



Novel Food Consumption

Gabriel Lagunes Martínez
Štefan Bojnec





Novel Food Consumption

Faculty of Management
Monograph Series

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Published by · University of Primorska Press
Titov trg 4, 6000 Koper, Slovenia
www.hippocampus.si

Editor in Chief · Jonatan Vinkler
Managing Editor · Alen Ježovnik

Koper, May 2017

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*The questionnaire and the survey data
are available from the authors upon request.*

*The research leading to this publication has received funding
from the European Commission Directorate general for Research and Innovation
under the European Union's Seventh Framework Programme
(FP/2007–2013) Grant Agreement n. 312029.*

*This publication has received funding from the
EC FP7 Post-Grant Open Access Pilot.*



<http://www.hippocampus.si/ISBN/978-961-7023-09-1.pdf>
<https://doi.org/10.26493/978-961-7023-09-1>

Kataložni zapis o publikaciji (CIP) pripravili
v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID=290363392
ISBN 978-961-7023-09-1 (pdf)

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Abbreviations

| | |
|--------|---|
| ANOVA | Analysis of variance |
| BSE | Bovine spongiform encephalopathy |
| CA | Cronbach's alpha |
| CF | Convenience food |
| CFS | Committee on World Food Security |
| DRD | Disaster Risk Reduction |
| DNA | Deoxyribonucleic acid |
| DRI | Dietary Reference Intakes |
| EC | European Commission |
| EF | Ethnic food |
| EFSA | European Food Safety Authority |
| EU | European Union |
| EUFIC | European Food Information Council |
| FAO | Food and Agriculture Organization for the United Nations |
| FBDG | Food-based dietary guidelines in Europe |
| FDA | Food and drug administration |
| FF | Functional food |
| FIBL | Research Institute for Organic Agriculture |
| FOSHU | Food for specific health use |
| FUFOSE | The Functional Food Science in Europe |
| GI | Gastrointestinal |
| GMF | Genetically modified food |
| GMO | Genetically modified organisms |
| IFOAM | International Federation of Organic Agriculture Movements |
| ILSI | International Life Sciences Institute |
| IM | Index mundi |
| INRAN | Instituto Nazionale di Ricerca per gli Alimenti e la Nutrizione |
| IP6 | Phytate acid |
| KMO | Kaiser-Meyer-Oklin |
| MARM | Ministerio de medio ambiente medio rural y marino de España |
| MHA | Million hectares |

Abbreviations

| | |
|-------|--|
| NOM | Official Mexican Standard |
| OECD | Organization for Economic Cooperation and Development |
| OF | Organic food |
| PCA | Principal component analysis |
| PDO | Protected designation of origin |
| PGI | Protected geographical indication |
| PUFA | Polyunsaturated fatty acids |
| RDA | Recommended daily allowance |
| SAGyP | Secretaría de agricultura ganadería y pesca |
| SAN | Argentinian Society of Nutrition (Sociedad Argentina de nutrición) |
| SPSS | Statistical package for social sciences |
| SURS | Statistični urad Republike Slovenije |
| TSG | Traditional speciality guaranteed |
| US | United States |
| USCB | United States Census Bureau |
| USDA | United States Department of Agriculture |
| WHO | World Health Organization |

1 Introduction

1.1 Theory and Description of the Problem

The consumption of nutritional products has undergone significant changes over recent years. At the present time society is becoming more concerned about health and the environment, also the exigencies and qualities of products are demanded much more.

Since the beginnings of the human race when the population was unaware of the adversities of the environment, people did not have enough information to differentiate between the varieties of wildlife living around them; mothers protected their children against the many dangers, places, animals, plants and food. Until the age of two years they were breastfed by their mothers, then they gradually had their diets increased, they had to be careful about what they ate, because if they ingested unknown foods they were at risk of being poisoned.

Becoming sick or killed from food consumption was almost impossible; in the past it was understandable that they were afraid of new experiences. Over many thousands of years things have changed, products from a vast variety of brands have been invented, developed and distributed, food is part of this movement; some products with success some of them not as successful as they would like. The numbers are alarming; the failure of small and medium enterprises (PYMES by its acronym in Spanish) is overwhelming in several countries of Europe and Latin America. Statistics indicate that on average 80% of the Pymes fail during the first five years and 90% never reach 10 years. The percentage of failure in new products such as packaged goods rose to 80–90% (Soriano 2005).

People are certainly scared of unknown things. However, to what extent (Frazer 2000)? Slovenia is a country with a population of a little more than two million people (2,058,821), according to the Statistical Office of the Republic of Slovenia (see www.stat.si). The second city of the country is Maribor with a population of 93,847 inhabitants according to the census conducted in 2012. The city is located in the Northeast

of the country, in the Podravska region, near to the Austrian border. It is divided in 33 residential areas.

Taking in consideration that the economy of Slovenia is small, open, and export-oriented (Lahovnik 2011), the research presented here has endeavoured to discover the perceptions of people living in Maribor regarding five dishes. These dishes are considered to be new. The research wanted to discover if they could become part of the Slovenian market. The research is intended to explore the possible relationship between novel products and their consumption by the Slovenian consumers.

The new kinds of food used for this research were: functional food (FF), genetically modified food (GMF), ethnic food (EF), convenience food (CF), and organic food (OF).

These five types of food were important for the research because they are a part of the new food of this century (Kimbrell 2002, 5). It is well known that people generally do not wish to make significant changes to their eating habits; this includes not only their consumption habits but also their lifestyles (Fischler 1980). In this globalised world, it is difficult to believe that there are persons who cannot accept certain types of food. Maybe they were educated in such a way that they reject everything that represents a change to their habits. Even patients who know they should adopt healthier eating habits seem not to be conscious that without such changes they will have health problems. Many people do not change because they do not know how to change, says Prochaska, the president of Pro-Change Behaviour Systems. Getting people to alter their habits is extraordinarily difficult, and for most people it is not something that happens overnight (Ulene and Prochaska 2011).

1.2 Purpose and Objectives of the Research

The purpose of the research was to determine the perceptions and the consumption preferences of the Slovenian population for novel food, focused on the city of Maribor. The research attempted to identify what factors could affect the consumption of new food products.

This research used five types of products: FF, GMF, EF, CF, and OF. The survey sought to determine whether these five products, which were chosen as new products, were part of peoples' diets within the Slovenian society.

Whether they are part of it or not, the research further intended to investigate which factors motivated consumers to buy certain products. Economic, quantitative and qualitative factors were analysed.

The objectives of the research were:

- To show the perceptions and consumption preferences of Slovenian society regarding novel food.
- To investigate which factors could possibly cause certain products to be rejected by Slovenians.
- To show the level of acceptance, or rejection, of the five chosen products (FF, GMF, EF, CF, and OF).
- To investigate any possible relationships that could exist between the five products (FF, GMF, EF, CF, and OF) chosen as novel and the motives that motivate people to accept or reject them.

The main thesis of the research was that the perceptions of Slovenian society towards novel food depended on experience with novel food and on economic factors. In order to reject or accept the statement of the main thesis, the following three hypotheses (H) were tested:

- H1 *The perceptions towards novel food products' consumption depend on consumers' habitual food consumption preferences.*
- H2 *The perceptions towards novel food products' consumption are influenced by food consumption experiences and economic factors.*
- H3 *The perceptions towards novel food products' consumption are influenced by information on novel food and marketing-promotional activities.*

1.3 Methodology of Work

The research used three methodological approaches. Firstly, we examined literature on theoretical concerns about the perceptions of novel food, previous studies regarding how people behave when they have to decide about novel food. Based on existing literature and specific data, such as gender, age, eating habits (where people eat), we created a questionnaire containing 26 questions that focused on the study's objective. This objective was the perceptions of Maribor inhabitants regarding novel food and thus the research focused on finding any possible existing correlation between the mentioned data and factors/variables such as price, flavour, nutritional facts, packaging, namely those factors that we considered might influence the consumption of goods.

The second step of the applied methodology was the launch of a questionnaire that was compiled from information collected following the careful study of existing literature, the antecedents, and what people

pay attention to when buying products. Once the questionnaire was prepared it was distributed amongst the chosen population according to the variables previously established.

The data was collated and then taken to the third step of analysis using a statistical package for social science (SPSS). The results showed the data: arithmetic means, averages, correlations, reliability; all this information helped to test our three hypotheses using various statistical techniques: Pearson correlation, Chi-square, analysis of variance (ANOVA), Cronbach's alpha (CA) and principal component analysis (PCA).

Survey Design and Variables

The questionnaire was clearly the fundamental basis of our research because it is the voice of the consumers. We used the SPSS to analyse the data and variables, making it possible to obtain some answers to the three hypotheses. The research was structured according to the characteristics of study that may influence people (study object). It included the same questions for all the sample population because the research did not want to give preference to any particular group; it was necessary to be objective in order to have the closest answers to the reality of the situation. This questionnaire was launched via the Internet through Google docs and printed to give by hand to the respondents.

The questionnaire comprised 26 questions. It was divided into two sections:

1. Questions of multiple selection, where concerns about respondent preferences are shown.
2. Personal data: number of household members, educational levels, genders, and age.

Sample and Unit

People who participated in the research were selected by systematic random sampling. The sample included 200 persons, who were divided using the following method:

Two groups of adults the first group being between 18 and 35 years of age. The research started with the age of 18 because this is the age that Slovenian society recognises legal majority. People over 18 can work; therefore, theoretically they can make personal decisions including their food habits. Young adults are considered potential consumers

to be highly valued by the market. Generally, they receive an income and have few responsibilities (Sánchez and Bódalo 2002). This group was composed of 100 people, 50 female and 50 male.

The second group was chosen to be between the ages 36 and 55 because during these years people are more active in their jobs. According to Sánchez and Bódalo (2002), these consumers are adults with family responsibilities and debts notoriously related to the purchase of a home with a mortgage, for example. This group was composed, as per the initial group, of 100 people, 50 female and 50 male.

The survey was limited to the territory of Slovenia and it was carried out in the city of Maribor (population 93,847). A total of 200 reliable questionnaires were used to analyse the outcome of the survey. The research was conducted during the year 2013 between the months of February and May. It is important to mention that among the possible limitations to be considered was the size of the sample as, according to the Statistical Office of the Republic of Slovenia (see www.stat.si), there are only 93,847 inhabitants in Maribor, Slovenia. However, the research maintains that the sample is representative as it was conducted in one of the more important cities in the country.

Data Collection and Processing Methods

The study used a structured questionnaire. It was divided into two main parts. The first part comprised 24 questions using the five-point Likert-type, Guttman scale, and ipsative description in order to investigate how respondents perceived the effects of their habits of food consumption. The second part of the questionnaire comprised two questions and examined basic information on the social characteristics of respondents in order to classify them by number of people in the household, educational level, gender, and age. It had a funnel structure therefore the questions were arranged from the general to specific points. The questionnaire included questions, where people were asked to choose between yes/no by applying to the Guttman scale (Robinson 1973). The subset of the survey items was binary (\pm). In addition, the respondents chose responses that reflected their intensity of agreement or disagreement by circling the appropriate answer.

The Likert scale offers graded statements or attributed statements in order of importance, where number 1 indicated strongly disagree, 2 indicated disagree, 3 indicated neither agree nor disagree, 4 indicated agree, and 5 indicated strongly agree (Likert 1932). The third descriptor

was used in the collection of data (the impassive description), which indicated the specific measure in which respondents compared two or more desirable options and selected the one that was the most preferred (Johnson, Wood, and Blinkhorn 1989).

1.4 Assumptions and Limitations

The limitations of this quantitative research would be limited to the sampling. A specially selected sample was used for data collection. This meant that the research was made only selecting people who fitted the specific requirements: those polled lived only in Maribor and were under the age of 55.

A limitation appeared when some polled people did not wish to collaborate with the research. It took a long time (around 4 months) to collect 200 usable questionnaires. A lot of them were rejected because the data obtained threw-up untrustworthy answers. In order to become aware of this, it was just necessary to look at the uniformity of the answers obtained, no matter what the question was, this presented us with contradictions. Without rejecting them, the lack of realistic information could have affected the accuracy and thus have steered the research towards an inappropriate scenario. For this reason care with selecting the participations and the reliability of those polled was extremely important.

The sample size could have been bigger. However, as mentioned before, not only was it a very difficult task to collect two hundred questionnaires, the lack of time also played a very important role. The bigger the research, the greater the time required.

From amongst the population polled men between the ages 36–55 were the least cooperative. It was complicated to explain to them what the scope of the research was. However, after looking into their results it seems that we did have reliable answers. It would have been better to give the explanation of the five types of novel food at the beginning of the questionnaire because most of the people did not know exactly what a GMF was as they specified that they did not consume them when in fact they did.

2 Perceptions and Determinants of Food Consumption

The food industry is one of the most important for the Slovene economy. Due to the number of processes involved in the manufacture and packaging of food, it is a valuable source of employment and labour.

Due to the pace of modern life, prevailing consumption habits orient the consumer preferences towards the types of food that require a high degree of industrialisation. Thus there are new ways of acquiring and preparing food: food consumption outside the home or pre-prepared food has increased in both the developed and developing countries and in fact, within all social strata (Kinsey and Senauer 1996).

The food industry pursues the following objectives (Cóccaro 2010):

- Extended life of foods through conservation techniques, making it possible to extend the time available for its distribution and storage.
- Increased variety of foods according to the needs and demands of consumers.
- Provide necessary nutrients for the normal development of mankind
- Generate economic benefits.

Basically, the technology used in the food industry is directed towards performing various activities aimed at three main operations: extraction, fermentation, and food preservation. Some techniques used in conservation use natural and artificial chemical substances including the so-called food additives. According to the European Parliament and the Council (2008), food additives are substances not normally consumed as food itself but intentionally added to food for some technological purposes such as preserving food with the following conditions:

- The substances must be harmless in themselves or through their actions as additives and the conditions of use.
- The functional category list must be updated accordingly and identify the scientific and technical development.

- Its use must be justified for technological reasons, health, or psycho-sensory reasons.

2.1 Consumption of Food Group Servings

A balanced diet can be as easy or as difficult as you wish to make it. For example, in the year 2005 the United States (US) with its population of 314,412,000 inhabitants (United States Census Bureau 2013) created a system to discover what types of food and how much of a particular food people should eat. It was a food guidance system, which was symbolised by the Food Pyramid until 2005 and then it adopted the name of MyPyramid, which was replaced in 2011. These were tools to help people in their quest to eat more healthily, offering the population an idea of various sorts of food as well as a methodology to measure what they were actually eating in comparison to what they should be eating.

The United States Department of Agriculture (USDA) created a food system called Pyramid better known as MyPyramid. It was a visual picture of suggested healthy eating habits and physical activities. MyPyramid illustrated the advice of the government's diet guide and it divided the recommended allowances into six food groups. The inconvenience was that instead of illustrating the number of servings based on a one size fits all 2000-calorie per day intake, the illustration of the pyramid showed six vertical coloured lines each representing the varying proportions of the pyramid. The food groups were represented by colours as follows (United States Department of Agriculture 2013): orange for grains, green for vegetables, red for fruits, yellow for oils, blue for milk, and purple for meat and beans.

The main problem with the system was that merely glancing at the symbol placed on a food package gave little information to work with. Americans started to complain because few of them were able to remember what purple or green represented. It required a reference to the Internet to figure it out.

The 2005 dietary guidelines on which MyPyramid was based promoted fruits, vegetables and whole grains. At the 2,000-calorie level, the guidelines suggested the following quantities (United States Department of Agriculture 2013):

- Fruit group should provide four daily servings, or 2 cups.
- Vegetable group should provide five servings, or 2.5 cups.
- Grain group should provide six ounce-equivalents (six servings).

- Meat and Beans group should provide 5.5 ounce-equivalents or servings.
- Milk group should provide 3 cups/servings.
- Oils should provide 24 g or 6 teaspoons.
- The remaining amount of calories at each calorie level after nutrient-dense food had been chosen. Up to 267 calories could be consumed in solid fats or added sugars.

What confounded people was that the colour bands represented a visual clue about what portion of the diet these foods were formed of. Then the question arose as to how helpful the pyramid was. The consumers were confused by the symbols. Moreover, unless people were really motivated they would not go to the Internet to discover how to customise their pyramid, the factor of Internet access in some places or older people who did not use it made this system quite unusable. Maybe these were the reasons why the US introduced a new dietary guideline called the food plate symbol (United States Department of Agriculture 2013).

On the other hand, the European Union (EU) has already taken appropriate steps to develop a proper hypothetical diet. The agency that regulates these matters is the European Food Information Council. This organisation created the Food-Based Dietary Guidelines in Europe (FBDG), which are simple messages for the general public on how to eat healthily. They offer guidelines on what each person should eat in terms of food rather than nutrients and provide a basic framework that can be used when planning meals or daily menus. The characteristics are as described by the World Health Organization (WHO).

