the basic form of the relationship between product attributes and overall judgements:

$$Y = \sum_{i=1}^n \sum_{j=1}^{m_i} V_{ij} \cdot X_{ij}$$

where y denotes the consumer overall evaluation of the product alternative, v_{ij} is the part-worth (the contribution to the various levels to the overall judgement) associated with level j ($j=1,2,\dots,m_i$) of attribute i ($i=1,2,\dots,n$) and x_{ij} is a dummy variable representing the presence or absence of the j^{th} level of the i^{th} attribute.

Conjoint measurement was applied to the quality evaluation of ham product. A necessary tool for forming the market segments and developing new products.

2.5. Network modelling

Total cost in an agricultural marketing system is the sum of production, handling, processing, transportation and storage costs. A study by Garsia-Diaz *et al.* (1982) compared the minimum-cost constrained network flow models with the standard linear programming, transportation, and transshipment models. Special attention was paid to the efficient integration of the physical, spatial and temporal aspects into the network model. The export grain marketing and transportation system under examination included grain production locations, on-farm storage, country elevators, rail classification/switching yards, river elevators, inland terminals, demand centres and port terminals. The minimum cost was estimated by a network flow minimisation procedure known as the out-of-kilter algorithm. The network flow models regarding the analysis of large-scale systems offered greater flexibility and efficiency.

2.6. A causal model

A causal model of food store patronage behaviour was used by Meulenberg and Steenkamp (1991) which assumed that patronage is a function of the distance to a store and its image. The latter was assumed to depend on price, product quality, assortment, service and atmosphere. The LISREL 7 was used to estimate the parameters of the model. LISREL differs from traditional regression models in its ability to separate and estimate errors in variables from errors in structural equations. It also allows an assessment of the fit of the total model, as opposed to assessing the fit of each structural equation. The maximum likelihood estimation procedure was employed. Product quality had the greatest effect on store image, emphasising the importance of co-operation among producer, wholesaler and retailer. Service and atmosphere had a significant effect on store image as well, but price and assortment were not significant.

2.7. Multidimensional modelling

Multidimensional measurement and analysis procedures are appropriate for determining the major attributes through which food products are perceived by consumers and for examining the existing relationships between these attributes and consumer preferences (Wierenga, 1980). The attributes that a consumer takes into account with agricultural and food products are both physical (nutritional value, health impact) and psychological (social status, side effects). The main assumption is that products can correspond to points in multidimensional space, in which the axes indicate the distinct food product dimensions by which products are perceived by consumers. Wierenga (1980) used three compensatory models to determine how consumers weigh criteria in the formation of preferences, for alternative products:

1. The vector model or the linear compensatory model, where the consumer is presented with his own preference vector and indicates the direction of his preference in the multidimensional product space. The disadvantage of this model is the monotonic relationship between attribute scores and overall utility. The utility of a specific product j , with co-ordinates x_{j1}, \dots, x_{jd} , as assigned by consumer i with preference vector (v_{i1}, \dots, v_{id}) is, according to the vector model,

$$U(X_j) = v_{i1}x_{j1} + v_{i2}x_{j2} + \dots + v_{id}x_{jd}$$

2. The ideal point model is a generalisation of the vector model. In the multidimensional space, the consumer is represented by his ideal point, a combination of the attributes he likes most. The utility of product j for consumer i is inversely related to:

$$d_{ji} = \left[\sum_{t=1}^d (x_{jt} - y_{it})^2 \right]^{1/2}$$

the distance to the ideal point of consumer i , with co-ordinates (y_{i1}, \dots, y_{id}) .

3. The part-worth or conjoint-measurement model is at the top of the model hierarchy; vector and ideal point models can be considered special cases of it. In this model, the function which describes the effect of varying levels of an attribute on preference can take all the possible forms in contrast to the vector model where this relationship is linear, and the ideal point model where it is monotonic. These types of models are appropriate for examining the trade-off between certain differences in product quality and price.

These preference models can be helpful at many stages in the marketing of agricultural products, from designing and developing new products to the distribution channels of the marketing system.

Within this framework, the UTA model has been developed, which is more general and powerful than the other models, since the relationship between the attributes is additive:

$$U(X_j) = v_{i1}u_{i1}(x_{j1}) + v_{i2}u_{i2}(x_{j2}) + \dots + v_{id}u_{id}(x_{jd})$$

where, $u_{i1}, u_{i2}, \dots, u_{id}$, the marginal utilities attached to the attributes; the weights v_{ij} and the utilities u_{ij} are to be estimated by the model UTA (Siskos and Matsatsinis, 1992). An improved version of UTA model, the UTASTAR, has been applied successfully in consumer behavioural analysis and in developing a new agricultural product (Grigoroudis, 1991).

The multidimensional scaling technique was used by Ness (1986) to produce a perceptual map displaying the position of the various brands with respect to certain attributes. This technique was employed by the IOOC (1990) to determine and design an optimal message strategy in the U.S. market.

Multidimensional scaling of preference was used for a simultaneous examination of the interaction between attitude statements and product. This procedure emphasised the attitudinal statements which were exclusively associated with each product. Marshall *et al.* (1992) examined four products ; white fish, white meat, red meat and dark fish. The differences in attitudes to meat and fish were more evident than between dark and white products.

2.8. A heuristic model

The Danish Ministry of Agriculture undertook an extensive research consumer study as part of its attempt to enhance consumer choice in the food market through assessing product characteristics of organically versus conventionally grown foods and to provide information for the design of campaigns for organic foods (Grunert and Kristensen, 1992). A heuristic two-part model was designed: the micro, with value - attitude - behaviour / hierarchy and socio-economic conditions, and the macro, representing the market situation. Two econometric models were estimated: in the first, social and personal values of the respondents were considered exogenous, with the endogenous part being attitudes, knowledge, intention and buying behaviour.

Social and Personal Values ~ Attitudes ~ Knowledge ~ Intentions ~ Buying Behaviour;

In the second model, the same structure was used, except that the exogenous values were replaced by socio-economic variables, and more precisely by education, income, number of persons in the respondent's household, age and gender.

Socio-Economic Situation ~ Attitudes ~ Knowledge ~ Intentions ~ Buying Behaviour.

The main conclusion from the two models was that social values were more important than personal values and that the exogenous variables, income, age and gender were important in explaining the endogenous variables.

2.9. Behavioural modelling

The Integrated model of consumer behaviour of Engel, Kollat and Blackwell (EKB model) was employed in order to examine the factors affecting milk consumption and buying behaviour (Termorshuizen et al, 1986). It is assumed that the stages of problem recognition, search alternative evaluation and choice, comprise the decision-making behaviour of consumers.

This model is based on modifications of the following equation:

$$AT_j = \sum_{k=1}^k b_{jk} w_k$$

Where

AT_j = attitude towards alternative j;

b_{jk} = belief, linking evaluative criterion k to alternative j and

w_k = subjective importance of evaluative criterion k.

Consumers were found to distinguish seven attributes in milk and other beverages: wholesome, ordinary, refreshing, cheap, not bad for the heart, tasty and social. In comparison to traditional econometric methods and techniques the employed integrated model offers a systematic approach for the analysis of the psychological and sociological factors intervened in consumer selection of food products.

Tuorila (1987) examined consumer behaviour and behavioural intention in relation to different types of milk focusing on: subjective experience related to a shift from one milk type to another; overall liking of non-fat, low-fat and regular-fat milks; the use of the Fishbein model in predicting consumer behaviour; beliefs and evaluations.

Consumer behaviour and behavioural intention were evaluated by the equations:

$$B \sim BI = A_{act}w_1 + SNw_2$$

$$A_{act} = \sum b_i e_i$$

$$SN = \sum NB_j Mc_j$$

where

B :	resulting behaviour	b_i :	behavioural belief
BI :	behavioural intention	e_i :	corresponding evaluation
A_{act} :	attitude toward behaviour	NB_j :	normative belief
SN :	subjective norm/behaviour	Mc_j :	motivation to comply
w_1, w_2 :	regression coefficients		

The belief structures of the subjects and their consumption of different types of milk were in perfect balance.

Steenkamp et al. (1986) in order to examine consumer perception regarding quality of food products, utilised a model incorporating information on the importance of quality indicators, ratings of products on quality attributes and the importance of quality attributes.

Two main quality indicators are identified, the intrinsic and extrinsic. The first is mainly determined by the production process while the later by the marketing policy.

Quality perception of perishable food products is based on the appearance of the product (intrinsic) and the image of the store where the product is sold (extrinsic). For the quality perception of non perishable food products the extrinsic indicator brand name is the most important.

Factor analysis was applied to discover the basic underlying quality dimensions of thirteen food products. Nutritional value, additives, energy and sensory were identified as the most important.

A further extension and elaboration of this model has been developed aiming towards assisting and furthermore, improving the consumer-oriented quality strategies implemented by the agribusiness firms (Steenkamp and Van Trijp, 1988).

APPENDIX: STUDIES IN AGRICULTURAL MARKETING

Reference	Issues	Assumptions	Methodology	Remarks
Wierenga (1980)	Implementation of multidimensional and analysis procedures to determine the major attributes by which food products are judged by consumers; examination of relationships between these attributes and consumer preferences.	Food products were judged through a number of attributes and dimensions by consumers.	Preference models: The vector, ideal point and part-worth model.	Preference models provided an analytical framework for product development, market segmentation and communication strategy; applications to different outlets and various types of supermarkets were feasible.
Lee (1981)	Impact of generic advertising and price adjustments to the Florida grapefruit processing industry.	Advertising effectiveness was measured by increased sales. There was some positive demand response to advertising effort, which decreased as advertising increased. The effect of a given advertising effort was distributed over time.	Econometric model.	Media advertising was more profitable than price reduction.

Reference	Issues	Assumptions	Methodology	Remarks
Garcia-Diaz, Fuller and Phillips (1982)	The production, handling, processing, transportation and storage of agricultural marketing with the use of minimum-cost constrained network flow models.	The network consisted of a set of nodes connected by a set of arcs. Nodes represented marketing system facilities in each time period and arcs for storage or distribution alternatives.	Network models.	The network approach in comparison to standard linear programming, transportation and transshipment models was superior.
Lee and Brown (1985)	The influence of coupon redemptions on domestic consumption of frozen concentrated orange juice.	The purchase rate for a household redeeming coupons was mutually exclusive of the purchase rate of a household not redeeming coupons.	Separate demand equations were estimated for coupon users and non-users. The use of an equation predicting the probability of a household using the coupons was considered.	Price discounts and information provided by coupons were effective in increasing the demand for the product.

Reference	Issues	Assumptions	Methodology	Remarks
Termorshuizen, Meulenber and Wierenga (1985)	Consumer behaviour with respect to milk employing an integrated model.	Four Stages comprise the decision-making behaviour of consumers.	A consumer decision model based on the EKB model has been developed.	Empirical models of this type can contribute to the understanding of consumer behaviour with respect to generic food products.
Ness (1986)	The application of multivariate techniques to marketing research with emphasis on product positioning and development.	Information about products led to an overall feeling about the product and as a result, to attitudes regarding intended product usage.	Multidimensional scaling (MDS), construction of a perceptual map representing the location of brands of products relative to certain attributes.	Multivariate techniques of factor analysis and multidimensional scaling had a role in generating decisions for product positioning and new product development.
Steenkamp, Wierenga and Meulenber (1986)	Consumer perceptions with respect to quality of food products	Consumers use intrinsic and extrinsic quality indicators to determine and evaluate the quality aspects of a product .	A comprehensive model for the formation of consumer quality perceptions was employed.	Consumers with lower income attach more importance to the price as an indicator of food quality.

Reference	Issues	Assumptions	Methodology	Remarks
Steenkamp (1987)	Utilisation of conjoint measurement in evaluating consumer quality judgements of ham.	<ol style="list-style-type: none"> 1. A product can be described by a set of attributes 2. Consumer overall evaluation depends on that set. 	Conjoined measurement was used. The part worths were estimated using OLS.	This approach is recommended for forming market segments and developing new products.
Tuorila (1987)	Consumer attitudes, perceptions and buying behaviour with respect to certain milk types.	Attitudes were examined in the framework of the Fishbein theory of reasoned action.	Use of the Fishbein model: behaviour and behavioural intention were the result of attitudes and subjective norms.	The belief structures held by the subjects were in perfect balance with their milk consumption.

Reference	Issues	Assumptions	Methodology	Remarks
Menkhaus, Whipple, Torok, and Field (1988)	Identification of the factors of influencing, purchasing and reordering of a branded low fat fresh beef product.	The target market may coincide with that segment of the market which reduced beef consumption for health-related factors.	Estimation of logic functions relating the probability of beef purchase and reorder decisions to a number of explanatory variables.	Health related factors and product differentiation mainly affected the probability of reordering the test product.
Liu and Forker (1988)	Overall effectiveness of a generic fluid milk advertising campaign.	Existence of a dynamic interplay between advertising and demand, including both time lag and carryover effect.	Evaluation of the sales impact of advertising determined the supply, response and assessed the cost/benefit of the program. The demand of fluid milk was estimated through a transfer function. NLS, Box-Jenkins' procedures, Gauss-Newton numerical method.	Advertising had a significant impact on consumption; the effect of advertising on total milk supply was insignificant; the advertising program was cost-effective but a reduction in advertising expenditure would have been appropriate.

Reference	Issues	Assumptions	Methodology	Remarks
Lee, Brown and Fairchild (1989)	The decay structure of advertising effects, general theoretical restrictions on demand and alternative modelling techniques designed to introduce advertising.	The effect of one dollar's worth of advertising was spread out over several time periods (decay or carryover effect).	Use of the scaling model when advertising affects perceptions of qualitative characteristics. Utilisation of the translation model when advertising affects basic fixed needs.	The single equation approach focusing on the distributed lag structure for advertising had limitations; substitution or complementary effects from other advertising programs were not taken into account. Different advertising programs had different objectives.
Goddard and Amuah (1989)	Determination of the own and cross commodity effects of the advertising expenditure in the Canadian fats and oils market.	Consumers were assumed to allocate their budget in two stages.	A model examined the own and cross-commodity effects of the advertising, in the market.	Demand was greatly affected by lagged advertising expenditures, habit persistence and by traditional variables.

Reference	Issues	Assumptions	Methodology	Remarks
Powers (1989)	Factors affecting weekly demand for California-Arizona navel oranges.	Consumers adjusted their purchase patterns gradually in response to advertising.	Use of regression analysis to control the effect of other demand factors (TSLs).	The peak response of navel demand to grocery advertising occurred during the week the advertising appeared; for brand and generic advertising it occurred at least one month later.
International Olive Oil Council (1990)	Identification, description, sales potential and optimal message strategy for various olive oil consumer market segments.	Varied according to the methodology.	Frequency distributions, cross tabulation, analysis of variance, factor analysis, discriminant analysis, cluster analysis, multidimensional scaling (MDS).	The MDS analysis recommended the optimal message strategy "Olive oil for your health," consistent with discriminant analysis.

Reference	Issues	Assumptions	Methodology	Remarks
Escribano and Mili (1990)	Identification of factors affecting olive oil demand. Determination of cyclical and/or seasonal variations in demand. Examination of price and income elasticity of demand.	Starting hypothesis: all variables were considered in a single equation.	Econometric analysis. Multiple regression and Box-Jenkins time series techniques were employed.	Consumption of olive oil was seasonal and depended on price, disposable income and time trend.
Canali (1991)	Examination of consumer behaviour and attitudes in EC countries toward different types of meat.	No autocorrelation across the equations used.	A linear approximate almost ideal demand system was used.	A great and increasing substitutability among different kinds of meat was identified.
Henson and Loader (1991)	Identification and examination of food consumption patterns in Europe.	Consumers make decisions about the allocation of limited income at a number of distinct levels (hierarchical structure of the utility tree).	Cluster analysis was used to group countries. As a complementary approach, factor analysis was employed.	A differentiation between consumption patterns in southern and northern European states.

Reference	Issues	Assumptions	Methodology	Remarks
Meulenberg and Steenkamp (1991)	Evaluation of the role of store image in food shopping patronage for meat in the Netherlands.	Patronage of retail food stores based on store image and distance.	A general causal model for quantifying the role of store image in food shopping patronage was tested. LISREL 7 was used to estimate the parameters of the model. The maximum likelihood estimation procedure was employed.	Store image was significantly influenced by product quality, service and atmosphere.
Morgan and Sarris (1991)	Examination of the key factors and forces in the international marketing system in the export of Cyprus wines to the U.K.	The key respondents adequately represented the market values of consumers. Attitudinal perceptions to product changes expressed true intentions.	Statistical tools and techniques with the use of the mainframe version of the minitab statistical package. The Kolmogorov-Smirnov technique and McNemar test.	Low awareness of Cyprus wines was the most common reason for not purchasing or stocking them.
Grunert and Kristensen (1992)	Assessment of product characteristics of organically and conventionally grown foods.	Purchase of organic products is reinforced both by personal and societal factors.	Use of a heuristic model. Clear distinction between micro part-value-attitude-behaviour-hierarchy-socio-economic situation and macro part-market situation.	Social values were more important than personal values. Gender, education and income affected buying behaviour.

Reference	Issues	Assumptions	Methodology	Remarks
Marshall, Rodriquez and Curvall (1992)	Measure of Spanish attitudes toward meat and fish. Focus on attitudes to food provisioning and how products were used.	Attitudes regarded as a method of determining the likelihood of behaviour recurring at a given time and in a given direction.	Analysis of variance (ANOVA) and multidimensional scaling (MDPREF).	Using MDPREF, it was possible to identify statements which were the best discriminators among products.
Okuda and Funamoto (1992)	Examination of changes in attitudes toward cooking by housewives in Japan.	The growing trend of housewives in Japan engaged in part-time work may change attitudes to cooking.	Principal component technique and clustering technique (CT). CT employed the Ward method as a hierarchical method and the re-allotted method as a non-hierarchical one.	The favoured attitudes towards cooking have been kept in pursuit of the family members health management.
Oude Ophuis, Van Dam and Lamer (1992)	Investigation of the role of health and environment as attributes of food products.	Perceived product quality is the sum of the various attribute scores weighted by their individual importance.	A conceptual model for health and environment as product attributes. Utilisation of preference regression for environment and health.	For lettuce, taste was considered more important than health or environment related attributes.

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CHAPTER 3

MARKET ANALYSIS AND NEW PRODUCT DEVELOPMENT RESEARCH METHODOLOGY

3.1. Introduction

Marketing research methodologies all along have been depended to a large extent, on improvements and advances taking place in computer science. This chapter attempts to formulate an agricultural product design and development methodology through the utilisation of consumer based models. The research methodology recommended is computer based and is operating under the scheme of a Decision Support System, developed by Siskos and Matsatsinis (1993).

An overview of the utilisation and advantages of these systems in the field of marketing is presented next. The factors contributing to the determination of the new "optimal" product are retrieved by conducting a large scale consumer study and collecting information on attitudes, perceptions and preferences. The employed system is illustrated on survey data from the Athenian olive oil market.

3.2. MIS, DSS and Expert Systems in marketing

The evolution of the different marketing approaches developed through advanced computer use, is presented in the following chart. Models expressing the diffusion, consumption, sales and production of new products have been developed and tested successfully (Skiadas, 1992).

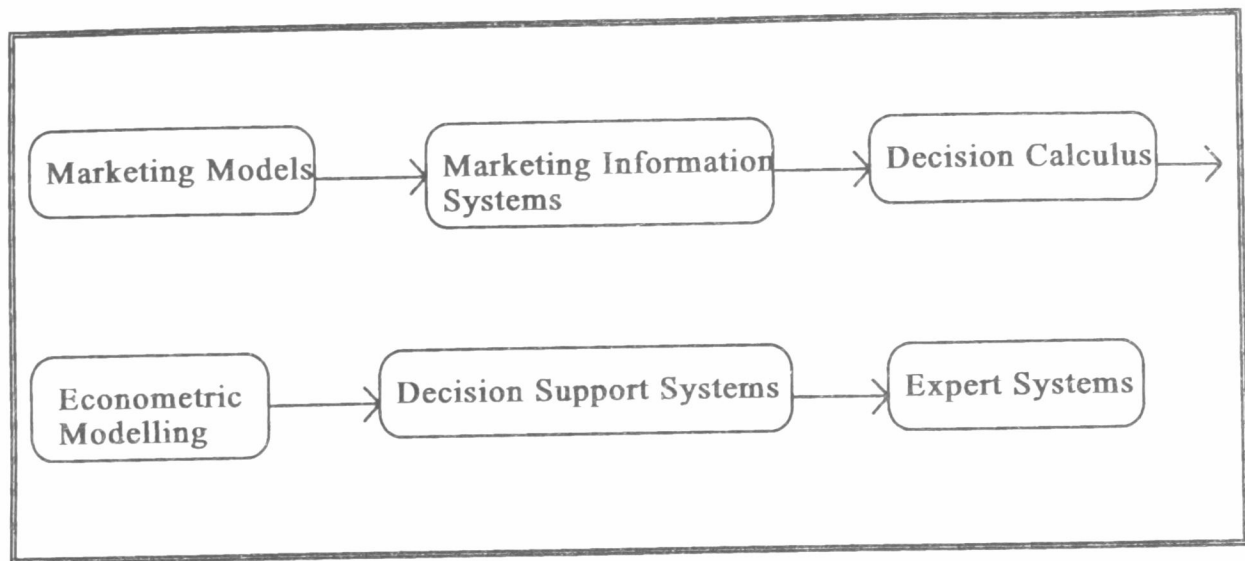


Chart 1. Marketing Methodologies
Source: Wierenga (1992)

Today's firms are equipped with Marketing Information Systems (MIS) to provide management with information retrieved through data processing (Fig. 1).

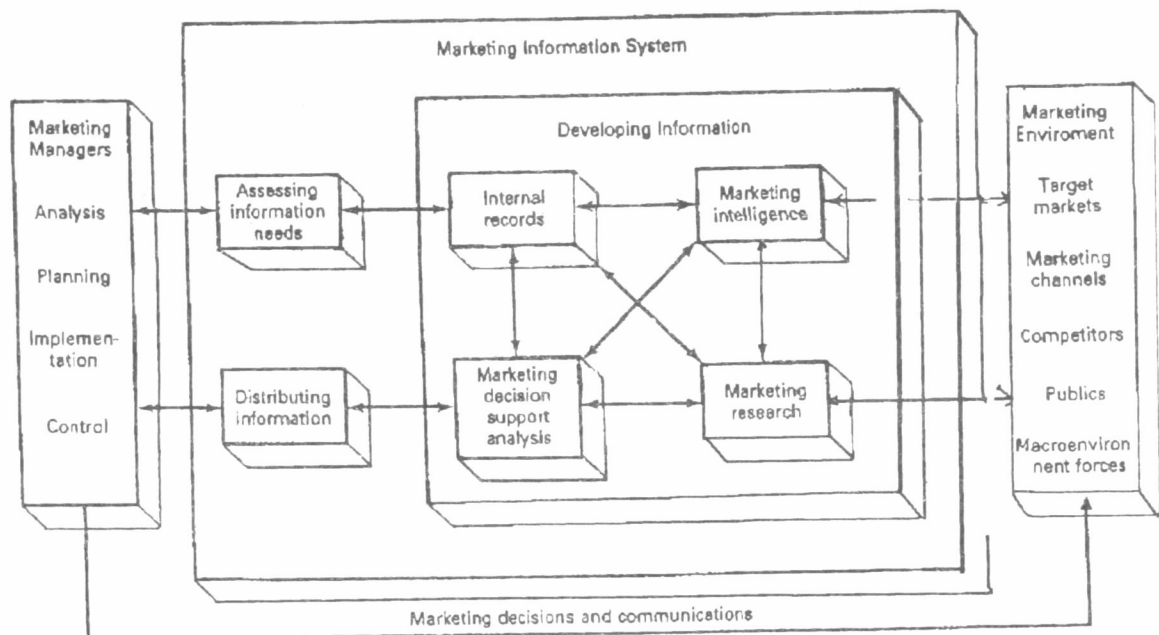


Fig. 1. Marketing Information System (MIS)
Source: Kotler (1991)

Four major subsystems comprise a company's MIS:

- internal records systems which supply information (data) on orders, sales, prices, costs, inventory levels, cash flows, accounts receivables and payables;
- marketing intelligence system through a number of procedures and sources informs the marketing managers of the everyday developments in the marketing environment;
- marketing research system designs, collects, analyses and reports data related to a specific marketing problem that the company is facing;
- marketing decision support system provides statistical tools and decision models in order to assist the marketing managers in their decision making process.

These separate components form the concept of MIS as an integrated totality (Sääksjärvi and Talvinen, 1993). According to Brodie (1989), marketing is undergoing rapid developments partly due to the development of appropriate computer software including Decision Support Systems (DSS).

A DSS incorporates several essential characteristics increasing thus the decision quality of a decision maker (Fig. 2):

- it contains a co-ordinated collection of a data base, a model base and computing power;
- it is not only appropriate for structured problems but also for less-structured ones and
- it is interactive, flexible and discovery oriented (Little, 1979; Dillon *et al.*, 1990; Bruggen, 1992).

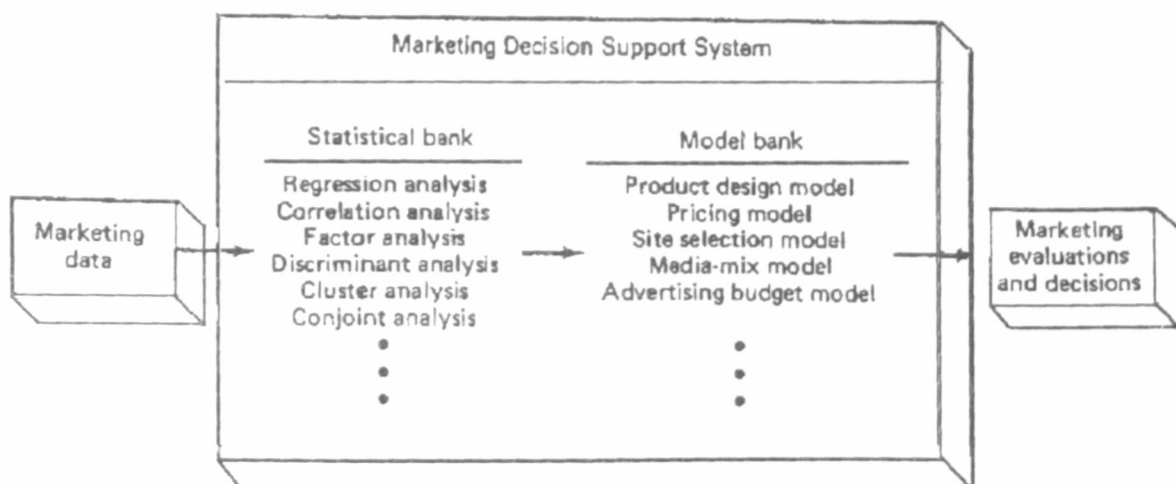


Fig. 2. Marketing Decision Support System.
Source: Kotler (1991)

The knowledge based systems or Expert Systems (ES) are computer programs that include qualitative information about a specific domain, originating from experts and other sources, enabling them to emulate the process that the expert follows in approaching a problem (Hahn, 1985; Mitchell *et al.*, 1991; Wierenga, 1992). The benefits arising from these systems in marketing are the encompassing of qualitative reasoning, which is closer to a realistic representation of managers thinking, the incorporation of a consultation process with the user, the elaboration and explanation of conclusions and better utilisation of experts (McDonald and Wilson, 1990; Curry *et al.*, 1992).

According to Curry and Moutinho (1991), expert system techniques are best suited to domains which are self-contained or bounded and useful if the relevant knowledge is well-documented. The marketing areas covered by the expert systems developed so far are marketing planning, sales promotion, market monitoring, advertising, media planning and new product development.

McDonald and Wilson (1990) argue that consistent advice, secure knowledge bases, better utilisation of experts, enhanced decision making and improved analysis are the potential advantages of Expert Systems in Marketing.

The proposed methodology through the next section operates by means of a Decision Support System (DSS) incorporating partial ESs for market analysis and new product development. The Cretan olive oil has been undertaken as a case study. Two oil markets of the European Union are examined, the Athenian in Chapter four and the one of Paris in chapter five.

3.3. Research methodology

The new product development research procedure is based on a large-scale consumer study and incorporates all the necessary steps for an effective marketing research: definition of the problem and research objectives, development of the research plan, collection of data and information, processing and analysis utilising multidimensional and multicriteria models and finally presentation and elaboration of results (Chart 2).

Market research methodologies for new product development or product differentiation have to deal, in general, with the four stages presented in Fig. 3. A further explanation of each individual stage follows next.