The FBDG must transmit simple messages based on foods suitable for consumers and that they should be easy to understand. They can be broad and unspecific as; the daily diet should be varied or fruits and vegetables must be consumed, or more specific such as; five servings of fruit and vegetables must be eaten every day. FBDG avoid using figures for the recommended intake of nutrients, such as the recommended daily allowance (RDA), or goals for the population, and instead they offer a convenient way of translating dietary advice to individuals of a population group. Therefore, if the goal for saturated fat is 10% of the total energy and the current consumption is greater, it will be included amongst the messages aimed at reducing the intake of saturated fats, such as, eat lean meat.

Table 2.1 The Italian Guidelines for a Healthy Feeding

Watch your weight and be active.
 More cereals, vegetables, tubers and fruit.
 Fat – choose high quality and limit the amount.
 Sugars, sweets, sweet drinks – only the right amount.
 Drink plenty of water everyday.
 Salt? Better if only a little.
 Alcoholic drinks – only if in limited amounts.
 Make varied choices.
 Special advice for special people.
 The safety of your food also depends on you.

NOTES Adapted from Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (2003).

FBDG in Europe

Most of the examples of foods that can be labelled with FBDG recommendations and what type of information they can contain can be found in Western Europe. Most European countries have some kind of association like the FBDG with information about its format and the recommendations contained. The guidelines of Slovenia and other neighbouring countries are shown in order to compare them. Most of the guidelines include recommendations on foods containing fat and foods containing sugar, fruits, and vegetables. They also often contain information about the recommended intake of protein, foods high in carbohydrates and fibre, about the restriction of salt, intake of sufficient fluids, control of body weight and alcohol consumption, and other aspects of lifestyle such as having enough exercise and respecting a schedule for meals. Some countries, such as Italy and Denmark, have a list of messages based on food. Table 2.1 presents an example of advice for healthy eating, whilst table 2.2 presents the format and the information provided by some of the countries adjoining Slovenia.

Graphic Formats. Proportions of different foods with similar characteristics that can be included in a balanced diet but may also include a list of messages and advice. The graphic formats provide a simple orientation for the consumer, because he/she knows that if he/she takes the food of the main groups daily it is an important step to achieving a healthy diet, although he/she has a lack of specific knowledge regarding nutrients.

Food Pyramids. As well as in the US, Europe uses the more popular visual illustration for the FBDG the shape of a Pyramid. Austria, Belgium, Finland, Greece, Ireland, Latvia, Spain, Germany, and Switzerland are

Table 2.2 European FBDG Formats and Information Provided by Four Countries

| (1) | (2) | (3) | (4) | (5) | (6) |
|----------|--------------------|--------------------------------|---|--|---|
| Austria | Pyramid | 6 groups | Qualitative and/or quantitative information for each group; not part of the model | Drinks are the sixth group at the base of the pyramid. | Additional tips on weight and alcohol |
| Croatia | Pyramid | 4 groups | Qualitative and quantitative information for each group | Advice on salt. | Advice on varied diet, weight (BMI), physical activity, alcohol |
| Hungary | House | 5 groups | Qualitative and quantitative information given in text separate from graphic | Salt, water mentioned in the supportive text | Advice on alcohol, body weight, exercise, food safety, labelling, regular meals and snacks mentioned in supportive text |
| Slovenia | Food Guide Pyramid | 7 groups (+ physical activity) | Qualitative and quantitative information for each group | Advice on salt | Advice on varied diet, weight (BMI), physical activity and alcohol |

NOTES Column headings are as follows: (1) country, (2) graphic format, (3) number of food groups, (4) supportive information, (5) fluid, salt, specific micro-nutrients, (6) lifestyle. Food groups include: milk and milk products, meat, fish, eggs and alternatives, fruits and vegetables, cereals, fats and sugary food. Adapted from European Food Information Council (2009).

amongst the countries using a pyramid as a food guide. The Austrian pyramid, as well as the Belgian and the Swiss ones, show liquids as an additional food group at the base of a two-dimensional graph.

Because this research is focused on Slovenia, we compared the composition of the Slovene pyramid to the neighbouring systems (such as the Croatian pyramid). It seems that the Slovenian pyramid is more organised and complete, with recommendations and messages about the intakes people should have.

Food Circles. The other common visual illustration used for FBDG is a circle divided into segments similar to a pie. Each segment contains a food group similar to those used in the pyramids. Many countries have opted for circles; Portugal, Sweden and the UK (in the form of a plate) are some of them. Finland and Spain use a circle besides the pyramid.

Perception versus Reality

Discussions about food over recent years, technological innovations (particularly in production, processing, preservation, and distribution) have included both positive and negative aspects. Amongst the first can be considered greater availability and variety, increased hygiene, greater quantity, reduced prices; amongst the latter ones the population's uncertainty is regarding the safety of these foods, refusing to take unnecessary risks arising from applications of scientific and technological innovative challenges due to the suspicion of withholding of information and including conflicting scientific assessments. Currently, one of the larger segments of demand in the food market is the category of FF.

FF is considered to be natural or processed foods that show favourable effects on health when consumed in adequate amounts by healthy people. There is no universally accepted definition for it to be more of a concept than a food group (Roberfroid 2000; Hasler 2002).

Some remarkable examples are those natural foods containing certain minerals, vitamins, fatty acids, phytosterols, fibre, antioxidant substances, modified food and enriched substances, probiotics, yogurt and fermented milks – meaning food that contain substances that stimulate the growth of bifidobacteria in the intestinal flora, such as inulin, oligofructose, galacto, fibre, lactulose and fructo-oligosaccharides, amongst others (Vasconcellos 2001a, 12; Vasconcellos 2001b, 10).

Given the importance of the issues for the food industry, there have been numerous studies of consumers but only some of them are available. These studies focus primarily on the beliefs, attitudes and sociodemographic characteristics of the consumers of functional food, predominantly descriptive and bivariate analyses. Moreover, food derived from genetically modified organisms (GMO) are a paradigmatic case in the analysis of the construction of social representations about food risks (Arnaiz 2004). According to the WHO, GMOS are those in which the genetic material has been altered using genetic engineering in an artificial way (Pelagalli and Ramognini 2004). The original purpose of GMO appears to have been skewed: the benefits of producers, farmers, retailers and consumers, the apparent favouritism of certain sectors of agribusiness food, the rise of suspicion amongst consumers and environmental organisations who question them regarding the adverse effects of GMO in relation to the possible harm to both the environment and health. Several studies have been carried out about the acceptance

or rejection of these products amongst the population providing different qualitative elements, referring to attitudes towards applications of biotechnology sometimes associated with potential risks (Arnaiz 2004; Mucci and Hough 2004).

On the other hand, there are organic, biological or ecological production methods encompassing all agricultural systems that promote healthy and safe production from the standpoint of environmental, social, and economical food. The growth of the supply of these products depends on the greater conversion of conventional to organic production and consumers expressing their interest in these products. The main market for organic food and beverages are the countries of North America and Western Europe. The Western European market was valued at \$13 billion and represents 51% of global revenues in this market, other regions, whilst having high growth rates, do not make a significant contribution to this revenue (Sahota 2005). While these markets capture consumers seeking variety, high quality and healthy food, organic farmers face problems regarding the acceptability of these products given their novelty, their high prices and poor distribution channels (Roddy, Cowan, and Hutchinson 1994).

Growing consumer awareness of food safety is related to the potential risks associated with the methods and technologies used in the production and processing of food (Henson 1996). The level of consumer confidence in public and private institutions responsible for providing information regarding their quality and trust in the different channels or outlets, have an influence on the consciousness of consumers' perceptions of the organisation throughout the food system. The information thus results in specific strategies and becomes an attribute in itself, as it may have to explain the difference between the levels of consumer demand of those who have it and those who do not. This assertion was tested empirically in a sensory experiment conducted with users and non-users of an organic product, which revealed that the availability of information to consumers did not modify their dispositions towards acquiring and paying for an organic product by those who did not know the product's attributes (Lacaze and Rodriguez 2003).

The way consumers obtain information about an organic product is through labels or certification seals, hence the importance of the role of recognition and identification (Lacaze and Rodriguez 2003). However, this sign, (label) often formal and reliable, poses a big threat regarding credibility, fraud in food is frequent and is quite common in the

food sector. Each fraud case in organics undermines the trust in the OF system as a whole and can demotivate consumers in a big way (International Federation of Organic Agriculture Movements 2012). On the other hand, labels have no bearing on the election of them as the social business marketing campaigns used to attract and win the trust of consumers (Cabinet Office 2008).

Therefore, then the question arises. Do people really know what they are buying? Do they really know what they are eating? To be honest, how many people take the opportunity to read the labels, how many calories? A new study found that people (especially women) who check food labels at the supermarket are thinner than people who do not. On average, women who read the nutritional information have a body mass index of 1.48 points lower, whereas this difference is just 0.12 points in men (Loureiro, Yen, and Nayga 2012).

It is probably necessary to be more concerned about what we are eating, with much more information and probably less sales and marketing.

2.2 Concern About Consumption of Novel Food

The novel food system has few aspects, sometimes paradoxical and other times complementary, which can be synthesised within at least four basic trends: the homogenisation phenomenon of a consumption society that has become overcrowded, the persistence of a differential consumption that is socially unequal, the increase of a custom food supply supported by the creation of new consumer groups who share common lifestyles and finally the increase of food individualisation causing growing anxiety regarding contemporary dining (Warde 1997; Germov and Therese 2008, 3–23). Indeed, the various socioeconomic processes have led various authors to characterise the new food order of hyper-homogeneous (Fischler 1979; Goody 1989) in the sense that there has been an inter-territorial homogenisation of the diet within a socially horizontal nature (Carrasco 1992). The industrialisation of food has facilitated several processes, some positive and some negative. In Western countries and among certain social groups of industrialised countries, people have favoured widespread access to food items produced in greater quantities and at relatively lower costs. Indeed, intensive food production, accentuated especially in the second half of the twentieth century has proved that, along with increasing living standards of the population, it can be more accessible and with more

frequency to some food that some years ago were inaccessible for the majority of social groups.

The expansion of distribution and transportation networks have allowed a wider variety of products to reach everywhere, even the more geographically isolated areas regardless of the production site being closer to the consumer. New agricultural technologies have been made available, a long list of food where supply is maintained, no matter if the products are out of their natural seasons, which means throughout the whole year. All these processes make food more varied and more diversified than before. This variety is perceived as positive in many ways. One result is, as a small incentive, that it allows consumers to escape food monotony.

Currently, you may eat differently from one day to another, from one meal to another. Furthermore, because diversity of food is supposedly healthier in nutritional terms it allows an adequate intake of certain nutrients and avoids, for example, diseases such as pellagra that during the nineteenth century attacked the poorest populations that had maize as staple food or diseases such as cretinism and goiter until just a few decades ago (Fernández 1990). Coinciding with the changes in diet, in this region life expectancy of the population, a key indicator of public health, has steadily increased.

However, the general recognition of the greater accessibility and hyperhomogenisation of the consumption must be contrasted with at least three realities. The persistence of social inequality in access to certain types of food and electives is growing. Furthermore, the differentiation by social and cultural background affects groups and individuals (food styles) and, finally, with variability of the food offered (in the hypermarkets can be easily found nearly 20,000 different food references) and local and national particularities that do not fade as quickly as some have suggested.

In this sense, an intra and inter-territorial heterogeneity with a social verticality still remain. Meanwhile, a social class with high-income components (although it has recently been subsumed in different jobs to other social variables like age or gender) remains the central aspect of diet (Fischler 1995; Warde 1997). One cannot ignore that disparities arising from the income level of the various sectors of the population have been increasing in industrialised countries over recent decades, so that the consumption patterns of the poor remain the same on issues historically defined: they are excluded from the possibility of vari-

ety and quality. In a comparative study between 1966 and 1998 on the food aspirations of the French, to the question, If you had more money for food, what would you use it for? The responses showed that indeed there had been a decrease in the percentage of people who would raise the quantity (38% in 1966 to 16% passed in 1998) whilst those had increased who would increase their spending on restoration (9% in 1966 up to 51% in 1998). However, the figure of 16% obtained from a sample of a responsible household owner interviewed in his home in 1998 confirms that not everyone still has the feeling of eating enough or, in any case, an amount that would suffice (Poulain 2002, 73).

It is important to mention the prevailing trends of the contemporary food system from an opposite perspective and especially in regard to malnutrition that within the overall terms food consumption characterises some population groups. For example, there are homes that have between 10 and 20 dishes that are repeated throughout the year and ultimately throughout their lives. When we get to plate No. 20, then they start with number 1, thus if there are deficiencies in these dishes, they will have lifelong impairments, moreover, if there are any excess, they will maintain the excess through their lifetimes. In industrialised societies, despite the relative accessibility to food and the opportunity to choose from multiple offers, some health problems seem to stem from current consumption (Iturrieta 2012).

Another problem is that we eat what we like, not what is best for us. This is what is called poor eating habits. The best way to tell if someone is feeding well is from the diseases presented (Iturrieta 2012).

There are diseases where a specific cause is poor diet. Many consider that diseases are not hereditary but a simple result of what parents eat, which is the same as their children eat and the same that the mother used to eat during her pregnancy. Accordingly, a disease suffered by parents will also be suffered by their children. This can be considered as a hereditary disease (Iturrieta 2012). Many believe that they are well-fed because they eat expensive meals and expensive dishes in restaurants, luxurious international food. Others believe that eating a lot is good for them. People relate well-fed situations with eating food that people with high economic levels consume, i.e. drinking wine instead of drinking water, white rice instead of brown rice, and so on. Therefore, people choose their food according to its colour, flavour, and social levels. Eat like the rich does not mean that you eat well. Eat like the poor does not mean that you eat poorly. Rich and poor both have good and bad food.

The important thing is to know what the food contains, not who eats it (Iturrieta 2012).

The failure to achieve optimal nutrition still concerns the medical community. Although having different backgrounds and with very different lifestyles, malnutrition exists within industrialised countries as well as in the poorer, less industrialized ones. In the former, it has its origin mostly in the excess consumption of certain nutrients, especially saturated fat and simple sugars. Here it is in partial or total default because of the food consumption in industrialised countries, such consumption has meant an increase in heart disease, stroke and bone disease, obesity, anaemia, diabetes, liver cirrhosis, or bulimia. All of them constitute the so-called diseases of the affluent society.

In terms of security, what is new? What about the security that is provided by the institutions who are in charge of regulating and applying the norms concerning the security regarding the traditional as well as the so-called novel foods? Has food security been improved over the last 10 years? What is the perception of the European population? There is a division of opinion, according to a survey conducted at community level. Whilst 38% of European consumers said the situation has improved, 29% felt that it is virtually unchanged. The remaining 28% think that the situation has worsened, especially regarding the presence of pesticide residues in food. The analysis also shows that European consumers are more concerned about the external factors they cannot control (Chavarrías 2006).

A study made by the European Food Safety Authority (European Commission 2010a) revealed that 60% of European consumers recognize a high level of European legislation knowledge on food safety; six out of ten believe that the decisions taken by the health authorities are based on scientific criteria. One in two think it is making a good job of information regarding the risks associated with food, and most did not quote the major food crises suffered like Bovine Spongiform Encephalopathy (BSE), commonly known as mad cow disease as one of the major concerns (European Commission 2010a). Can the socio-economic aspect make an influence on the perception of food risks? According to a document presented by the EFSA with the title Risk Perception and Food Safety, what is the status of European consumers? Both, EFSA and General Directorate for Health and Protection for the Consumer of the European Commission (EC), detailed assessments that European consumers have regarding health risks, valuations that are often incon-

sistent, they showed low-risk situations, say the officials of the analysis.

European consumers initially rate food by pleasure and flavour and only one in five by health. For Europeans, food is mostly associated with taste (31% of respondents) and pleasure (29%). The survey makers insist on the idea that risk perception is an irrational factor, a complex that does not necessarily relate to the real situation. In this sense, they emphasize the fact that risks usually generate less concern that is associated to their own behaviour or practices. A study conducted by the portal Aina tried to explain how much influence can be generated by the colour of food in the perception of product flavour? Colour is the central part of our visual experience of food as it gives us clues as to whether food is edible or not and on the identity and intensity of its flavour. Therefore, in many cases it has been shown that colour can play a decisive role in influencing the taste experience of food we eat. The variable sensory that consumers consider as the most important regarding the decisions they make in the food they eat is mostly flavour. However, during the act of eating or drinking, the user experiences a multitude of sensations beyond flavour exclusively and often some others of which the consumer himself is unaware. In fact, at present, the fact that consumers make a preconception about the products flavour just by looking the colour it is gaining strength in research about the origin of the interaction of colour-flavour which it takes into consideration for its interpretation, the roll of expectations, and the background that people have acquired through previous experiences (cognitive aspects) (AINIA 2012).