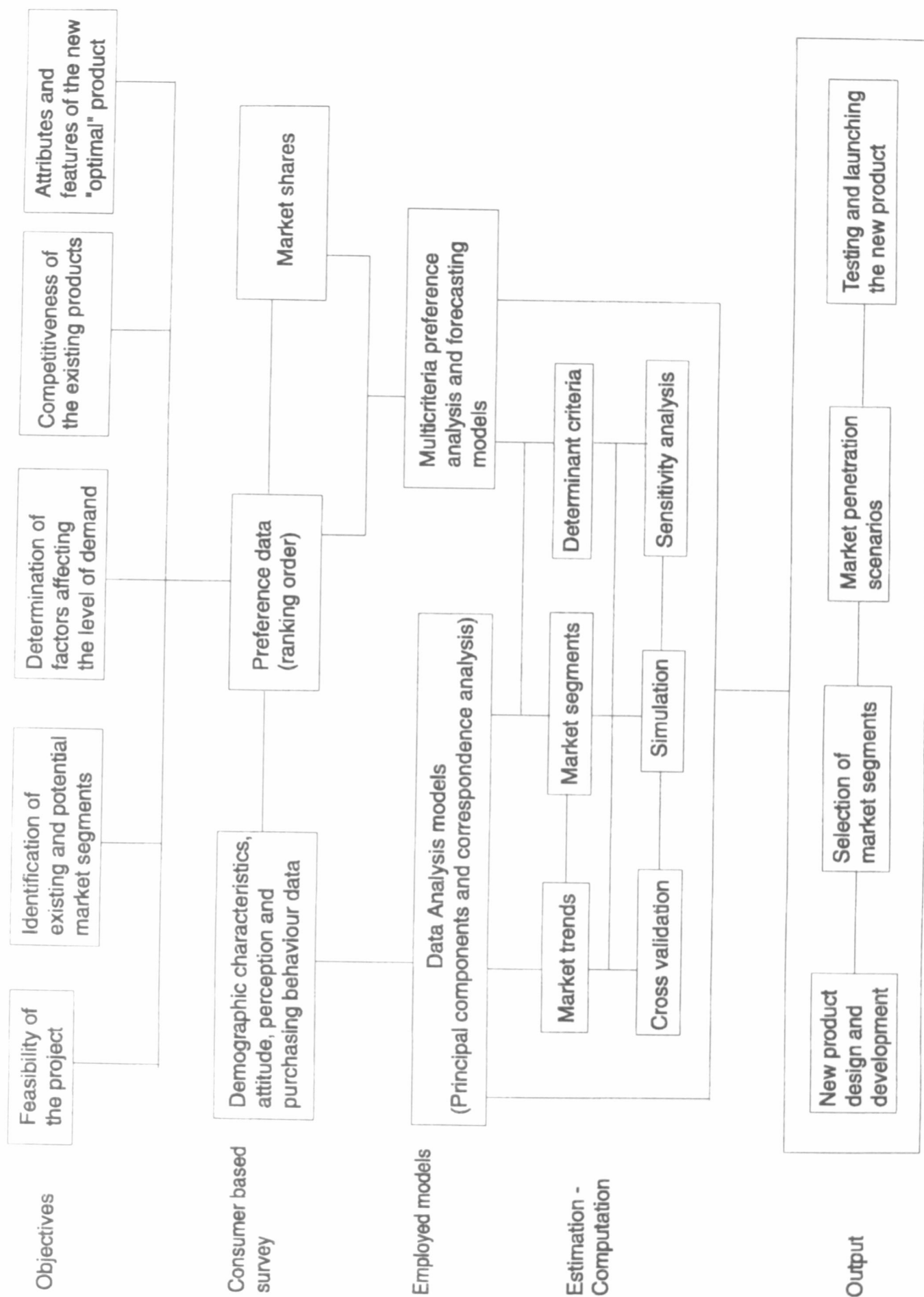


Chart 2. New product development research procedure

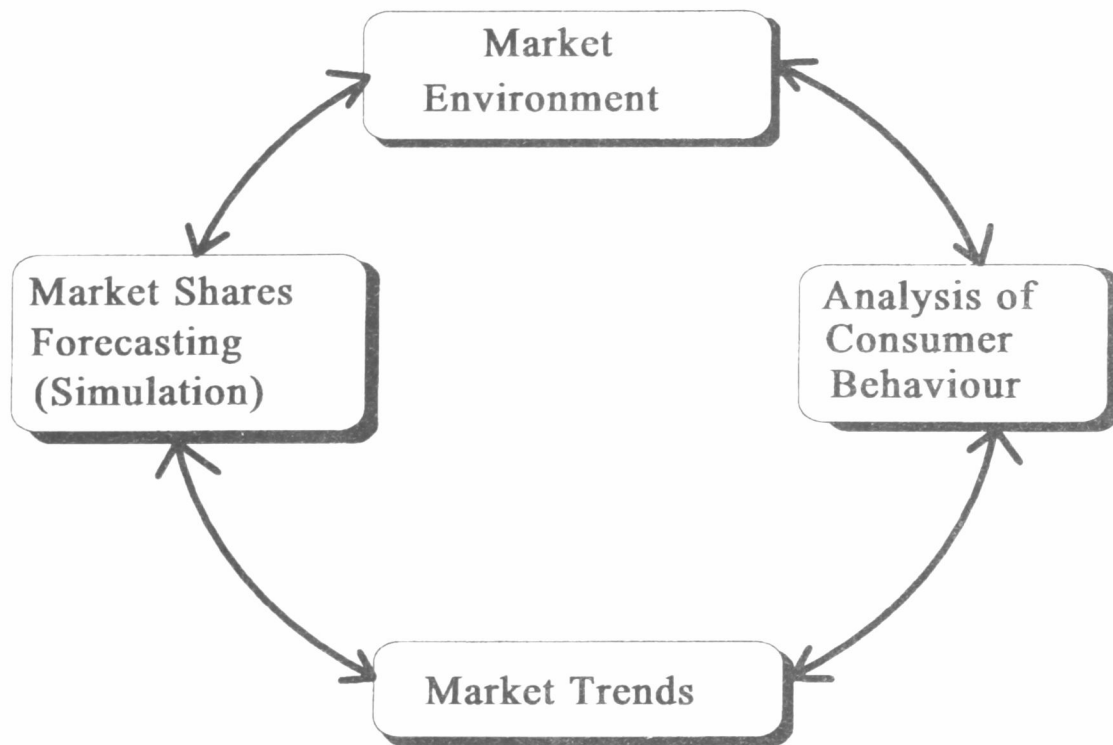


Fig. 3. Research methodology applied to new product development

Market environment

The first stage includes definition of the marketing problem, determination of the research objectives, identification, examination and selection of competing products, preliminary market research on supply and demand of the brands through secondary sources of data, questionnaire preparation, sampling, determination of contact method, conduct of a pilot study, final modification of the questionnaire and survey completion.

Analysis of consumer behaviour and market trends

Consumer behaviour analysis is accomplished utilising multicriteria preference analysis for each consumer separately in combination with data analysis methods and techniques concerning consumer profiles in general. In many multicriteria decision problems the typical problem of assessing an overall preference model appears as follows: given the consumer purchasing policy, is it feasible to estimate an analytical preference model which is as close as possible with this policy?

A consumer selection policy can be collected or externalised by means of a set of reference products which he, the consumer, either has or can rank through simple questionnaires, familiar decision making situations, and so on.

The problem concerned here is how to estimate a multiattribute utility under certainty which should be as consistent as possible with the consumer ranking of these reference products. The UTASTAR model (Siskos and Yannacopoulos, 1985), an improved version of the multicriteria method UTA of Jacquet-Lagrèze and Siskos (1982), is applied on the consumer data preference set. This is an ordinal regression method allowing the use of qualitative criteria. During the survey each consumer is asked to express his/her estimation for a set of products $A = \{a_1, a_2, \dots, a_m\}$ which are examined on the basis of certain criteria. Following this, all products are ranked by the purchaser according to the order which he/she would purchase them on the assumption that the product previously selected was not available. This method uses a special linear programming formulation to estimate the consumer's utility function which has the following additive form:

$$u(\underline{g}) = p_1 u_1(g_1) + p_2 u_2(g_2) + \dots + p_n u_n(g_n) \quad (1)$$

$$\text{s.t. } u_i(g_{i*}) = 0, \quad u_i(g_i^*) = 1 \quad \forall i = 1, 2, \dots, n, \quad \sum_{i=1}^n p_i = 1$$

where $\underline{g} = (g_1, g_2, \dots, g_n)$ is a vector of the utilised criteria, g_{i*} and g_i^* the worst and the best level of criterion i respectively, $u_i(g_i)$ is the marginal utility of criterion g_i normalised between 0 and 1, $u(\underline{g})$ is the global utility of \underline{g} and p_i is the weight of the i -th criterion. The sum of weights is one. The utility function is as consistent as possible with the observed selections on known subjective preferences. The revised UTA method (UTASTAR) estimates an equivalent unweighted utility function and is presented in Appendix I.

Results expected from the utilisation of the UTASTAR model are, examination of consumer behaviour determinant criteria and identification of consumer market segmentation.

Descriptive statistics and data analysis methods help to determine the profile of the consumer purchasing each of the examined products (Bouroche, 1977). The analysis has two directions: one toward the identification and determination of consumer general perceptions and attitudes and the other toward the examination of the existing interactions among consumers on different product criteria and the correlation among the attributes of

the products. The data analysis methods used in this market research were principally component analysis, correspondence analysis and multiple correspondence analysis.

The multivariate statistical technique of principal components analysis has been used extensively in biological and social sciences and in marketing research (Gatty, 1966; Koutsoyiannis, 1977). Recently, data analysis has used this technique to describe a set of data without making assumptions about distributions on an underlying statistical model (Lebart *et al.*, 1984). Principal components analysis is utilised when the primary objective is to summarise most of the initial information in a minimum number of factors for predicting purposes (Hair *et al.*, 1987). When the initial variables are highly correlated, this method is highly recommended (Flury and Riedwyl, 1988).

This method constructs from one set of variables, X_j ($j = 1, 2, \dots, p$) new variables (PC_i) called principal components, which are linear combinations of the X 's with coefficients equal to the eigenvectors of the correlation or covariance matrix (Fig. 4).

$$PC_i = a_{i1}X_1 + a_{i2}X_2 + \dots + a_{ip}X_p$$

where PC_i = the i -th principal component;

a_{ip} = the coefficient relating the p -th variable to the i -th component (often called loading).

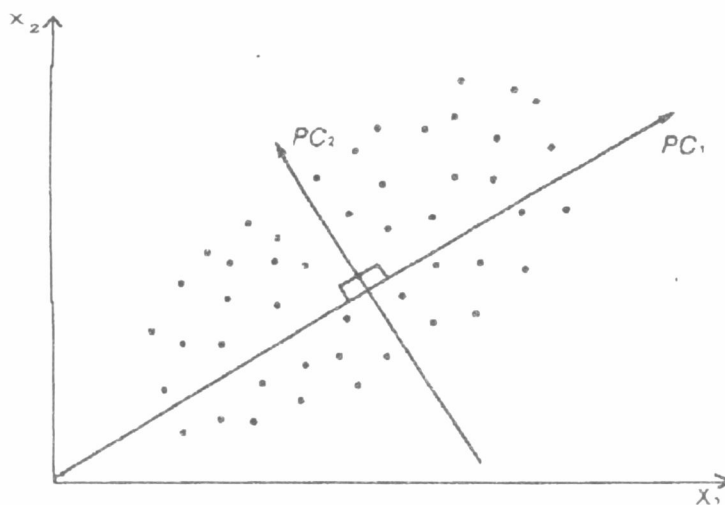


Fig. 4. Principal components of two variables
Source: Lehmann (1989)

The principal components are uncorrelated (orthogonal); the first principal component accounts for the maximum possible proportion of the total variation of all the original variables, the second contains as much as possible of the remaining variation in the X 's, and so on (Koutsoyiannis, 1977; Cooper and Weekes, 1983; Lehmann, 1989). This transformation of the original vector variable to the vector of principal components amounts to a rotation of co-ordinate axes to a new co-ordinate system that is applicable

to inherent statistical proportions (Anderson, 1984). A rotation of the original components is presented in Fig. 5.

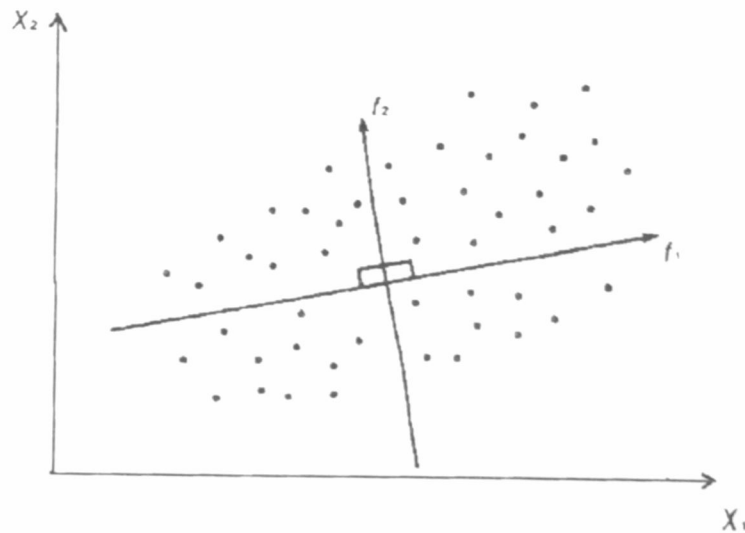


Fig. 5. Rotation of original components.
Source: Lehmann (1989)

A variety of useful statistical properties is attributed to principal components analysis (Rao, 1964; Kshirsagar, 1972):

- the first principal component has the largest variance of any unit-length linear combination of the observed variables;
- the first j principal components are the best linear predictors of the original variables among all possible sets of j variables. A least-square solution is obtained in this model through the first j principal components: $Y = XB + E$, where
 Y : is an $(n \times p)$ matrix of the centered observed variables;
 X : is the $(n \times j)$ matrix of scores on the first j principal components;
 B : is the $(j \times p)$ matrix of eigenvectors;
 E : is an $(n \times p)$ matrix of residuals, $\min \text{tr } E' E$.

Comparative tests have been developed to define the number of extracted factors with the use of principal components analysis that will be retained in each case applied. Kaiser (1960) claims that only factors with eigenvalues greater than one should be retained, while another method, the Scree test (Hair *et al.*, 1987) plots the eigenvalues and the shape of the resulting curve determines the cut-off point.

Correspondence analysis provides the best simultaneous representation of two data sets that comprise the rows and columns of a data matrix (Lebart *et al.*, 1984). While principal components analysis is used for tables of continuous measurement,

correspondence analysis is applied to contingency tables. This type of data analysis is popular in France and Japan and has been used in market research.

Multiple correspondence analysis is an extension of two-way correspondence analysis. This method requires the square matrix $B = Z'Z$, where Z is the matrix of responses, to be a Burt table. A Burt table is a partitioned symmetric matrix containing all pairs of cross tabulations among a set of categorical variables.

Market shares forecasting

The market shares estimation is based on the utility functions estimated by the UTASTAR model for a set of consumers: $J = \{1, 2, \dots, k\}$. This is accomplished by evaluating a product's purchasing probabilities for each single consumer, based on the formulae:

i) **Luce** (1959, 1977):

$$P(a_i; A) = u[\underline{g}(a_i)] / \sum_{l=1}^m u[\underline{g}(a_l)] \quad i=1,2,\dots,m \quad (2)$$

ii) **Lesourne** (1977):

$$P(a_i; A) = (u[\underline{g}(a_i)])^2 / \sum_{l=1}^m (u[\underline{g}(a_l)])^2 \quad i=1,2,\dots,m \quad (3)$$

iii) **Spiliopoulos** (1987):

$$P(a_i; A) = \begin{cases} \frac{1}{R} & \text{when } u[\underline{g}(a_i)] = \max_{a \in A} \{u[\underline{g}(a)]\} \\ 0 & \text{otherwise} \end{cases} \quad (4)$$

where $P(a_i; A)$ is the purchasing probability of the product a_i from the set A of available products, and R is the number of products providing the maximum utility.

The first formula estimates the sales probability of a product with respect to the total utility obtained with the purchase of all products. The second, places greater emphasis on utilities of higher value while the third, assumes that unless a consumer gains the maximum utility he/she does not purchase the product. The estimated probability by Spiliopoulos (1987) can be considered as a short run criterion but it lacks the dynamic projection of the purchasing probability of a product.

Therefore for each consumer j , the probability of purchasing each market product is

$$[P_j(a_1), P_j(a_2), \dots, P_j(a_m)]^T, \quad j=1,2,\dots,k \quad (5)$$

The evaluation for each single product is retrieved

$$S_i = \sum_{j=1}^k P_j(a_i) \quad i=1,2,\dots,m \quad (6)$$

Finally, the market share for product a_i is estimated:

$$MA(a_i) = 100 * S_i / \sum_{l=1}^m S_l \% \quad i=1,2,\dots,m \quad (7)$$

Implementation

All the products examined in the conducted survey form the product base with a maximum number of 36 products. The utilised DSS system provides the flexibility of either inserting new products or discarding others. The system user has the opportunity of creating new partial reference markets. The data from the initial reference market are processed applying the three formulae of the previous section.

The results, compared with the existing product market shares, identify the formula which will be implemented. New market shares are generated by experts introducing multicriteria evaluations of the product under development. The new product utility is estimated according to the appropriate formula. Various market penetration scenarios for the new product are feasible through the modification of the multicriteria evaluations. The outcomes, based on the different strategies, are compared and the optimum market policy is selected for the firm (Fig. 6).

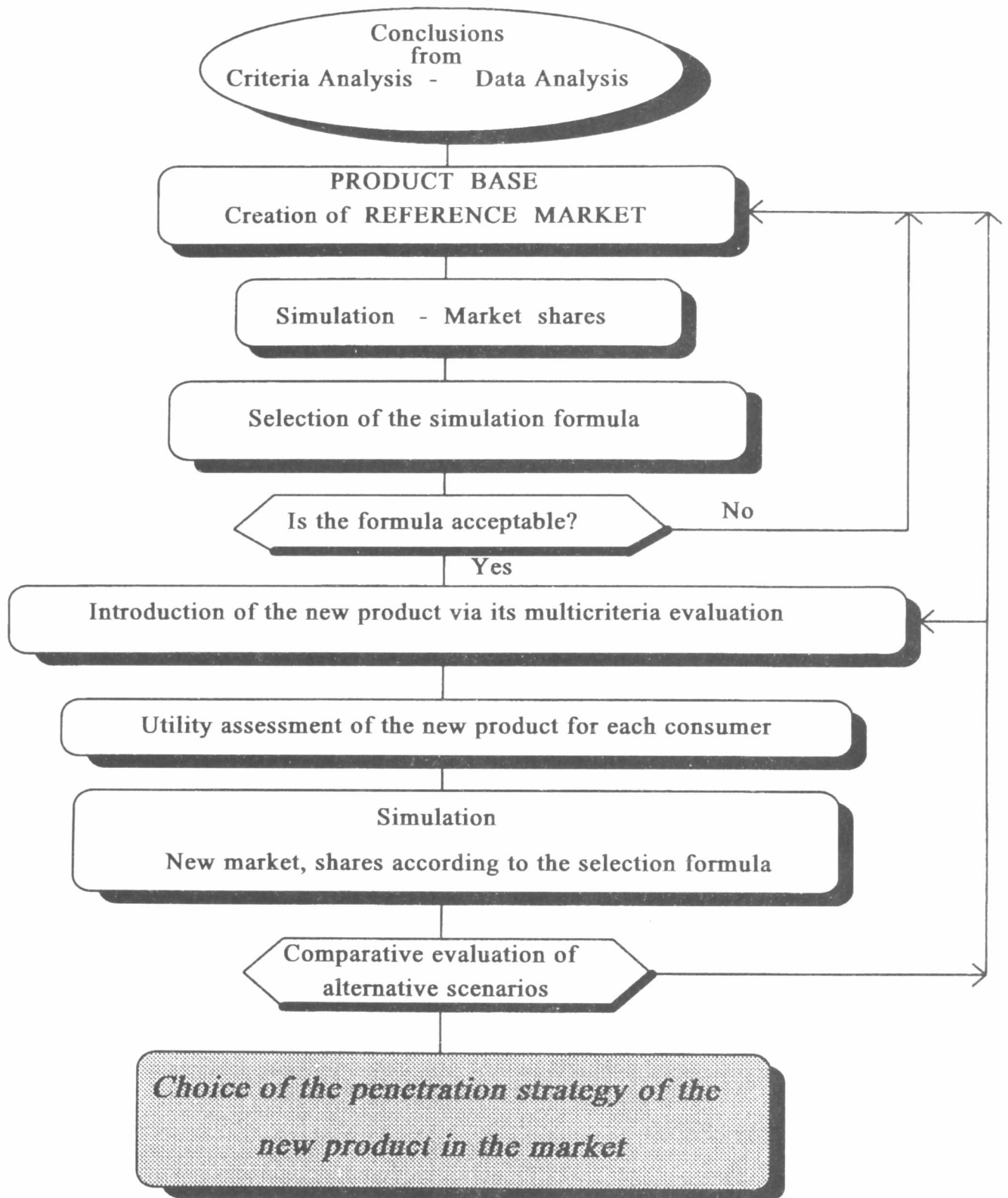


Fig. 6. Optimum market penetration strategy
Source: Siskos and Matsatsinis (1993)

APPENDIX I

The UTA algorithm

Given a subjective consumer ranking (\succsim, \sim) on a set of reference products $A_R = \{a_1, a_2, \dots, a_k\}$, where they are rearranged so that $a_j \succ a_{j+1}$ (a_j preferred to a_{j+1}), or $a_j \sim a_{j+1}$ (a_j indifferent to a_{j+1}), for every $j = 1, 2, \dots, k-1$, the UTA algorithm procedure runs in four steps:

Step 1

Express the global utilities of reference products $u[\underline{g}(a_j)]$, $j = 1, 2, \dots, k$, first in terms of marginal utilities $u_i(g_i^l)$, then in terms of variables:

$$w_{il} = u_i(g_i^{l+1}) - u_i(g_i^l) \geq 0, i = 1, 2, \dots, n; l = 1, 2, \dots, a_i - 1 \quad (1)$$

by means of the relations

$$u_i(g_i^1) = 0 \text{ and } u_i(g_i^l) = \sum_{t=1}^{l-1} w_{it}, \forall i \text{ and } l > 1 \quad (2)$$

Step 2

Introduce two error functions σ^+ and σ^- by writing for each pair of consecutive products in the ranking, the analytic expressions:

$$\Delta(a_j, a_{j+1}) = u[\underline{g}(a_j)] + \sigma^+(a_j) - \sigma^-(a_j) - u[\underline{g}(a_{j+1})] - \sigma^+(a_{j+1}) + \sigma^-(a_{j+1}) \quad (3)$$

Step 3

Solve the linear program:

$$\text{Minimize } F = \sum_{j=1}^k [\sigma^+(a_j) + \sigma^-(a_j)] \quad (4)$$

under the set of constraints:

for $j = 1, 2, \dots, k-1$:

$$\Delta(a_j, a_{j+1}) \geq \delta \text{ if } a_j \succ a_{j+1} \quad (5)$$

$$\Delta(a_j, a_{j+1}) = 0 \text{ if } a_j \sim a_{j+1} \quad (6)$$

$$\sum_i \sum_l w_{il} = 1$$

$$w_{il} \geq 0, \quad i = 1, 2, \dots, n; \quad l = 1, 2, \dots, \alpha_i - 1 \quad (7)$$

$$\sigma^+(a_j) \geq 0, \quad \sigma^-(a_j) \geq 0, \quad j = 1, 2, \dots, k \quad (8)$$

δ being a small positive number.

Step 4

Test the existence of multiple optimal or near optimal solutions of the linear program (4) - (8) (stability analysis); in case of non uniqueness, find the mean additive utility of those (near) optimal solutions which maximize the objective functions

$p_i = u_i(g_i^*) = \sum_l w_{il}$ for all $i = 1, 2, \dots, n$ on the polyhedron (5) - (8) bounded by the new constraint:

$$\sum_{j=1}^k [\sigma^+(a_j) + \sigma^-(a_j)] \leq F^* + \varepsilon \quad (9)$$

F^* being the optimal value of the linear program in step 3 and ε a very small positive number.

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CHAPTER 4

THE OLIVE OIL PRODUCT

4.1. Description

Olive oil has great nutritional, social and economic importance for many regions in the world. There are approximately 805 million olive trees, the majority of which 98% is in the Mediterranean Basin (Guerbaa, 1987). World olive tree distribution is shown in Fig.1.

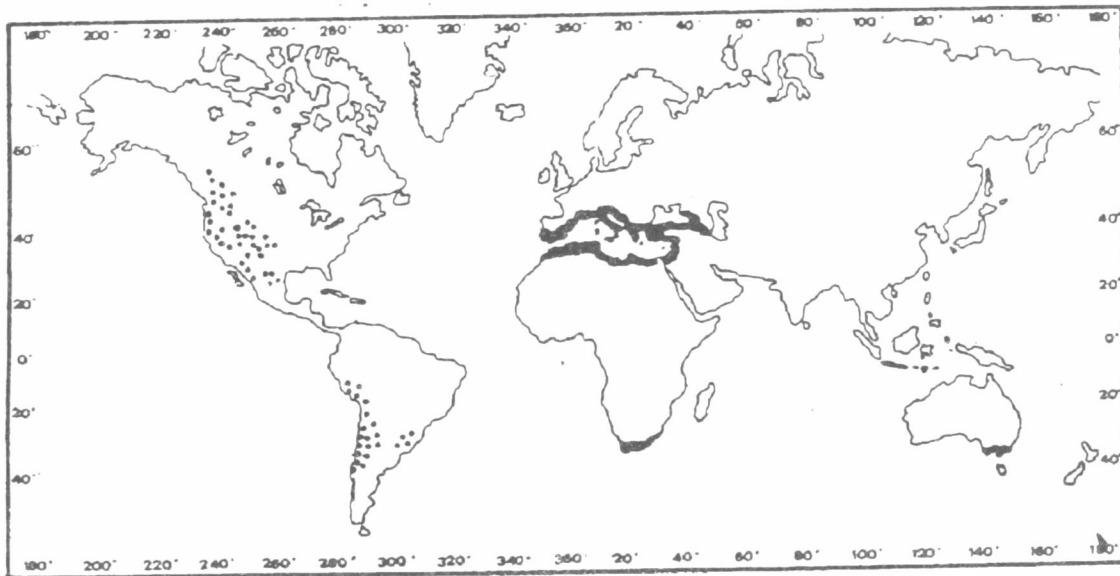


Fig. 1. Olive tree cultivation areas
Source: Kiritsakis (1988)

Olive oil in the EC countries constitutes the total or partial income of over two million farmers, that is in Italy (900,000), Spain (550,000), Greece (350,000), Portugal (200,000) and France (45,000) (Panorama of EC Industry, 1990).

Olive oil is the oil obtained solely from the fruit of the olive tree, to the exclusion of oils obtained using solvents or re-esterification processes and of any mixture with oils of other kinds. Olive oil can be classified into four categories based on the quality criteria of its organoleptic characteristics of free acidity, peroxide value and ultra-violet (International Olive Oil Council - IOOC, 1992).

Definitions of olive oils and olive-pomace oils are given in Appendix 1. The quality criteria applied to the different types of olive oil and olive-pomace oil are shown in Table 1 (Appendix 2*).

Data from the Central Greek Co-operative Olive Oil Union (Elaiourgiki), and the principal olive oil marketing co-operatives of Crete, indicate that 65% of Greek and Cretan olive oil production is extra virgin olive oil. Therefore, an emphasis is expected to be placed by this research on this type of oil.

4.2. Nutritional, biological and medical characteristics of olive oil

Numerous studies have been conducted on the effect of olive oil consumption on atherosclerosis, digestion, childhood bone and brain growth and ageing. A study by Christakis *et al.* (1980), showed that olive oil is rapidly digested and completely absorbed. It has clinical applications to anti-ulcer regimens and in gallbladder disease. Countries with high olive oil consumption show low rates of coronary heart disease. Two rural areas of Greece, the islands of Crete and Corfu, were selected for an examination of the relationship between characteristics of life, diet and personal habits and the incidence of cardiovascular disease (CVD); on both islands, particularly in Crete, rates of CVD were low (Aravanis, 1980).

A seven-country study of the incidence of major coronary diseases, showed that a diet high in olive oil and low in animal fats was correlated with a low incidence of coronary heart disease (Keys, 1980). In this research Greece stands out with a low incidence rate of heart disease with the explanation being the dominance of olive oil in the diet. Experimental studies have indicated that olive oil protects arteries, the stomach and the liver. It also promotes growth during childhood and extends life expectancy (Viola and Audisio, 1987).

A study which was conducted on middle aged Italians showed that olive oil consumption is inversely correlated with blood cholesterol and glucose levels and blood pressure (Trevisan *et al.*, 1990).

* Appendix 2 includes Tables 1-17.

4.3. The olive oil market

4.3.1. Greek domestic market

Olive oil production is of great social and economic value to a large portion of the Greek population. Kiritsakis (1988), states that 400,000 families benefit from olive oil cultivation. Almost 50% of Greek farms grow olive trees in a part of their land, and in some islands such as Crete, almost all farms have some olive tree culture (Papageorgiou, 1987).

The production of olive oil in geographic areas of Greece in the years 1975-1990, is presented in Table 2. The overall average distribution of the domestic olive oil production regarding the Greek geographic areas for the same crop years, is displayed in Fig. 2.

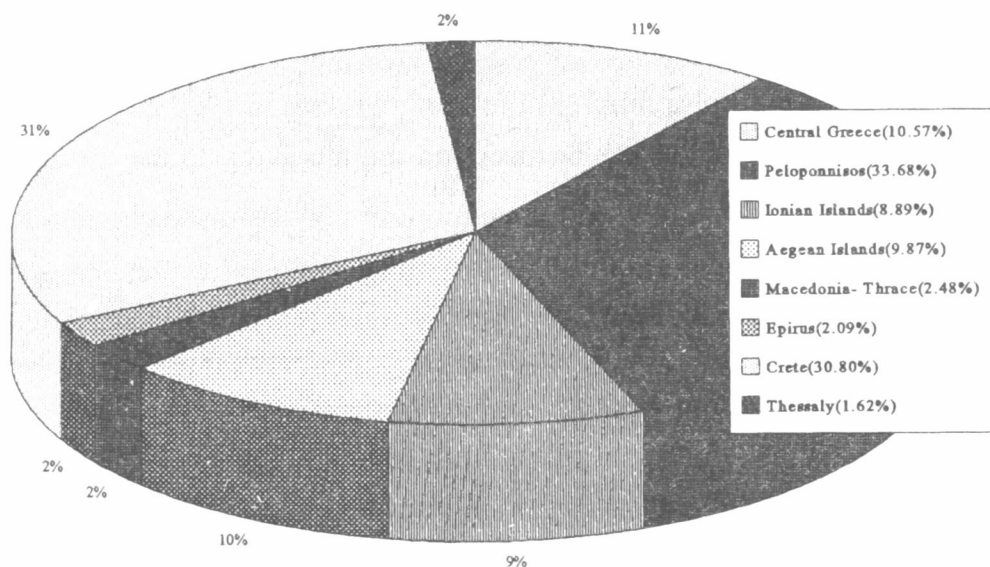


Fig. 2. Distribution of Greek olive oil production, 1975-1989, (average in thousands of tonnes)

Source: National Statistical Service of Greece (1991)

Olive oil consumption has been stabilised in recent years at approximately 20 kg/person (Table 3 and Fig. 3).

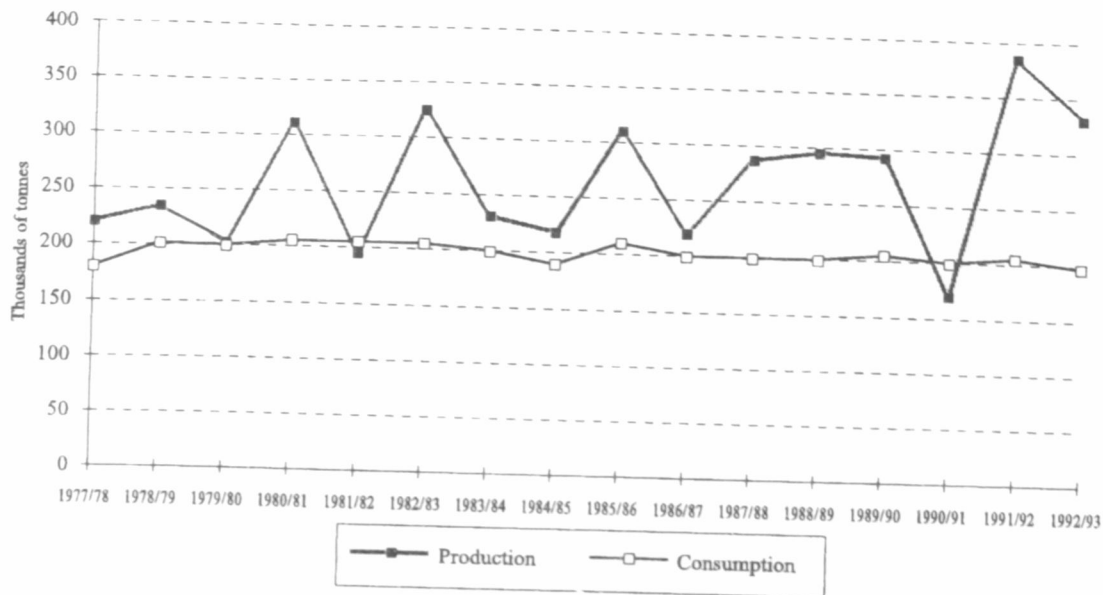


Fig. 3. Greek olive oil production and consumption 1977-1991 (000's of tonnes)

Source: IOOC (1991)

There was an olive oil surplus from 1977 to 1989; whereas in 1990 there was a shortage. A small decline in consumption can be identified and this is due to the advantage of seed oils and cooking fats (Table 4, Fig. 4).