2.3 Benefits of Novel Food

This section offers a short introduction of the benefits that can be found in novel foods; not going straight to the conclusions but giving an introduction of the advantages of having new types of food that can improve the lives of people who are accept with them.

Whenever there has been a breakthrough in food, it has significantly improved the lives of those who have had access to it. To discover a seed that was later cultivated, to learn how to use the cold and heat to unite the temperature control the vacuum or the pressure, succeed in closing containers in a hermetic way, selecting animals and plants first by their external characteristics and later by a deep knowledge that makes it possible to make genetic modifications, to make use of disposable products by applying the appropriate recycle system, to understand in depth

the rolls of bacteria, fungi and yeasts, and use them for our benefit, are examples that show how it has been possible to pass from a society totally suppliant to external factors such as drought, floods, livestock diseases, crop pests, to a society capable of managing the majority of those factors that affect production, capable of increasing the quantities of the products, conserving and transforming them to levels that today may look really advanced but perhaps in a few years will become as normal as salt, for example.

The consequence of this development is that today there is enough food to meet current and future needs, even if the world's population increases significantly, the birth rate expands and life expectancy is raised. The most important thing is that the availability of necessary food is guaranteed despite the negative factors known so far, even as unfavourable as they have been so far during the worst periods. There is an extraordinarily large society denomination satiety, which is threatened by serious nutritional problems, such as obesity, cardio circulatory diseases and some that are due to misuse of food. There is another society, equally large, that is still hungry, having a concept of food security based on the lack of an availability of sufficient food, thus having serious problems such as malnutrition, deficiency diseases and limited physical and intellectual development, explains (Cóccaro 2010).

Studies, made by one supermarket chain, indicate that in 1954 (on average) in a European supermarket it was possible to find 550 different items and today that quantity has reached on average 10,000 (Freischem 2012). One more piece of data is given by a French survey, which states that the periods of cooking have been reduced from two hours and a half to one hour and forty minutes per day in four-person families. These data are simple indicators that food, feeding, and even their concept have evolved considerably. Although the changes have not been uniform, probably because neither is the society uniform, due to wealth, lifestyles, publicity, urban concentration, all constitute factors that affect feeding and lead to different models (Yubero 1998). There is one factor that dominates all others in the choice of food: health and the influence on it, however also in a very broad sense (although patchy because it is closely linked to the concept of the individual, because quite often when making food choices there are personal aspects involved) it is influenced by advertising. A lot of food that a few years ago was unknown has penetrated and positioned itself in such a way in our diets that they have now become in common use, to the point that we con-

sider them traditional. Some others have different properties that a few years ago were considered irrelevant in our diets, the classic example is chocolate, the subject of countless investigations regarding health. The latest, as published in the American Heart Association journal, is that it could keep the brain young. According to the geriatrics team of at Avezzano Hospital and the University of L'Aquila in Italy, cocoa can combat aging in brain cells and improve cognitive ability (Desideri et al. 2012).

Coffee is an example of a controversial and highly consumed beverage: No substance has generated more debate explains the president of the Argentina Society of Nutrition (SAN), Edgardo Ridner. For the comfort of coffee drinkers, several studies have found that drinking coffee leads to a lower risk of type II diabetes, stroke, depression and diseases such as Parkinson's and Alzheimer's, coffee drinkers are even expected to live longer (Freedman et al. 2012).

Nuts are another food extensively studied and considered to be anti-carcinogenic. Their derivative-sauces and condiments contain lycopene with a high level of antioxidant. Many studies have associated high consumption levels with a reduced risk of prostate cancer and cardiovascular ailments (Cormillot 2012). Two of the more popular are dried fruits and olive oil, which are important classics of the Mediterranean diet. An article in *Biology of Reproduction* believes that walnuts help fertility: testing on healthy men aged 21 to 35 who eat 75 grams a day found they improved the vitality, motility and morphology of sperm because of the high proportion of polyunsaturated fatty acids that nuts contain (Cormillot 2012). Table 2.3 shows some other beneficial health products.

These are some products that already have implicit properties that may be beneficial to humans, although they can be improved somewhat by various processes, the benefit could become even greater if they fulfil all the requisites from the institutions in charge of food security.

2.4 Disadvantages of Novel Food

Choosing a good food model brings extensive benefits. The problem arises when the chosen model is inadequate, and we take the diet to extremes that separate us from health and quality of life, to the point of inducing pathological practices such as anorexia and bulimia, which ultimately are real diseases in themselves. The fact of a misunderstanding of food properties and going beyond logical eating behaviours can produce authentic psychic disturbances and thus destroy the food properties and advantages of food (Yubero 1998).

Table 2.3 Benefits of Vegetables, Fruits and Legumes

| Product | Content | Benefit |
|----------------------------------|-----------------------------------|--|
| Blueberries | Hippuric acid | Enhance microcirculation in the testis; prevents prostate inflammation and kidney stones |
| Orange | Bioflavonoids, Vitamin C | Prevents the formation of kidney stones. |
| Soy | Vitamins B9 and B7 | Regular use during adolescence helps prevent breast cancer in adulthood |
| Cabbage, spinach and cauliflower | Antioxidant | Protects eyesight |
| Curry, mustard and saffron | Curcumin, which is an antioxidant | Analgesic and anti-inflammatory |

NOTES Adapted from Cormillot (2012).

The concern for health and the influence it has on food is an excellent measure that should be taught and practiced from the earliest age. The consequences are very favourable because the influence of food is observed individually and especially the influence on the set of appropriate eating practices on health. Many diseases are related to food (Mead et al. 1999). When food and eating are healthy and properly enable the improvements of all health indicators, they also prevent many diseases and delay certain signs of aging.

In some cases, people refuse food due to certain components that they do not want to eat. Because of this, they ignore the positive aspects in order to avoid a danger that does not exist. The demand for organic and natural food that is not subject to the action of any treatment, such as freezing or cold storage, this can lead to the non-consuming certain products derived from traditional systems or not consuming them out of season. Another common problem is the derivative of the guidelines monitoring, which can lead to unbalanced consumption. Vegetarianism in its most radical form (veganism) can lead to a reduction in necessary vitamin intake such as B-12, which is only present in those products from the animal kingdom (Skerrett 2013). In certain cases without justification, some kinds of food are dispensed or consumed only under very specific conditions (whole grains, fruits with skins, sprouts). While they may have positive effects (fruit eaters), if consumption is exaggerated and especially when it is done at the expense of other kinds

of food to the point that sometimes the diets become mono-diets, they can result in serious nutritional problems (Shelton 1935, 223). The products based on strict regimes or diets that are falsely attributed to health benefits lead to concerned behaviour, although in certain circumstances there is some truth, even that which is scientifically proven. For example: it is true that broccoli has in its composition an active antioxidant, therefore, it is a fact that it could reduce cancer risk (Talalay, Fahey, and Zhang 1997), but this does not justify the practice of vegetable-based diets.

Even less justified is the over-zealous intake of certain seed oils, even very rich capsules of vitamins or vinegar from fruit or many other remedies. It is unjustified in cases where people consume these products to prevent gaining weight, trying to stop aging, eliminate wrinkles, style the figure, or decrease the waist. In many cases, the concept of new food does not mean that food has been discovered because it was previously unknown, but overlaps with better knowledge of its composition or the effect it has on health or one of its components. Unsurprisingly, it has been tried, and has managed to isolate the elements responsible for negative health effects, but the results have not always been favourable because the activity of the isolated component is usually lower, even if the amount is increased. Capsules, pills, nutrition bars can be concentrated sources of vitamins, minerals or certain nutrients but often the absorption, metabolism of a given molecule are affected, probably because in its pure form they cannot be metabolised as they are in the presence of other food components (Yubero 1998).

Moreover, a study conducted by Block, Patterson, and Subar (1992) suggested that dietary antioxidants can reduce cancer risk according to the relationship between fruit and vegetable intake and cancers of lungs, colon, breast, cervix, oesophagus, oral cavity, stomach, bladder, pancreas, and ovary. In addition, they conclude that there are many substances that act in lowering the risk of cancer and that most of them are not considered to be traditional nutrients, but there are food components, which are still not characterised.

2.5 The European Food Information Council

The European Food Information Council (EUFIC) is a non-profit organisation based in Brussels. It was established in 1995 to provide science-based information on food safety, food quality, health, and nutrition to the public. EUFIC is supported by companies of the European food

and drinks industries and the EC (European Food Information Council 2012).

One of the main tasks of the council is to provide a specialized guide to inform consumers about different kinds of food that could be part of a balanced and nutritious diet. Communication plays a very important role, various portals such as the Food Standards Agency, WHO, European Scientific Steering Committee (just to name few examples) show and give guidance to those interested in information about the various aspects involved in this European Council supply. EUFIC is divided as follows.

Food safety & quality is subdivided in several parts: safe food handling, food contaminants, risk communication, farm to fork, food additives, animal health, food allergy, and intolerance. It explains how the European Food Safety System works, the responsibility that must exist between the organisation (in this case EUFIC) and consumers, how each one of us must take care of our food consumption and how we should follow advice given by food specialists. It is also shown where the food comes from, how it is manufactured, transported, and how it is stored, as well as about the challenges in food security. At the end it explains microbiological contamination. There is a section (amongst others) that explains how to eat well on a low budget.

Food technology refers to the major scientific and industrial advances, about biotechnology advances and the effects on a possible environmental impact. The last part reviews processed food benefits.

Nutrition explains the different components that make up the diet, substances such as: proteins, fats, carbohydrates, fibre, salt, sugar, sweeteners, vitamins, minerals & phytonutrients, it explains functional foods, the role they play in a diet as well as the benefits that people can find by their consumption.

Health & lifestyle is divided as follows: healthy eating, diet & weight control, food choice, food for all ages, physical activity, eating disorders. It provides an approach about certain tips that could improve the basic diet and in turn provides advice to pregnant women regarding making better food choices. Scientific articles can also be found. Finally it comments on nutrition from childhood through adolescence and ultimately reaching adulthood.

The diet explains diseases: obesity, cardiovascular, diabetes, osteoporosis, dental care, deficiencies, and cancer. Ignorance of the issues is often one of the main reasons for fear (Calvo 2004). New articles ap-

pear to give advice to people suffering from these diseases as well as some others. Consumers need to pay more attention towards learning the details of any new trends that may be emerging within the field of nutrition.

With regard to consumer insights, here it is easy to find a communication centre for people to find a wide range of podcasts, web seminars, and a section of high resolution images, free to download and use, as well as proper information on new topics about food security, novel food, and studies about their consumption.

Food for thought focuses on studies about what life would be like in the EU with or without new kinds of food.

EU initiatives are making proposals to strengthen the union's health strategies in Europe. They also make personal approaches to nutrition as well as the possible challenges that can be found in them (studies, the need for food, and health research for infrastructures in Europe). Another part of this section is about interventions for promoting healthy eating habits, as well as sustainable food research.

In the spotlight it is possible to find information about national nutritional foundations across Europe and the various materials they have developed. Making this information available in new languages, modifying the national content to the needs of our European visitors, and disseminating it to a wider audience form a part of EUFIC's collaboration.

The energy balance section aims to help people to understand their daily energy needs. It provides an overview of what energy is, and advice on how to achieve a healthy balanced lifestyle. It also provides information about how everyday activities and physical exercise help to burn calories and improve health, and how to balance what people eat and what people expend through activities. It is divided into three steps. The first one is called healthy life style and it teaches the basics about nutrition and physical activity, and it helps people to find practical ways to reduce calorie intake by making small changes in everyday life and it also teaches how to use nutritional information on food labels. The second step is about the profile that is necessary to fit with personal data when determining current weight status as well as specific daily energy requirements.

Finally the third step is divided in two parts where the first relates to the calorie burner, which teaches how many calories it is possible to burn through various activities. The second step is called eat & move

which teaches how to balance the energy input with the energy that is expended, what kinds of exercise could burn off the calories that have consumed or what should be eaten after specific physical activities.

2.6 Food and Agriculture Organization of the United Nations

In 1945, the concerns about recurrent famines and malnutrition led to the establishment of the Food and Agriculture Organization of the United Nations (FAO). FAO was assigned the duty of improving levels of nutrition, standards of living and improving agricultural productivity, all these objectives were (and still are) an important part of their purpose. Today, agriculture is still seen as one of the foundations for development (Oshaug and Haddad 2002).

Over the past 55 years, evidence has been accumulated to show that agricultural productivity is a powerful force for poverty reduction and economic development. However, over more recent decades, a wide range of factors has hampered agricultural productivity growth in the less developed areas. These factors that are overseen by the FAO include low investment in agricultural research and development, irrigation, rural infrastructure, education, and the inability of poor farmers to access development or developing markets of rich consumers (Oshaug and Haddad 2002).

The strategic objectives followed by FAO are as follows:

Help Eliminate Hunger, Food Insecurity, and Malnutrition. According to data, more than 870 million people still face chronic hunger in the world. Amongst children under five years, there are around 170 million who experience chronic hunger (suffer from stunted growth); almost 104 million are underweight, and about 55 million acutely wasted. Micronutrient lack or hidden hunger affects more than 2 billion people worldwide impeding human and socio-economic development and contributing to the vicious cycle of malnutrition and underdevelopment. The numbers are alarming and the FAO is working to reduce this by the implementation of diverse development programmes. All the challenges and objectives are organised by governments, worldwide leaders have made pledges at various high-level events to reduce hunger, food insecurity, and malnutrition. Recently at the Rio+20 Summit, the UN Secretary General agreed with development partners to join forces for a zero hunger challenge. To achieve food security it is necessary to encompass many different dimensions, par-

ticularly the availability, access, stability, and utilisation of food. In the worldwide scenario the Committee on World Food Security (CFS) provides a single platform for food security governance. High and volatile prices of food, natural resource degradation, urbanisation, globalisation, and climate change are just some examples of major food security challenges that must be dealt with in order to create equilibrium between nutrition and prosperity (see www.fao.org/about/what-we-do/so1/en/).

Make Agriculture More Productive and Sustainable. Competition over natural resources, such as land, water and oceans, is growing fast and the numbers of claimants is increasing. The world population is also predicted to grow to 9 billion people by the year 2050. It is predicted that some of the higher rates of population growth will be in countries where the agricultural sector plays a very important role (crops, livestock, forestry, and fisheries) and these countries already have serious problems regarding food insecurity. Innovative approaches are needed across the agricultural sector to increase productivity, conserve natural resources, and use sustainable and efficient supplies. The vision that FAO has about sustainable systems for agricultural production requires their integration within the social, economic and environmental sectors.

FAO's activities focus on (see www.fao.org/about/what-we-do/so2/en/):

1. Increasing efficient usage of resources to achieve better productivity with fewer resources.
2. Managing the ecological, social and economic risks related to agricultural production systems.
3. Identifying and enhancing the role of ecosystem services, especially in terms of their effects regarding efficiency in the usages of resources and the responses to risks, as well as their contribution to environmental conservation.
4. Promote access to information.

Reduce Rural Poverty. Reduction of rural poverty is fundamental for the FAO, since hunger and food insecurity are, above all, characteristics of rural poverty. A great effort has been made by the FAO to eradicate poverty in rural zones. Since 1990, 54% of people living in rural poverty did so on 1.25 dollars per day and are considered to be extremely poor.

By 2010, the number had decreased to 35%. Rural poverty is still mostly concentrated in Southern Asia, and Africa.

Generally a reduction of rural poverty has been achieved by FAO in situations of fast economic growth, although poverty still exists where politicians have not given enough attention to the improvement of agricultural productivity.

Climate change, other environmental threats, population growth, and migration are putting a disproportionate pressure on livelihoods in rural areas where poverty is already entrenched and people have the least resilience.

FAO's strategy regarding rural poverty (see www.fao.org/about/what-we-do/so3/en/):

1. Define a coherent approach to rural poverty reduction.
2. Strengthen rural institutions, local producers, community organizations and the sustainable use and management of natural resources.
3. Reduce inequalities for access to productive resources and social services.
4. Implement programmes and policies that promote the creation of decent agricultural and non-agricultural employment opportunities for men, women, and the youth.
5. Design social protection programmes that effectively reduce food insecurity amongst rural populations.

Promote More Efficient Agricultural and Food Systems. Societies have to enable more efficient agricultural and food systems at local, national, and international levels. With globalisation growing constantly, agriculture, as an independent sector will cease to exist, becoming just one part of an integrated value-chain instead. This situation is supposed to be a great challenge to small-scale farmers in developing countries where even the more economically valid smallholders can easily be excluded from important parts of the value-chain. Likewise poorer countries, which are perhaps seen as less important players in the global market, can be in a difficult position of exclusion due to other players with more effect on the global market. This happens mainly because countries lack the mechanisms to allow them to participate in a globalised market.