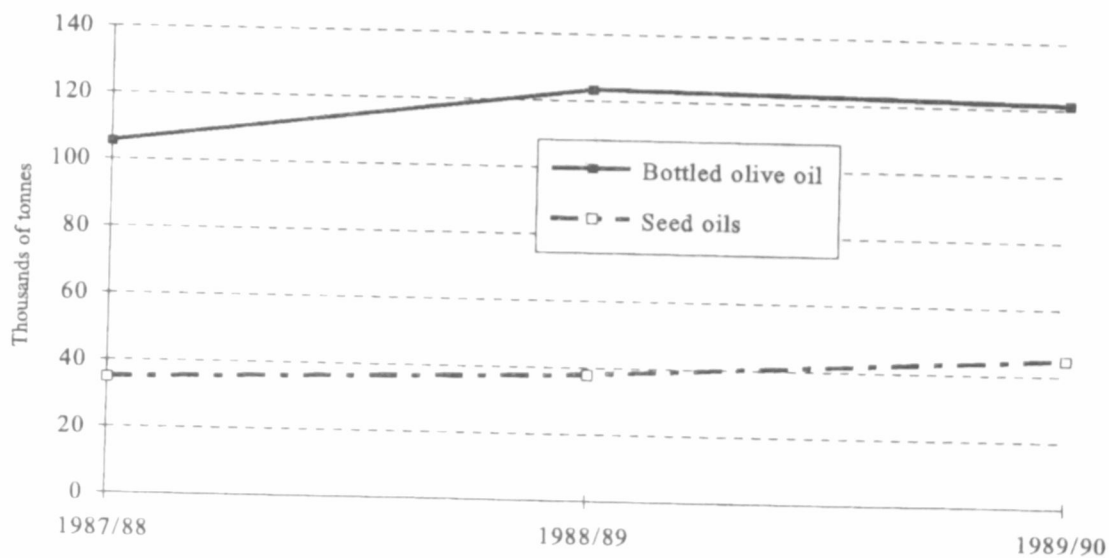


Fig. 4. Olive and seed oil consumption 1987-1990, (000's of tonnes),
Source: Elaiourgiki (1990)

A significant increase in the proportion of olive oil processed through packaging or bottling has been noticed since 1987/88 (Fig. 4); the consumption aid under the EC olive oil regulations is the main cause. A significant percentage of annual olive oil production is consumed by the olive growers' immediate surroundings and the remainder is

processed through the marketing distribution channels to the end users in a variety of packaging schemes.

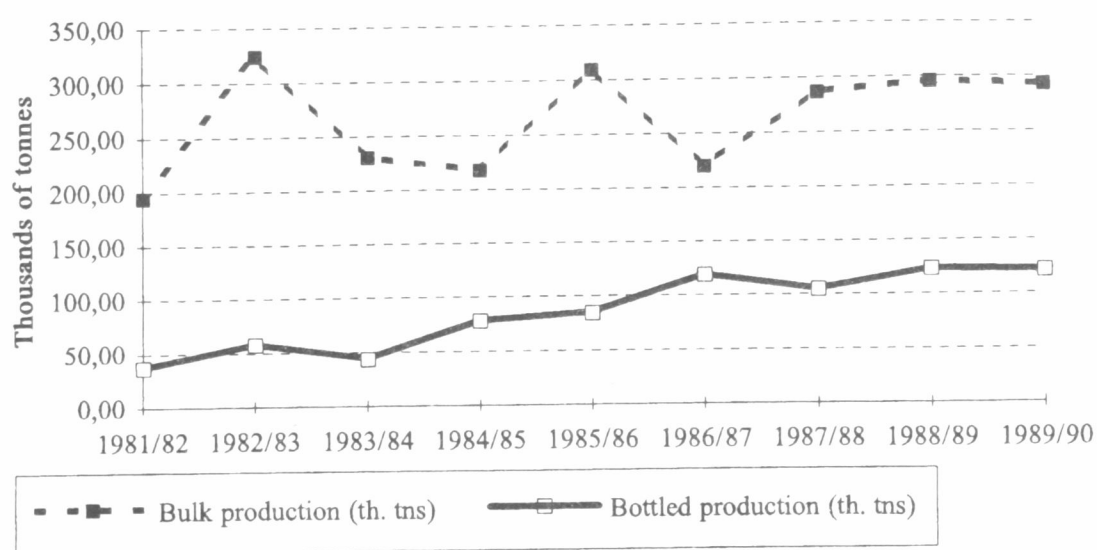


Fig. 5. Bulk and bottled olive oil production in Greece 1981-1990, (000's of tonnes), Source: Elaiourgiki (1990)

4.3.2. Olive oil marketing distribution system

The distribution channels for olive oil are complex, long and sometimes unreliable. Many stages are involved in the chain: the grower, privately-owned or co-operative mills, packaging and bottling units, brokers, distributors, wholesalers and retailers.

The trading activities of exporting and importing are among the main factors affecting the olive oil distribution system. Italy absorbs significant proportions of high quality Greek olive oil; a quantity of insignificant value is also distributed to Spain (Table 5).

Exports are in bulk, mainly used for lowering the acidity and thus improving the locally produced olive oils. Other countries importing Greek olive oil are France, the USA, Canada, Australia, and Arab states. The ex-Soviet Union was among the main importers but due to recent political and economic events, there is no current trade. Recently, lower quality olive oil has been imported into Greece. Its inferior taste and quality have contributed to the confusion of consumers concerning types of olive oil and their attributes. The main economic and trade figures for the Greek olive oil market are shown in Table 6 and Fig. 6.

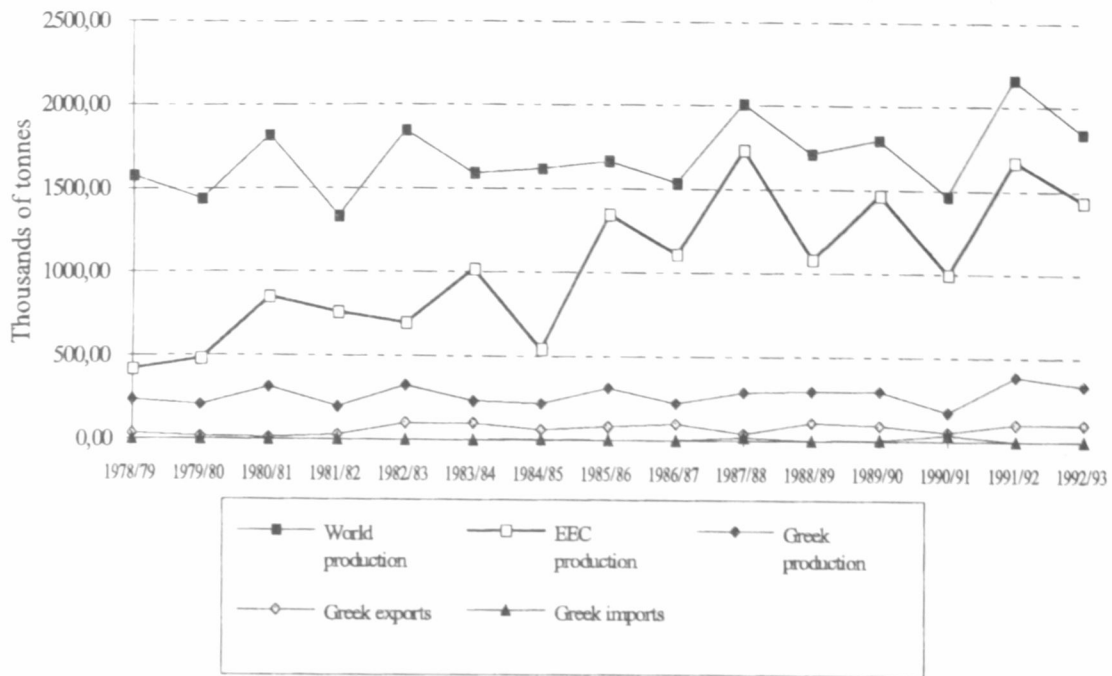


Fig. 6. Olive oil production and trade figures 1978-1991 (thousands of tonnes)
Source: IOOC (1991, 1992)

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The size of Greek olive oil production and export variables signify this product's importance for the Greek economy. Olive tree cultivation is suitable for the Greek climate and is an ideal crop for part-time farming, a common phenomenon especially in tourist areas such as Crete. Moreover, olive picking offers employment to local population which is of vital importance for the less-developed rural areas. Farms on the islands of Greece are small, labour-intensive and family run. Olive growing offers a supplementary source of income which can be combined with agrotourism or other tourist services in the summer months. A decline in olive farming is expected to lead to soil erosion, desertification and rural depopulation. The factors and the stages in olive oil marketing and distribution are shown in Fig. 7.

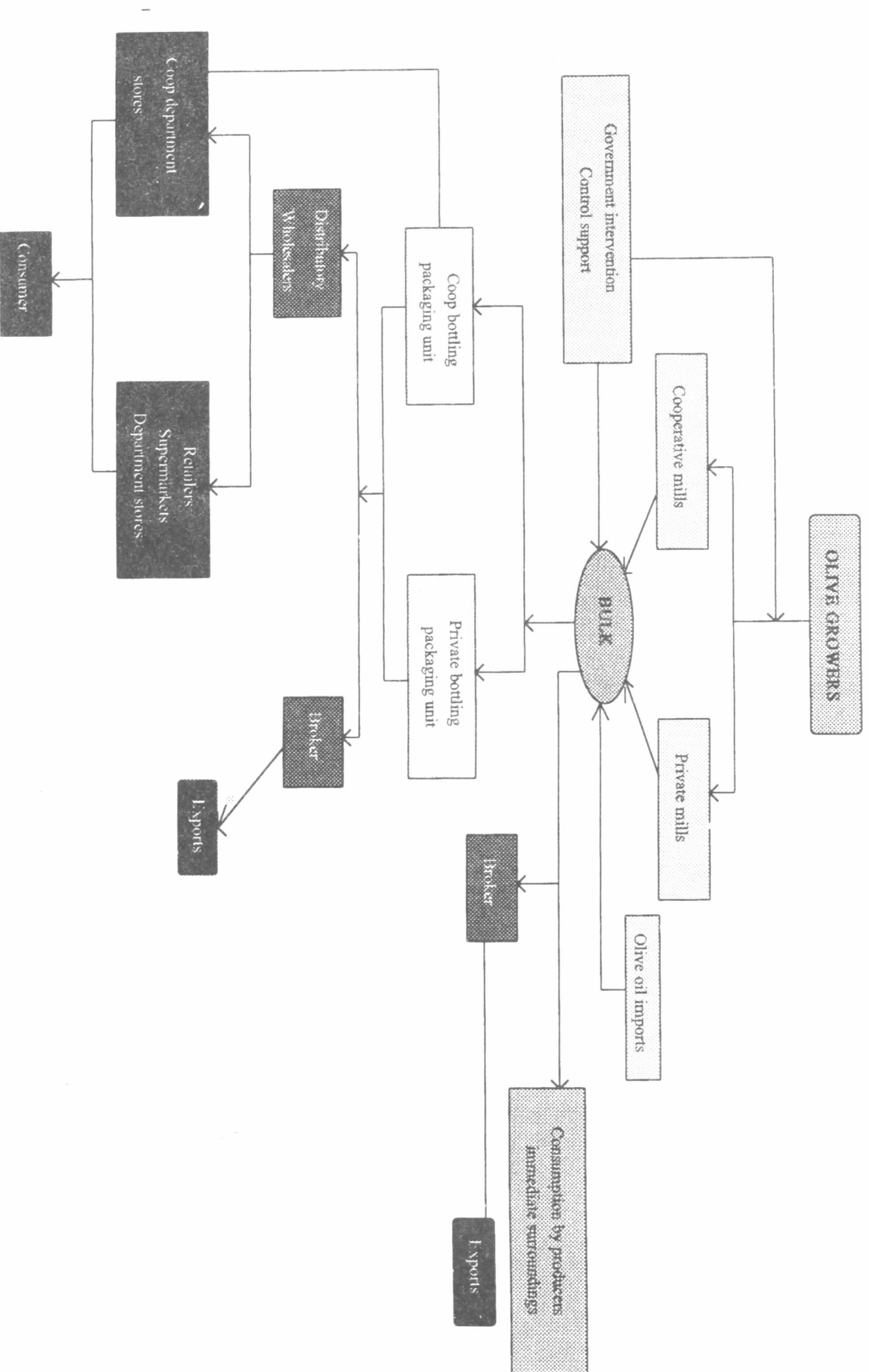


Fig. 7. Olive oil distribution

4.3.3. International olive oil market

In addition to southern EC olive oil producing countries, other producing countries are mainly located in the Mediterranean basin: Turkey, Tunisia, Morocco, Syria and Algeria. Among the non-Mediterranean countries, only Argentina has a significant share of the total. World and EC olive oil production for 1978-91 is shown in Table 7 and Fig. 8.

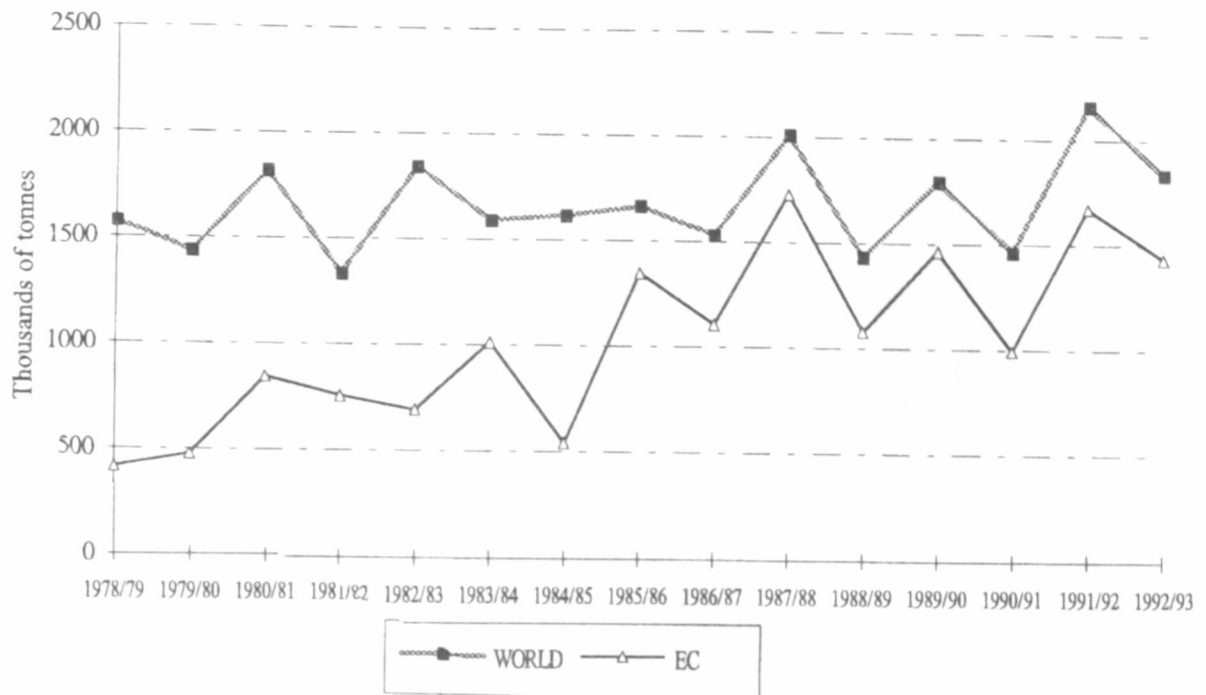


Fig. 8. World and EC olive oil production, 1978-1993 (thousands of tonnes)

Source: IOOC (1991, 1992)

Olive oil production fluctuates from one crop year to another. This has an impact on prices, producer income and constant supply. Italy, Spain, and Greece are the main EC producers, followed by Portugal and France (Table 8, Fig. 9). A supply analysis of the Greek olive oil has been attempted by Xekalakis (1980), using price, production capacity, capital invested, agricultural wages and technological changes as explanatory variables.

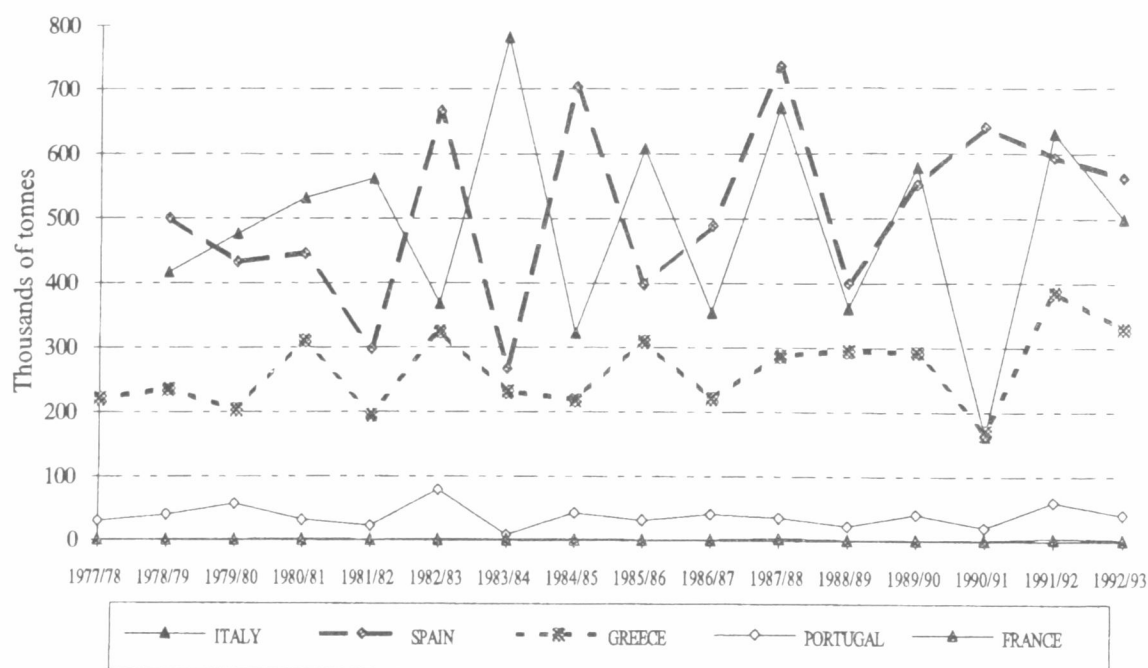


Fig. 9. Olive oil production in Italy, Spain, Greece, Portugal and France, 1977-1993 (thousands of tonnes). Source: IOOC (1991, 1992)

The decrease in Italian and Greek production in 1990 had an immediate impact on olive producer prices, while the sharp increase in the olive oil production of the same countries decreased the producer prices drastically (Table 9). The increased price differential between olive oil and its close substitutes, the vegetable oils, led to a rapid increase in the consumption of the latter. A way to cope with this, lies in the development of high quality products and markets through increased consumer awareness of the superior elements of olive oil and the differences among olive oil types (Patsis, 1988).

On the demand side, world consumption is independent of the rate of production (Table 10, Fig. 10). EC olive oil consumption accounts for most of the world consumption. The traditional olive oil EC producer - states are the major consumers as well (Table 11, Fig. 11). Greece has had a stable consumption rate of 20 kg/person, in the 1977-93 period. Italian and Spanish consumption has varied with a slow increasing tendency while consumption in Portugal and France has been rising steadily.

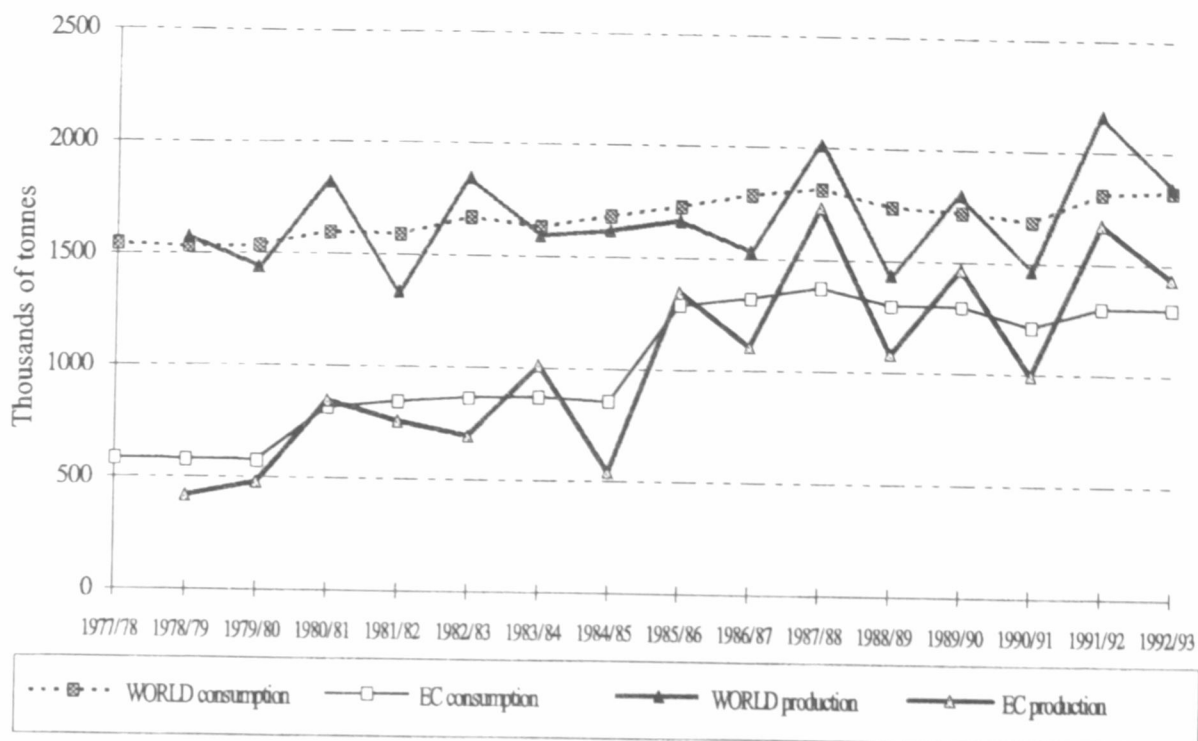


Fig. 10. Comparison of EC and world olive oil production and consumption, 1977-1993
(thousands of tonnes). Source: IOOC (1991,1992)

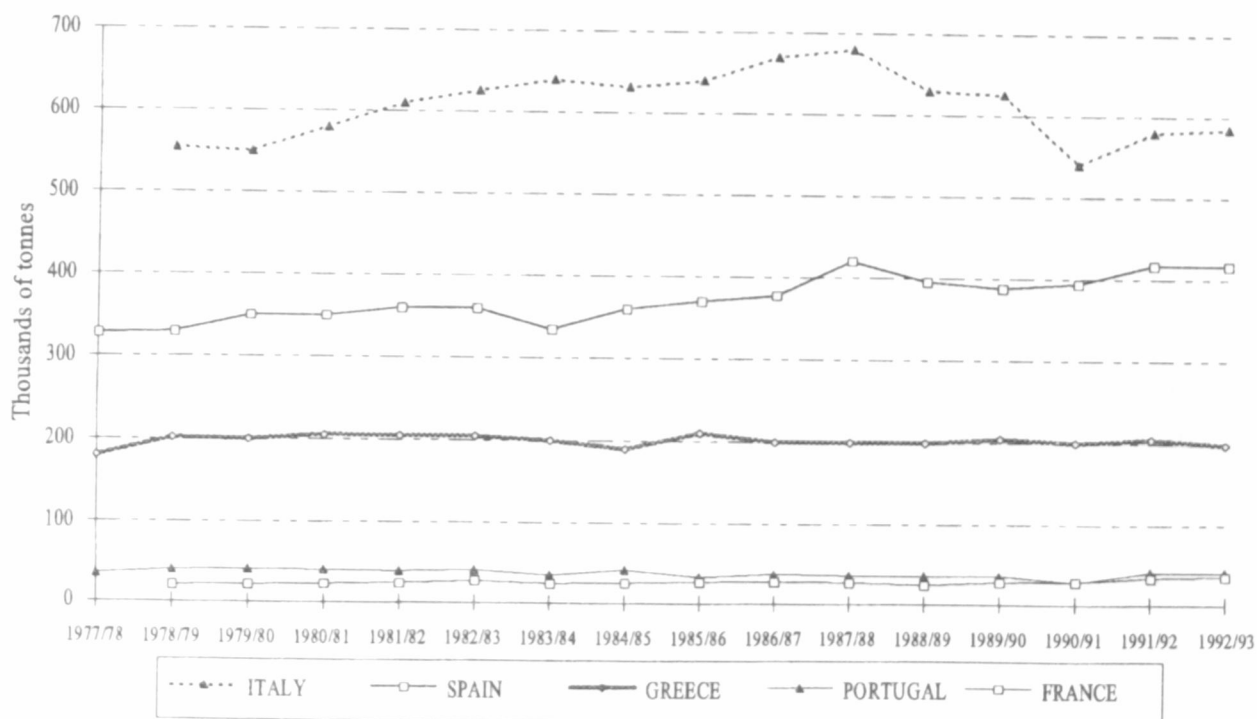


Fig. 11. Olive oil consumption in Italy, Spain, Greece, Portugal, France, 1977-1993
(thousands of tonnes). Source: IOOC (1991, 1992)

Amongst non-producer countries, Germany and Great Britain, have had low consumption but a significant rate of growth (Table 12, Fig. 12).

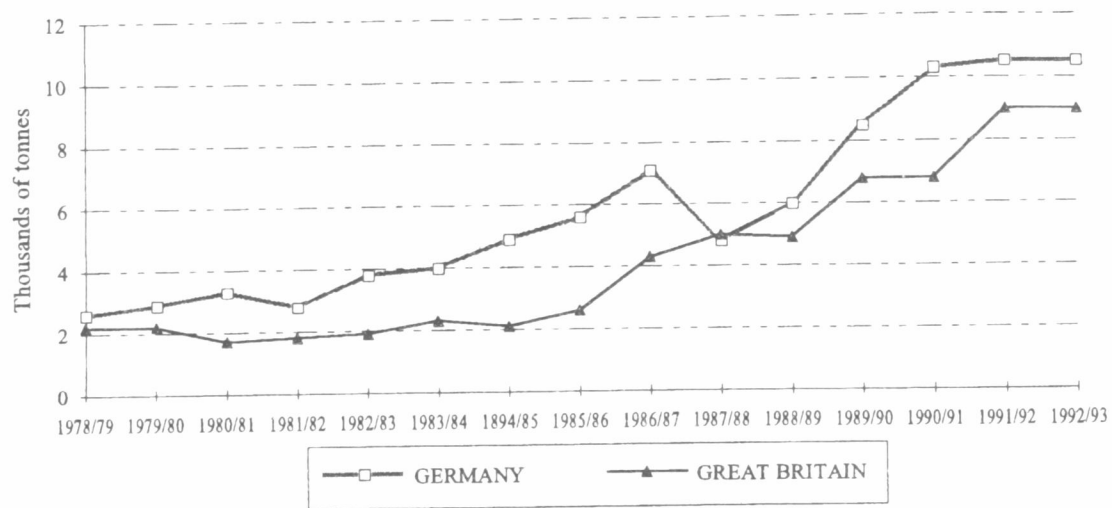


Fig. 12. Olive oil consumption in Germany and Great Britain 1978-1993
(thousands of tonnes). Source: IOOC (1991, 1992)

Growing consumer awareness in these countries of products with health-related attributes and their purchasing powers provide a potential for expansion of the olive oil market. The rate of consumption in the rest of EC states is insignificant and thus a unique opportunity for market penetration exists in these countries. High quality extra virgin olive is ideal for applying niche marketing strategies. Apart from the EC countries with a respectable olive oil consumption, in the Mediterranean basin countries such as Turkey, Tunisia, Syria, Libya, Morocco and Algeria have had a long tradition of olive oil consumption. Of these, Tunisia, Turkey and Morocco are major exporters (Table 13, Fig. 13).

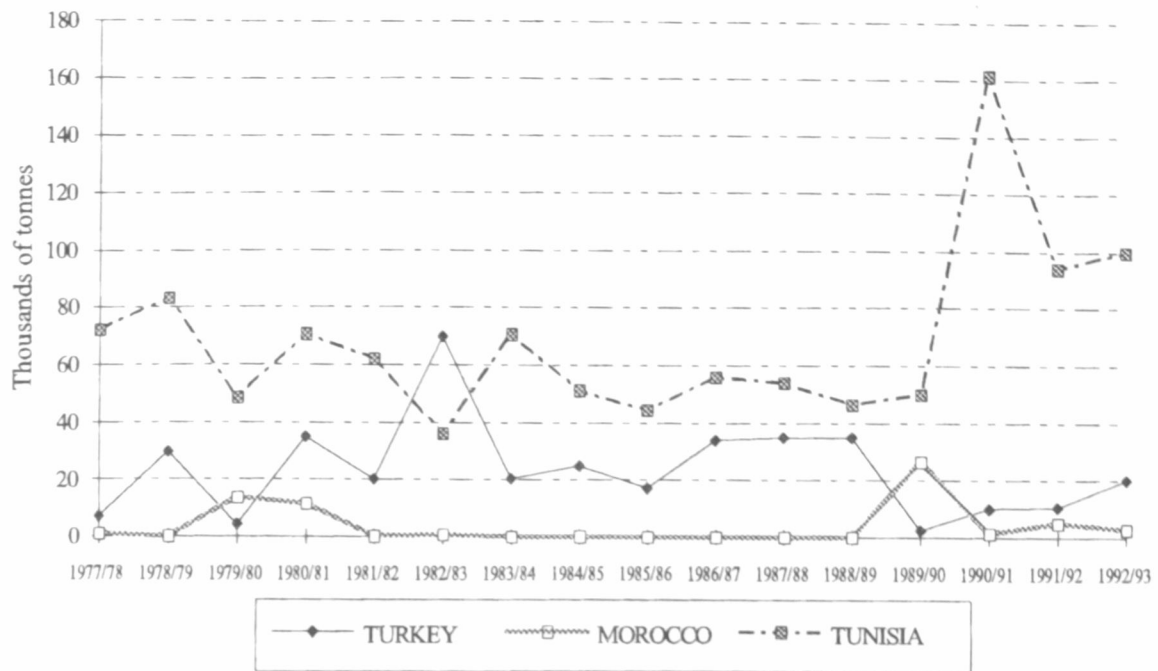


Fig. 13. Olive oil exports from Turkey, Morocco and Tunisia, 1977-1993, (thousands of tonnes). Source: IOOC (1991, 1992)

The North American and Australian olive oil markets are expected in the short run to play a more active role in the world olive oil market. Their steady increase in consumption is shown in Table 14 and Fig. 14.