One of the principal objectives of the FAO is to give priority to integration; the FAO seeks to intervene to help people solve various

challenges within the value chain that small producers and even small economies face.

Another FAO's task is collaboration with business. It is necessary to work together with the private sector, which plays a fundamental role in helping to shape the international marketplace. Global companies need to incorporate principles, practices, and socially responsible mechanisms in order to ensure accountability. The FAO is thus working to facilitate a dialogue between governments and the private sector, developing and encouraging the use of voluntary standards, facilitating private investment in good value-chains that will include smallholders and others who have been largely excluded (see www.fao.org/about/what-we-do/so4/en/).

Protecting Livelihoods from Disasters. People should increase the resilience of their livelihoods to threats and crises. The FAO's work in this area is to pay attention to poor people who are disproportionately affected in rural as well as in urban zones. Each year, millions of people who depend on the production, marketing and consumption of crops, livestock, fish, forests, and other natural resources are confronted by disasters and crises (earthquakes, tsunamis). These emergencies threaten the production of (and access, to) food at local, national and (at times) regional and global levels. Threats and crises may be categorised as natural disasters, emergencies in the food chain, socio-economic crises, violent conflicts, protracted crises.

The FAO's work focuses on creating, protecting and recovering livelihoods so that the integrities of societies that depend on farming, livestock, fish, forests, and other natural resources are not threatened by crises.

In order to improve resilience, there is also a need for political will, investment, coordination, technical expertise capacities, innovation, and shared responsibility for disaster risk reduction (DRD) and crisis management of countries, local authorities, civil society, communities, the private sector, and the international community. Four main complementary and multi-sector components are essential at global, regional, national, and local levels (see www.fao.org/about/what-we-do/so5/en/):

1. Enabling the environment: it is necessary to reinforce the capacity of countries towards management risk and crises, early warning, risk analysis, and surveillance systems of multi hazard risks for

agriculture, food and nutrition, thus providing timely, accurate, and actionable warnings.

2. Watch/safeguard: constant improvements in the management of information.
3. Apply DRD measures: while hazards are unavoidable, there is no need for them to become disasters. Disasters can be prevented and mitigated by systematically applying DRD.
4. Prepare and respond: when the population's capacities are overwhelmed by crises, they need to be able to count on effective local, national, and international emergency responses.

It is essential to know what these two organizations, EUFIC and FAO, are doing because information could be the most important resource. In this way people can have an idea of what to do in the event of a disaster (for example following the instructions provided from the FAO, with the EUFIC people can have an idea of how to make the best diet for themselves). Information could provide an advantage towards reaching a healthier and indeed better life. To understand how food works, it is necessary to understand and at least know who is behind everything and which two of the biggest European organisations are doing regarding the food and health industries.

3 Types of Novel Food

Food concepts have changed considerably in the Western world; from its primary importance of survival or the mere satisfaction of hunger in a not too distant past (and unfortunately, still in force in large parts of the planet), to the absence of adverse effects on health, especially in relation to the security and nutritional potential in the second half of the twentieth century.

Over the last decade, the promise of food that would promote better health and well-being has helped people reduce the risk of prevalent chronic diseases, such as cardiovascular and neurodegenerative diseases, cancer, obesity, diabetes, osteoporosis, and others, and represents a new twist in the search for transcendence through food. This idea of food as magic elixir of health is not new as the belief in the medicinal power of food is as old as the recorded history of humanity. What is new is the explosion of interest in food that is presumptively healthy or curative. It has much to do with the growing consumer demand in the first world, where populations with a significant life expectancy, average age, and purchasing power aspire to perennial physical and mental wellbeing that is several times greater.

Moreover, the rising cost of health services and technical advances in the agriculture and food industry are important when searching for designed food with which to satisfy those citizens who want to live longer without becoming ill and the shareholders of big multinational food companies.

However, as has been observed consistently in multiple epidemiological studies in the second half of last century, nature has already designed many kinds of food without modification; foods which appear to have a significant beneficial effect on the incidences of various diseases. A good example is the basic components of the so-called Mediterranean diet: grains, vegetables, legumes, fruits, olive oil, and fish, whose usual consumption is associated with longevity and low frequency of chronic diseases (Ros, Fisac, and Perez-Heras 1998).

3.1 Functional Food

The contemporary science of nutrition has coined the term functional food for all those food products, natural or manufactured that provide benefits beyond the smell, taste, texture, or nutritional value, and affect the physiological functions in a measurable way in terms of preventing disease, and the promotion of health (Goldberg 1994, 8).

Another definition provided by The National Academy of Sciences of the United States defines different kinds of functional food as any modified food or food ingredient that may provide a health benefit higher than the traditional nutrient values it contains (Thomas and Earl 1994).

It considers food to be any product, natural or processed that supplies the body ingestively with the energy and chemicals needed to maintain good health; and as nutrients to the chemicals contained in food that the body uses, transforms, and incorporates within its own tissues. These are divided into macronutrients, which include proteins, carbohydrates, lipids, and micronutrients: minerals and vitamins. There are well-known roles played by each of these nutrients combinations, which are essential for the life of living organisms. This is why the first or the main function (primary function) linked to food is the nutritional function (Villegas and Zamora 1991).

The second function or secondary function attributed to food is its ability to stimulate the appetite, which, according to the resultant level of acceptance or rejection, depends on their organoleptic characteristics (colour, flavour, odour and texture); it could be termed as sensorial or sensory function (Prieto et al. 2008). Besides nutrients, and components of aroma, flavour, colour and texture, some kinds of food contain certain chemicals that can have positive effects on promoting and/or restoring health, allowing the ascribing of a tertiary function or healthy function. During the 1980s and 1990s, scientists began to give importance in the Western Hemisphere regarding the tertiary function of food that is involved in the modulation of the physiological systems of living organisms, such as the immune, endocrine, nervous, circulatory and digestive systems. Thereafter, the term FF was introduced in the West (Cóccaro 2010).

It was in Japan in the 1980s, where the term was used for the first time, referring to food products fortified with special constituents possessing physiologically advantageous effects. In 1991, the Ministry of Health of Japan introduced rules for approval of the specific category

of health related to food called FOSHU (Food for Specified Health Uses, or Food for Specific Health Use) (Arai 1996). After approval, food products could carry the symbol FOSHU on its label. Thus, the first food FOSHU corresponded to a consumer rice species, which was removed by enzymatic hydrolysis of a protein that causes skin allergy, obtaining a new product safe and immunologically healthy. Over time many terms have been used to identify functional kinds of food, such as designer food, nutraceuticals, genetically-engineered food, farm food, vital food, phytofood/phytonutrients, food of high performance, smart food, therapeutic food, value-added food, genomic food, prebiotics/probiotics, superior food, nutritious hyper food, and real food (Xu 2001).

What Makes Food Functional? Typically, the food marketed as functional contains added ingredients technologically developed for a specific health benefit. However, although there are different definitions, as shown previously, there is still no universally accepted definition of this food group and many countries do not have a statutory definition of the term. The Functional Food Science in Europe (FUFUSE) was derived from the European Commission (EC) and is coordinated by the International Life Sciences Institute (ILSI) which defines functional food as follows: A food product can only be considered functional if together with the basic nutritional impact, has additional benefits for one or more functions of the human organism, improving the general conditions, physical and/or decreasing the risk of progression of disease. The amount of consumption and functional food form should be normally expected with dietary purposes.

Therefore, it cannot be in the form of a tablet or capsule, only as normal food (Di Pasquale, Adinolfi, and Capitanio 2011). In contrast, since 2001 FOSHU products in Japan can also take the forms of capsules and tablets, although a large majority of products are presented in more conventional ways. Similar complications occur in South Korea, the United Kingdom, the US, China, Australia and many other countries, to the point that defining a line between a conventional and a functional food is not easy, even for scientists (Siró et al. 2008).

Classification of FF

Functional food has been developed in most food categories, which is why several classifications have been created for them. One classifica-

tion is based on how the functional property is included in the food product, resulting in four types of functional food:

1. *Fortified products* are significantly supplemented kinds of food having a natural abundance of essential nutrients. Usually the fortified food is one where it is possible to add value with little additional cost, such as: bread, breakfast cereals, milk, cookies, and pastas. The term fortification is applied in situations where a specific nutrient is added to food, which originally lacked it (Bello 1995). Clearly, demonstrating the functionality of a food in question must be associated with a detailed study of the safety dosages needed for it to appear which is a prerequisite for fortified food (Hatchcock 1995).
2. *Enriched products* are those to which nutrients have been added that are not normally found in that food. The objective is to solve deficiencies in the food that result in lack of collective phenomena. On the current market there are series of products that help to promote proper growth and the development of an individual, particularly interesting for women during pregnancy, foetal development, growth and development of unweaned infants and children. There are varieties of food rich in iron and folate (breakfast cereals), iodine (iodised salt), calcium (dairy drinks), vitamin D (milk and fat), and specific nutrients in childhood foods (infant formula) (Brouns and Vermeer 2000).
3. *Altered products*: food, where a harmful component has been removed, reduced, or substituted by other substances with beneficial effects, for example, the addition of vitamin A, which provides a very good quantity of iron.
4. *Enhanced products*: food where one component is naturally enhanced by special growth conditions, genetic manipulation or other forms, for example some countries have added iodine to the salt with the hope of preventing mental handicap (Harlem Brundtland 2001).

Benefits of FF

As described above, the surprising rise of the functional food industry emerged at the end of 1980's and the early 1990's. The causes of this revolution are various; Jones (2002) suggests the following:

- The public cares more about their health and buys food with added nutritional value.
- Organisations responsible for food regulation are recognising the benefits of functional food to public health.
- The government is paying attention to this rung because it foresees the economic potential of these products as part of prevention strategies for public health.
- Other factors, which contribute to the boom of FF, encompass technological breakthroughs, including biotechnology and scientific research, documenting the health benefits of these kinds of food. It is a fact that consumers have begun to see these diets as essential for the prevention of chronic diseases such as cancer, cardiovascular disease, osteoporosis, and others. Thus a phenomenon has presented itself called self-care, which is the main factor that motivates decisions to buy healthier food and this factor will rule the growth of the functional food industry (Sloan 2000).

In relation to the organisations responsible for food regulation, they must find scientific support for endorsing the health benefits of functional food assumptions (Vasconcellos 1998).

According to the EFSA many academics, scientists and regulators are working to find ways of establishing a scientific basis for supporting claims that are associated with functional components or kinds of food containing them. In order that FF can provide all possible benefits to public health, consumers need to understand well and trust the scientific criteria used to document their effects and claims.

Some of the specific benefits of functional food are described below by the European Commission (2010b):

- Functional food can help in a mother's diet while pregnant. It may help in the development of the baby. More specifically the composition of breast milk can be influenced by energy and protein intake as well as nutrients such as n-3 and n-6 polyunsaturated fatty acids (PUFAs), amino acids, and micronutrients including folic acid, iron, zinc, and iodine. These kinds of nutrients can be useful as ingredients in FF.
- The immune function can be affected by FF; it can contribute to optimum immune response because throughout life the immune function can be influenced by nutrition.

- The gastrointestinal (GI) tract is a perfect target for the development of FF because it acts as an interface between the diet and all other metabolic functions. The GI function depends on an appropriate balance of healthy bacteria for preventing the invasion of harmful bacteria. The use of ingredients to modify the composition and metabolic activities of the gut micro flora is one of the more interesting and promising areas for the development of FF (European Commission 2010b).

Probiotics, Prebiotics, and Synbiotics (Mixtures of Probiotics and Prebiotics). Intestinal flora is acquired during the neonatal period and remains more or less stable for the remainder of an individual's life and although it depends on various factors, such as the use of antibiotics or diet, it is difficult to modify it permanently (Hentges 1980). The addition of certain bacteria allows the maintenance of a certain type of flora, and with this base born probiotic concept: a live microorganism, a food component that when ingested has a beneficial effect on improving the balance of intestinal flora (Fuller 1991). Since the addition of live bacteria some technological problems and side-effects may appear, the industry has resorted to substances that are naturally found in various kinds of food or that may be added to them, and that these can benefit the presence and actions of probiotic germs. Prebiotics, indigestible components of food that when ingested encourage the growth and establishment of beneficial germs of the intestinal flora (Fuller 1991; Simon and Gorbach 1984).

Finally, synbiotics are a combination of both for improving the survival and implantation of germs supplemented with the diet. In some kinds of food pro and prebiotics constitute the synbiotics. Again, human milk can be considered an example because it contains living cells that when arriving at the intestine exert actions as probiotics and can be obtained industrially with fermented lactic food (Hansen and Yolken 1999).

Mental health can also be influenced by functional food, for better performance, and better optimal mental state. They may influence cognitive performance, mood and vitality, reaction to stress, short-term memory, vigilance and attention, changes in memory, and other mental processes during ageing (European Commission 2010b).

For example, glucose may have benefits on mental performance by having an effect on memory and decision times. Caffeine can lead to

improvement in cognitive performance with effects on reaction time, vigilance, memory and psychomotor performance (European Commission 2010b).

Health and wellbeing during aging, recent studies say that now people live longer (Veenhoven 2005), medics pay more attention to diseases (e.g. cardiovascular disease, cataract, cancer, age-related macular degeneration, Parkinson's disease, Alzheimer's disease, and osteoarthritis). These conditions may put increased oxidative stress on the body. Thus if it could be possible to reduce the stress, it is then possible to delay or prevent these diseases. FF can help the body in being physically active.

Liquid food formulae that deliver an appropriate balance of fluid, electrolytes, and energy substrates in a convenient and easily digestible form can help physically active people, including athletes. These liquid kinds of food may also help people who cannot easily consume enough food to meet their nutritional requirements. Some other benefits found are: reduction of obesity, which has become a global public health issue, cardiovascular disease, a reduction of diabetes number 2 due to overweight and lack of physical activity, musculoskeletal disease (Froidmont-Görtz 2008).

Inconvenience of FF

Can functional kinds of food become harmful by an inadequate intake? Olmedilla (2009) explains that the society faces many new kinds of food on the market, which contain active components added (or the removal of those identified as harmful and similar) in order to produce beneficial health effects both short and long term. Nevertheless, in most cases there are insufficient and consistent studies to permit making a statement about the health related to certain components or food. In general consumers do not have clear information about what these kinds of food are, what they can contribute or how to understand the differences between them. It would be necessary to provide concise information on these products, explained by experts. In fact, in this type of food, for which allegations are made regarding their health benefits, manufacturers must have previously assessed the benefits and possible undesirable side effects. FFS must prove they are safe and comply with legislation. Moreover, when taking into consideration that this type of food can be integrated fully in a diet and that diet should be varied and balanced.

Comprehensible and Reliable Information Should Be on the Label. The way to communicate the benefits of FF to consumers is via labelling which should contain comprehensive and reliable information. The labelling, according to the European Parliament and the Council (2006) can be considered in two categories:

1. Maintain or improve function (Article 13).
2. Reduce the risk of disease (Article 25). This regulation also explains that it will only allow the use of nutritional statements and healthy properties if the average consumer understands the beneficial effects that are described in the statement.

In this sense, it will permit the statements of healthy properties if they are included amongst others in the labelling information. Some adequate awareness about the quantity of the food and pattern of consumption should also be required in order to obtain the claimed beneficial effect; on their containers, a statement addressed to persons who should avoid using the food, and adequate warning regarding products that may pose a risk to health if consumed in excess.

Some other markets have still not reached the standards for the labelling of these products, therefore, confusion can arise regarding products aimed at different markets, such as products aimed at those wishing to lose weight, explains Olmedilla (2009). The substances that give any extra benefit to the products that have historically been available. For this reason, many scientists claim that if people have a full diet, balanced, varied and sufficient, then the consumption of these kinds of food is unnecessary.

Research Challenges for Functional Kinds of Food. Some other proposals made by Olmedilla, Granado, and Blanco (2001) argue that the key research challenges for FF is the need to identify new functional food ingredients and to gain consumer acceptance of such products. In particular, the research needs to:

- Identify potential functional ingredients that could provide benefits in terms of health and well-being;
- Identify individual biological responses to FF;
- Define the bioavailability of functional food ingredients;
- Develop appropriate biomarkers for a wider range of FF;
- Develop the potential utility of nutrigenomics, bioinformatics,

proteomics, metabolomics and nanotechnology in the development of functional food;

- Anticipate demand for personalised nutrition and the potential role of FF;
- Ensure stability of FF ingredients during manufacturing and passage through the GI tract to reach the target organ intact;
- Establish Dietary Reference Intakes (DRI) for a wider range of nutrients to enable commercial exploitation of more functional components.