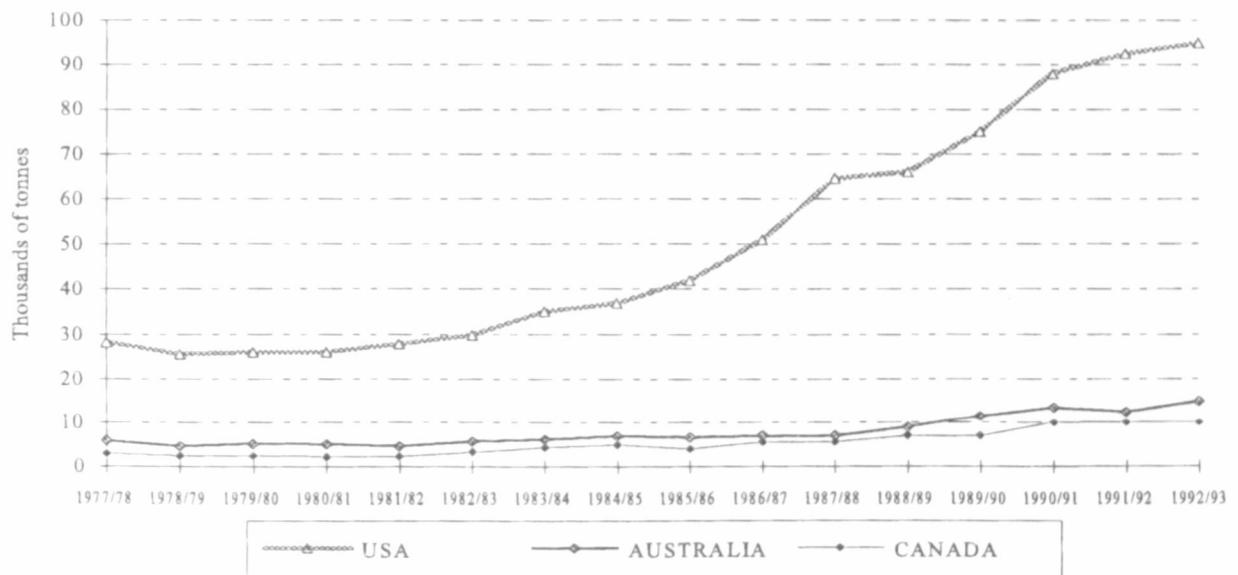


Fig. 14. Olive oil consumption in the USA, Canada and Australia, 1977-1993 (thousands of tonnes). Source: IOOC(1991, 1992)

The rate of olive oil exporting activities is consistent with the production rate of each crop year (Table 15, Fig. 15).

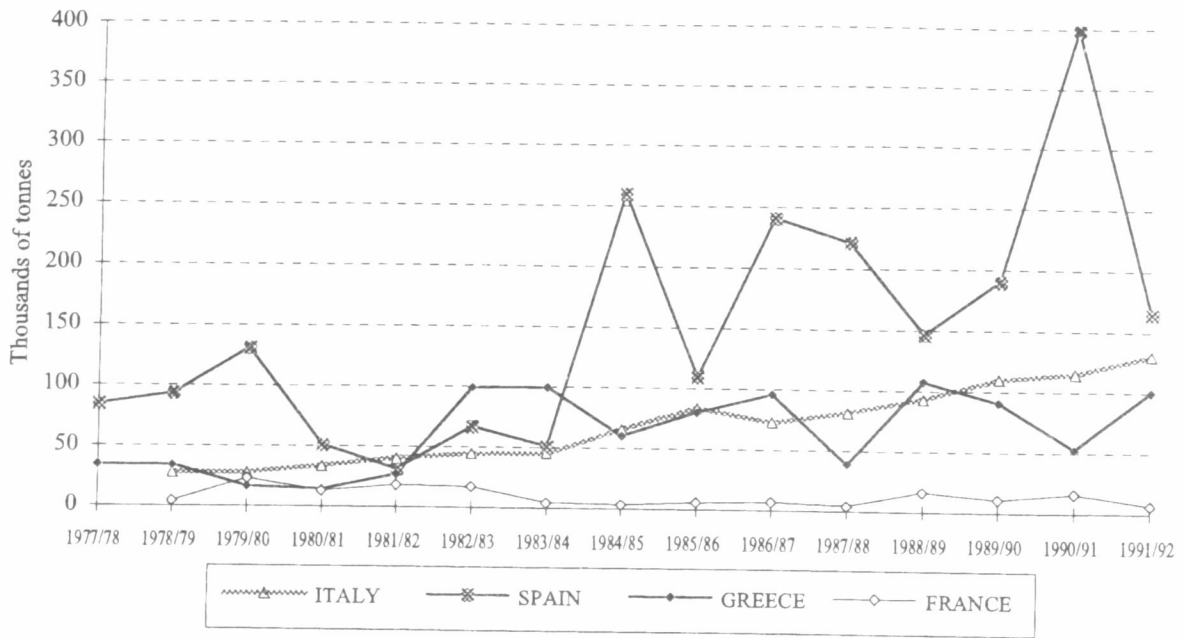


Fig. 15. Olive oil exports from Italy, Spain, Greece and France 1977-1993 (thousands of tonnes). Source: IOOC (1991, 1992)

The Mediterranean basin is the centre of almost all international olive oil marketing activities. Italy, Spain and Greece are the main exporting countries in relation to other European countries, North America, Australia, Japan and Libya. Inter-community trade also takes place within EC. Some producing countries import from Tunisia and Turkey; total imports are shown in Table 16 and Fig. 16.

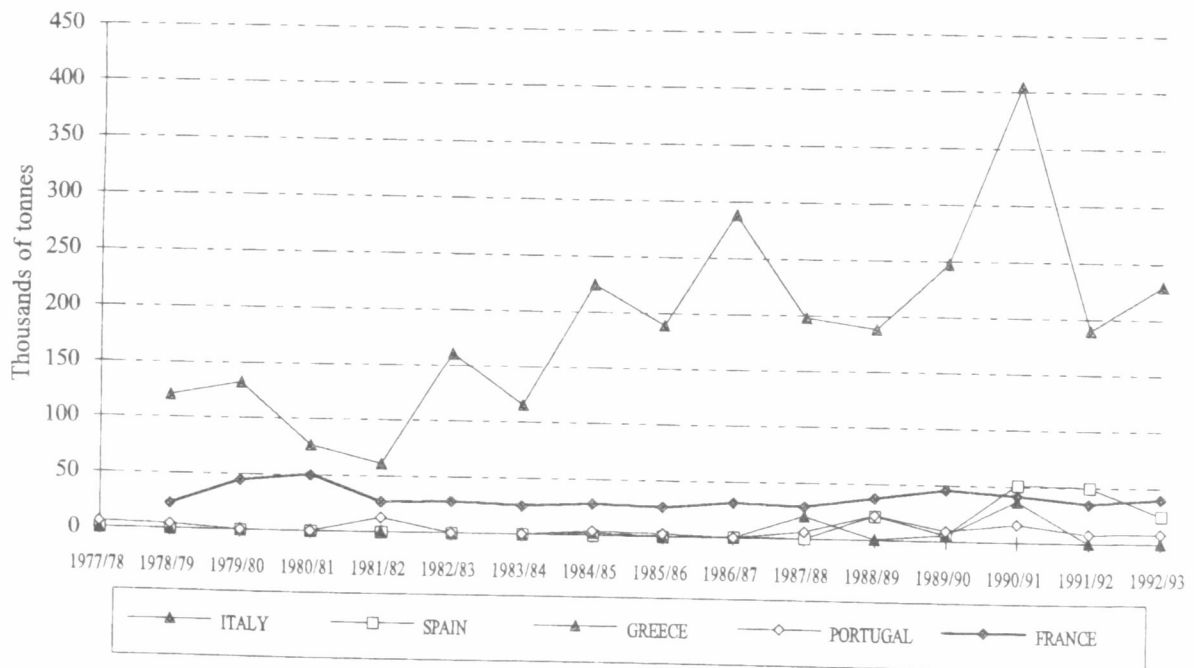


Fig. 16. Olive oil imports into Greece, Spain, Portugal, Italy and France, 1977-1993 (thousands of tonnes). Source: IOOC (1991, 1992)

4.4. EC - olive oil economic policies

The olive oil market in the EC, in the period of 1977-1980 and 1981-1985 (EC of 10) experienced an overall shortage. Since the integration of Spain and Portugal into the EC (1985/86-1992/93), olive oil has been in surplus. Forecasting (Box-Jenkins) techniques applied on the available olive oil production and consumption data, revealed a persistence of the production surplus. A slight consumption increase is expected in the olive oil markets of France and USA.

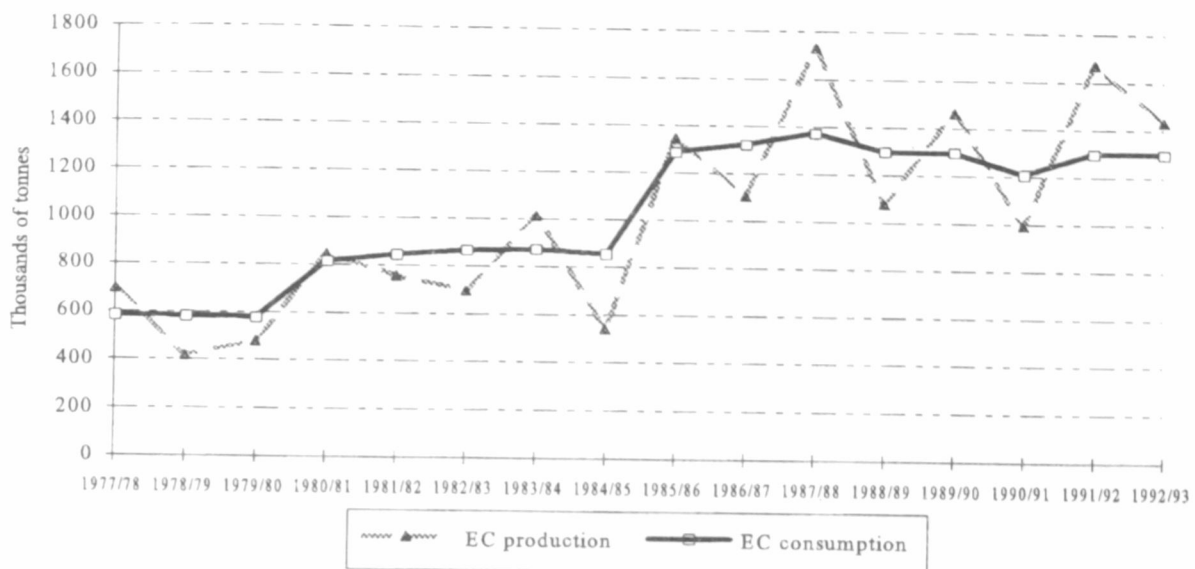


Fig. 17. Olive oil production and consumption in EC, 1977-1993 (thousands of tonnes)
Source: IOOC (1991, 1992)

The European Community regulations for olive oil originate from the Common Market Organisation (CMO) for olive oil which was established in 1966 (CEE. 136/66) for a common market for fats and oils. The importance of these regulations is illustrated by the fluctuations in olive oil production from one crop year to another. Production decreased by 37.5% (1987-88) and 31% (1989-90), and increased by 35.6% (1988-89) and 50% (1990-91). The role of the olive oil product within EC has been upgraded since all three main producer countries Spain, Italy and Greece are members of the Community. Among the main objectives of EC policy are restriction of production and increase in consumption over its main vegetable substitutes.

The olive oil price intervention system is complex, and includes the producer target price, the intervention price, the representative market price, the threshold price and the utilisation of a variable levy for imports and a variable refund for exports. Compensatory payments are also part of this system, offering production and consumption aid. Production aid is available to all EU olive oil producers and is approximately the difference between the producer target price and the representative market price.

Consumption aid is available to olive oil packaging firms, applicable to containers of 5 litres maximum capacity. The principal EC regulations for production, pricing, promotion and distribution of olive oil are given in Appendix 3.

4.5. Application to the Athenian olive oil market

Introduction

Extensive research was conducted in the greater area of Athens in Greece in order to:

- a) identify consumer preferences and attitudes with respect to Cretan olive oil qualitative attributes such as odour, colour, and taste;
- b) determine the preferences in packaging, labelling and product design and
- c) design effective promotional messages based on olive oil; nutritional and biological value for target market segments.

The overall aim is to design and develop a new Cretan olive oil product and identify the optimum market penetration strategy. Nine olive oil products were included in this study originating from agricultural co-operatives and private firms. Among the eighteen unions of Crete, four were selected because of the size of their total assets. The state representative in the olive oil market and four other private firms dominating the olive oil sales consisted the rest of the producer companies. Extra virgin olive oil products were selected for this survey, namely, Kolymvari, Kastelli, Peza, Sparta, Xorio, Elanthi, Astro, Spitiko and Knossos.

The average distribution of Cretan olive oil production for the four Cretan prefectures from 1975-1990 is as follows: Heraklio 44%, Lasithi 15%, Rethymno 12%, Chania 29%.

The survey and first results

Two hundred people were surveyed in a study of olive oil purchasing behaviour. The restrictions imposed on the sample size were that 60% of the respondents should be female and 40% male, more than 18 years old and that the majority should come from middle- sized families. Extra virgin olive oil was used daily by 62.19% of the consumers interviewed; those using pure olive oil, corn oil and sunflower were 25.87%, 3.48% and 5% of the sample, respectively (Fig. 18).

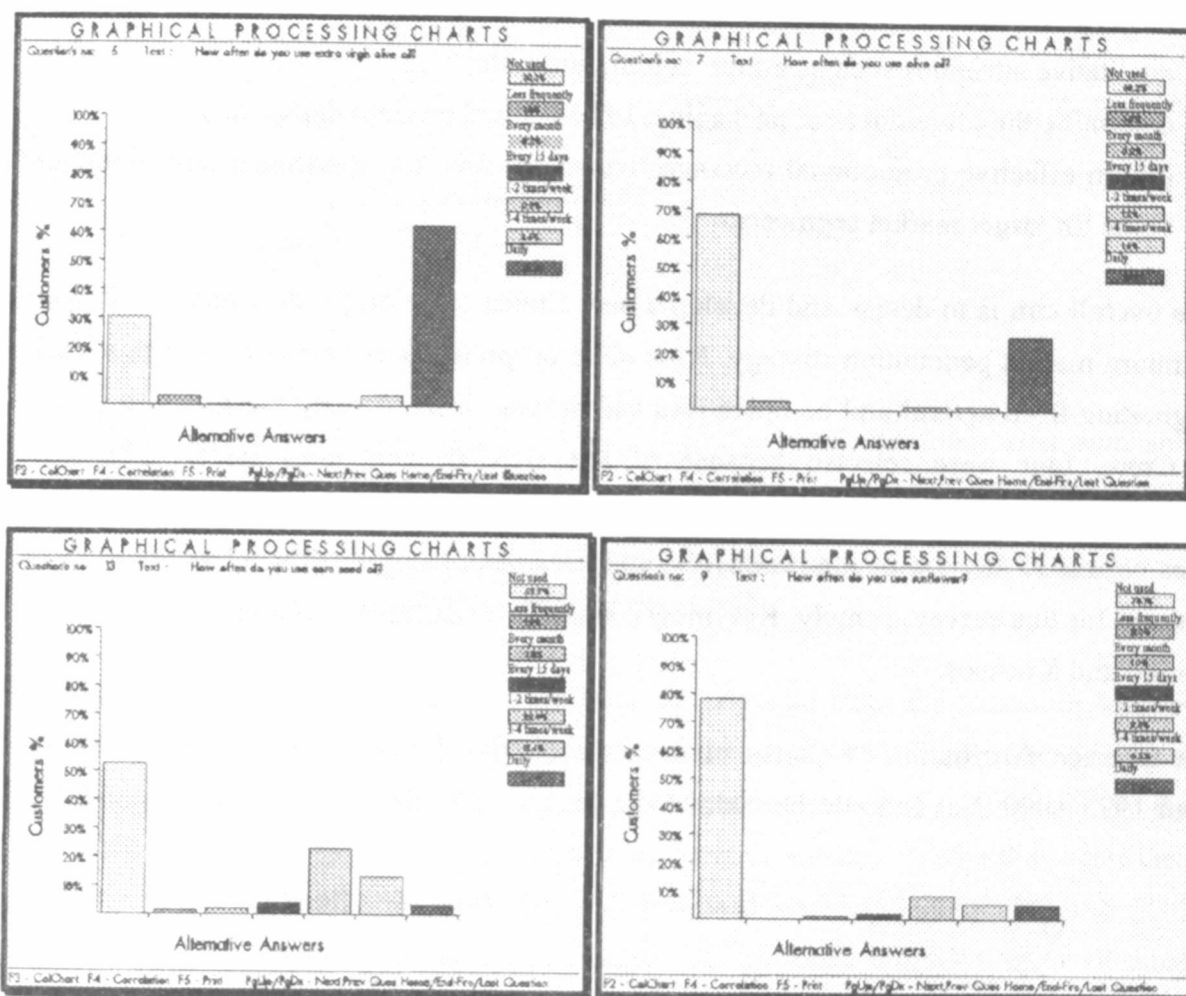


Fig. 18. Frequency of use of extra virgin olive, pure olive, corn and sunflower oils

Consumer preferences for natural characteristics of oils are presented in Table 1A. Extra virgin olive oil was preferred by a considerable portion of people to other oils for taste (66.17%), odour (59.20%), health (58.71%), colour (57.21%), liquidity (47.76%), quality (36.82%) and clarity (32.34%). Although a few consumers preferred it for clarity and quality characteristics, most consumers claimed ignorance about these characteristics.

PRODUCTS	Odour	Taste	Colour	Liquidity	Clarity	Quality	Health
Soya oil	2.49	3.48	2.99	3.48	4.48	2.99	7.46
Olive oil	11.94	18.91	12.94	7.96	6.47	8.96	15.92
Sunflower oil	1.49	1.00	1.00	2.49	2.99	1.00	1.99
Cotton seed oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Virgin oil	3.48	4.48	3.98	2.99	1.49	1.49	3.98
Corn oil	0.50	1.99	1.00	6.47	5.47	3.98	7.46
Extra virgin oil	59.20	66.17	57.21	47.76	32.34	36.82	58.71
I do not know	20.90	3.98	20.90	28.86	46.77	44.78	4.48

Table 1A. Consumer preferences (%) for natural oil attributes

Principal components analysis

The frequency of use of extra virgin olive, soya, sunflower, corn and olive oils and margarine in relation to age, income and family size is shown in Fig. 19. There are two distinct market segments, one for extra virgin olive oil and the other for olive oil. The competition between these two products is also confirmed by the corresponding value of the correlation coefficient (-0.802).

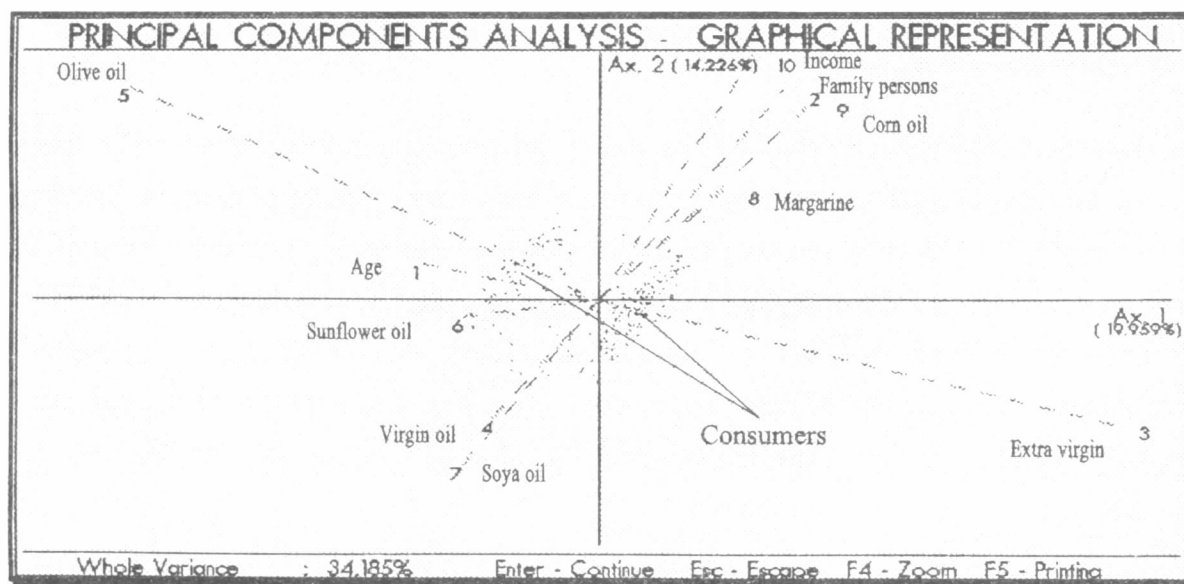


Fig. 19. Oil consumption frequency in relation to age, income and family size

The relationships among the different oils, their main use and their natural characteristics have been estimated. The two axes of Fig. 20 account for 44.4% of the total variance. This shows that extra virgin oil is used mainly in salads and cooking; olive oil is mainly

used for the same purposes. Corn and sunflower oils are mainly used in frying and to a much lesser extent in cooking and salads. Soya oil is used for all purposes. Health reasons, taste, odour and colour are the principle factors favouring extra virgin olive oil usage. Quality seems not to be significant for any oil.

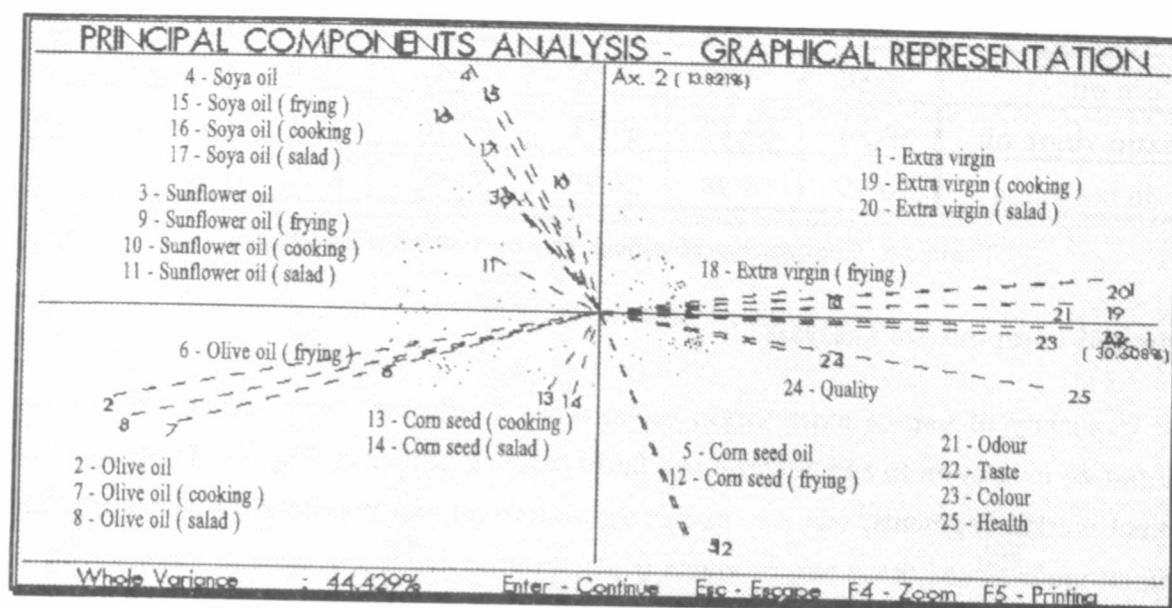


Fig. 20. Oil consumption, main use and natural attributes

Correspondence analysis

This method identifies interrelationships among possible alternative answers. The interdependence between the alternative selections for frequency of usage of extra virgin olive oil and corn oil is shown in Fig. 21. There is a positive relationship between extra virgin olive oil and corn oil. Monthly use of extra virgin is related to less frequent use of corn oil and less frequent use of extra virgin is related to monthly use of corn oil. Additionally, the daily use of extra virgin olive oil is negatively related to less frequent and daily use of corn oil, while it is positively related to monthly use of corn oil.

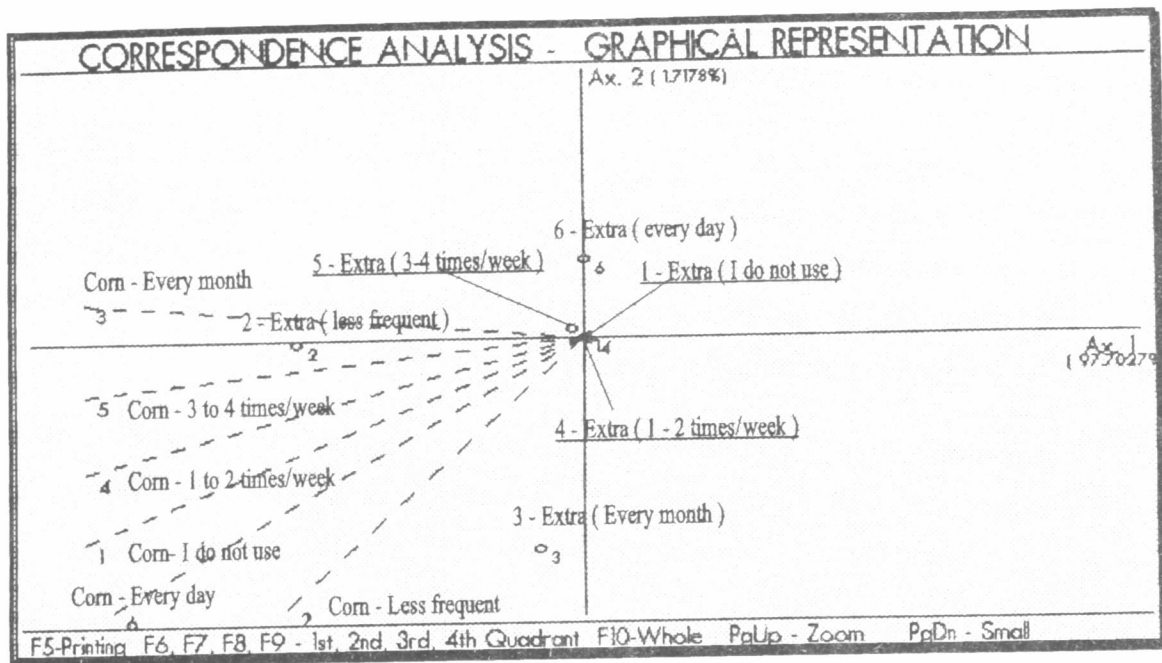


Fig. 21. Frequency of use of oils

Fig. 22 shows that consumers who perceive extra virgin olive oil as very expensive, use it in salads but less in cooking. Daily use of extra virgin olive oil is positively related to cooking and less to salads, while three to four times weekly use is correlated with sauces and once or twice weekly use is mainly intended for hot dishes and frying.

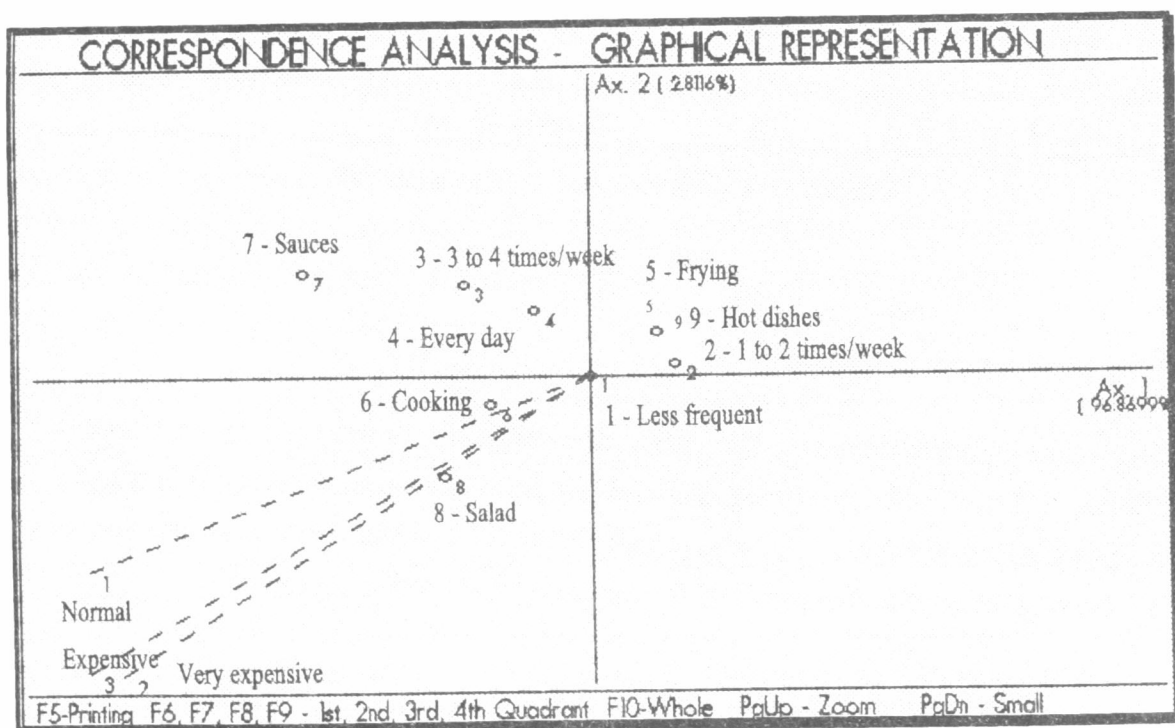


Fig. 22. Type and frequency of use of extra virgin olive oil in relation to price

Multicriteria preference analysis

The main criteria explaining consumer behaviour are displayed in Table 2A (see also Appendix 4). The computer system was used to estimate the percentage of consumers for whom particular criteria explain their purchasing behaviour. A threshold level was used to determine the lowest percentage needed for a criterion to be considered significant for consumer purchasing behaviour.

Table 2A shows that, based on consumer perceptions, a company's image was the most significant criterion for 88% of the consumers, that criteria such as influence, packaging and quality of the product were highly rated, and that price had little significance.

These results are verified by criteria combinations. Quality was considered a significant criterion by 40% of the consumers, while a combination of quality and price was insignificant.

Criteria	Average weight Consumers (%)	Criteria combination	Average weight Consumers (%)
Image	88	Image + Influence	48
Influence	52	Image - Influence	40
Quality	40	Quality + Packaging	19
Packaging	55	Quality + Price	0
Price	3	Quality - Price	40
Threshold level	20	Threshold level	20

Table 2A. Criteria analysis of consumer behaviour

New product development

The current market shares of the extra virgin olive oil brands Colymvari, Kastelli, Peza, Sparta, Xorio, Elanthi, Astro, Spitiko and Knossos were estimated according to the three formulae noted in Chapter 3. Fig. 23 also includes the multicriteria evaluation table for the development of a new product for the co-operative of Colymvari.

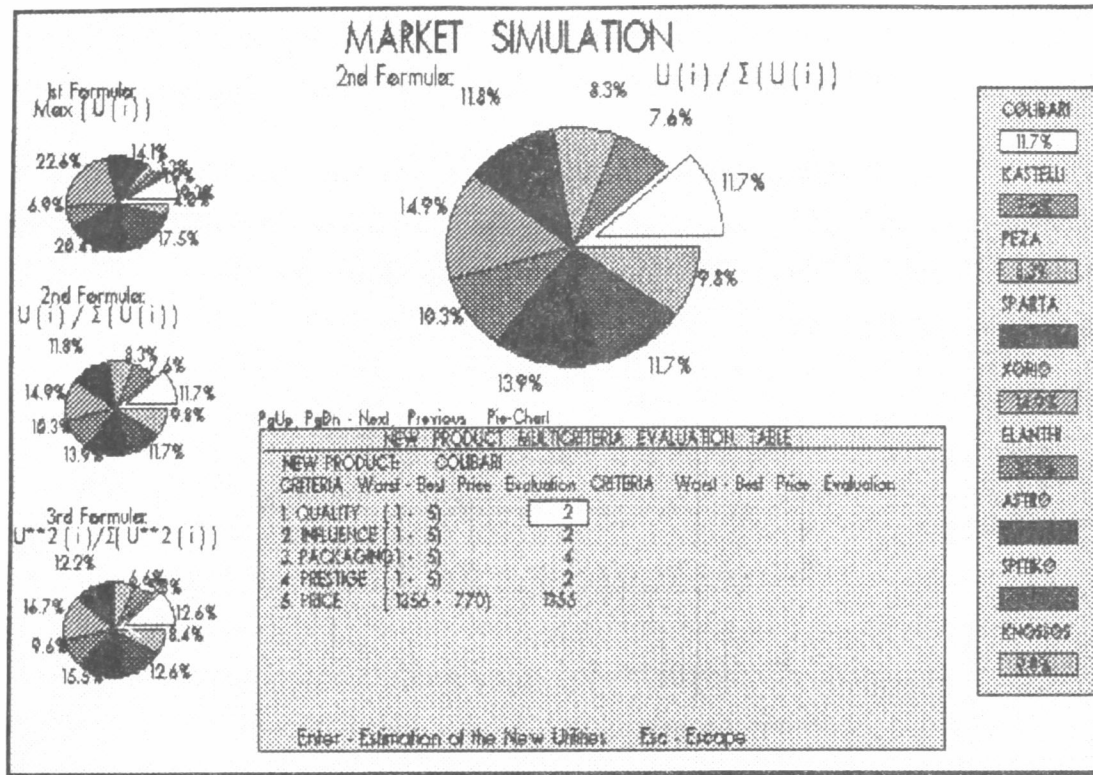


Fig. 23. Current market shares

At this stage where market trends and consumer preferences of a product's attributes are identified, certain market penetration scenarios, utilising a simulation market methodology may be implemented. The modifications that a product's profile is undergoing, result in a re-evaluation of the new product's global utility for each consumer and henceforth to a re-estimation of the new market shares for the individual products.

A consumer evaluation of the four Cretan olive oil products (Kolymvari, Kastelli, Peza, Knossos) with respect to the criteria of image of the producing firm, influence of the immediate environment, quality, packaging and price is presented in Table 3A.

Criteria	Kolymvari	Kastelli	Peza	Knossos
Image	Unaware	Unaware	Unaware	Unaware
Influence	Unaware	Unaware	Unaware	Unaware
Quality	Unaware	Unaware	Unaware	Unaware
Packaging	Good	Fair	Fair	Fair
Price (dr)	1356	875	770	780

Table 3A. Consumer evaluation criteria of Cretan olive oil products

According to the second formula the present market shares of the four Cretan products were Kolymvari (11.7%), Kastelli (7.6%), Peza (8.3%) and Knossos (9.8%).

Through packaging modifications for Kastelli, Peza and Knossos which aim at the evaluation of these as "good", as that of Kolymvari, the market share difference among the Cretan products is almost eliminated, indicating thus, the significance of the packaging criterion (Fig. 24).

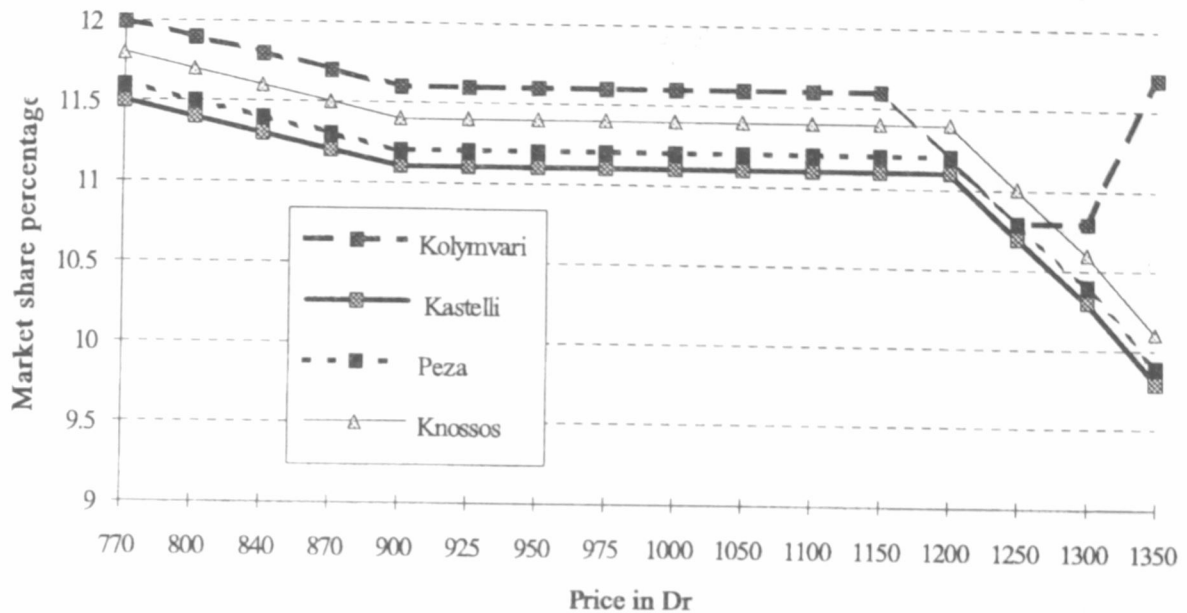


Fig. 24. Estimation of market shares through price fluctuation and keeping packaging at the constant level of "good"

APPENDIX 1

INTERNATIONAL TRADE STANDARD APPLYING TO OLIVE OILS AND OLIVE -POMACE OILS

Definitions

Olive Oil is the oil obtained solely from the fruit of the olive tree *Olea europaea sativa* (Hoffm. et Link), excluding oils obtained by using solvents or re-esterification processes and by any mixture with oils of other kinds. In no case will the designation "olive oil" be used to refer to olive-pomace oils.

Virgin olive oil is obtained from the fruit of the olive tree solely by mechanical or other physical means under conditions, particularly thermal, that do not lead to alterations in the oil and which has not undergone any treatment other than washing, decantation, centrifugation and filtration.

Virgin olive oil fit for consumption:

- i) **Extra virgin olive oil:** virgin olive oil that has an organoleptic rating of 6.5 or more and a free acidity, expressed as oleic acid, of not more than 1 gram per 100 grams, with due regard for the other criteria laid down in this standard.
- ii) **Fine virgin olive oil:** virgin olive oil that has an organoleptic rating of 5.5 or more and a free acidity, expressed as oleic acid, of not more than 1.5 grams per 100 grams, with due regard for the other criteria laid down in this standard.
- iii) **Semi-fine virgin olive oil** (or ordinary virgin olive oil): virgin olive oil that has an organoleptic rating of 3.5 or more and a free acidity, expressed as oleic acid, of not more than 3.3 grams per 100 grams, with due regard for the other criteria laid down in this standard.

Virgin olive oil not fit for consumption, designated *lampante virgin olive oil*, is virgin olive oil that has an organoleptic rating of less than 3.5 and/or a free acidity, expressed as oleic acid, of more than 3.3 grams per 100 grams, with due regard for the other criteria laid down in this standard. It is intended for refining or for technical purposes.

Refined olive oil is the olive oil obtained from virgin olive oils by refining methods which do not lead to alterations in the initial glyceridic structure.

Olive oil is the oil consisting of a blend of refined olive oil and virgin olive oil fit for consumption as it is.

Olive-pomace oil is the oil obtained by treating olive pomace with solvents, to the exclusion of oils obtained by re-esterification processes and of any mixture with oils of other kinds. It can be classified as follows:

crude olive-pomace oil: olive-pomace oil intended for refining with a view to its use in food for human consumption, or intended for technical purposes.

refined olive-pomace oil: obtained from crude olive-pomace oil by refining methods which do not lead to alterations in the initial glyceridic structure. It is intended for human consumption either as it is or else in blends with virgin olive oil.

olive-pomace oil: Blend of refined olive-pomace oil and virgin olive fit for consumption as it is. In no case will this blend be called "olive oil".

— **The quality of the virgin olive oil is affected by a number of factors:**

Endogenous and exogenous agronomic variables: Cultural care, harvesting and transport are endogenous variables, while olive variety, environment and climate are exogenous.

Processing: Reception of the fruit, washing, storage, crushing, mixing and filtration.

Preservation: After a period of eight to nine months, olive oil quality starts to change. Under the right conditions and with time, olive oil loses some of its original bitterness.

Packaging: Tin plate is best for maintaining oil quality. Containers must comply with the general principles of food hygiene recommended by the Codex Alimentarius Commission. Glass bottles prevent oxidation better than polyethylene bottles (Kiritsakis and Dugan, 1984).

Strict olive oil standardisation methods for extra , fine and regular olive oil are difficult to determine, since changes in flavour are caused by factors such as the variety of olive, micro climate, soil and other biological and ecological factors, methods of harvest and post-harvest processing and storing. Because of this, labelling should be as descriptive and detailed as possible to enable retailers and consumers to be well-informed.

Olive oil and olive - pomace oil labels should indicate according to IOOC:

oil classification: extra virgin olive oil
fine virgin olive oil
semi - fine or ordinary virgin olive oil
refined olive oil
olive oil
refined olive - pomace oil
olive-pomace oil;

oleic acid (percentage or degree);

weight or volume of net contents;

names and addresses of the lot, manufacturer, packer, distributor, importer, exporter and seller;

country of origin: if the product is processed or re-packed in a second country, the latter is considered the country of origin;

date of minimum durability: This period ranges between twelve and eighteen months for oils packed in metal containers;

indications of source and appellation of origin. Labelling of virgin olive oil may indicate the country, region or locality of origin, when the whole production, processing and packaging procedure has taken place in the origin mentioned. Blends of olive oil and virgin olive oil indicate only the source of the exporting country. Appellation of origin status may be used when such distinctions have been awarded. Blends of refined olive oil and extra virgin olive oil may indicate the appellation of origin awarded to the extra virgin olive oil in the blend;

storage information. To avoid oxidative deterioration, olive oil should be stored in bottles which are not transparent to light or permeable to oxygen (Kiritsakis and Dugan, 1984).

Source: IOOC (1992)

QUALITY CRITERIA

	Extra virgin olive oil	Fine virgin olive oil	Semi-fine virgin olive oil	Lampande virgin olive oil*	Refined olive oil	olive oil	Crude olive-pomace oil	Refined olive-pomace oil	Olive pomace oil
1. Organoleptic characteristics									
-odour	≥ 6.5	≥ 5.5	≥ 3.5	≥ 3.5	acceptable	good		acceptable	acceptable
-taste	absolutely perfect	absolutely perfect	good	off-smelling	acceptable	good		acceptable	acceptable
-colour	absolutely perfect	absolutely perfect	good	off flavour defective	light yellow	light yellow to green		light yellow to brownish yellow	light yellow to green
-aspect of 20 °C for 24 hours	light yellow to green	light yellow to green	light yellow to green		limpid	limpid		limpid	limpid
2. Free acidity % m/m expressed in oleic acid	≤ 1.0	≤ 1.5	≤ 3.3	≤ 3.3	≤ 0.3	≤ 1.5	no limit	≤ 0.3	≤ 1.5
3. Peroxide value in milleq. peroxide oxygen per kg/oil	≤ 20	≤ 20	≤ 20	≤ 20	≤ 10	≤ 20	no limit	≤ 10	≤ 20
4. Absorbency in Ultra-Violet (E _{1cm} ^{1%}) -at 270nm -Δ E	≤ 0.25 ≤ 0.01	≤ 0.25 ≤ 0.01	≤ 0.30 ** ≤ 0.01	no limit**	≤ 1.10 ≤ 0.16	≤ 0.90 ≤ 0.15		≤ 2.00 ≤ 0.20	≤ 1.70 ≤ 0.18

IOOC (1992)

* It is not obligatory for criteria 1, 2 and 3 to be concurrent; one is sufficient.

** After passage of the sample through activated alumina, absorbency at 270 nm must be 0.11 or less.

Table 1

APPENDIX 2 (continued)

YEAR	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90
GREECE (TOTAL)	238494	223705	234116	239785	245984	328830	249839	343842	268151	251593	409159	320990	345162	300334	309419
Central Greece	23055	24106	25033	22770	32918	41003	31714	42463	22987	23876	39582	26759	38252	32232	31445
Peloponnese	72805	67107	83789	85833	91275	99421	103981	102489	103908	86927	152514	106657	106041	99447	97080
Ionian Islands	20384	18373	18563	21365	19513	29211	18333	22957	27448	17535	10129	30841	39766	23710	40996
Epirus	5947	1738	5911	3117	4406	5305	5260	2465	6900	2797	11832	7417	11112	6061	10177
Thessaly	5739	4302	3154	3943	1720	7552	4513	14090	2828	2129	1780	1883	4840	7016	4795
Macedonia-Thrace	8809	5441	1804	5529	3676	5895	6131	7966	5616	7111	107111	7150	10874	11731	9221
Aegean Islands	28340	38904	19974	29985	20834	48601	18566	36506	29209	20974	34852	27199	26218	23142	24248
Crete	73338	63697	75854	67214	71560	91748	61256	114877	69235	90220	126009	113084	108059	113809	91457

Table 2. Distribution of Greek olive oil production, 1975-1990 (thousands of tonnes)
Source: National Statistical Service of Greece (1991)

YEAR	Production	Consumption
1977/78	220.00	180.00
1978/79	235.00	201.70
1979/80	203.00	200.00
1980/81	311.00	205.40
1981/82	195.00	205.00
1982/83	324.50	205.00
1983/84	231.00	200.00
1984/85	218.00	190.00
1985/86	309.60	210.00
1986/87	220.00	200.00
1987/88	287.00	200.00
1988/89	295.60	200.00
1989/90	292.90	205.00
1990/91	170.00	200.00
1991/92*	385.00	205.00
1992/93**	330.00	198.00

Table 3. Greek olive oil production and consumption, 1977/88-1992/93 (thousands of tonnes),
Source: IOOC (1991), IOOC (1992), * Provisional quantity, ** Estimated

APPENDIX 2 (continued)

	1987/88	1988/89	1989/90
Bottled olive oil	105.500	123.500	121.500
Seed oils	35.000	38.000	45.000

Table 4. Olive and seed oil consumption, 1987-1989 (thousands of tonnes),
Source: Elaïourgiki (1990)

YEAR	ITALY	SPAIN
1978/79	26.45	0.00
1979/80	10.61	0.00
1980/81	3.81	0.00
1981/82	6.35	0.00
1982/83	64.30	0.00
1983/84	74.90	0.00
1984/85	23.78	0.00
1985/86	44.89	0.00
1986/87	49.08	0.00
1987/88	31.59	0.00
1988/89	95.20	1.60
1989/90	75.24	0.10

Table 5. Greek olive oil exports to Italy and Spain, 1978-1990
(thousands of tonnes). Source: IOOC (1990)

	World production	EEC production	Greek production	Greek exports	Greek imports
1978/79	1576.00	417.70	235.00	34.00	0.00
1979/80	1437.00	478.50	203.00	16.30	0.00
1980/81	1818.00	845.00	311.00	13.90	0.00
1981/82	1333.90	757.40	195.00	26.80	0.00
1982/83	1843.70	694.60	324.50	98.80	0.00
1983/84	1589.50	1013.30	231.00	99.60	0.00
1984/85	1616.40	542.10	218.00	60.00	2.00
1985/86	1663.00	1347.30	309.60	80.00	0.00
1986/87	1532.90	1106.70	220.00	95.70	0.00
1987/88	2010.70	1729.20	287.00	39.00	20.40
1988/89	1712.00	1080.10	295.60	107.50	1.20
1989/90	1796.00	1464.61	292.90	90.30	5.50
1990/91	1465.00	993.70	170.00	52.50	36.60
1991/92*	2160.20	1672.20	385.00	100.00	0.00
1992/93**	1841.00	1435.00	330.00	100.00	0.00

Table 6. Olive oil supply and trade figures, 1978/79-1992/93 (thousands of tonnes)
Source: IOOC (1991), IOOC (1992), * Provisional quantity, ** Estimated

APPENDIX 2 (continued)

YEAR	WORLD	EC
1978/79	1576.00	417.70
1979/80	1437.00	478.50
1980/81	1818.00	845.00
1981/82	1333.90	757.40
1982/83	1843.70	694.60
1983/84	1589.50	1013.30
1894/85	1616.40	542.10
1985/86	1663.00	1347.30
1986/87	1532.90	1106.70
1987/88	2010.70	1729.20
1988/89	1434.60	1080.10
1989/90	1796.00	1464.61
1990/91	1465.00	993.70
1991/92*	2160.20	1672.20
1992/93**	1841.00	1435.00

Table 7. World and EC olive oil production, 1978/79- 1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992)

* Provisional quantity, ** Estimated

YEAR	ITALY	SPAIN	GREECE	PORTUGAL	FRANCE
1977/78			220.00	29.80	1.50
1978/79	416.00	499.90	235.00	39.90	1.70
1979/80	477.00	432.80	203.00	56.90	1.50
1980/81	532.00	446.00	311.00	31.70	2.00
1981/82	561.00	297.30	195.00	22.90	1.40
1982/83	368.00	666.00	324.50	78.60	2.10
1983/84	780.00	266.50	231.00	8.70	2.30
1894/85	322.00	702.70	218.00	43.00	2.10
1985/86	607.40	397.20	309.60	31.50	1.60
1986/87	354.60	489.80	220.00	40.80	1.50
1987/88	670.00	733.70	287.00	35.00	3.50
1988/89	361.10	399.40	295.60	22.80	1.20
1989/90	578.00	550.80	292.90	41.00	1.90
1990/91	163.30	639.40	170.00	20.00	1.00
1991/92*	630.00	593.00	385.00	60.00	4.20
1992/93**	500.00	563.00	330.00	40.00	2.00

Table 8. Olive oil production in Italy, Spain, Greece, Portugal and France, 1977/78-1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992), *Provisional quantity, **Estimated

APPENDIX 2 (continued)

	SPAIN Virgin 1 ^o	GREECE Extra virgin	ITALY Extra virgin
1988/89 average	169.221	250.632	283.738
1989/90 average	177.119	257.533	299.614
1990/91	184.168	360.482	476.525
Dec. 1990	170.049	334.472	462.687
Jan. 1991	173.465	378.342	514.419
Nov 91-Mar 92	194.658	241.313	272.739

Table 9. Olive oil producer prices (ECU's/100lt). Source: Olivae (1992)

YEAR	WORLD	EC
1977/78	1544.30	584.70
1978/79	1530.90	581.10
1979/80	1533.50	578.40
1980/81	1597.40	814.80
1981/82	1590.20	845.20
1982/83	1669.00	865.60
1983/84	1631.00	872.20
1894/85	1680.90	855.40
1985/86	1727.10	1289.00
1986/87	1784.30	1323.90
1987/88	1813.70	1374.70
1988/89	1737.50	1299.50
1989/90	1719.70	1299.70
1990/91	1683.50	1210.50
1991/92*	1811.9	1299.90
1992/93*	1822.5	1300.00

Table 10. World and EC olive oil consumption 1977/78-1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992)

*Provisional quantity **Estimated

APPENDIX 2 (continued)

YEAR	ITALY	SPAIN	GREECE	PORTUGAL	FRANCE
1977/78		328.00	180.00	34.00	
1978/79	554.00	330.00	201.70	38.90	20.60
1979/80	550.00	350.00	200.00	39.80	21.50
1980/81	580.00	350.00	205.40	39.40	22.50
1981/82	610.00	360.00	205.00	38.60	23.70
1982/83	626.00	360.00	205.00	39.90	26.90
1983/84	640.00	335.00	200.00	34.00	24.00
1894/85	631.60	360.00	190.00	40.80	25.00
1985/86	640.00	370.00	210.00	32.20	26.50
1986/87	670.00	377.80	200.00	36.10	27.00
1987/88	680.00	420.40	200.00	35.00	26.50
1988/89	630.00	395.90	200.00	35.00	24.20
1989/90	626.00	388.10	205.00	34.50	27.00
1990/91	540.00	394.10	200.00	27.00	28.00
1991/92*	580.00	417.00	205.00	40.00	33.20
1992/93**	585.00	417.00	198.00	40.00	35.00

Table 11. Olive oil consumption in Italy, Spain, Greece, Portugal, France, 1977/78-1992/93 (thousands of tonnes). Source: IOOC (1992), *Provisional quantity, **Estimated

YEAR	GERMANY	GREAT BRITAIN
1978/79	2.60	2.20
1979/80	2.90	2.20
1980/81	3.30	1.70
1981/82	2.80	1.80
1982/83	3.80	1.90
1983/84	4.00	2.30
1894/85	4.90	2.10
1985/86	5.60	2.60
1986/87	7.10	4.30
1987/88	4.80	5.00
1988/89	6.00	4.90
1989/90	8.50	6.80
1990/91	10.30	6.80
1991/92*	10.50	9.00
1992/93**	10.50	9.00

Table 12. Olive oil consumption in Germany and Great Britain 1978/79-1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992)
* Provisional quantity, **Estimated

APPENDIX 2 (continued)

YEAR	TURKEY	MOROCCO	TUNISIA
1977/78	7.00	1.00	72.30
1978/79	29.70	0.10	83.10
1979/80	4.20	13.60	48.60
1980/81	35.00	11.50	70.60
1981/82	20.00	0.20	62.10
1982/83	69.80	0.80	36.10
1983/84	20.30	0.00	70.70
1894/85	25.00	0.10	51.30
1985/86	17.20	0.00	44.40
1986/87	34.00	0.00	56.00
1987/88	35.00	0.00	54.00
1988/89	35.00	0.00	46.50
1989/90	2.50	26.50	50.00
1990/91	10.00	1.50	161.50
1991/92*	10.50	5.00	94.00
1992/93**	20.00	3.00	100.00

Table 13. Olive oil exports from Turkey, Morocco, Tunisia, 1977/78-1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992)

*Provisional quantity, **Estimated

YEAR	USA	AUSTRALIA	CANADA
1977/78	28.20	5.90	3.00
1978/79	25.50	4.60	2.50
1979/80	25.90	5.20	2.50
1980/81	25.90	5.10	2.30
1981/82	27.80	4.60	2.40
1982/83	29.80	5.70	3.30
1983/84	35.00	6.20	4.30
1894/85	36.90	6.90	5.00
1985/86	41.90	6.60	4.10
1986/87	51.00	7.00	5.50
1987/88	64.50	7.00	5.50
1988/89	66.00	9.00	7.00
1989/90	75.00	11.50	7.00
1990/91	88.00	13.50	10.00
1991/92*	92.50	12.50	10.00
1992/93**	95.00	15.00	10.00

Table 14. Olive oil consumption in USA, Canada and Australia 1977/78-1992/93 (thousands of tonnes). Source: IOOC (1991), IOOC (1992)

* Provisional quantity, **Estimated

APPENDIX 2 (continued)

YEAR	ITALY	SPAIN	GREECE	FRANCE
1977/78		84.40	34.30	
1978/79	27.90	93.40	34.00	4.00
1979/80	27.80	131.00	16.30	23.10
1980/81	33.50	50.90	13.90	12.80
1981/82	40.50	31.20	26.80	17.90
1982/83	44.40	66.90	98.80	16.90
1983/84	45.20	50.90	99.60	4.20
1984/85	65.60	260.00	60.00	3.20
1985/86	83.60	109.70	80.00	5.70
1986/87	72.50	240.70	95.70	6.70
1987/88	81.20	221.40	39.00	4.20
1988/89	93.00	146.60	107.50	16.00
1989/90	109.70	190.20	90.30	10.40
1990/91	114.70	398.80	52.50	15.70
1991/92*	130.00	165.00	100.00	6.40
1992/93**	130.00	223.00	100.00	7.00

Table 15. Olive oil exports from Italy, Spain, Greece, France, 1977/78-1992/93
(thousands of tonnes). Source: IOOC (1991), IOOC (1992)
* Provisional quantity, **Estimated

YEAR	ITALY	SPAIN	GREECE	PORTUGAL	FRANCE
1977/78		0.00	0.00	5.60	
1978/79	120.50	0.00	0.00	4.60	22.90
1979/80	131.60	0.00	0.00	0.20	44.60
1980/81	76.50	0.00	0.00	0.00	50.40
1981/82	60.70	0.00	0.00	13.00	26.70
1982/83	160.90	0.00	0.00	0.00	28.20
1983/84	115.40	0.00	0.00	0.40	25.60
1984/85	225.00	0.00	2.00	3.90	28.20
1985/86	189.40	0.00	0.00	2.60	26.60
1986/87	288.70	1.10	0.00	0.10	31.30
1987/88	198.60	0.60	20.40	6.50	28.70
1988/89	188.60	21.60	1.20	22.10	37.60
1989/90	247.70	6.00	5.50	9.30	45.70
1990/91	404.60	51.40	36.60	16.20	41.70
1991/92*	190.00	50.00	0.00	8.00	35.30
1992/93**	230.00	25.00	0.00	9.00	39.90

Table 16. Olive oil imports from Italy, Spain, Greece, Portugal, France, 1977/78-1992/93
(thousands of tonnes). Source: IOOC(1991), IOOC (1992)
* Provisional quantity, **Estimated

APPENDIX 2 (continued)

YEAR	EC production	EC consumption
1977/78	695.00	584.70
1978/79	417.70	581.10
1979/80	478.50	578.40
1980/81***	845.00	814.80
1981/82	757.40	845.20
1982/83	694.60	865.60
1983/84	1013.30	872.20
1984/85	542.10	855.40
1985/86****	1347.30	1289.00
1986/87	1106.70	1323.90
1987/88	1729.20	1374.70
1988/89	1080.10	1299.50
1989/90	1464.61	1299.70
1990/91	993.70	1210.50
1991/92*	1672.20	1299.90
1992/93**	1435.00	1300.00

Table 17. Olive oil production and consumption in EC, 1977/78-1992/93 (thousands of tonnes). Source: IOOC(1991), IOOC (1992)

* Provisional quantities, ** Estimated

** EC of 10, *** EC of 12

YEAR	EC production	EC con/tion	FRANCE con/tion	USA con/tion
1973/94	2020.74	1321.80	37.94	98.47
1994/95	1679.04	1314.78	41.13	101.55
1995/96	2264.78	1329.03	44.58	103.66
1996/97	1923.09	1324.41	48.31	105.29
1997/98	2508.81	1333.79	52.35	106.69

Table 18. Forecasting methods (Box-Jenkins): 1993/94-1997/98 (thousands of tonnes).

APPENDIX 3

EC Council regulations related to olive oil

Regulation	Date	Objective
No 136/ 66	30 Sep. 1966	It introduces an aid to the olive oil production. Establishment of the Common Market organisation. It also includes specific policies for the fats and oils (intervention price, imports, exports, market price etc.).
No 3224/74	21 Dec. 1974	It defines generic action relative to the aid for the olive oil production.
No 154/75	24 Jan. 1975	It introduces the establishment of a foundation for oils concerning the producing Member States.
No 1058/ 77	24 May 1977	The regulation is related to the olive oil characteristics and to certain olive oil containing products.
No 2960/77	30 Dec. 1977	It is related to the manipulation of the merchandising of the olive oil released into the market from the intervention organisations
No 3089/78	29 Dec. 1978	It suspends the application of general regulations relative to the consumption of olive oil.
No 591/79	30 Mar. 1979	Preparation for the general regulations for the restitution of olive oil production, used at the fabrication of certain cans.
No 1963/79	7 Sep. 1979	It determines the standards of application for the restitution of the olive oil production, used at the fabrication of certain cans.
No 1970/8	26 Jul. 1980	This regulation introduces the general rules applied towards the actions for promotion of the olive oil consumption within the Community.
No 2261/84	3 Aug. 1984	It terminates the general regulation providing the right to an aid for the olive oil production and to the producer organisations.
No 2262/84	3 Aug. 1984	It establishes special measures to the olive oil sector.
No 3061/84	1 Nov. 1984	It establishes modifications to the application of the aid regime of the olive oil production.
No 27/85	5 Jan. 1985	It modifies the application of the No 2262/84 which had established special measures to the olive oil sector.
No 683/85	16 Mar. 1985	It brings new forms of application to the 4th article of the No 136/66 regarding the representative market price and the limit price for the olive oil.

APPENDIX 3 (continued)

No 2677/85	25 Sep. 1985	It presents new forms of application to the aid regime of the olive oil consumption.
No 3067/85	1 Nov. 1985	It determines the mobility criteria, into the Community's Market, for the vegetable oils with food aid destination.
No 3472/85	11 Dec. 1985	This concerns the forms of buying and stocking for the olive oil from the intervention organisations.
No 314/88	3 Feb. 1988	It brings new forms of application to the contracts regime of stocking for the olive oil production.
No 983/ 88	15 Apr. 1988	This regulation is laying down special provisions on the marketing of olive oil containing undesirable substances.
No 1098/88	29 Apr. 1988	The basic regulation No 136/66 is amended. Olive oil market operation is based on price arrangements and on specific market instruments.
No 1860/88	1 Jul. 1988	The regulation establishes special marketing standards for olive oil and amends Regulation No 983/ 88.
No 200/90	27 Jan. 1990	This regulation is modifying the No 2262/ 84, that had brought special measures to the olive oil sector (1st article).
No 828/90	31 Mar. 1990	These regulations modify the No 3061/ 84 regulation that had introduced new forms to the application of the aid regime of the olive oil production (articles 3,5, 6, 8, 9, 10, 12, 15).
No 3315/90	17 Nov. 1990	
No 928/91	16 Apr. 1991	
No 1684/91	19 Jun. 1991	
No 1704/ 90	23 Jun. 1990	This regulation establishes particular dispositions concerning restitution's to the fats and oils sector.
No 3251/ 90	10 Nov. 1990	These regulations modify the No 2677/ 85 that had introduced new forms to the application of the aid regime of the olive oil consumption (articles 2, 3, 4, 9, 11, 12, 13, 15, 16, 17, 18, 19).
No 571/ 91	9 Mar. 1991	
No 3500/ 90	5 Dec. 1990	This regulation modifies the No 2261/ 84 suspending the general regulations related to the right of aid at the olive oil production and to producers organisations (articles 2, 3, 6, 7, 8, 10, 12, 14, 15, 17, 21).
No 1524/ 91	6 Jun. 1991	This regulation modifies the No 3472/ 85 with respect to the new forms of purchasing and stocking from the intervention organisations (articles 1, 2, 8).

APPENDIX 4 : CONSUMER PREFERENCE ASSESSMENT

What is your opinion of the following products?

PRODUCTS		Kolibari	Kastelli	Peza	Sparta	Xorio	Elanthi	Astro	Spitiko	Knossos
Quality (a)	BAD									
	I DO NOT KNOW									
	INDIFFERENT									
	GOOD									
	VERY GOOD									
Immediate influence of the environment (b)	BAD									
	I DO NOT KNOW									
	INDIFFERENT									
	GOOD									
	VERY GOOD									
Packaging (c)	BAD									
	I DO NOT KNOW									
	INDIFFERENT									
	GOOD									
	VERY GOOD									
Image (d)	BAD									
	I DO NOT KNOW									
	INDIFFERENT									
	GOOD									
	VERY GOOD									

- (a) What is your opinion of the quality of extra virgin olive oil?
- (b) Have you ever heard from others (relatives, friends) of extra virgin olive oil?
- (c) What is your opinion of the package of extra virgin olive oil?
- (d) What is your opinion of the producing company of extra virgin olive oil?

RANKING

Which of the following extra virgin olive oils would you buy?

Repetitive question: If you could not find your oil of preference, which one would you buy?