The main technological challenges facing the development of new FF are: improvement of the stability of physiologically active components, the problem of quantification and analysis, maximum doses, conducting more clinical studies that guarantee in a rigorous way the beneficial effects attributed to the various components, as well as comply with new consumer expectations, market and legislative aspects that are generated.

3.2 Genetically-Modified Food

According to the World Health Organization (2012), GMF can be defined as organisms in which the genetic material, Deoxyribonucleic acid (DNA) has been altered artificially. The technology is often called modern biotechnology or gene technology, sometimes also recombinant DNA technology or genetic engineering.

For a large number of consumers, biotechnology food is equivalent to applying genetics in food or, more directly, putting genes in their soup. This statement has no scientific validity because food biotechnology is simply the use of a living organism to produce food. The ideal thing would be to educate people in the definitions and applications of these technologies, but that would certainly take a long time and, in addition, much of the opposition to these developments would see it as a perverse form of indoctrination. This makes it much more convenient to explain to our society that genetic food production is nothing new. In contrast, it is something that people have been doing for more than twelve thousand years, since agriculture and livestock started in the Neolithic era (Ramón 1999). Indeed, throughout time mankind has genetically improved breeds of animals for consumption, edible plant varieties or the microorganisms responsible for the production of different kinds of food and fermented beverages (Diamond 2002). It has been done empir-

ically, using different genetic techniques, amongst them hybridisation, also called sex crossing. Very little of what we eat has escaped these improvements, maybe just some animal species that are hunted or fished in captivity. The rest, no matter how natural some would seem, are not free of genetic modification. It is easy to understand this with a couple of examples. The first concerns the use of hybridisation when applying random crossings of two parental genomes was trying to find in their offspring a combination of more suitable genes. The example refers to wheat varieties with those which are produced today, bread and pasta. They were obtained from work through centuries, which included successive mutations and crossovers, to the point that we can now define them as genetic puzzles in which, unlike progenitor wheat species, it was possible to find two copies of each chromosome as in humans; currently they have six copies (Feldman and Sears 1981). The second relates to using mutation in the improvement of food. In this technique a gene amongst thousands of genes in a genome randomly mutate and consequently a new mutant appears with a characteristic of interest. This was the case of the cabbage. A few thousand years ago an ancestor of the same gene mutated in a gene that controlled the size of the terminal bud and consequently appeared a monster where the terminal buds had grown out of control. A farmer saw it and it seemed attractive, it grew and that is how it came to be known to this day by the name of cabbage. In a similar way arose, although in mutations with different genes, cauliflower, broccoli and Brussels sprouts. Cabbages and breads are just two of the thousands of examples of the use of genetics in food (Ramón 2004).

This is how food technology has worked for centuries. It wasn't until the late nineteenth century that Mendel laid the foundations for the heredity we apply to these technologies, before that we applied them with complete ignorance. After Mendel's contribution, we do it with more knowledge. Only thirty years ago, genetics offered, in the field of food production, a new tool to improve our meals. It is called genetic engineering, however, there are no longer randomly hybrid or mutation processes of thousands of genes. It works in a lab with isolated genes that are clearly identified at the molecular level. These genes are introduced into the desired genome generating the organisms that we call transgenic. Therefore, when designing some kind of food and we employ genetic engineering some names arise such as transgenic food. This is the usual name in Spanish speaking countries, although in English-

speaking countries and French they are known as GMF (Ramón and Calvo 2001).

Many transgenic foods of animal, vegetable or fermented origins have been developed. A large percentage have been obtained in the laboratories of private companies, however, others have been public research organisms. Contrary to popular belief, not all benefit from the first links in the food chain, meaning the seed companies and farmers. Some favour the processing industries, others consumers and even some to professionals of the sectors for the avoidance of diseases. It is therefore appropriate to analyse some of the examples listed below. A very high percentage of GMOs in food and agriculture have led to constructing transgenic plants that can resist attacks by various pests such as viroids, viruses, bacteria, fungi or insects. To do this, scientists have worked with varieties of clearly agronomic interest in the developed countries such as maize, potato, soy, or tomato. In them it is possible to eliminate the use of pesticides because the plant itself is resistant to attacks thanks to the introduced gene, considerably reducing the usages of these products and their possibly negative impact on the environment (Prins 2003). The best-known example is the authorised genetically modified maize in the EU. In its genome, a gene from the soil bacterium *Bacillus thuringiensis* has been introduced that synthesises a protein that destroys the stomach of the corn borer, one of the most important pests of this crop. The improvement of productivity by employing these Bt is between 10 and 20% and, moreover, with its use it is unnecessary to use insecticides. This explains the widespread use of transgenic products in American agriculture. In Spain, for example, it was planted in some regions and the results were similar to those obtained in the US (Brookes 2002). Another large group of transgenic plants show resistance to herbicides. It is the one represented by the so-called transgenic soybean that is authorised in the EU. The cultivation of this plant, like many others, has the disadvantage of joint growth with weeds and when competing with soybeans for soil nutrients they produce significant reductions in production. Thus, scientists are trying to remove the weeds, which is feasible by using herbicides. However, in the same way that it kills the weeds it also removes soybean, which is sensitive to that compound. To solve this problem, scientists have obtained transgenic soybean varieties that contain in their genomes a gene from petunia genome, which provides resistance to the herbicide (Shah et al. 1986). In this way it is possible to manage the transgenic

plantation with the herbicide and at the same time eliminate the weeds. Other transgenic developments have been directed towards improving the physical or chemical properties in food. There are transgenic tomatoes that can delay their softening and can be stored for long periods without causing changes in colour or taste (Sheehy, Kramer, and Hiatt 1988). Studies have also developed transgenic potatoes with changes in starch content, which affects their ability to retain oil during frying (Visser and Jacobsen 1993). Recently scientists have generated transgenic cows that have high levels of various caseins, such that their milk has new functional properties (Brophy et al. 2003). Even in the field of fermentation different kinds of food and drinks have been generated by lactic bacteria that can reduce the ripening times of cheeses. Some of these developments have already been evaluated and some others are being studied. In any case GMF's are prepared for the immediate future.

GMF through the Years

As it is apparent from the above preceding paragraphs, the difference between GMF and other conventional food is only technological because it is based on a genetic technique used in its design: genetic engineering as against sexual crossing or mutagenesis. In many cases, it has become an oversimplification of this fact by some defenders of this new technology to conclude that because there is nothing new from the evaluation and information then they are unnecessary (Ramón and Calvo 2001).

Firstly, as noted above, in the design of transgenic food directionality is imposed to chance because it does not mix or mutate genes in a genetic roulette. One is selected, then it is molecularly dissected, and then finally it works with it. With this, we can say that the knowledge of genetic diversity in the case of transgenic food is much higher than the one we have of the changes in other food. For example, when generating a sexual crossing the resulting product exhibits a distinct change in its genome that may be evaluated between 30 and 50% compared to the parental genomes. In contrast, when generating a transgenic plant such changes do not exceed the value of 0.1% compared to the conventional variety (Frederick, Virgin, and Lindarte 1995; Ramón 2004).

Secondly, when designing transgenic food, the results are obtained much more quickly, which is of significant importance for food companies. For example, an improvement programme for a commercial melon

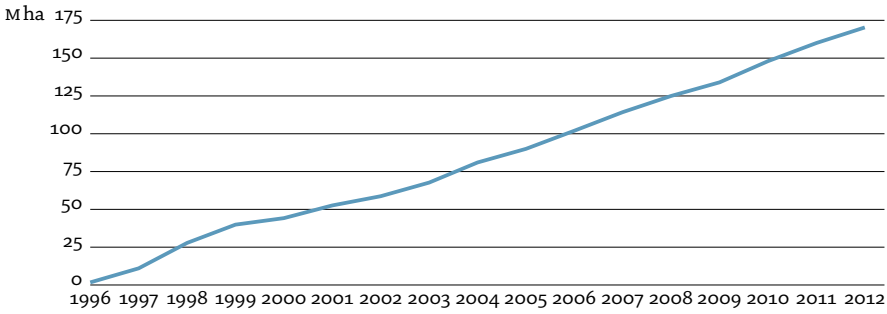


Figure 3.1 Global Area of Biotech Crops, 1996 to 2012 (adapted from Clive 2012)

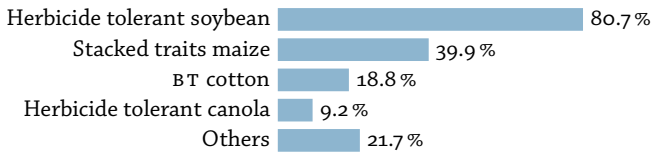


Figure 3.2 Global Biotech Crop Plantings by Main Trait and Crop, 2012 (adapted from Clive 2012)

involving the introduction of three important agribusiness features is a three-year project whilst using conventional techniques it would be ten years. It is necessary to explain that the fact of obtaining quicker development does not necessarily mean that this will come onto the market any earlier. All GMFS must be evaluated for health and toxicology reasons before obtaining market approval; these procedures normally take a period of no more than ten years (Jaffe, 2004; Ramón 2004).

In order to understand the issue of GMFS, it is necessary to know the numbers involved. In the year 2012, the global area of biotech crops grew to a new record of 170.3 million hectares (mha). They increased for the 17th consecutive year, at a sustained growth rate of 6% equivalent to 10 mha. Figure 3.1 shows the progression of GMFS throughout the years from 1996 until 2012.

The breakdown of the main biotech traits planted globally in 2012 is shown in figure 3.2. Biotech herbicide tolerant soybeans led with 80.7 mha, this is equivalent to 47% of the global biotech area. The second position was occupied by biotech maize stacked traits with 39.9 mha equivalent to 23% of global biotech area. The third more dominant crop was Bt cotton; it was planted in more than 18.8 mha equivalent to 11% of global biotech area. In the fourth position, we found biotech herbicide tolerant canola with 9.2 mha equivalent to 5% of the global biotech area.

Table 3.1 Biotech Crop Area of Global Area of Principal Crops, 2012

| Category | Soybean | Cotton | Maize | Canola |
|--------------|---------|--------|-------|--------|
| Biotech | 80.7 | 24.3 | 55.1 | 9.2 |
| Conventional | 19.3 | 5.7 | 103.9 | 21.8 |

NOTES In percent. Adapted from Clive 2012.

To show another way of providing a global perspective of the presence and status of biotech crops, we have to present the proportion rates as a percentage of the respective global areas of the four principal crops: soybean, cotton, maize, and canola. Table 3.1 shows that in 2012 81% (80.7 mha) out of the 100 mha of the global soybean plantation were biotech. Biotech cotton represented the same 81% in its trait according to the 24.3 mha planted out of 30 mha of global cotton. 55.1 mha of biotech maize planted out of the 159 mha represented 35% of the global plantation. Finally, herbicide tolerant biotech canola was planted in 9.2 mha or 30% of the 31 mha of canola grown globally in 2012. If we summarise the total production (biotech and conventional) of these four crops the total area covered would be 320 mha, of which 170.3 mha or more than a half 53% were biotech.

Benefits of GMF

Modern biotechnology has led to important solutions in health, agriculture, mining and the environment. However, it is in the agricultural sector of food production where there has been a fierce campaign of opposition based on political and economic arguments but with lack of scientific support (Gutiérrez-Correa 2008; Herring 2008).

There are high hopes that modern biotechnology will play an important role in protecting human security constantly threatened by disease, hunger, poverty, environmental degradation and, specifically, a contribution to the solution of hunger and poverty, particularly in less developed countries (Brookes and Barfoot 2008; Dowdeswell, Singer, and Daar 2006). Some of the examples where biotechnology has been exploited over the years are presented below.

Genetic manipulation techniques can be used to increase, decrease, or modify the amount of-specific nutrients of different plant (food). One potential application of this technology (and it is one of the main arguments of those in favour of it) would be to prevent and even treat many diseases. Their potential has been studied in the area of drugs and vaccines. To date there has been an evaluated treatment of inflam-

matory diseases of the digestive system with transgenic potatoes and bananas. Also with genetically modified rice and wheat, antibodies for tumor cells of lung and colon cancer have been developed (Harlander 1989).

Another advantage of genetic engineering that would benefit many is to improve the protein quality of alfalfa. One of the major limitations to the growth of sheep is that alfalfa has a low content of sulphur amino acids. In order to overcome this weakness, a gene was introduced into the genome of the alfalfa that encodes sequences of sulphur amino acids. This gene had high expression value, which resulted in an increase in lysine, thus leading to an increase of 1% total protein, which resulted in a greater amount of meat and wool production from sheep that were fed with transgenic alfalfa compared with those fed with wild alfalfa (Tabe et al. 1995).

Calgene Inc. (Davis, USA) developed a canola oil low in saturated fatty acids, low triglycerides, and rich in marine oils. It has low costs and is without the great inconvenience of a 'fishy smell,' it is also an enriched fibre and contains some micronutrients such as vitamins E and A. In theory, this oil may reduce the risk of cardiovascular disease and cancer. Other researchers have managed to increase the outreach of Vitamin E from certain vegetables (Shintani and Della Penna 1998).

There is genetically modified rice called Golden Rice, which incorporates seven different plant genes that, with higher contents of beta-carotene and iron, is useful for the prevention and management of anaemia and blindness, diseases that are endemic in some parts of the world. With 300 g of rice, it is able to provide 50% of the daily requirement of vitamin A and 50% of adult iron (Xudong et al. 2000).

A study from 1998 is one of the more interesting trials and one of the few performed to evaluate the effects of new kinds of food obtained through genetic manipulation (Mendoza et al. 1998). The authors based their study on a previous one where a strain of maize was created that had a low amount of phytate acid (IP6), and a compound that decreases the bioavailability of iron. In the transgenic maize obtained this was 35% less than in the wild IP6. The results showed that the concentrations of macro and micronutrients were not significantly different between the genetically-modified maize and the wild one, and the incorporation of iron erythrocytes was 49% higher in those individuals who digested corn low in phytate acid, when compared to the wild corn. The conclusion of the researchers was that the consumption of genetically

modified low phytate acid maize may improve the iron absorption and hence nutrition in populations consuming diets based on modified corn (Mendoza et al. 2001).

The current Dietary intake of fructans for Americans is about 1 to 4 g per day; meanwhile Europeans have 3 to 10 g per day. Human studies show that consumption should be increased to 20 g daily in order to achieve or promote health benefits without side effects to the digestive tract (Bosscher 2009). The usage of these compounds has resulted in increased production of short-chain fatty acids, of fructo-oligosaccharide influencing the quality of intestinal microflora, decreasing the growth of pathogenic bacteria, and helping to restore the normal flora after antibiotic therapy. It is also associated with a reduced risk of colon cancer and an improved lipid-profile. Investigators from the Netherlands were able to increase the amount of flavonoids in tomato when involved in aspects of plant growth like resistance to the pathogenic production of pigments and UV protection. Due to its known antioxidant properties, flavonoids are beneficial to human health, providing protection against cardiovascular disease and cancer (Sévenier et al. 2002).

One of the oppositional arguments to GMF is that they could be harmful, based on experiments that did not have a proper experimental design or were not subject to arbitration specialists. In this regard, over 100 animal studies published in refereed scientific journals found no significant differences in the nutritional values of transgenic kinds of food first generation (plants with enhancements without substantial changes in its composition) compared to conventional kinds of food (Flachowsky et al. 2007). Similarly, elements on the toxicities and allergenicities of Bt plants have been scientifically refuted (Lemaux 2008). Then GMF were proved to be biologically and chemically safe. Therefore, they are not harmful to health; moreover, transgenesis reduces or eliminates the presence of natural plant compounds, which generate toxicity, as is the case of asparagines, which is the precursor for the formation of acrylamide in conventional potato chips, baked or toasted, and has been achieved by silencing two asparagine syntheses genes (Rommens et al. 2008).

Finally, the economic benefits of GM crops to farmers and countries where there has been significant commercial production (US, Brazil, Canada, Argentina, China, South Africa) include: higher incomes for farmers, reduced pest applications for Bt cotton and Bt maize leading to reduced farmer poisoning (Food and Agriculture Organization of the

United Nations 2004; Tripp 2009). For national economies, GM crops have expanded exports such as soy in Argentina and Brazil (Fukuda-Parr 2006).