Kolymvari	Kastelli	Peza	Sparta	Xorio	Elanthi	Astro	Spitiko	Knossos

APPENDIX 4 (continued)

ΕΚΤΙΜΗΣΗ ΠΡΟΤΙΜΗΣΗΣ ΤΩΝ ΚΑΤΑΝΑΛΩΤΩΝ

Ποιά η γνώμη σας για τα παρακάτω ελαιόλαδα;

ΠΡΟΙΟΝΤΑ	Κολυμβάρι	Καστέλλι	Πεζά	Σπάρτα	Χωριό	Ελάνθη	Αστρο	Σπιτικό	Κνωσσός
	Κακή								
	Δεν γνωρίζω								
ΠΟΙΟΤΗΤΑ	Μέτρια								
(α)	Καλή								
	Πολύ Καλή								

Φήμη	Κακή								
Επιρροή	Δεν γνωρίζω								
περιβάλλοντος	Μέτρια								
(β)	Καλή								
	Πολύ Καλή								

	Κακή								
	Δεν γνωρίζω								
Συσκευασία (γ)	Μέτρια								
	Καλή								
	Πολύ Καλή								

Εικόνα	Κακή								
Κύρος	Δεν γνωρίζω								
(δ)	Μέτρια								
	Καλή								
	Πολύ Καλή								

(α) Τι γνώμη έχετε για την ποιότητα του λαδιού

(β) Γνωρίζετε, έχετε ακούσει για το λάδι.....από φιλικά, συγγενικά σας άτομα.

(γ) Πως θα χαρακτηρίζατε την συσκευασία της μάρκας

(δ) Τι γνώμη έχετε για την εταιρία που παρασκευάζει το λάδι

ΤΑΞΙΝΟΜΗΣΗ

Ποιό ελαιόλαδο ή ποιά θα αγοράζατε;

Εάν δεν υπήρχε αυτό (ή αυτά) ποιά άλλα θα επιλέγατε;

[illegible]

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CHAPTER 5

OLIVE OIL MARKET RESEARCH IN FRANCE

5.1. Introduction and survey design

An extensive survey was conducted in Paris, France during the months of January - February, 1993. This was part of the study designed to:

- identify the olive oil market segments and examine their potentiality based on the existing consumer perceptions and attitudes;
- design the "optimal" Cretan olive oil product for the French market;
- determine the marketing strategy for the new product's market entry.

Olive oil consumption in France is very low in comparison to the one in Italy, Spain, and Greece but quite significant with respect to the rest of European countries. The French olive oil production is mainly concentrated in the southern part and the existing gap between production and consumption level has been increasing during the last years (Fig. 1).

Six olive oil brands were utilised: the Italian Carapelli, the Spanish Lerida, the Greek Kolymvari and the French olive oil brands Hediard, La Jarre d' Or and Puget.

Two market segments initially appear, the one consisting of the traditional consumers of the south and the one in the north, which is behaving similarly to the north European oil consumers.

All the participating brands were of half a litre volume, the first five, were extra virgin olive oil products, while La Jarre d' Or was a biological olive oil product.

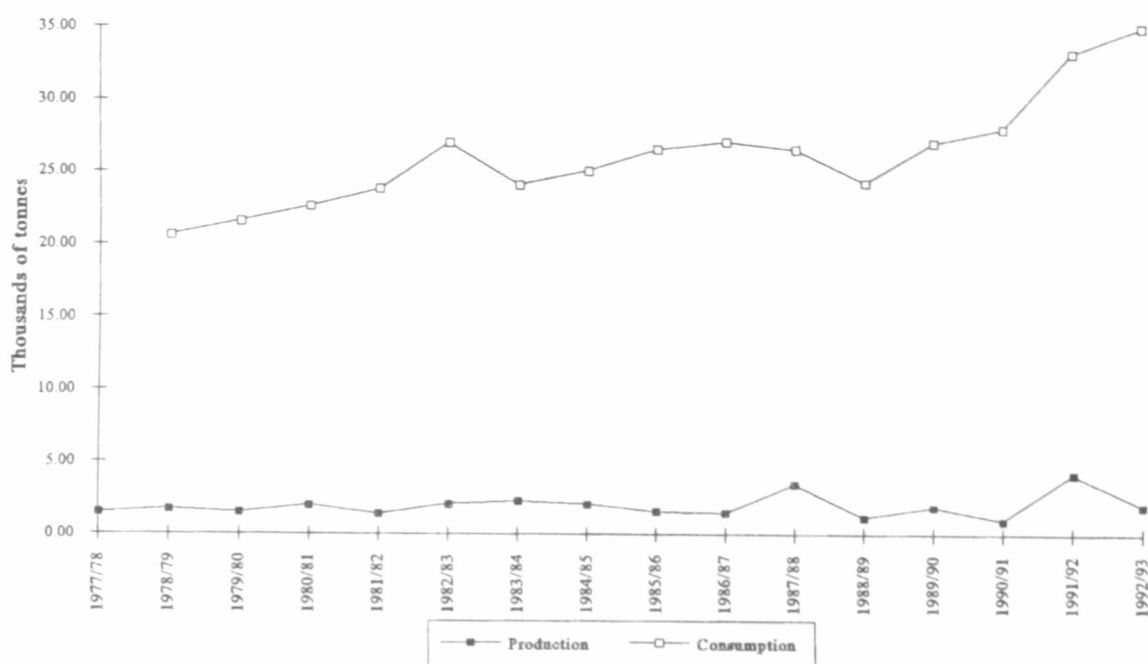


Fig. 1. Olive oil production and consumption in France, 1977-1993 (thousands of tonnes)
Source: IOOC (1991, 1992)

Carapelli being a medium quality extra virgin olive oil seems to be competitive to the Cretan olive oil. Lerida also is one of the few Spanish branded products which are exported to France. La Jarre d'Or is available in health food stores while Hediard can be purchased only in Hediard stores, which provide products of high quality. Finally, Puget is available in almost every supermarket and is considered as the leader of the French olive oil market.

The questionnaire (Appendix 1) was designed in such a way in order to collect information of the sample's demographic characteristics, determine the oils generally used, frequency of olive oil use, type of use of the different oils and consumer perceptions with respect to attributes and factors such as health, taste, purity and pricing. Another section dealt with the size and type of packaging, brand loyalty, branding, colour, odour, taste, packaging and finally labelling.

Through the last part of the questionnaire the aim is to identify afterwards which one of the six olive oil brands the consumer would purchase in a ranking order.

Two hundred and five olive oil consumers were interviewed in their houses. Interviews lasted approximately 45 minutes and in each single case all the examined brands were evaluated. A number of districts of different socio-economic background were included in this survey.

5.2. Preliminary results

The frequency distributions by gender, profession, age, and family status are displayed in Table 1.

Gender	(%)	Profession	(%)	Age	(%)	Family size	(%)	Family status	(%)
Female	67.6	Professional	37.3	20- 30	27.9	1 - 2	38.2	Single	29.4
Male	32.4	Private or Public employee	23.5	31- 40	19.1	3 - 4	60.3	Married	70.6
		Student	04.4	41- 50	23.6	5 - 6	1.5		
		Housewife	08.3	51- 60	18.6				
		Pensioner	15.7	61- 80	10.8				
		Others (Artists)	10.8						

Table 1. Frequency distributions of the sample's demographic characteristics

In the second and third items of the questionnaire, interviewees were asked which kinds of oils they use in general and the frequency of olive oil use (Table 2).

Oils	%	Frequency of olive oil use	%
Olive oil	99.5	Daily	22.1
Groundnut oil	50.0	3 - 4 times/week	26.0
Sunflower oil	79.9	1 - 2 times/week	27.0
Soya oil	0.0	Every 15 days	9.8
Corn oil	16.2	Every month	15.1
Margarine	36.3		
Other oils	33.8		

Table 2. Oils used generally and frequency of olive oil use.

Nearly all consumers utilise olive oil in general, 79.9% of them use sunflower oil while 50% use groundnut oil. This outcome is not surprising; Pelurson (1988) argues that the spectacular increase in the world production of seed oils and the widening gaps between the prices of these and olive oil had a small impact on French olive oil consumption's levels.

The frequency of olive oil use classifies the consumers into two broad categories; the regular consumers (75.1%) and the occasional consumers (24.9%).

Table 3 shows that consumers mainly use olive oil for salads, hot dishes and cooking. In frying, sunflower and groundnut oils are used, while in cooking, sunflower, olive oil and to a lesser extent, margarine. For the preparation of mayonnaise and sauces sunflower and olive oil are used, while for salads and hot dishes the order of usage is reversed.

	Frying (%)	Cooking (%)	Mayonnaise (%)	Sauces (%)	Salads (%)	Hot dishes (%)
Olive	7.4	44.1	29.9	28.9	97.5	53.4
Groundnut	31.4	19.6	22.1	18.1	9.8	15.7
Sunflower	39.7	48.0	48.0	39.7	27.9	35.8
Corn	2.9	9.8	4.9	6.9	1.5	8.8
Margarine	4.4	25.5	1.5	6.4	0.0	5.4
Other	11.3	12.3	1.5	7.4	10.8	9.3

Table 3. Frequency and type of oil use

Andlauer (1988) claims that France, being a Mediterranean country, obtains important benefits from its model of society based on historic and cultural references closely linked to the olive, while at the same time, being a north European country, it is directly associated with well acquainted and informed customers.

Several hypothetical questions (question 5, appendix 1) on olive oil attributes showed that 66% of the respondents agree that it is the healthiest among the oils, 92% that it makes dishes tasty, while 54% disagree that it can be reused for frying. Confusion existed with respect to its contribution in weight and cholesterol increase, 41% agree that it is good for the heart but 49% were unaware, 51% claim it is a pure product and 93% argue that it is relatively expensive.

The size of container found most useful is the 1 lt (58.8%) and 0.5 lt (38.2%). The vast majority prefers the glass bottles and does not consider the plastic bottles, the small cans, the large cans and the other kinds of containers as useful.

Olive oil consumers are loyal to their brands and they do not change frequently (79.9%). A large percentage (48.5%) are not familiar with the differentiation among extra virgin olive oil, first cold extraction and ordinary olive oil. Labelling provides necessary information to consumers (52.5%) but only a small percentage (31.4%) believes in it.

Consumer image with respect to the olive oil brands showed that the French olive oil Puget, and Hediard were perceived as very good or good by 87.3% and 55.9% of the respondents, respectively. The bad image of La Jarre d' Or (11.8%) and of Lerida (8.3%) should be further examined. It is also of great significance the number of consumers (36%) that had a fairly good impression of the Kolymvari brand despite its first unofficial entrance in this market (Table 4).

	Bad %	Unaware %	Good %	Very good %
Carapelli	2.5	51.5	35.8	10.3
Lerida	8.3	46.1	31.9	13.7
Kolymvari	2.0	61.8	22.5	13.7
Hediard	1.5	42.6	37.5	18.6
La Jarre d' Or	11.8	68.1	16.2	3.9
Puget	4.9	7.8	77.9	9.3

Table 4. Consumer opinion regarding the olive oil brands

The colour perception of the olive oil products (Table 5) shows that the majority of respondents consider it as natural in all of the brand cases except the one of the biological La Jarre d' Or. The dark colour of this brand, despite its usefulness for olive oil storage, is perceived as unnatural by a large percentage of the consumers.

	Unnatural %	Natural %	Attractive %
Carapelli	17.6	66.2	16.2
Lerida	19.1	54.4	26.5
Kolymvari	16.7	70.1	13.2
Hediard	11.3	65.2	23.5
La Jarre d' Or	45.6	43.6	10.8
Puget	12.3	71.5	16.2

Table 5. Colour perception of the various olive oil brands

The heavy odour of the olive oil is not highly appreciated by consumers. The odour of Hediard and Lerida was evaluated as pleasant by 46.1% and 42.6% of the consumers. Kolymvari odour was considered unnatural by 37.3% of respondents mainly because of its strength (Table 6).

	Unnatural %	Natural %	Pleasant %
Carapelli	26.0	64.7	9.3
Lerida	25.0	32.4	42.6
Kolymvari	37.3	46.0	16.7
Hediard	15.7	38.7	46.1
La Jarre d' Or	33.8	50.0	16.2
Puget	8.8	66.7	24.2

Table 6. Odour perception of the various olive oil brands

The Spanish Lerida and the French Hediard pass the taste test with flying colours with a delicious distinction by receiving 60.8% and 53.9% of the respondents. A percentage of 25.5% finds the Kolymvari taste as unnatural and identifies some bitterness in it (Table 7).

	Unnatural %	Natural %	Delicious %
Carapelli	18.1	56.9	25.0
Lerida	17.2	22.0	60.8
Kolymvari	25.5	39.2	35.3
Hediard	13.7	32.4	53.9
La Jarre d' Or	24.5	54.4	21.1
Puget	8.3	65.2	26.5

Table 7. Taste perception of the various olive oil brands

Packaging of Lerida is considered as very good by 35.3% while the one of Hediard comes second with 33.3%. Lerida's evaluation as bad by 26.5% is mainly attributed to its inconvenient packaging, which reminds a pharmaceutical product and the impracticability of the cork. La Jarre d' Or receives a 23% evaluation as bad due to its dark bottle colour and strange shape (Table 8).

	Bad %	Fair %	Good %	Very good %
Carapelli	9.8	20.1	50.5	19.6
Lerida	26.5	19.5	18.6	35.3
Kolymvari	15.7	47.1	32.8	4.4
Hediard	9.8	19.7	38.2	33.3
La Jarre d' Or	23.0	37.3	25.3	14.2
Puget	11.3	38.7	33.8	16.2

Table 8. Packaging perception of the various olive oil brands

Overall, the majority of consumers revealed that Lerida and Hediard have the best natural attributes while Hediard and Carapelli the most preferable packaging. Kolymvari differentiates itself with a relative good taste and La Jarre d' Or receives the lowest positive ratings of all.

Taking all the previous product attributes into consideration and attaching the corresponding price to each one of them the consumers revealed their purchasing preference (Table 9).

Brand	Price (Fr. Francs)	1 st selection (%)	2 nd selection (%)
Carapelli	31	17.2	22.5
Lerida	65	5.9	10.3
Kolymvari	20	17.2	27.0
Hediard	48	13.7	17.6
La Jarre d' Or	37	5.4	9.3
Puget	18	43.6	16.7

Table 9. Consumer purchasing selection

Puget is selected by 43.6%, Kolymvari and Carapelli preferred by 17.2% respectively and thereafter Hediard, Lerida and La Jarre d' Or follow.

In the last part of the questionnaire, certain space was available to interviewees for commenting and expressing freely their opinions, which in general terms revealed that: French consumers show a great interest for the olive oil although they use it mainly for salads. Packaging plays a decisive role in selecting an olive oil brand. Most consumers seem to appreciate a practical shape of the bottle which can be easily held, has a neck which makes it easy to pour and uses a specially designed top for spillage prevention. Transparent glass bottles are preferred and the labelling must include all the relevant information in French. Regarding the individual brands, consumers did not like the strong (bitter) taste of Kolymvari, while the interest for biologically produced olive oil is limited (La Jarre d' Or). The packaging of Hediard and Carapelli was widely accepted as very practical, due to the small bottle's diameter and its big height which reminds either perfume or liquor to consumers. On the other hand the luxurious packaging of Lerida was perceived as impractical due to its big diameter and the tendency of the cork to crumble. The comments on Puget were focused on its rational price.

5.3. Data analysis

Principal components analysis

Through this analysis an attempt will be made to identify relations among consumer characteristics such as age, family size, frequency of olive oil use and consumer olive oil preference and awareness. The correlation matrix in table 10 shows that sunflower oil is positively related with margarine and negatively with groundnut oil. This describes the sunflower and groundnut oil as competitive products while the sunflower oil and margarine as complementary. The consumers are spread all around the origin of the two axes and therefore there is no ground for defining any market segments (Fig. 2).

Age	+1.000								
Family size	+0.476	+1.000							
Olive oil	-0.043	-0.029	+1.000						
Groundnut oil	-0.006	-0.142	+0.070	+1.000					
Sunflower oil	-0.016	+0.183	-0.035	-0.306	+1.000				
Corn oil	+0.033	+0.047	+0.031	+0.040	+0.021	+1.000			
Margarine	-0.044	+0.022	-0.093	-0.061	+0.149	+0.001	+1.000		
Other	+0.043	+0.010	-0.098	+0.031	+0.100	+0.108	-0.173	+1.000	
Frequency of use	+0.020	+0.012	+0.122	-0.026	+0.030	+0.122	-0.039	-0.044	+1.000

Table 10. Correlation matrix of consumer characteristics and type of oil

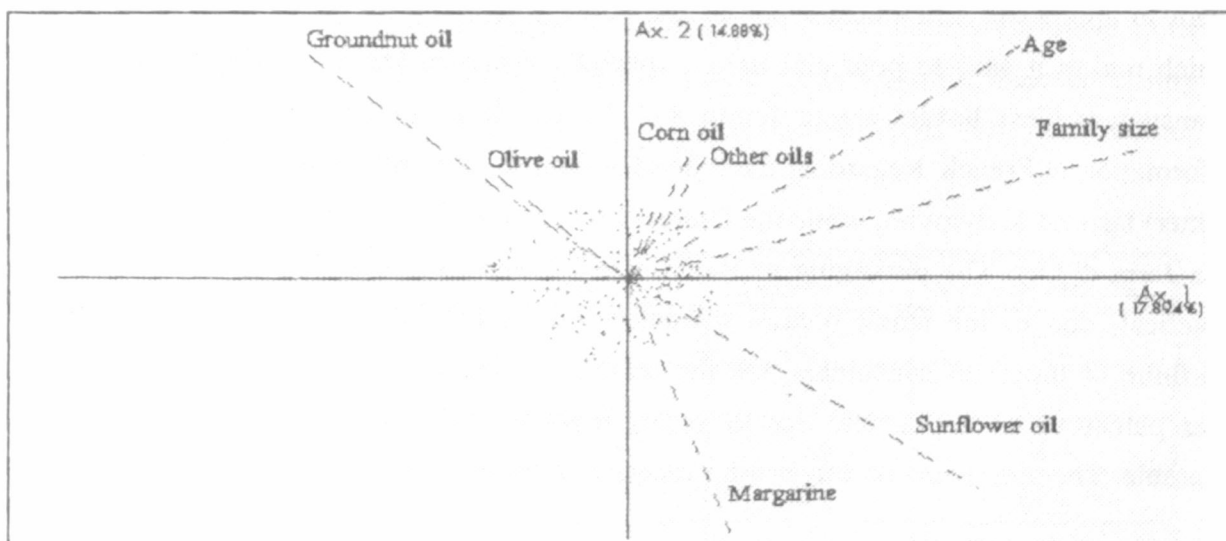


Fig. 2. Consumer characteristics in relation to type of oil used

Concerning the olive oil packaging, consumers are segmented into two broad categories the ones preferring the glass and the others preferring the plastic bottles (Table 11, Fig. 3). The first group is closer to the small packaging while the second presents the reverse attitude. The existing consumer perceptions and attitudes with respect to certain olive oil properties and characteristics can partition the oil market off four distinct segments (Table 12, Fig. 4). The first believes that it is a health related product (hypotheses 1, 4, 5, 6), the second has developed a positive tendency towards its taste (hypothesis 2), the third considers it expensive (hypotheses 8, 3), and finally the last regards it a pure product. The first group is aware to a large extent of the difference between extra virgin olive oil and olive oil (vector 9).

Age	+1.000									
Family size	+0.476	+1.000								
Frequency of use	+0.020	+0.012	+1.000							
Size of container	-0.030	+0.166	+0.191	+1.000						
Glass bottle	+0.136	-0.049	+0.109	-0.195	+1.000					
Plastic bottle	-0.069	+0.014	-0.113	+0.167	-0.665	+1.000				
Small can	+0.048	-0.021	-0.036	-0.059	-0.062	-0.065	+1.000			
Large can	-0.092	-0.009	+0.012	+0.239	-0.115	+0.062	-0.032	+1.000		
Other	-0.052	-0.085	-0.012	+0.112	+0.067	+0.118	+0.120	+0.326	+1.000	

Table 11. Correlation matrix of consumer characteristics with type and size of container

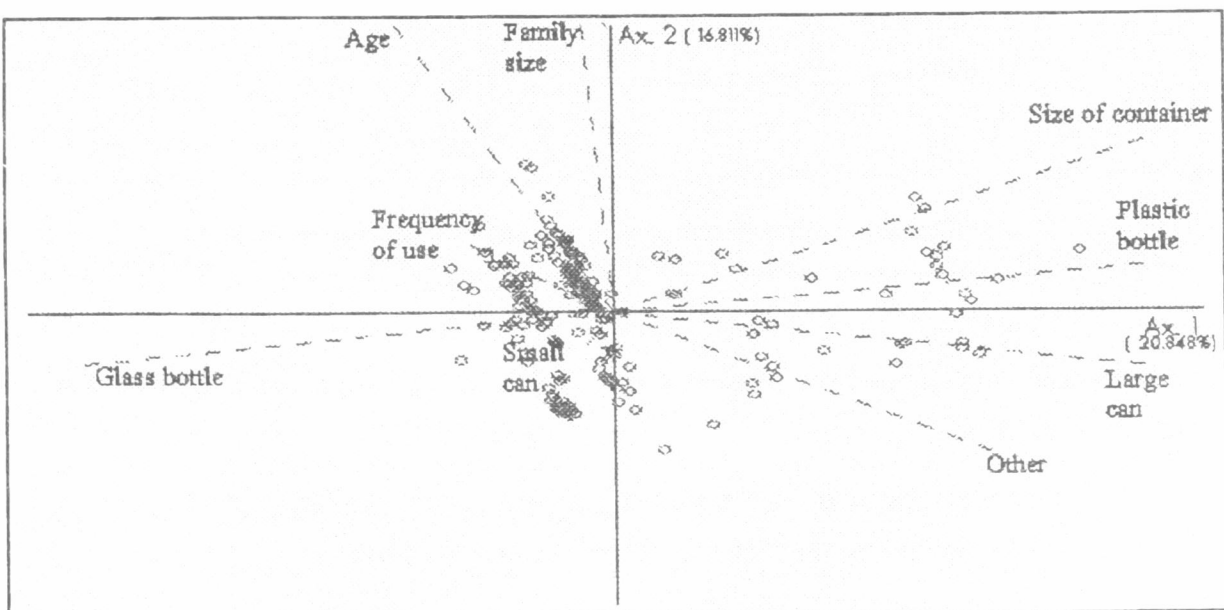


Fig. 3. Consumer characteristics with respect to container's type and size

- Carapelli; its preference is positively related with age and family size.
- Lerida and Hediard; they consist a team of expensive products, with high qualitative characteristics.

Age	+1.000									
Family size	+0.476	+1.000								
Frequency of use	+0.020	+0.012	+1.000							
Carapelli	+0.100	+0.152	+0.040	+1.000						
Lerida	+0.036	+0.067	-0.204	-0.100	+1.000					
Kolymvari	-0.098	-0.060	+0.072	+0.006	-0.193	+1.000				
Hediard	+0.034	-0.115	-0.006	-0.201	+0.205	-0.397	+1.000			
La Jarre d' Or	-0.114	-0.079	-0.028	-0.168	-0.274	-0.265	-0.194	+1.000		
Puget	+0.014	-0.068	+0.041	-0.337	-0.462	-0.076	-0.232	+0.177	+1.000	

Table 13. Correlation matrix of consumer characteristics concerning the product's ranking

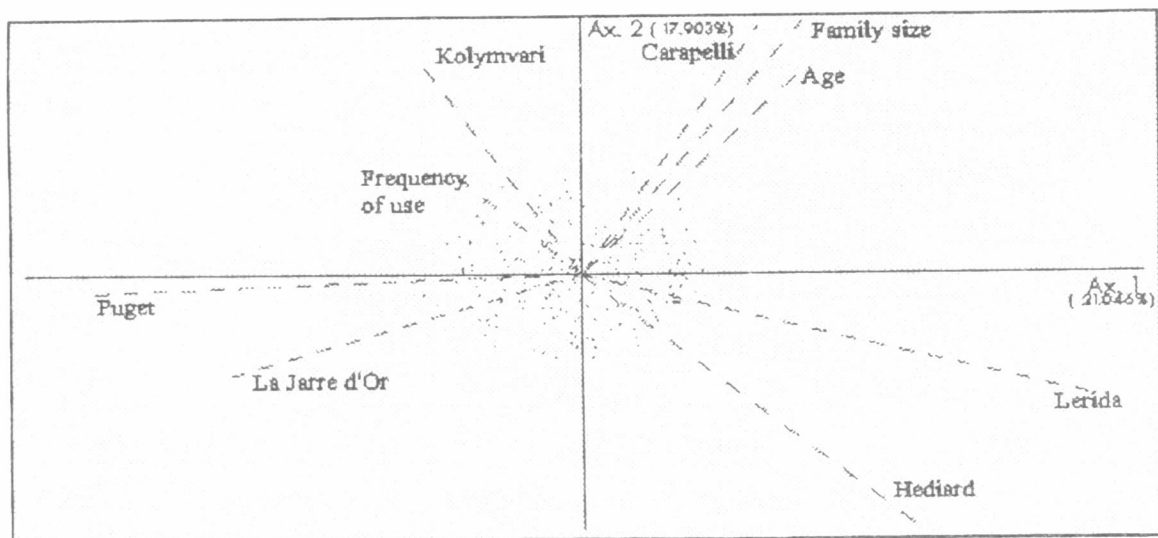


Fig. 5. Consumer characteristics with respect to product's ranking

The olive oil product's natural attributes of colour, taste and odour are examined in relation to the olive oil brands (Tables 14-16, Figs. 6-8).

Carapelli	+1.000					
Lerida	+0.003	+1.000				
Kolymvari	+0.153	+0.341	+1.000			
Hediard	+0.225	+0.129	+0.122	+1.000		
La Jarre d' Or	-0.140	-0.184	-0.114	-0.195	+1.000	
Puget	-0.299	-0.132	-0.012	-0.048	+0.316	+1.000

Table 14. Correlation matrix of the natural attribute of colour in relation to olive oil brands

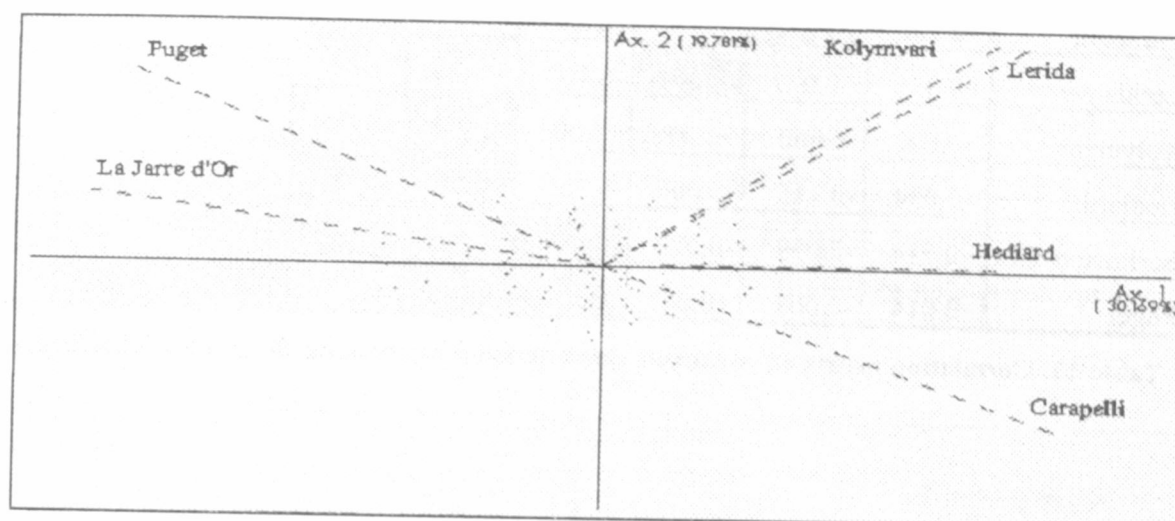


Fig. 6. Olive oil's natural attribute of colour with respect to brands

Carapelli	+1.000					
Lerida	+0.009	+1.000				
Kolymvari	+0.161	+0.019	+1.000			
Hediard	-0.038	+0.011	-0.106	+1.000		
La Jarre d' Or	+0.117	+0.029	-0.041	+0.089	+1.000	
Puget	+0.020	-0.093	-0.075	+0.014	+0.224	+1.000

Table 15. Correlation matrix of the natural attribute of taste with respect to brands

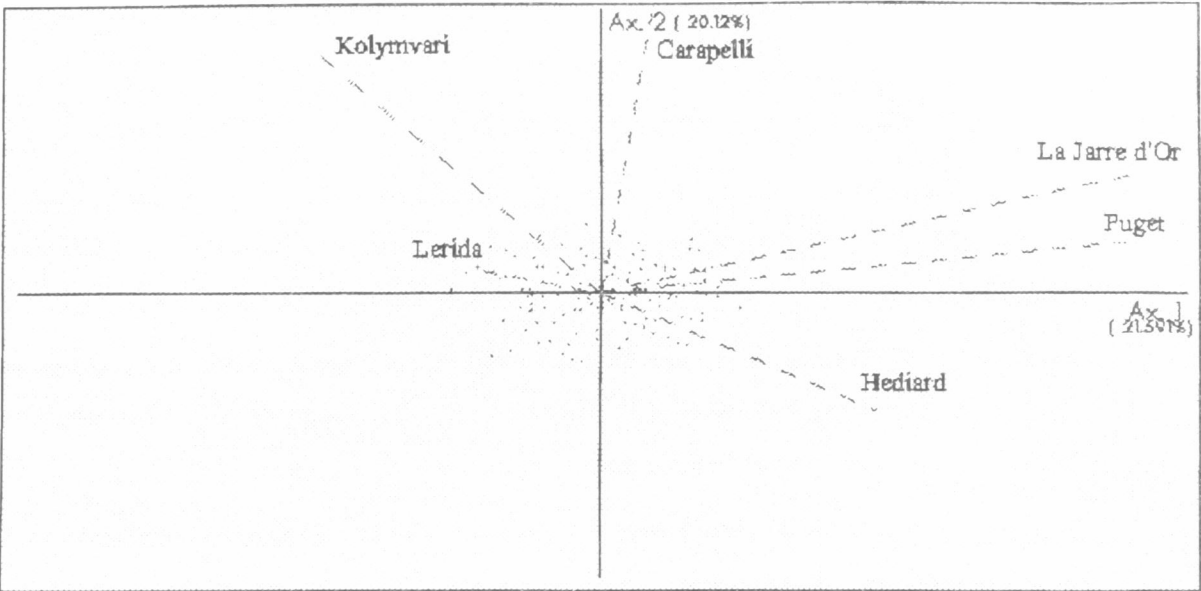


Fig. 7. Olive oil's natural attribute of taste with respect to brands

Carapelli	+1.000					
Lerida	-0.096	+1.000				
Kolymvari	+0.171	+0.125	+1.000			
Hediard	-0.091	+0.152	-0.060	+1.000		
La Jarre d' Or	+0.013	-0.024	-0.126	+0.118	+1.000	
Puget	-0.165	+0.015	+0.032	+0.028	+0.305	+1.000

Table 16. Correlation matrix of the natural attribute of odour with respect to brands

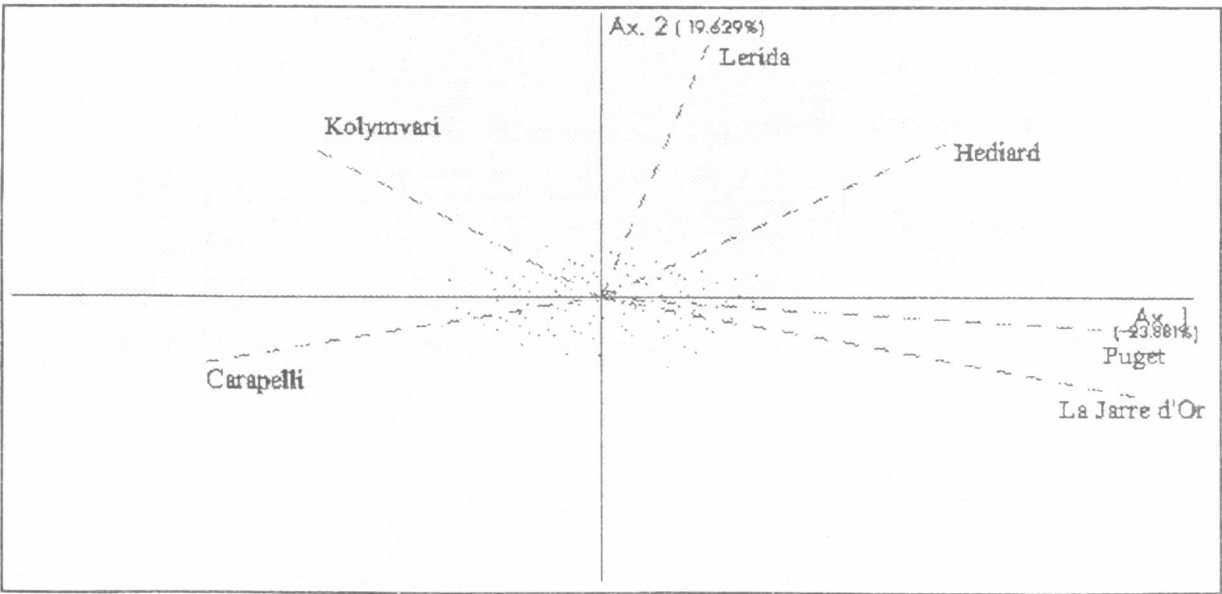


Fig. 8 Olive oil's natural attribute of odour with respect to brands

The main issues revealed in these presentations are that :

- there is a clear ordering of the olive oil brands from the dark green colour of Kolymvari to the light yellow of Carapelli as follows: Kolymvari - Lerida - Hediard - Carapelli;
- the brands of La Jarre d' Or and Puget have a similar taste, while the consumers preferring the taste of Hediard (light olive oil) have exactly the opposite impression of Kolymvari (heavy taste).
- with respect to odour, Puget and La Jarre d' Or are evaluated similarly by a segment of consumers. These same consumers express an opposite view for Kolymvari's odour.

Correspondence Analysis

The underlying relations among the different age groups and the type of oils used are displayed in Table 17 and Fig. 9. Consumers with age ranging between 20-30 do not seem to indicate a special preference for a particular type of oil. On the contrary the age group 51-60 is the one closer to the corn oil. Olive oil, margarine, groundnut and sunflower oils are positively correlated with the ranges 31-50 and 61-80.

Olive oil	1.000					
Groundnut oil	0.798	1.000				
Sunflower oil	0.962	0.724	1.000			
Corn oil	0.079	0.363	0.233	1.000		
Margarine	0.943	0.846	0.816	-0.036	1.000	
Other	0.658	0.741	0.683	0.717	0.657	1.000

Table 17. Correlation matrix of the age groups and the different types of oil used

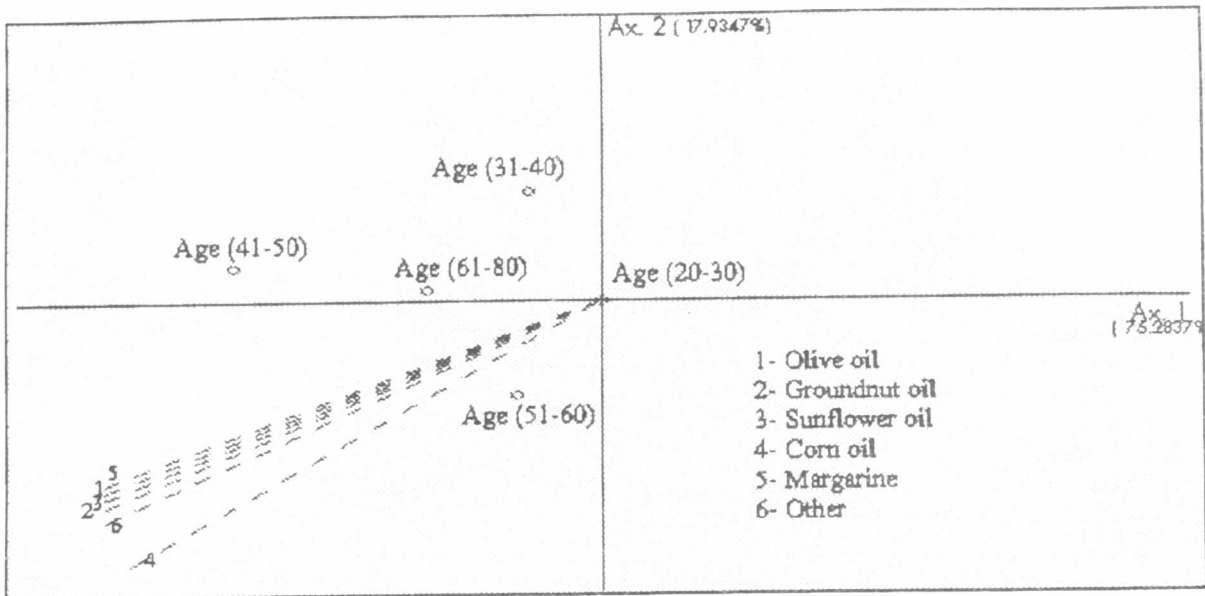


Fig. 9. Age with respect to the different types of oil used

In a similar way the consumers profession can be examined with respect to the oils used (Table 18, Fig. 10). Four brand categories of profession are formed the first includes the professional executives with no systematic tendency to a particular oil; the artists show a trend towards olive and groundnut oils; the public servants use olive oil, corn oil, sunflower oil and margarine and the fourth segment, consisting of housewives, pensioners and students, purchases very small quantities of oil, in general.

Olive oil	1.000					
Groundnut oil	0.961	1.000				
Sunflower oil	0.993	0.917	1.000			
Corn oil	0.752	0.570	0.808	1.000		
Margarine	0.978	0.906	0.980	0.831	1.000	
Other	0.989	0.930	0.994	0.735	0.735	1.000

Table 18. Correlation matrix of the profession groups and oils used

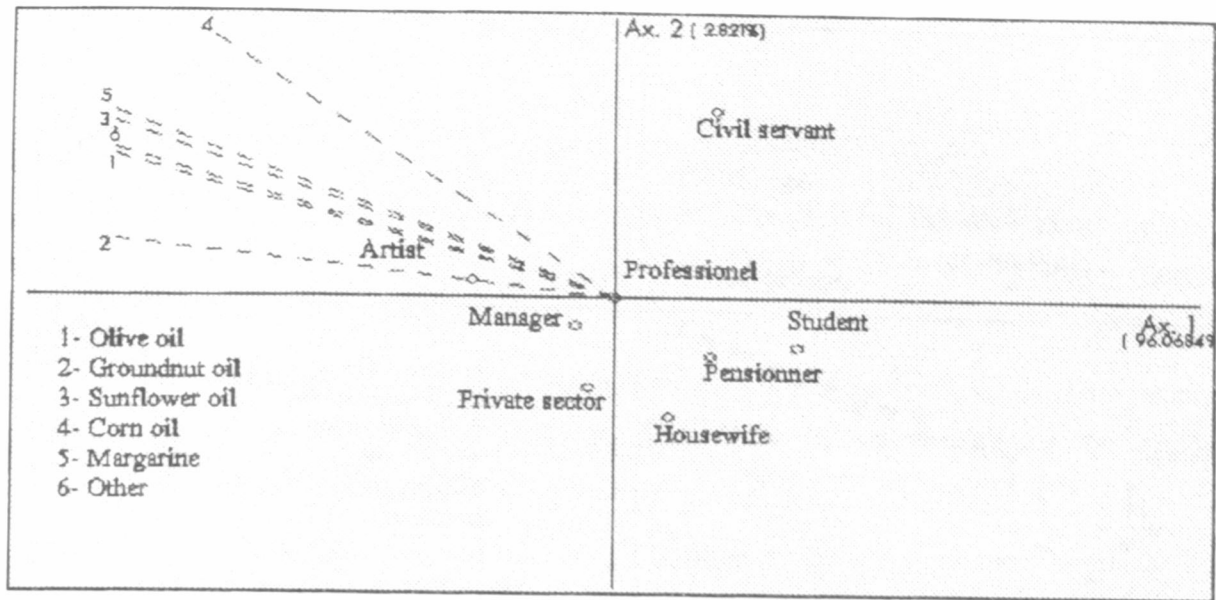


Fig. 10. Profession with respect to the oils used

The type of use of the different oils is of great interest (Table 19, Fig. 11). All the oils with the exception of the olive oil are related to frying. This verifies consumers' reserved attitude in utilising olive oil for frying purposes. The regular olive oil consumers (daily, 1-4 times/week) utilise it for several purposes. On the contrary, the least frequent consumers (every 15 days or more rarely), utilise the olive oil only for specialised purposes (Table 20, Fig.12).

Frying	1.000					
Cooking	-0.971	1.000				
Mayonnaise	-0.666	0.678	1.000			
Sauces	-0.088	-0.006	-0.328	1.000		
Salads	-0.144	0.207	0.553	-0.156	1.000	
Hot dishes	0.241	-0.134	-0.378	0.084	0.459	1.000

Table 19. Correlation matrix of utilisation purpose with respect to different oils

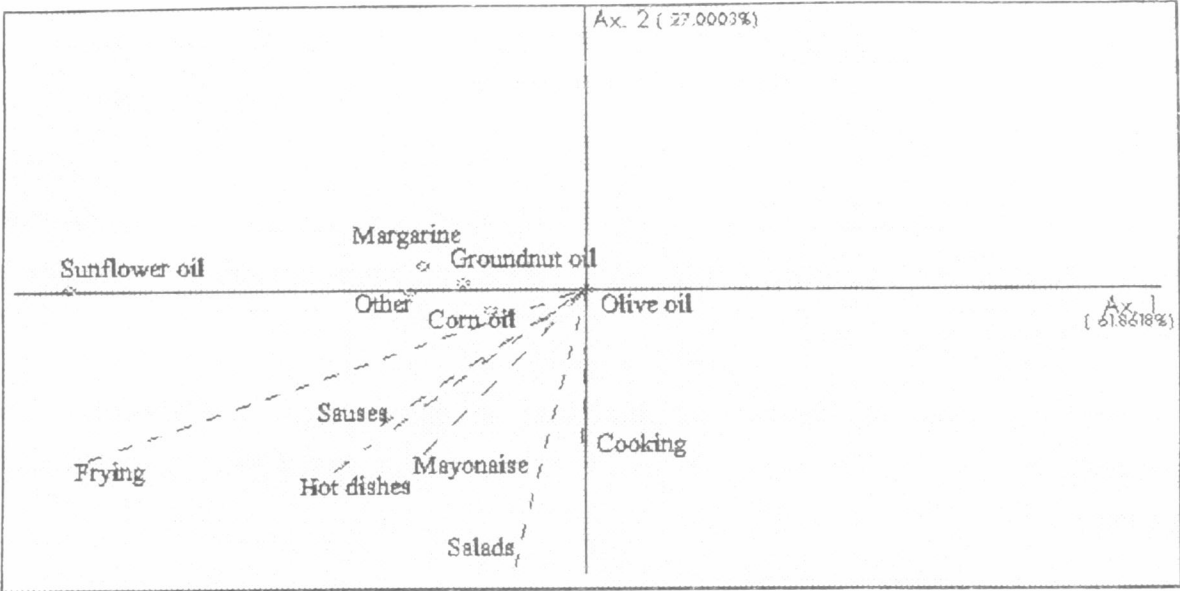


Fig. 11. Utilisation purposes regarding the different oils

Daily	1.000				
1-2 times/week	0.980	1.000			
3-4 times/week	0.954	0.961	1.000		
Every 15 days	0.762	0.851	0.904	1.000	
Monthly	0.849	0.908	0.962	0.984	1.000

Table 20. Correlation matrix of frequency and type of olive oil use

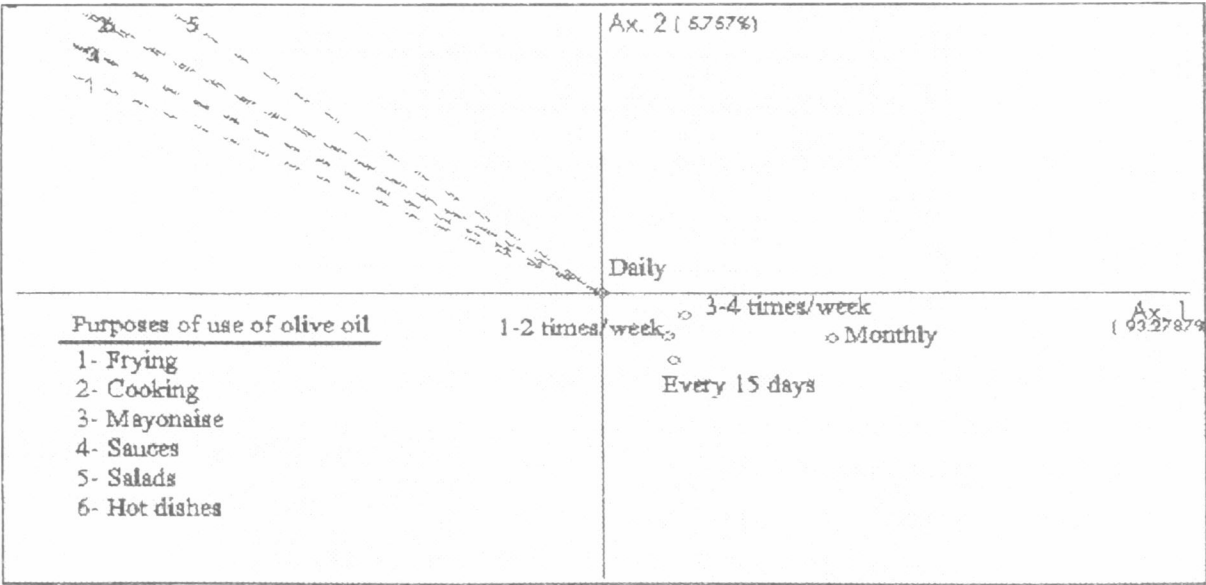


Fig. 12. Frequency and type of olive oil use

5.4. Multicriteria analysis

Introduction

An attempt will be made to analyse consumer behaviour using the improved multicriteria model UTASTAR and then through specialised software to introduce market simulations for the products under examination.

Our main purpose is to analyse the consumer selection criteria and evaluate them respectively. It is of great significance as well to examine the market segmentation according to a criteria set.

Criteria selection

Table 21 presents the percentage of consumers for whom a criterion has been determinant and also the relative significance level with respect to the other involved criteria. Among consumers, 77% consider the olive oil colour to be important at a weight significance level, 19% with respect to the other criteria of image, price, taste and odour, while an 80% considers the product's image as a determinant criterion.

Criteria	Level of importance (%)	Consumers (%)
Colour	19	77
Image	18	80
Price	17	64
Packaging	17	70
Taste	15	61
Odour	13	57
Threshold level	10	

Table 21. Determinant criteria

Based on the criteria ranking according to the level of significance it is feasible to segment the olive oil market through criteria or complex combinations of them. The criteria of price and colour are considered significant by 49% of consumers (Table 22), while 37% of them

perceive as important the image, the price and the packaging and they do not consider as determinant the criteria of colour, taste and olive oil odour (Table 23).

	Colour	Image	Price	Packaging	Taste	Odour
Colour	77%	61%	49%	58%	48%	47%
Image		80%	53%	54%	50%	46%
Price			64%	46%	37%	35%
Packaging				70%	43%	44%
Taste					61%	41%
Odour						57%

Table 22. Market segmentation through criteria combinations

Colour	Image	Price	Packaging	Taste	Odour	Consumers
+				+	+	34%
+	-	-	-	+	+	0%
+		+		+		29%
+	-	+	-	+	-	0%
		+	+			46%
-	-	+	+	-	-	0%
	+	+	+			37%
-	+	+	+	-	-	2%
+		+	+	+		22%
+	-	+	+	+	-	0%

Table 23. Market segmentation through complex criteria combinations

The decisive conclusion coming from this analysis is that all six criteria are segmented, generally, into three categories according to their importance. Olive oil colour and image are the most determinant criteria for the choice of a specific olive oil brand, while price and packaging consist a criteria group of medium importance to French consumer. Finally, olive oil taste and odour are the least determinant criteria for the consumer behaviour.

5.5. Estimation of market shares

The present market shares in the French olive oil market excluding the Kolymvari product are presented in Figure 13. It appears that the market leader by far is Puget (51%), followed by Carapelli (21%) and Hediard (17%). If we include the Cretan product in these estimations it is obvious that Kolymvari would benefit a serious market share reaching a 15%. This percentage will be mainly extracted from Puget and Carapelli (Fig. 14).

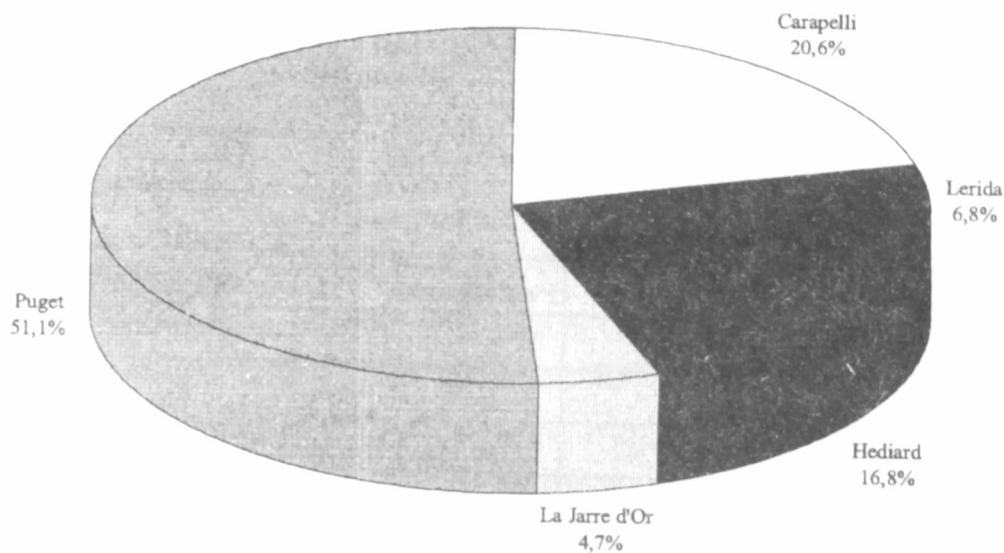


Fig. 13. Estimation of market shares in France (without Kolymvari)

Regarding Hediard most of its consumers are quite loyal and as a result Kolymvari conquers only 1% of its present market share. As far as La Jarre d' Or is concerned, since it is a niche product, it has no losses from the Kolymvari entry.

Figure 15 demonstrates the market shares based on the sales revenue. While Lerida and Hediard own 4.8% and 15.8% of the total olive oil volume sold in the French market, their revenues reach 11% and 27% respectively of total olive oil sales in France. Puget, due to its low price, occupies 29% of the olive oil sale revenue.

Market shares are computed as a percentage (based on quantities or on sales value) of the participating brands and not of the total French olive oil market.

Market shares are computed as a percentage (based on quantities or on sales value) of the participating brands and not of the total French olive oil market.

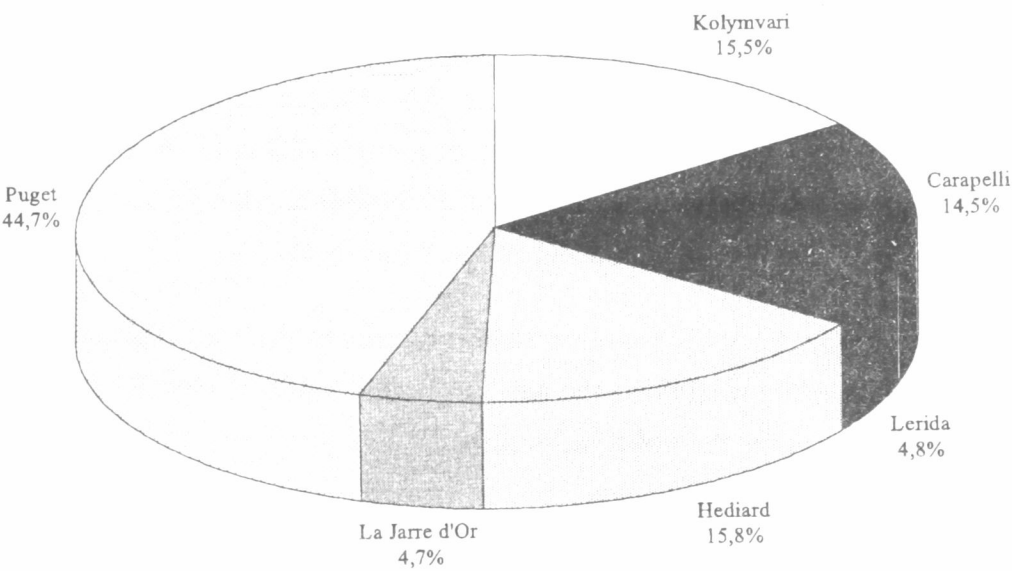


Fig. 14. Estimation of market shares in France (including Kolymvari)

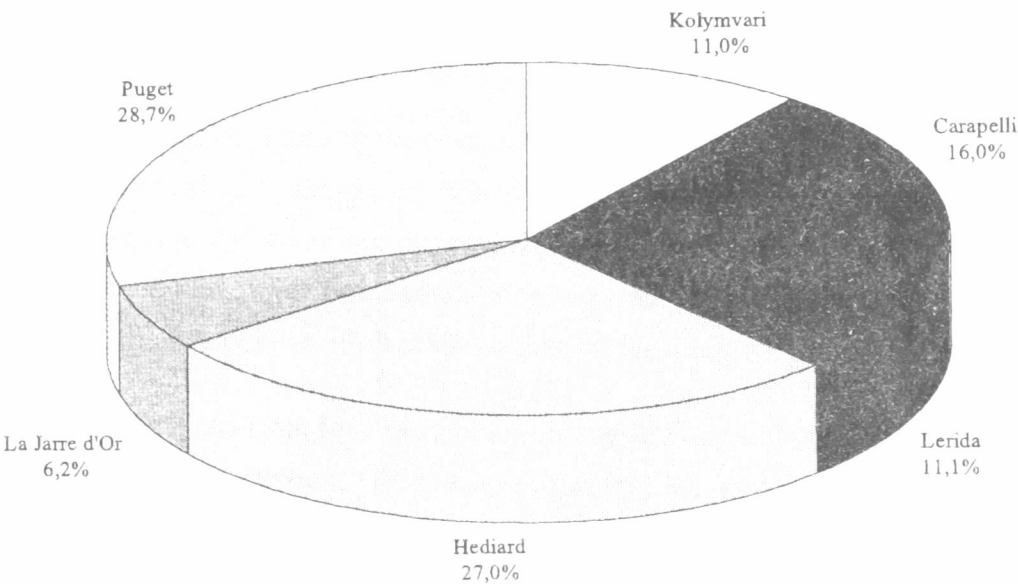


Fig. 15. Market shares based on sales values

5.6. Olive oil market forecasting

Introduction

At this stage we will try to put the consumers' preferences and tendencies revealed in the previous analysis, in some order and, furthermore, design and develop the new Kolymvari olive oil product. This new product will be a modification of the extra virgin Kolymvari brand in order to better satisfy the consumer needs and adjust to the guidelines set by the French market. The utilised software for the qualitative marketing has the potentiality of market simulation through the conducted survey's data base.

The simulation methodology is based on each consumer utility functions which are estimated with the UTASTAR. By modifying the attributes-criteria of a product it can be evaluated for each individual consumer the utility of purchasing this new product. A new reestimation of the market shares is taking place then.

Market Sensitivity Analysis

During the sensitivity analysis procedure we are trying to explore through improving the attributes of the Kolymvari product the effect on the leading market shares. Henceforth in collaboration with the results retrieved in the previous sections, we will try to approximate the new product.

Figures 16-21 present the outcomes of the sensitivity analysis by experimenting on the criteria of price, image, colour, odour, taste and packaging. The brands of La Jarre d' Or, Hediard and Lerida are not involved in these analyses since the consumers that purchase them are quite loyal. Therefore any possible change and improvement on the Kolymvari's attributes will not bring a significant impact on these three products' market shares.

The most significant criteria are price, packaging, colour and taste. This comes as a conclusion since they induce the greatest impact on the market shares. The odour and image of the product are less important criteria and they only become significant by approaching their optimum values.