Concerns about GMF

The potential risks when exposed to GMF and that are the basis for environmental organisations that reject the use and consumption of GMF, are the development of allergies, antibiotic resistance, loss or modification of the nutritional value of food, the presence of toxic compounds, the appearance of new and untreatable diseases, as well as damage to the wild species of plants. Food has historically produced allergies in susceptible people. Genes that are transferred from one organism to another to obtain GMF may encode certain proteins that are allergenic for certain groups of a population. The company Pioneer Hi-Bred International observed that animal growth could be increased by a diet rich in sulphur amino acids. Therefore, they designed transgenic soybeans that had this characteristic by introducing a gene from the Brazil nut. Nordlle et al. (1996) noted that those allergic to nut extract were positive in a test of genetically modified soy extract, demonstrating that the allergies were linked to the product. That is why the soybeans were removed before they entered the market. The difficulty of separating the soy for human consumption and separating it for other purposes is a big problem. The soy protein is often used in infant milk formulas, meat substitutes, amongst others (Friedman and Brandon 2001). The Food and Drug Administration (FDA) of the US requires rigorous procedures for assessing the allergenic potential of genetically-modified products before authorising its marketing and allowing the industry the possibility of assessing whether the products are as safe as the traditional ones (Gendel 2002).

The possibility of antibiotic resistance transmitted through the consumption of GMF is one of the biggest fears regarding GMF consumption. It is postulated that using bacteria or other microorganisms resistant to a particular antibiotic by selecting those bacteria that have incorporated the genes that encode the trait of interest. By eating these products, it will transmit that resistance to the antibiotic making it difficult to manage the pathologies. However, there is no evidence that these resistant genes can be transferred from the GMF to the human digestive tract. Furthermore, this methodology is becoming less used thus reducing the importance of this aspect (Gay 2001). We must re-

member that toxins can also be in traditional kinds of food. If the toxin concentration were higher in transgenic food than in the traditional product because of manipulation it could not be commercialised. In conclusion, there is currently no scientific evidence to support the theory that associates the consumption of GMF with people who have developed an illness or long-term damage. No adverse reaction was observed with modified food (Gendel 2002).

The biotechnology industry is dominated by large multinational corporations (Monsanto, Syngenta, DuPont), the spread of GM technology would ultimately lead to corporate control of the food-chain, leading to monocropping production systems (Fukuda-Parr 2006). Many researchers consider agricultural biotechnology to be a technology such as any other, like nuclear fission it can be used for positive or negative social ends. Its impact depends on who uses it, for what purpose, and under what conditions. Public policy choices make a significant difference to those consequences. Why do public sector research institutions (especially in developing countries) not invest in biotechnology research? There are three theories:

- Is it a lack of capacity, do only corporations have biotechnology capacities?
- Lack of finance, do only corporations have the finance?
- Is it due to political pressure from anti GMF movements on governments to resist this path (Paarlberg 2008, 122–148)?

Corporations have dominated the GM crop field but we can find some exceptions. For example, China's public agricultural research centres have developed considerable capacity, rivalling that of Monsanto, some small seed companies in India also produce GM crop seeds. On the American continent, Brazil's NARS is developing a significant program in biotechnology whilst its neighbour Argentina has decided to leave it to the private sector (Fukuda-Parr 2006).

The moral/ethical concerns seem to be of great importance for the obstruction of GMF, the dimension of the moral issue is one of choice. People who oppose GM crops argue that if GM crops were to spread, this action would leave farmers with no alternative but to use GM varieties and in this way it would become a dominant source of seeds (Shiva 2006).

An issue of big concern is one of information and consumer labelling. While labelling is mandatory in some countries (e.g. in Europe), it is

not in others (e.g. the US). According to a poll taken by the Rutgers Food Policy Institute, 54 percent of Americans believe that GM crops threaten the natural order of the food supply, this statistic seems to be ironic, considering that a vast number of Americans consume GM crops regularly (Paarlberg 2008).

EU Regulations about GMF

Labelling regulations for GMF products have been established by the European Parliament and the Council (2003). These rules apply to products that present distinct processing degrees. The regulation does not require labelling of food products that are not food ingredients, such as processing additives. Meat, milk, or eggs obtained from animals fed with genetically modified or treated with genetically modified medicinal products do not require labelling as GMF. Traceability rules require all commercial operators to transmit and retain information about genetically modified products in order to identify both their suppliers and their customers. All food products containing GMOS (produced from GMF or ingredients) must be labelled even if they no longer have detectable genetically modified traces. The present allowable level of GMF varieties approved by the EU is 0.9%. Above this level, all products must be labelled. The terms to be used on labels for GMF are the following (European Commission 2005):

- When the food has more than one ingredient the word transgenic or produced from genetic modifications has to be used as well as: This product contains genetically modified organisms or: This product contains genetically modified [(name of organism(s))]. For example, a cookie containing genetically modified soy flour should have a label reporting genetically modified soy flour (European Commission 2005).
- Appendages may appear in a footnote in the list of ingredients, as long as they are printed in the same font and in the same size as the list of ingredients. If there is no list of ingredients, it should be clear on the label.
- Where there is no list of ingredients, the term transgenic or Produced from a [name of ingredient] genetically modified must appear clearly on the label. Example 1: liquor containing caramel produced with genetically modified maize. Example 2: Genetically modified maize.

The USA, Canada, South Africa, and Argentina have a relatively permissive approach. India and Brazil have a more precautionary regime. China has a unique and pragmatic regime. The EU initially had a more facilitating environment but policy shifted in the late 1990s towards a precautionary approach, and in 1998 enacted a moratorium on new approvals (Tiberghien 2007). Although the moratorium was revoked in 2004, the EU continues to demand strict labelling requirements for all products containing GM crops and remains precautionary when it comes to the importation of GM crops.

3.3 Ethnic Food

From the definitions from Dwyer and Bermúdez (2003) and according to the authors Verbeke and Poquiqui (2005), an ethnic food could be defined as one part of the food culture of a people or nation whose consumption, however, extends beyond its borders geophysical and culturally, and therefore it is ethnic while viewed from the perspective of a market and/or consumers outside the cultural reference group. Furthermore, as ethnic individual food it is considered equally to any other food or prepared dish, in which the culinary tradition of an ethnic group and/or culture provides one specific way of cooking, seasoning, or preparing the food. Firstly the demand for these kinds of food focuses on groups of immigrant populations, and can gradually be extended to the whole society, whilst tourism, improvements in communications and the globalisation of economies, act as factors that contribute and boost the development of this market (Cardello et al. 1985).

Food that from an internal perspective of their own culture is considered traditional or typical can become ethnic food when it goes beyond geographical and cultural references. The climatic characteristics of farming an area determine the existence and availability of food products that may be unique or at least possess distinguishing characteristics.

The coexistence of a multicultural population, with the most diverse roots has contributed to the arrival of food in different corners of the world. This was not only the creation of chain restaurants and supermarkets specialising in ethnic food but also the emergence of local restaurants and small stores, more informal, where people could find a varied cuisine and food from every part of the planet.

Countries such as the US and the United Kingdom have been at the forefront in the development of ethnic food markets. Globalisation,

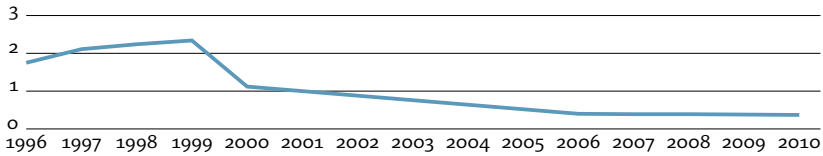


Figure 3.3 Slovenia Net Migration Rate (migrants/1,000 people, adapted from Index Mundi, <http://www.indexmundi.com/g/g.aspx?c=si&v=27&l=en>)

the intensification of trade, migration flows, the increased purchasing power of the population in developed countries has encouraged tourism, aided by the improved media of communication and transport, as well as the demand for diverse cuisines which are cited amongst the main stimulating factors of this market (Sloan 2001). Slovenia has not had such a great migration in comparison with countries like those cited above, the rate in Slovenia is around 0.39 migrants per one thousand persons (based on the mid 2012 population), this means that there are 780 foreigners in Slovenia equivalent to 0.039% of the total population, see figure 3.3.

The fact that the migration rate is low could mean that maybe the inhabitants are not interested in food and customs from other cultures because the diversity of a people also enriches the culinary aspects of their country. The social and symbolic significance of the spread of ethnic kinds of food across advanced industrial societies is one with the potential of clarifying many issues associated with economic and cultural processes of globalisation. The more diverse a culture is the more chances people have to try new customs from other parts of the world (Warde 2000).

From the moment of their arrival, immigrants demand home, food, and basic consumer goods. Some of these demands, however, cannot be satisfied by the existing supply in the market, since these products are not within the diet of an average consumer. The traditions and customs that immigrants maintain over time are those that will shape their consumption habits and, in turn, will highlight the differences between this group and the native population. Thus, food companies find in immigration a new way to expand an emerging market niche. These companies are gradually expanding business lines that incorporate ethnic dishes to try to attract and retain these new consumers (Rodríguez 2006). Ethnic food therefore, represents a business opportunity for entrepreneurs and has become an instrument that immigrants use to recreate their

identities when emigrating to other cultures, which is often something that identifies and differentiates them from the rest (Medina 2002, 123).

Studies, primarily developed in the US, have investigated the dietary patterns of different ethnic groups. The studies were interested in information as to how much the dietary patterns are conditioned or modified depending on variables such as the degree of acculturation and adoption of the general trends of the host country or if can they be directly related to the years of residence. This is if people are members of the first or subsequent generations of immigrants, socio-economic status and age, as well as the educational level, employment status and household composition, amongst others (Ayala et al. 2005; Batres-Marquez, Jensen, and Brester 2003; Satia et al. 2001).

Several studies have found that the purchasing and consumption behaviour of immigrants is related to their cultural characteristics and feelings of nostalgia and memories of their countries (Camarena, Garrido, and Pedraja 2007; Cruz, López and Schatan 2004, 64). That is why these groups tend to show a more positive and receptive attitude to products that come from their countries of origin to the detriment of those from other geographical areas and which are not part of their traditional habits (Verbeke and Poquiviqui 2005).

The EF in Europe

According to Camarena and Sanjuán (2008a) mostly, EF have already been introduced onto the European market, although part of the population is still reluctant to consume these kinds of food, knowledge and tasting of ethnic kinds of food gradually extends over a larger number of consumers. Restaurants are favourite places to taste EF and the preferences that domestic consumers are inclined to are in the following order: Mexican, Asian and Arabic (Camarena and Sanjuán 2008b). As indicated, according to the personal conditions, consumers most likely reject ethnic kinds of food and are the most reluctant to try new kinds of food (neo-phobic), which is manifested in the ethnocentric trends in their buying behaviour and when seeking higher personal development.

One characteristic of the early stages of commercialisation is that ethnic food is aimed primarily at consumers from the country they came from and their immediate environment. However, with the passage of time, the promotion and distribution strategies of these products expand in such a way that they reach segments of the national consumers (Durán 2006).

It often passes unnoticed that most of Mexico's exports are destined for the US market, and that it is increasingly difficult to find new niches within a highly competitive environment. Therefore, the researchers of the portal have taken the route to the countries of the EU, to find that there is indeed a potential niche that is being stimulated by the consumption of ethnic food and beverages, the market values of which were estimated in 2006 at 4.5 billion dollars. When we talk about the EU market, we have integrated 456 million inhabitants in 28 markets with different consumption habits and preferences. Besides European diversity, there is a diversity caused by immigration, the minorities from Eastern Europe, Asia and Africa being the more prominent. Immigration, tourism, communication, trade expansion, and economic activities have influenced the development of new food alternatives, such as ethnic food (Batres-Marquez, Jensen, and Brester 2003).

Health and personal image have also influenced the need for more nutritious food, functional, and natural food. Changes in consumer habits are generating a significant increase in demand for processed food and ready to eat, without being considered as fast food but quite the contrary, with specific quality and diversification. To present an idea, in the last year the value on the European market for processed food was \$544 billion, with a share of 0.9% for ethnic food, where there are the opportunities for expansion into new markets.

While in the EU the ethnic food retail market represents 0.9% of the total value of products packaged, in the US the market constitutes 11.5% of total packaged products. However, the growth of the ethnic food retail market in the EU is growing at a rate of 14% per year, whilst the US growth rate is 5%. For the US, Mexican food represents 42% of the ethnic food category, whilst in European countries it accounts for 20% of the segment (980 million dollars).

The more widespread ethnic cuisine in the European market is the Asian: Chinese 39%, Indian 28%, and 8% other Asian (Camarena and Sanjuán 2008b). One of the main reasons for the growth of the ethnic food market is the immigration of people from countries with some historical relationship: India to United Kingdom and Latin America to Spain.

EU Regulations about EF

The first question to be asked of a foreign food supplier is their readiness to export to the EU. Above all, it must be recognised that the EU is

Table 3.2 Schedule for Phasing Out Tariffs (List C)

| Tariff basis (Mexico) | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|-----------------------|------|------|------|------|------|------|------|------|
| 20 | 18 | 12 | 8 | 5 | 5 | 4 | 3 | 0 |
| 15 | 13 | 10 | 7 | 5 | 5 | 4 | 3 | 0 |
| 10 | 8 | 6 | 5 | 4 | 4 | 3 | 1 | 0 |
| 7 | 5 | 4 | 3 | 3 | 2 | 2 | 1 | 0 |
| 5 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 0 |

NOTES Adapted from De Mateo and Holer (1998).

not the US, and not simply because the products from Mexico, Peru or Colombia are ready to be exported to the US does it mean they are ready to be exported to the EU. Every country has its own regulations regarding health and consumption many of them are very different from the FDA or the Official Mexican Norm (NOM) for example. Therefore, it is necessary to verify the products' ingredients, which are not products made with genetically-modified raw materials, products without colorants, preservatives or prohibited flavour enhancers. When people make the decision to enter European markets, the exporter must obtain European trademark registrations, certify the quality, and control the production processes in an efficient way and know the market shares in the exporting and importing countries (Cruz, López, and Schatan 2004).

One advantage that seems significant in terms of export that currently exists between Mexico and the EU is that the Mexican state liberalised its market to export from the EU in four stages, according to four lists: List A includes 47.6% of the value of Mexican imports from the EU, it was liberalised immediately on 1st July 2000, list B covered 5.1% of the export from the EU to Mexico, was free of tariffs on 1st January 2003; list B plus, accounting for 5.6% of Mexican purchases to the EU, which were released on 1st January 2005 (list B+), and finally, list C which comprised 41.7% of the trade and was fully liberalised in January 2007, see table 3.2 (Puyana 2003, 59).

Rebossio (2012) explains that for five Latin American countries it will be more difficult to export to the EU. For European consumers, some products from Argentina, Brazil, Cuba, Uruguay, and Venezuela will cost more from January 1st, 2014. The EU announced the new scheme of the general system of preferences, which unilaterally reduces tariffs and quotas on imports of certain products from developing countries. In times of austerity in the Old Continent, the Commission, with the

Table 3.3 Trade Balance between Mexico and the EU 1995–2007

| Year | Exports | Imports | Balance |
|----------------------|------------|------------|-------------|
| 1995 | 3,382,308 | 6,724,175 | -3,341,867 |
| 1996 | 3,553,281 | 7,732,057 | 4,178,776 |
| 1997 | 4,020,333 | 9,900,818 | -5,880,485 |
| 1998 | 3,883,614 | 11,682,680 | -7,799,066 |
| 1999 | 5,323,020 | 12,732,859 | -7,409,839 |
| Change 1995–1999 (%) | 57.4 | 89.4 | 121.7 |
| 2000 | 5,593,367 | 15,032,673 | -9,439,306 |
| 2001 | 5,350,896 | 16,313,866 | -10,962,970 |
| 2002 | 5,528,237 | 16,627,829 | -11,099,592 |
| 2003 | 6,121,058 | 18,005,441 | -11,884,383 |
| 2004 | 6,705,587 | 20,908,124 | -14,202,537 |
| 2005 | 9,008,609 | 25,008,143 | -15,999,534 |
| 2006 | 10,890,288 | 27,847,488 | -16,957,200 |
| 2007 | 14,487,336 | 34,002,359 | -19,515,023 |
| Change 2000–2007 (%) | 159.0 | 126.2 | 106.7 |
| TMCA 2000–2007 | 14.6 | 12.4 | 10.9 |

NOTES Thousands of dollars. Adapted from Arroyo et al. (2008).

support of the Council and Parliament, decided to reduce the number of benefitting countries by GSP from 176 to 89 although, of the 87 excluded, only 20 would lose all advantages for access to the European market because the remaining 67 would be included in other schemes. Therefore, their prerogatives would remain valid.

The argument of the EU for removing tariffs from 20 countries is that over the last three years their per capita incomes reached levels that the World Bank described as economies of high or upper middle income. Mexico was also affected by this restriction, as one of the other 34 countries that already had trade agreements with the EU, which is why, according to the Commission, Mexico practically would not lose benefits. Table 3.3 shows the balance of import and exports between Mexico and the EU. If this restriction were to continue, it would be interesting to see the numbers in few years, although it might be possible to see that there would be more import into Mexico than export to the EU.

3.4 Convenience Food

What is convenience food? It is possible that each country (not only Europe but also on other continents) has its own definition. The site Prax-

air (2001) tells us that according to the Spanish legislation convenience foods are:

Those kinds of food that, subjected to a full preparation, contained in suitable containers and submitted to conservation procedures to prolong their commercial life can be eaten at anytime, with or without preheating.

There is a general belief that industrialised food nourishes less than so-called fresh food. While it could be difficult to define the idea of fresh food, the reality is that the food industry has brought tremendous benefits to improving the nutrition of the population (Resa 2007). The industrialisation of prepared dishes is a phenomenon that evolves daily depending on the economic, social, and industrial developments of the countries. Arguably one of the indexes (perhaps atypical for the majority) that can be used to measure a country's economic growth would be its evolution in the consumption of these products by virtue of the changes experienced by lifestyles, because in the developed countries time is a scarce resource and the schedules of people living under one roof are different. Therefore, lack of time as well as the convenience and speed that helps to give the final preparation of these products are some of the reasons for the growth in the consumption of convenience kinds of food (Ministerio de Medio Ambiente, Medio Rural y Marino de España 2009).

Ministerio de Medio Ambiente, Medio Rural y Marino de España (2009, 9) states that according to the norm 3484/2000 established by Spanish legislation, CF is:

Convenience food is the culinary elaboration resulting from the raw, cooked or precooked preparations of one or more kinds of food of animal or vegetable origins, with or without the addition of other authorised substances and seasoned when appropriate. It may be submitted as not packaged and ready for consumption, either directly or following additional heating or cooking methods.

From this definition of convenience food, there are plenty of subdivisions according to the treatment they receive (Sánchez 2005):

- Convenience food and precooked refrigerated, for example, tortillas, various stews, pizzas, pastas, prepared salads, and packaged ready-to-eat fresh and prepared food (fourth range).
- Convenience food and precooked frozen, for example, frozen pizzas; frozen convenience food from meat, fish or vegetables; frozen

Table 3.4 Subdivision of the Concept of Convenience Food

| |
|------------------------------------|
| Convenience food |
| Canned convenience food |
| Corned beef convenience food |
| Canned fish convenience food |
| Canned vegetables convenience food |
| Canned legumes convenience food |
| Canned pasta convenience food |
| Frozen convenience food |
| Frozen beef convenience food |
| Frozen fish convenience food |
| Frozen vegetables convenience food |
| Frozen pasta convenience food |
| Other frozen convenience food |
| Soups and creams |
| Pizza |
| Pasta (others) |
| Refrigerated tortillas |
| Convenience food (others) |

NOTES Adapted from Ministerio de Medio Ambiente, Medio Rural y Marino de España (2009).

stir fry; frozen snacks such as croquettes; chicken nuggets, onion rings.

- Sterile convenience food, vacuum-packed products, in cans, glass or other containers, for example, vegetable dishes and specialties prepared from poultry, meat, or fish.
- Dehydrated convenience food, for example soups, creams and pastas prepared and dehydrated.

Arguably, every institution, agency, consultancy, that develops market research work, creates its own classifications and subdivisions; therefore it is not possible to readily obtain comparable data when sources are different. It could happen that even some products that were included in the study in the context of convenience food remain engulfed in another context seemingly distanced from it, as could be canned fish. Therefore, the results of any study focusing on this group must be analysed with extreme caution. The subdivision performed in this sector can be seen in table 3.4.

The Microbiology of a Product. The type and amount of microorganisms present in a produced product are as functions of:

- The environment in which the raw material was obtained.
- The type of processing that has been submitted, including hygienic conditions in which the food has been handled, processed, and stored.
- The conditions of product transportation from the production site to the consumer.

The industrial production of convenience food requires not only quality of raw materials and specific processes. In this case, it is very important that those microorganisms that persist in the food run at low levels and are kept under control for reasons of the public's safety, and the aesthetic and commercial lives of the products. Temperature, humidity and oxygen are three fundamental factors, which modulate the development of microorganisms (Praxair 2001).

As previously mentioned, CF can be defined as any dish totally or partially prepared, in which a significant part of the preparation time, culinary skills, and applied energy were transferred from the cook to a food processor or distributor. The fever consumption for CF was not only in Germany, and France, which have population consumptions twice as big as Spain, or Britain, where more than 50% of the population consume these products assiduously, they are some of the best markets in the world. The turnovers from these countries range from 5 to 6 billion Euros (Murcia 2010). Over recent decades, prepared dishes, a type of CF, have been registered as high-growth consumption. To a greater or lesser extent, CF is present in many homes of the more developed countries. They are especially useful in households where all of the adults work outside of their homes and arrive at the end of the day with no will to cook but, at the same time, they want the comfort and peace of eating at home. Many consumers, besides lacking the necessary time to prepare a traditional meal, lack culinary knowledge. They need, therefore, a prepared meal or, at best, a set of semi-prepared foods whereupon they can easily make a meal without special cooking ingredients. According to several authors, the most decisive factor for the growth of this market is the incorporation of women who work outside the home. We have to indicate that it is not so much the work itself, but rather the stress resulting from the perception of time scarcity, which influences food-consumption patterns. The incorporation of women into the work force

Table 3.5 Employment Rate of People between 15 and 64 Years of Age

| Category | France | Germany | Slovenia | Spain | UK |
|------------------|--------|---------|----------|-------|----|
| Women | 60 | 66 | 61.8 | 53 | 65 |
| Total population | 64 | 71 | 66 | 59 | 70 |

NOTES In percent. Based on data from OECD, see www.oecdbetterlifeindex.org/countries/slovenia/.

Table 3.6 Percentage of People a High-School Degree between People 25–64, 2012

| Category | France | Germany | Slovenia | Spain | UK |
|------------------|--------|---------|----------|-------|----|
| Women | 69 | 83 | 82 | 53 | 70 |
| Men | 71 | 88 | 85 | 51 | 77 |
| Total population | 70 | 85 | 83 | 52 | 74 |

NOTES In percent. Based on data from OECD, see www.oecdbetterlifeindex.org/countries/slovenia/.

outside the home leads to an increase in household income, allowing them to have easier access to products with a higher value. Many consumers are aware that convenient food is more expensive and they are willing to pay more for the added value of convenience (Feliciano and Albisu 2005).

Table 3.5 presents the role that women develop at home and at work and, specifically, takes into account the influence that can exist from convenience food. The absence of the option to purchase convenience food, theoretically would influence the consumption. Table 3.5 shows that slightly more than 61% of Slovenian women between the ages of 15 and 64 years work. If we make a comparison with the numbers of the Organization for Economic Cooperation and Development (OECD), we can see that Slovenia is slightly above the average which is 60% (see www.oecdbetterlifeindex.org/countries/slovenia/).

The level of education is a factor that is directly related to the level of income (see www.bls.gov/emp/ep_chart_001.htm) and, therefore, it is referred to as a factor positively affecting the consumption of convenience food. Table 3.6 shows the level of education of people in several countries aged 25 to 64, respectively. In Slovenia, 83% of adults aged 25 to 64 have earned the equivalent of a high-school degree, higher than the OECD average of 74%. It appears the same between men and women, as 85% of men have successfully completed high school compared to 82% of women (see www.oecdbetterlifeindex.org/countries/slovenia/).

Table 3.7 Average Number of Persons per Household-by-Household Composition, Number of Children

| Country | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|----------|------|------|------|------|------|------|------|
| France | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 |
| Germany | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Slovenia | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.5 | 2.5 |
| Spain | 2.9 | 2.8 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 |
| UK | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 |

NOTES Based on data from Eurostat (ec.europa.eu/eurostat).

Another important factor for the increased consumption of prepared meals is the growing number of single-family homes and the decrease of the average number of people per household. The numbers in Slovenia went down from 2.7 people per household to 2.5 from the years 2005 to 2011, as visible in Table 3.7. The importance of the increase of leisure time over recent years is proof that consumers relate their quality of life to leisure time. This has contributed significantly to the increases in the consumption of convenience foods (Feliciano and Albisu 2005).

Benefits of CF

According to a report by the consulting firm Global Industry Analysts and despite the economic crisis, the global market for CF will continue to grow strongly resulting in, amongst other things, the increase in women's employment and disposable income in such emerging economies as important and decisive as China and India and, finally, the gradual shift to Westernized eating habits. The advantage of prepared dishes is their easy handling. This saves a lot of time for consumers. CFs, regardless of their scope, are driven primarily by the way they have to adapt to the habits and fashions that they drive. Therefore, fast foods and microwavable foods have yielded to other factors such as organic or health-conscious foods. According to the consultant, these trends are quickly adapted within a time perspective and assimilated by the sector with increases in popular demands. Along these same lines are other niche markets such as frozen foods, which tend to engage in new forms and deals with the need to attract customers. These foods, marketed to children, is currently a small segment with a current, major growth potential. The purchasing of prepared meals remains a trend that dominates Europe. The greatest potential for future growth in this market is in the Asia-Pacific region because of increasing living stan-

dards. The purchasing of refrigerators, freezers and microwave ovens allows for the popularity of convenience food, despite having such inconveniences as: the preference of local diets; the abusive presence of pork consumption that has important religious restrictions in these regions; and the lack of adequate cold storage infrastructures for frozen and refrigerated, prepared dishes. All of these are common denominators in household infrastructures in both Europe and the USA (Murcia 2010).

Disadvantages of CF

Certainly, the possibility of making a soup in three minutes, or paella in ten minutes without a stain nor a casserole, nor a cabinet throughout the kitchen, is more than a tempting idea, but rush is not always a good motive for balanced and healthy nutrition. The truth is that these products are inappropriate for every day consumption.

We must recognize that prepared food is not as nutritious as homemade food, especially when comparing those meals that take a whole morning to prepare. The reason for the reduced quality is based on the fact that food loses its nutritional value when it is cooked and then re-cooked. In addition, every time food is heated, it loses a significant amount of vitamins. Another drawback is that usually the dishes are spicy and sometimes too strong, therefore they can cause digestion problems. The CF dishes contain more sugar and salt than the dishes people prepare at home. Other reasons in addition to increased sodium, which has been used for centuries as a preservative. Currently, people still use sodium (Cuevas 2006, 22).

Generally, the consumer does not know the exact compositions of these products, unlike compositions known in foods prepared at home. In addition, there are noticeable differences between similar pre-cooked foods according to their trademarks; the type of oil or fat for seasoning or cooking (olive, sunflower, soybean, coconut, or palm) and the proportions of other ingredients contained therein. Alterations derive from nutritional value variations based on loss of nutrients in the reheating processes.

Although there is an increase in the development of techniques of pre-cooked food to minimise, to the greatest extent, nutrient losses, CF is not as nutritious as homemade food. Taking time and with a lot of effort, food is healthier. People prefer just to eat without noticing what they are cooking, although sometimes the packaging indicates the in-

redients. The steak we chop ourselves is not the same as beef in CF. Which part of the animal and how much fat is not known in CF. When people express vegetable, it is not the same if we use palm oil or sunflower oil from the point of view of their differing healthiness (Martín 2003).

The energy value of the food is often highest when fresh. Therefore, it is necessary to be conscientious of potential weight gain. In fact, many people become fatter when they reach independent living. The reason is the increased consumption of, not other than these types of prepared dishes. Therefore, it is important not to abuse the consumption of these products and to include fresh food in a greater proportion to one's diet (Martín 2003). Saturated fats are those which tend to increase the excess of cholesterol levels in the blood. These are too abundant in CF, due mainly to sauces, fats, and other ingredients used during manufacturing processes (Martín 2003).

CF is usually compounded by, amongst other things, preservatives, colorants, and anti-caking agents. Although certain fresh food also carries these additives, it contains them in a much smaller quantity. In any case, food additives have certain benefits, such as longer shelf-lives. This is certainly one of their major advantages; immaculately maintained for several months beyond the manufacturer's expiration instructions contained on the labelling. The truth is that they are less natural and can cause digestive problems in susceptible stomachs. Furthermore, it is difficult for people to know the amounts of salt they eat. A limitation of the amount of CF eaten is recommended because they include numerous additives (Martín 2003).

If we are concerned about obesity, we must know that many of the convenience foods are high in calories. This tends to lead consumers of these products to become quite fat. Moreover, they are often saturated in fat, which may increase our cholesterol (Martín 2003).

Ultimately, pre-cooked food is not the most nutritious and healthy on the market, but we must not consider it as something negative. If it is eaten occasionally and not on the basis of a diet, there are less adverse affects. It is practical, varied, and tempting but we should not abuse it, especially if we are concerned about our health (Martín 2003).

3.5 Organic Food

According to the European Parliament and the Council (1991), organic production is defined as:

A system for the management of agricultural cultivation that uses environmentally-friendly practices to harvest its products and which applies tighter restrictions on the usages of fertilizers and pesticides.

The organic product's market is one of the more dynamic and diverse with a high growth over recent years, according to the International Federation of Organic Agriculture Movements (IFOAM) and the Research Institute for Organic Agriculture (FiBL), the organic market doubled its size between 2003 and 2008 from US \$ 25 billion to \$ 50 billion 900 million. This entity has revealed that, despite the effects of the economic crisis that took place between 2008 and 2009, the organic market showed a growth rate of 5% for the year 2009 reaching US \$55 billion (Research Institute of Organic Agriculture and International Federation of Organic Agriculture Movements 2012).

In terms of growing organic products, by 2009 there were 37.2 million hectares (mha) operating under organic standards, which corresponds to an increase of 6.2% in relation to the number of hectares in 2008. In addition, there are an increasing number of countries incorporating organic production techniques, and not just for food and beverages, but also in the production of textiles and the development of hygiene products and cosmetics. Similarly, there are a growing number of consumers who show a stronger preference for organic products and an expansion into the Asian market, from such traditional markets as the European market, is observed. According to the latest data compiled by IFOAM for the year 2009, the cultivation of organic products covered a total of 37.2 mha, equivalent to 0.9% of the total agricultural land worldwide.

As can be seen from figure 3.4, Oceania (12.2 mha), Europe (9.3 mha) and Latin America (8.6 mha) are the major contributors to organic production, representing 81% of total organic areas of the world, whilst Australia (12 mha), Argentina (4.18 mha) and the US (1.95 mha) are the countries with the largest numbers of hectares under organic cultivation. Compared to 2008, the global organic area increased by 6.2%. This growth was driven by a higher crop certification in Europe, where almost one million hectares were incorporated. At the country level, the highest increases were registered in Argentina, Turkey and Spain (Willer and Kilcher 2011).

It is important to mention that besides the increase in the amount

3 | Types of Novel Food

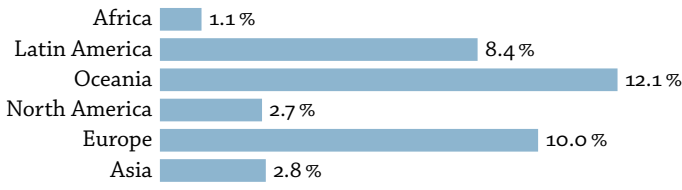


Figure 3.4 Organic Hectares by Region, 2010 (adapted from Research Institute of Organic Agriculture and International Federation of Organic Agriculture Movements 2012)

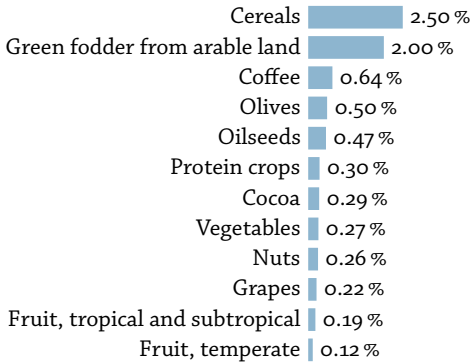


Figure 3.5 Main Organic Products Cultivated in 2010 (adapted from Research Institute of Organic Agriculture and International Federation of Organic Agriculture Movements 2012)

of organic hectares, there was an increase of 31% in the number of organic producers worldwide, so that by 2010 there were 1.6 million organic producers, of which 29% are in Asia, 34% in Africa, and 18% in Europe. At the country level, most organic producers are in India, where there are 400,551 producers, in Uganda with 188,625 producers, and in Mexico with 128,862. Figure 3.5 shows the products under the system of organic production, the most representative are cereals (2.51 mha), followed by the green fodder from arable land (2.0 mha), coffee (0.64 mha) and olives (0.5 mha). Other products have less representation all of which are under the half-million hectare mark (Willer and Kilcher 2011).