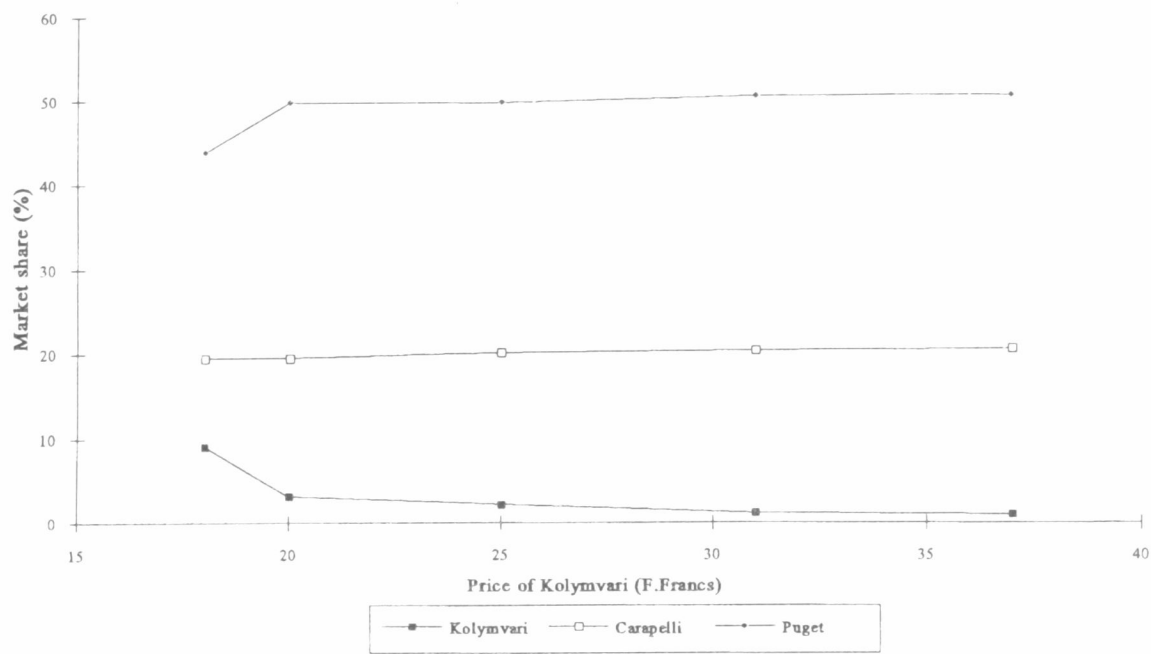


Fig. 16. Sensitivity analysis of Kolymvari's price

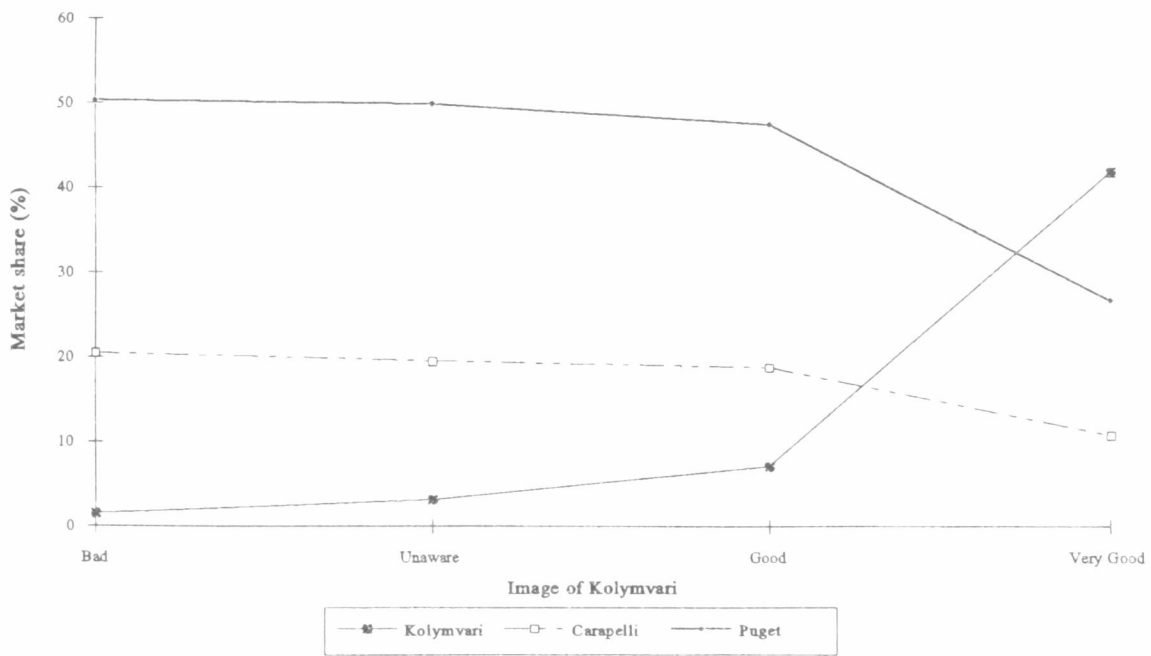


Fig. 17. Sensitivity analysis of Kolymvari's image

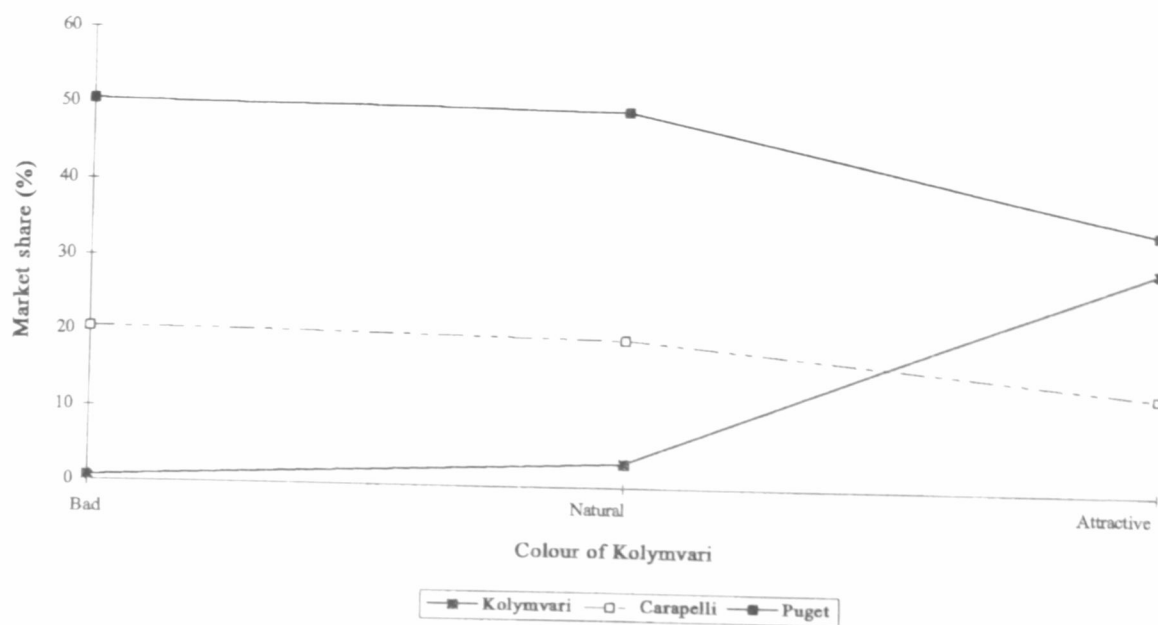


Fig. 18. Sensitivity analysis of Kolymvari's colour

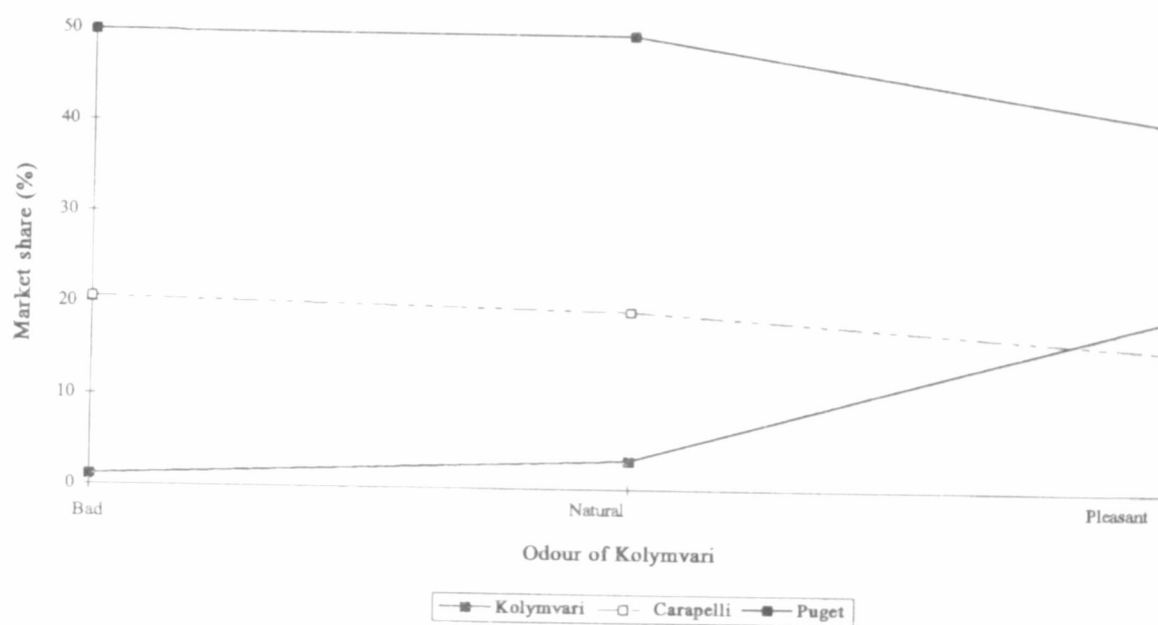


Fig. 19. Sensitivity analysis of Kolymvari's odour

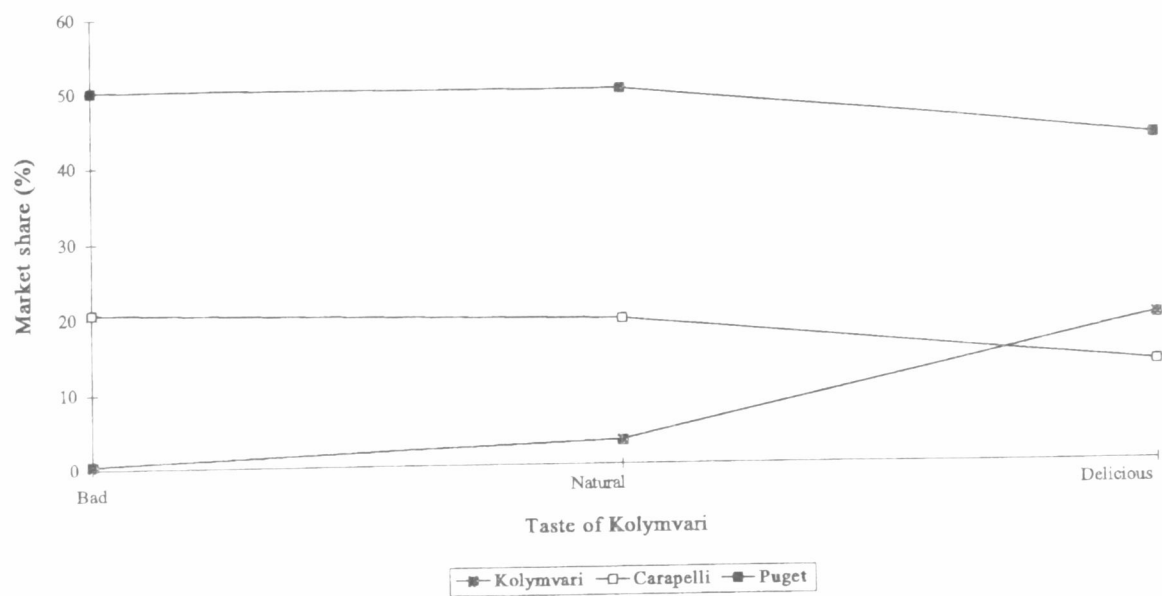


Fig. 20. Sensitivity analysis of Kolymvari's taste

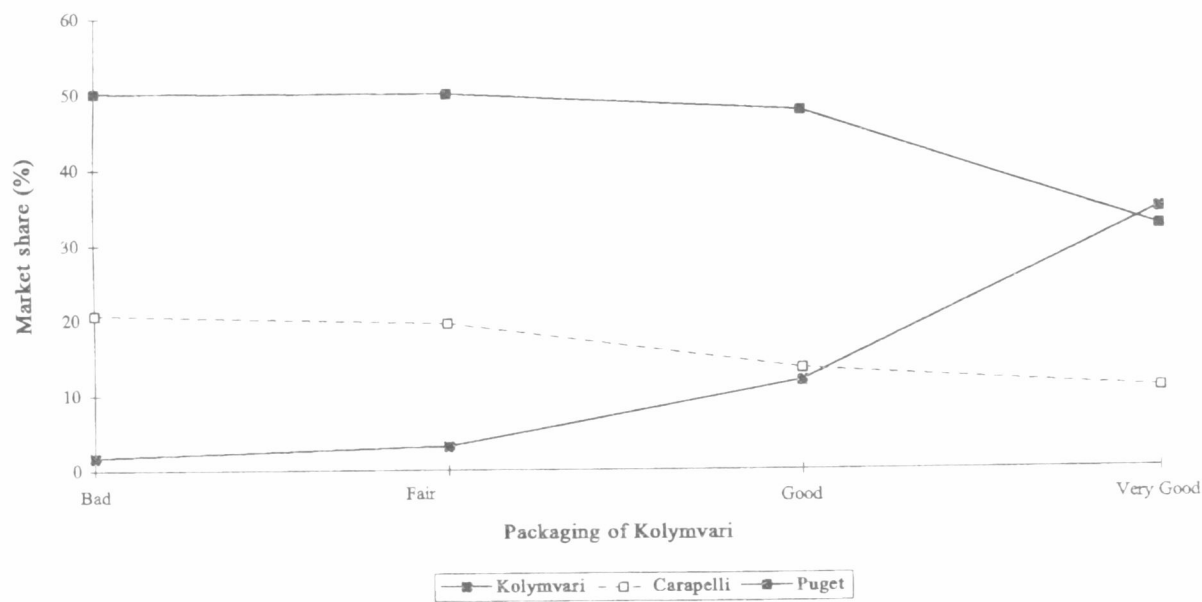


Fig. 21. Sensitivity analysis of Kolymvari's packaging

5.7. Potential market penetration strategies

The average values of the criteria for all the examined products are displayed in Table 24. The new product design will mainly be based on the improvements of the determinant criteria of colour, taste and packaging, while price is treated as an independent variable.

Product	Image	Colour	Odour	Taste	Packaging	Price
Carapelli	Unaware	Natural	Natural	Natural	Good	31F
Lerida	Unaware-Good	Natural	Natural	Natural-Delicious	Fair-Good	65F
Kolymvari	Unaware-Good	Natural	Natural	Natural	Fair	20F
Hediard	Good	Natural	Natural	Natural-Delicious	Good	48F
La Jarre d' Or	Unaware	Unnatural	Natural	Natural	Fair	37F
Puget	Good	Natural	Natural	Natural	Fair-Good	18F

Table 24. Profile of the olive oil brands

Table 25 presents three alternative market penetration strategies for the Kolymvari product in the French market.

Criteria	Strategy 1	Strategy 2	Strategy 3
Price	18-37F	18-37F	18-37F
Packaging	Fair	Good	Good
Taste	Natural-Delicious	Natural	Natural-Delicious
Odour	Natural	Natural	Natural
Colour	Natural	Natural	Natural
Image	Unaware-Good	Unaware-Good	Unaware-Good

Table 25. Alternative market penetration strategies for the Kolymvari product

An improvement on the taste is recommended in order for Kolymvari to approach the lighter taste of Lerida and Hediard. The present dark green colour of Kolymvari, while it is suitable for south France (except the area of Nice), it is not ideal for the greater area of Paris (Avlonitis and Kouremenos, 1993). Consumers have ranked the examined products from darker to lighter in the following order: Kolymvari - Lerida - Hediard - Carapelli. The new

product's colour ought to look like the ones of Lerida and Hediard. The determination of the colour mainly depends on factors such as the type and quality of olive trees.

Finally a new packaging is required such as to approximate the evaluation of good. The packagings of Hediard and Carapelli have been rated as good. The required modifications are that:

- the label has to be in French (which was not the case for the utilised labelling of Kolymvari in this survey);
- the shape of the glass bottle has to be square with small diameter and long height and neck (Carapelli and Hediard have this type of shape);
- the container needs to open easily, pour and reseal properly ;
- a more intense promotion of the product's Cretan origin is required (both Carapelli and Lerida emphasize it);

These three strategies offer alternative solutions to the decision maker. The first is based on the natural attributes' improvement (colour, taste), the second on the packaging and the last on a combination of the previous two (improvement of packaging, colour and taste).

The optimum market penetration strategy selection is solely depended on the management of Kolymvari cooperative. Figure 22 presents the estimated market shares of the Kolymvari olive oil under different pricing. The market shares are evaluated as percentages with respect to the total sale value of olive oil marketed in France.

A comparison of these three different approaches (Fig. 22) indicates that the first two provide rather similar sales revenues while the third one appears as the optimum. This was expected since all three involved criteria were improved.

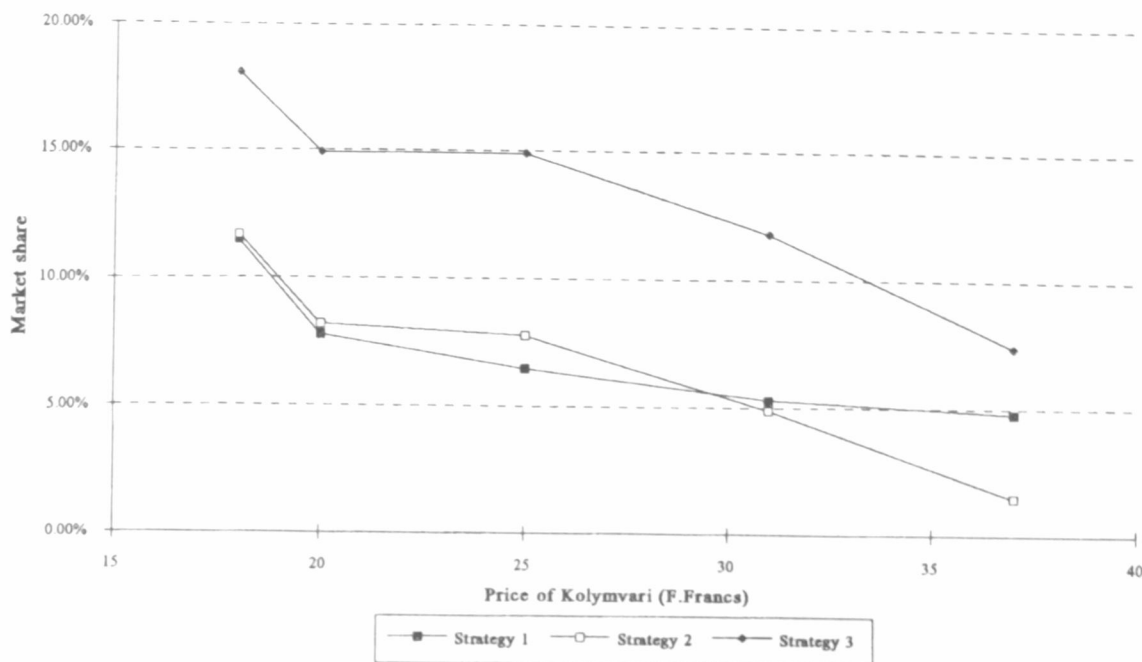


Fig. 22. Market shares (sales value) of Kolymvari for the three potential marketing strategies

Concerning the price of Kolymvari it can increase from 20FF to 25FF without a significant decrease of its market share. If it approaches 31FF then it is not a competitive product since Carapelli has the same price as well. On the contrary, if its price decreases to 18FF, that of Puget's, then its market share is further increased. A modelling of this decision making approach is presented in Figure 23.

5.8. Conclusions - Recommendations

The French oil market is segmented into the north and south consumers. The southern part mainly consists of traditional olive oil consumers who mainly prefer a dark green colour. On the contrary, in the northern areas the use of olive oil is in very limited amounts and the main influence on the decision to use olive oil arises from the health benefits.

This survey took place in the greater area of Paris which can be considered as a representative sample of the country since both types of oil consumers are present. The olive oil market in Paris is not homogeneous and to a large extent the consumers' behaviour is determined by their origin.

The olive oil market in France and mainly in the northern part is of great interest since olive oil is recognised as a product of higher status. A percentage of 50-60% who presently purchase Puget or Carapelli would be willing to try the new Kolymvari product.

Price seems to be the most important determinant criterion. Despite that, if consumers are persuaded of a product's superior qualitative characteristics, they prefer it. This is the case of Hediard and its consumers are loyal to it as well. There is also a small market segment (5%) loyal to the biological olive oil La Jarre d' Or.

If we plan to introduce an expensive olive oil product to the French market then a great effort is required to assure potential buyers that this product is worth it. Also great consistency is expected with respect to the taste, colour and odour of the product.

A new product development involves a large number of variables and it is a rather difficult and complex management decision. This new product will probably replace another one that all along has been promoted and distributed by the firm. Avlonitis (1993) claims that in the manufacturing industry nineteen evaluation factors (marketing, accounting/finance, etc.) are generally considered by management in order to make the product's elimination/retention decision. The Kolymvari product is a co-operative product which requires the participation and contribution of farmers and, to a lesser extent, of the state in the decision making.

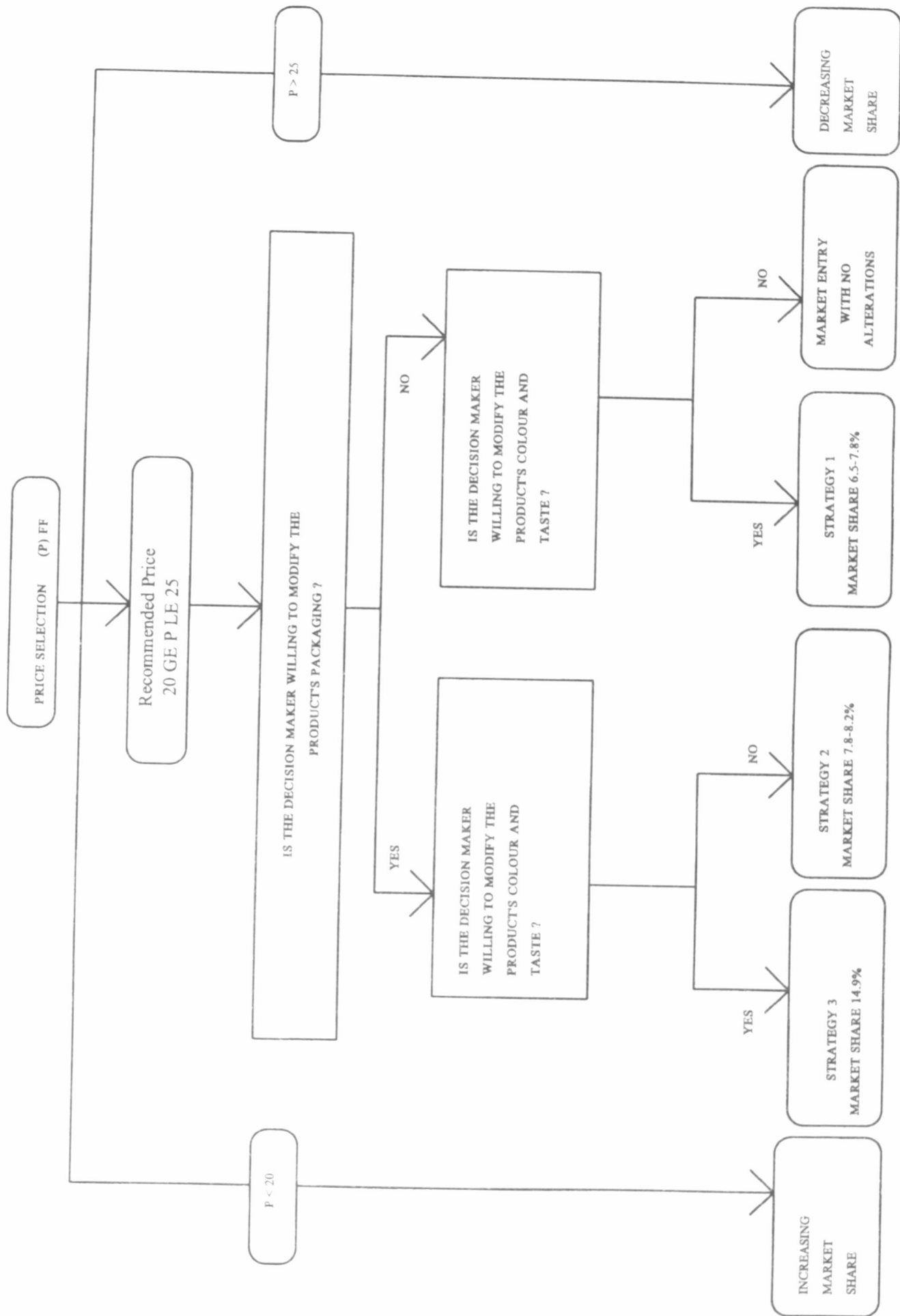


Fig. 23. Decision Making model

Appendix 1

Questionnaire

OLIVE OIL MARKET RESEARCH IN PARIS, FRANCE

PARIS - 1993

0. HAVE YOU EVER BOUGHT OLIVE OIL ?

Yes ☐No ☐

1. CONSUMER

• Sex

• Profession

• Age

• Family status

Married ☐Single ☐Children ☐

2. WHICH KINDS OF OILS DO YOU USE GENERALLY ?

- Olive oil ☐
- Groundnut oil ☐
- Sunflower oil ☐
- Soya oil ☐
- Corn oil ☐
- Margarine ☐
- Other ☐

3. HOW FREQUENTLY DO YOU USE OLIVE OIL ?

- Daily ☐
- 3-4 times/week ☐
- 1-2 times/week ☐
- Every 15 days ☐
- Every month ☐

4. WHICH KIND OF OIL DO YOU USE FOR :

- Frying
- Cooking
- Mayonnaise
- Sauces
- Salads
- Hot dishes
- Other

5. DO YOU AGREE THAT :

	Agree	Disagree	Don't know
• Olive oil is the healthiest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil makes the dishes tasty	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• With olive oil, I can fry several times	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil does not increase weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil does not increase cholesterol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil is good for the heart	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil has no additives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Olive oil is relatively expensive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. WHICH SIZE AND TYPE OF CONTAINER DO YOU FIND MOST USEFUL?

Quantity

0.25 l ☐

0.5 l ☐

1 l ☐

3 l ☐

Container

Glass bottles..... ☐

Plastic bottles..... ☐

Small cans..... ☐

Large cans..... ☐

Other..... ☐

7. DO YOU FREQUENTLY CHANGE YOUR BRAND OF OLIVE OIL ?

Yes ☐

No ☐

8. DO YOU KNOW HOW EXTRA VIRGIN OLIVE OIL- 1st COLD EXTRACTION- DIFFERS FROM ORDINARY OLIVE OIL ?

Yes ☐

No ☐

9. ACCORDING TO WHAT YOU KNOW OR HAVE HEARD, WHAT IS YOUR OPINION OF THESE BRANDS OF OLIVE OIL :

	Bad	I do not know	Good	Very good
CARAPPELLI (Italy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Spain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete, Greece)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE D' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. HOW WOULD YOU CHARACTERISE THE COLOUR OF THESE OLIVE OILS :

	Unnatural	Natural	Attractive
CARAPELLI (Italy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Spain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete, Greece)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE D' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. HOW WOULD YOU CHARACTERISE THE ODOUR OF THESE OLIVE OILS :

	Unnatural	Natural	Pleasant
CARAPELLI (Italy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Spain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete, Greece)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE D' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. HOW DO YOU FIND THE TASTE OF THESE OLIVE OILS :

	Unnatural	Natural	Delicious
CARAPELLI (Italy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Spain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete, Greece)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE D' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. HOW DO YOU FIND THE PACKAGING OF THESE OLIVE OILS :

	Bad	Fair	Good	Very good
CARAPELLI (Italy)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Spain)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete, Greece)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE D' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. DO YOU READ THE INFORMATION ON LABELS ? DO YOU REALLY BELIEVE IT?

Yes ☐

No ☐

Yes ☐

No ☐

FINAL CHOICE:

15. WHICH OIL WOULD YOU BUY ?

<u>Brand(origin)</u>	<u>Cost</u>	<u>Rank of purchase</u>
CARAPELLI (Italy)	31 Francs	<input type="text"/>
LERIDA (Spain)	65 Francs	<input type="text"/>
KOLYMVARI (Crete, Greece)	20 Francs	<input type="text"/>
HEDIARD (France)	48 Francs	<input type="text"/>
LA JARRE D' OR (France)	37 Francs	<input type="text"/>
PUGET (France)	18 Francs	<input type="text"/>

IF THE OIL YOU PREFER WAS NOT AVAILABLE, WHICH BRAND WOULD YOU CHOOSE ? (asked for all rankings)

16. COMMENTS

(consumer attitudes and important criteria)

QUESTIONNAIRE

RELATIF A L' ETUDE DU MARCHE PARISIEN D' HUILE D' OLIVE

0. AVEZ-VOUS DEJA ACHETE DE L'HUILE D'OLIVE?

Oui ☐ Non ☐

1. CONSOMMATEUR

- Sex
- Profession
- Age
- Situation familiale

Marié(e) ☐

Celibataire ☐

Enfants ☐

2. QUELLE SORTE D'HUILE UTILISEZ-VOUS EN GENERAL?

- Huile d'olive..... ☐
- Huile d'arachide..... ☐
- Huile de tournesol..... ☐
- Huile de soya..... ☐
- Huile de maïs..... ☐
- Margarine..... ☐
- Autre..... ☐

3. AVEC QUELLE FREQUENCE UTILISEZ-VOUS L'HUILE D'OLIVE?

- Tous les jours..... ☐
- 1-2 fois/semaine..... ☐
- 3-4 fois/semaine..... ☐
- tous les 15 jours..... ☐
- tous les mois..... ☐

4. QUELLE HUILE UTILISEZ-VOUS POUR:

- Frire
- Cuisiner
- Mayonnaise
- Sauces
- Salades
- Plats chauds
- Ailleurs

5. ETES-VOUS D'ACCORD QUE:

	Oui	Non	Ne sais pas
L'huile d'olive est l'huile la plus saine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive rend les plats savoureux	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avec l'huile d'olive on peut frire plus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive ne fait pas grossir	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive n'augmente pas le taux de cholestérol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive est bonne pour le cœur	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive n'a pas d'ingrédients chimiques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L'huile d'olive est relativement chère	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. QUEL EMBALLAGE D'HUILE VOUS PARAÎT PLUS USUEL?

Quantité

0.25 lt ☐ 0.5 lt ☐ 1lt ☐ 3 lt ☐

Emballage

Bouteille en verre ☐

Bouteille plastique ☐

Petite boîte ☐

Grande boîte ☐

Autre ☐

7. CHANGEZ-VOUS SOUVENT DE MARQUE D'HUILE

Oui ☐

Non ☐

8. **SAVEZ-VOUS EN QUOI DIFFERE L'HUILE D'OLIVE VIERGE EXTRA 1^{ère} PRESSION A FROID DE L' HUILE D' OLIVE ORDINAIRE?**

Oui ☐

Non ☐

9. **D'APRES CE VOUS SAVEZ ENTENDU, LE PAYS/MARQUE PRODUIT DE L'HUILE:**

	Mauvaise	Ne sais pas	Plutôt bonne	Très bonne
CARAPELLI (Italie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Espagne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete-Gr.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE d' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

10. **COMMENT CARACTERISERIEZ-VOUS LA COULEUR DE L'HUILE:**

	Bizarre	Naturelle	Belle
CARAPELLI (Italie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Espagne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete-Gr.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE d' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. **COMMENT CARACTERISERIEZ-VOUS L'ODEUR DE L'HUILE:**

	Bizarre	Normale	Bonne
CARAPELLI (Italie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Espagne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete-Gr.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE d' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. COMMENT VOUS PARAÎT LA SAVEUR DE L'HUILE:

	Plutôt Mauvaise	Ordinaire	Délicieuse
CARAPELLI (Italie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Espagne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete-Gr.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE d' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. COMMENT VOUS PARAÎT L'EMBALLAGE DE L'HUILE:

	Mauvais	Moyen	Bon	Très bon
CARAPELLI (Italie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LERIDA (Espagne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KOLYMVARI (Crete-Gr.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HEDIARD (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LA JARRE d' OR (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PUGET (France)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. LISEZ-VOUS LES SLOGANS DE L'ETIQUETTE?

Oui ☐ Non ☐

Y CROYEZ-VOUS
VRAIMENT?

Oui ☐ Non ☐

15. **CHOIX FINAL**
QUELLE (S) HUILE(S) ACHETERIEZ-VOUS?

Rang d'achat

CARAPELLI	(Italie)	31 Francs
LERIDA	(Espagne)	65 Francs
KOLYMVARI	(Crete-Gr.)	20 Francs
HEDIARD	(France)	48 Francs
LA JARRE d' OR	(France)	37 Francs
PUGET	(France)	18 Francs

QUESTION REPETITIVE:
SI CETTE(S) HUILE(S) N'EXISTAI(EN)T PAS AU RAYON DU SUPERMARCHE,
LAQUELLE ACHETERIEZ-VOUS?

16. **COMMENTAIRES**
(attitude du consommateur, Critères importants, Points forts l' expérience,.....)

REFERENCES

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CONCLUSIONS

Agricultural marketing differentiates from the general marketing with respect to a product's attributes and natural characteristics, price determination, promotion, advertising and finally, distribution (transport - storage) procedures. Only in the last decade the research methodologies developed and utilised in behavioural sciences, economics, statistics and computer-related areas, have started having an impact on agricultural marketing.

The framework of the single European market sets new rules, opportunities and obstacles for an effective and efficient market strategy. Environment, health and resource use are the factors mainly determining the new marketing environment. Special market segments have been identified displaying homogeneous perceptions and attitudes.

An agricultural product of great social and economic importance in Greece and more particularly in Crete, is the olive oil. This is a dynamic product due to its organoleptic, nutritional, biological and medical features. Crete presents a comparative advantage in this field since it produces 4.8% of the world production and is the main supplier of the domestic and international market in high quality extra virgin olive oil.

The complexity and unreliability of olive oil domestic and international marketing distribution system is worth mentioning and placing some emphasis on. All three major olive oil producers, Spain, Italy and Greece, are members of the Community and therefore EC has upgraded and placed special emphasis on its role.

This thesis has formulated an agricultural product design and development methodology based on a large-scale consumer study employing consumer based models under the scheme of a Decision Support System. A utilisation of multicriteria preference analysis for each consumer separately in combination with multidimensional data analysis methods identifies and determines the consumer behaviour analysis. The utilised DSS allows the development of partial reference markets and the generation of market shares by modifying the multicriteria evaluations of the examined product. This integrated - interactive methodology provides a systematic procedure for the design, development and market entry of the agricultural product in question.

The new "optimal" product is defined through the conduct of a large-scale consumer study trying to identify and determine consumer behaviour with respect to the product's attributes and special features. Market analysis was feasible through the interaction of the system's embodied multicriteria preference and data analysis methods and techniques. Consumer profile and the factors contributing to the selection of a product are determined by the data analysis' use. Multicriteria preference analysis identifies and further evaluates the significant criteria determining the purchasing behaviour of consumers to a large extent. The evaluation of the potential market shares and the selection of the best market penetration strategy are achieved through market simulation.

Through this interactive - integrated approach, which consists a serious novelty for the field of agricultural marketing, the marketing - manager of the interested firm is able to determine the exact specifications and factors involved in the market success of the examined product. Therefore, intervention may take place at the stages of:

- production and processing;
- packaging and labelling;
- selection of the market penetration strategy.

The methodology was employed and tested in Athens, Greece towards the development and design of a new olive oil product and determination of the best market penetration strategy.

In a large scale consumer based survey conducted in Paris, France, the revealed consumer preferences and tendencies through the collaboration of data and multicriteria analyses contributed to the forecasting of the potential market shares. A close approximation of the "optimal" product was reached with the support of market sensitivity analysis, under a constant modification of the product's determinant criteria.

This approach provides final and tested recommendations with respect to the feasibility of a new product's design and development, the selection of the proper market segments and the optimum market entry strategies.

Certain improvements that may contribute towards a more effective and suitable methodology is the embodiment and elaboration of the firm's interrelated financial data and information regarding the optimum channel distribution and positioning of its rival and substitute products.

As far as the French oil market is concerned, it is necessary for the planned marketing strategy of the newly designed olive oil product, to include certain measures and precautions in order not only to conquer a significant market share in the short run but to safeguard it and further increase it in the near future.

Therefore the major agricultural co-operatives of Crete must collaborate and join their forces and experience in the production, processing, distribution and promotion stages. Thus the difficulties faced occasionally in keeping up with the provision of a constant supply and production of a standardised product over the years, can be overcome. Additionally, this type of co-operative merging would be in the financial position not only to promote this product but to keep a representation or an agency on a constant basis in the markets of major concern and interest.

A tremendous need has been identified towards the development of flexible and friendly marketing information systems which include the internal records, marketing intelligence, marketing research and decision support systems. Management and marketing decision makers in the agribusiness industries are necessary to accustom themselves to the utilisation and full exploitation of intelligent decision support systems able to provide experience and knowledge. It is also necessary with the existing convergence trend of the Single European market that these systems embrace variables and factors such as quality of life, social welfare and environmental awareness.

Marketing problems have always been tackled through model building and optimisation methods. In today's constant changing marketing environment most of the issues are too complicated and therefore a new approach is required for the less structured problems. The developed decision support system applied, in the present thesis, through its three main essential features; the general data base, the user interface and the library of statistical and modelling tools, satisfies the emerged gap.

Enhancement of decision making, overall perception and understanding of the existing and future market situation, extensive and multivariate use of the available data are only some of the benefits arising from this DSS. This user friendly system allows the decision maker to understand and intervene in all the procedures involved.

In order for this system to be more effective and increase thus the decision quality of the decision maker, expertise and knowledge of qualitative nature obtained from human experts or other sources should also be incorporated. The encompassing of qualitative reasoning as compared to the numeric one provides a more precise approximation and representation of decision makers' thinking.