Developments at a Country Level. As in previous years, Australia is the country with the most organic land. Number two is currently Argentina, which had an increase of over 4 mha, followed, in third, by the USA. Major increases of organic land in Brazil have made this country the new number four, followed by Spain. The top ten countries com-

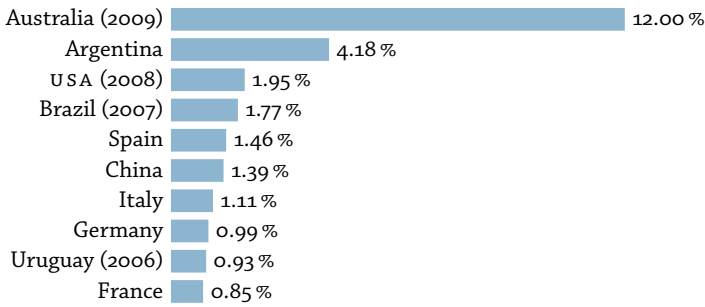


Figure 3.6 Ten Countries with the Most Organic Agricultural Land, 2010 (adapted from Research Institute of Organic Agriculture and International Federation of Organic Agriculture Movements 2012)

bined have a total of 26.7 mha (see figure 3.6), thus constituting more than three-quarters of the world's organic land.

What is Organic?

While the term organic is more familiar now than previously, we must recognize that, generally, there is no clear idea of what the term actually means. To avoid confusion, it is evident that everything related to organic production is identified, both nationally and internationally, with three words that can be used interchangeably: organic, ecological and biological (Comerón and Salto 2001).

The term organic leads one to conceptualize an agricultural establishment as an organism in which all its components, including minerals, organic soil matter, micro-organisms, insects, plants, animals, and humans interact to create a stable and coherent environment. The term ecological refers to the production of these approaches, its benefit to the ecosystem's production, to promoting self-sufficiency and the use of processes and technologies that minimize external inputs. The word biological means that these systems are mainly based on the exaltation of their biological processes (Comerón and Salto 2001).

In order to provide acceptable levels of food production and profitability, the greatest emphasis of organic agriculture and organic production focuses on the use of renewable resources generated within the same establishments or within the region. The management of biological processes and their interactions is also of great importance. Furthermore, the objective is that the dependence on external inputs, whether chemical or organic, is minimal. Considering the above, it is stated that

organic farming is the implementation of sustainability (Comerón and Salto 2001).

Another definition, according to the Argentinian Secretary of Agriculture, Livestock and Fisheries' Resolution No. 423/92 organic is defined as (Secretaría de agricultura ganadería y pesca 1992, 2):

Any sustainable production system that, through the rational management of natural resources and without the use of synthetic chemical products, provides safe and abundant food, maintains or increases soil fertility and biodiversity, and, likewise, allows clear identification by consumers of the mentioned characteristics through certifications that guarantee them the products are organic.

International Federation of Organic Agriculture Movements (1996, 46) expands the definition above in terms of the essential goals of agriculture and ecological processing:

- Produce high-quality food in sufficient quantity.
- Engage constructively and enhance life with natural systems and cycles.
- Promote and enhance biological cycles within the farming ecosystem which is comprised of micro-organisms, soil's flora and fauna, and plants and animals.
- Maintain and increase soil's long term fertility.
- Promote the judicious use and proper care of water, aquatic resources and the life that it sustains.
- To assist in the conservation of soil and water.
- Extend and maximize renewable resources in locally organized agrarian systems.
- Extend organic matter and mineral nutrients as far as possible within a closed system.
- Work as much as possible with materials and substances that can be reused or recycled, either on the farm or elsewhere.
- Provide livestock living conditions that allow them to develop their basic functions of their innate behaviours.
- Minimize all forms of pollution that may be caused by agricultural practices.

- Maintain genetic diversity within the agricultural system and its environment; this includes protecting the habitats of plants and wildlife.
- Allow all those involved in agricultural production and ecological processing to have a life according to the Declaration of Human Rights of the UN, to cover their basic needs, adequate income and to obtain satisfaction from their work, which is to take place in a safe working environment.
- Get non-food products that are completely biodegradable from renewable resources.
- Promote organic farming organizations that operate according to democratic lines and the principle of the fair and equal division of power.
- Progress towards production practices that are entirely ecological, socially fair, and ecologically responsible.

Health versus OF

A comparative study by Kafka and Von Alvensleben (1998) concluded that German consumers, as well as Austrians, Greeks and Danes, consume organic foods mainly because they are concerned about their health and they are willing to pay a higher price for a product free of pesticides.

Other studies found differences in the income variables in both Europe and the US: The study of Haest (1990), Buzby and Skees (1994) did not find it as significant as a determinant of demand as other authors such as Menghi (1997) and Meier-Ploeger and Vogtman (1996, 176–89). They concluded that households with middle and high incomes were more likely to buy organic food. A higher level of education, on the other hand, was seen to be positively correlated with the tendency to purchase these products. This research aimed at evaluating the provision for consumers to pay a premium price to show that when a smaller gap between an organic and a conventional product exists, the number of potential consumers increases. These differences in prices seem to be associated with the differing structures of marketing channels in different countries. Wier and Calverley (2002) explained that the prices paid by German consumers were higher in a specialized organic store than in a supermarket.

The halo effect is a psychological bias which perceives, for example,

that an attractive person must also be intelligent, which can be either true or false. This mental mechanism also affects, according to new research, organic food and its consumers and may result in a response quite opposite to the intention (Trorndike 1920). As mentioned before, organic products have been produced without the use of pesticides or chemical fertilizers, a trait that many buyers consider positive but does not necessarily mean that the food is healthier from a nutritional point of view. However, consumers, on average, attributed fewer calories to these items, which could, potentially, lead them to being unaware and to actually consuming more calories (Chandon and Wansink 2007).

Jenny Wan-Chen (2011) has presented results that reveal the halo effect of organic food which is considered to be healthier and more nutritious for most consumers. The study involved 144 volunteers with an average age of 35 years. Participants, were asked to compare a number of food items including chocolate chip cookies, yogurt and chips labelled organic as well as unlabelled or conventional. Actually, all of the foods were organic, but participants were uninformed. Most volunteers opted for organically-labelled food as it was predicted by Wan-Chen. As expected, in food labelled organic, the caloric estimations were significantly lower and inspired a greater willingness for consumers to pay more. This result contrasts to the food without the organic label.

Regulations of the OF

Product quality is the result of the processes along the entire production and marketing chain. In the case of a food product, this chain is summarized commonly in the term from farm to fork (Ablan 2000). In order to analyze the qualities of these products, we may distinguish between the following three categories:

1. The quality and safety guards which define that food will not cause harm to the health of people who consume it. This corresponds to the basic level a food product must satisfy, it is usually controlled at the state or country level, to safeguard the public health of citizens.
2. The nutritional quality, which refers to the ability of food to meet the body's needs in terms of energy and nutrients. This factor has acquired great importance for the informed consumer who knows about the preventive potentials of a healthy and balanced diet.
3. The quality defined by the value attributes. These attributes are factors that are above the basic quality and safety of the food. They

divide the products according to their organoleptic and compositional characteristics, and the satisfaction shown in the act of eating linked to socio-cultural traditions, education and convenience. Therefore, over the last decade, factors such as respect for the environment, respect for the laws of social workers in charge of production (e.g. fair trade), and respect for the traditions (e.g. food prepared by traditional methods) amongst others (Niño de Zepeda, Godoy, and Echávarri 1999) have been valued throughout the entire production chain (e.g. organic products).

Fair Trade. Over recent years, initiatives have appeared in the field of economy that are part of the commercial fair trade or just simply fair trade. The fundamental difference from other instruments of development cooperation is that fair trade uses the market to achieve its main objective. Unlike profit companies, fair trade does not pursue financial gain, but a socially beneficial approach to sales as well as solidarity (Socías 2005).

Through the responsible consumption carried out by people with resources in the North (The First World), it is possible to help to develop Southern countries (The Third World) and the North's fellow citizens who are in marginalization and socially excluded (The Fourth World).

We can take as widely accepted definition of fair trade as possible, offered by the International Fair Trade Association (see www.fair-trade-hub.com):

Fair Trade is a trading relationship based on dialogue, transparency and respect that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions and securing the rights of marginalized producers and workers, particularly in the South.

Fair Trade Organizations (backed by consumers) are engaged actively in supporting producers, to sensitize the public and carry out campaigns for changes in the rules and practices of conventional, international trade. Now, in order to develop their activities, Southern producers must ensure the democratic functionings of their organizations and are required to carry out sustainable activities within the economic, environmental, and social sectors. They also undertake the responsibility to respect the fundamental rights of the International Labour Organization. On the other hand, fair trade's Northern organizations are obliged to pay a fair price to producers. This price consists of a minimum

price settled by the market price plus an additional premium according to the products and categories (Socías 2005).

Another obligation assumed by fair trade Northern organisations is to pay the price in advance, between 40% and 50%, so the producers can acquire raw material without going into debt.

- Northern organizations should ensure long-term business relationships with Southern producers.
- Northern import organizations provide advisory services in production and management
- The producers are not obliged to sell all their production to the importing organisation, but only the portion they deem necessary.
- Producers' responsibilities have to strive to enter into the local and international markets, fair trades, or others.
- Provide information to producers about consumer tastes and preferences (see www.fair-trade-hub.com).

We can deduce that the operation of fair trade is complex. The producers are in Southern countries. They manufacture the products that, in part, the importers, acting as wholesalers from the Northern countries, buy and support. These wholesalers sell the products to the fair trade stores (located in the North), products, which, in the end, are purchased by the consumers from the North.

Control Systems and Quality Stamps. In order to effectively guarantee to the consumer that a food product has one or more attributes of differentiating value, volunteer control systems exist. These systems consist of an independent company establishment called the certifying body, which verifies and checks that the product meets the attributed value it holds. The visible form that shows how the product has been verified is defined on the label with a seal, logo or a symbol of quality.

In some developed countries, there is an institutionalized quality policy which is controlled at the state level and the presence of quality seals on packaged food is visible (Blatnik and Bojnec 2015). Although the regulation can be made by private or public entities, they must be accredited or recognized by the competent public authority. Under this system, quality seals usually have a unique shape according to the characteristic they support, although the certification authorities are different. This is the case with organic certification in France, Belgium and Germany, where this system was introduced to reduce consumer con-

fusion caused by the proliferation of different labels to highlight an organic product. Moreover, in many countries there are private certification systems that control the products according to their own standards or a national/international technical standard. They also support verification with a quality seal on the packaging. In many cases, this seal corresponds to the trademark, which is also called the quality brand. In these cases, the certification authority is also independent from the company that makes the product. The value or quality of this trademark is known as is the confidence that consumers have in it. When the brand is positioned on the market, it is instantly recognized. This indicates that the product and the production processes meet the standards and have passed all of the quality controls required to bear that mark (Cantarelli 2000).

Therefore, quality seals are effective when differentiating between the attributes and values of a product. They require the following conditions:

- The seal is recognized by the target market of the product.
- The seal ensures that an independent body controls or verifies the distinguishing feature supported by it.
- The certifying authority is recognized as an authority in the field that it guarantees.
- The consumer is educated in differentiating between attributes that guarantee the seal.
- The market seems interested in differentiating between the attributes provided by the product.
- A market exists, with purchasing power, to pay the value added by the corresponding attributed value differentiator.

The benefits of the presence of a quality seal are to improve the product's differentiation at the sale point, provide confidence to the consumer and to give a guarantee in accordance with local and international standards.

Food Quality Seals in the EU. European consumers are looking for more information about the origins and food production processes. There are also people who prefer authentic products that are more flavourful and are made according to knowledge preserved by tradition. It is no longer about comparing standard products that differ in price, but products whose qualities can be identified, guaranteed, and that respond to the

expectations of the consumer. Both the evolution of the European consumer's behaviour and the saturation of the food product market have contributed greatly to the development of a favourable policy towards a cultural identification of agricultural and food products (Mulder 1998).

The Quality Policy of the EU is currently regulated by three streams of quality seals for food products and their agricultural origins (e.g. Blatnik and Bojnc 2015):

- Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), according to the Regulation (EC) No. 1898/2006 (European Parliament and the Council 2006).
- Cultural specialities' traditions guaranteed (TSG) in accordance to the Regulation (EC) No. 1216/2007 (European Parliament and the Council 2007).
- Organic farming, in accordance to the Regulation (EU) No. 271/2010 (European Parliament and the Council 2010).

The presence of these labels on the packaging of a food product guarantees common and controlled conditions to the products sold under the respective seals. The purpose of these seals, backed by a common law for all member states, is to harmonize when protecting the authenticities of the products at the level of the EU and to provide a uniform approach, given the disparity of national practices that existed in each member state. The regulations governing the uses of these classifications were made in 1992 to support the development and protection of rural agribusiness products, to encourage diverse agricultural production to protect the misuse and imitation of products' names and to help consumers by delivering information related to the specific natures of the products (Oyarzún 2001).

These are the logos implemented for the different denominations according to the Regulations 1898/2006; 1216/2007 and 271/2010 (European Parliament and the Council 2006; 2017; 2010).

Figure 3.7 shows the sign for PDO, this logo assures that the product bearing this stamp has been produced, processed and prepared within a given geographical area and with the specific expertise that have been recognized and proven.

Figure 3.8 presents the mark for PGI. This logo assures that the product bearing this stamp has a link to the geographical environment during at least one of the stages of its development: production, processing or preparation.



Figure 3.7
Protected Designation of Origin



Figure 3.8
Protected Geographical Indication



Figure 3.9
Traditional Speciality Guaranteed



Figure 3.10
Organic Farming Logo

Figure 3.9 shows the mark for TSG, this logo assures that the product bearing this stamp has a traditional composition or is prepared according to traditional production methods.

Some changes in the logos were introduced due to their similarities. The label, as it was presented in the Regulation (EC) No. 2092/1991 (European Parliament and the Council 1991), was too similar to the one that protects the geographical indication. In September 2008, the Regulation (EC) No. 967/2008 (European Parliament and the Council 2008) demanded a new logo. After a year and a half a new logo was designed as seen in figure 3.10. Following the withdrawal of the logo presented in Regulation (EC) No. 2092/1991, a revised logo was then prepared. A public competition was held and three designs were chosen. The winner was the now familiar, mandatory logo, the leaf of stars, published in Regulation (EU) No. 271/2010 (European Parliament and the Council 2010).

4 Hypotheses Test and the Results of the Analyses

There are three hypotheses described from the literature review:

- H1 *The perceptions towards novel food products' consumption depend on consumers' habitual food consumption preferences.*
- H2 *The perceptions towards novel food products' consumption are influenced by food consumption experiences and economic factors.*
- H3 *The perceptions towards novel food products' consumption are influenced by information on novel food and marketing-promotional activities.*

4.1 The Methodology Used

The literature used during the compiling of this thesis included different sources: web pages, articles in magazines, specialized books, annual reports of the statistics of the Republic of Slovenia, technical and scientific papers and one statistical program.

In order to analyze the data, we used different methods for rejecting or not rejecting our hypothesis, and came up with conclusions (Martínez Lagunes and Bojnec 2014).

At the beginning, the questioning about whether Slovenes were adept at using new products led to three hypotheses that were created to provide possible reasons why people from Maribor, Slovenia do not consume new products. A questionnaire was designed and launched to conduct an investigation that would lead us to reliable answers. Different variables such as: gender, age, education of respondents and new products served as the basis for determining the preferences of consumers. Numerical data related to the acquisition of goods was examined using the statistical SPSS program version 20.0. Quantitative and qualitative data was analyzed using various statistical techniques, which help to clarify the preferences of consumers. The results were presented in descriptive and graphical forms.

The following statistical methods were used:

Correlation Analysis is a statistical method that finds connections between numerical variables. The correlation between the two variables is indicated by the Pearson correlation coefficient (r_{xy}), which is a measure of linear association between two normally distributed interval variables (Rodgers and Nicewander 1988).

Normally, it is necessary to have a hypothesis where one variable is associated with another variable and that could describe a relationship which ranges between:

- -1 where 1 means a perfect relationship,
- 0 indicates no relationship at all,
- $+1$ indicates a perfect, direct relationship.

The significance level (2-tailed) if the value is less or equal to 0.05 [(Sig.) ≤ 0.05], the correlation is significant which means that we will probably see it in the real world.

The Analysis of Variance (ANOVA) is a statistical technique used to determine significant differences between mean values of a dependent variable. The mean values compared are those observed in the groups of individuals or objects that are determined by the treatment levels or in categories of the explanatory variables. This technique allows for the analyzing of differences with more than two means. Typical values for α are 0.05 and 0.01 . These values correspond to the probability of observing such an extreme value by chance. In other words, if the probability is less than or equal to the significance level, then the H_0 is rejected and the outcome is said to be statistically significant (Tangren 2000).

It is necessary to set independent and dependent variables. It is important to test the main effects and the interactions. It is necessary to check the significance level in order to reject Sig. ≤ 0.05 or retain Sig. ≥ 0.05 the null hypothesis. The partial eta squared tells us what percentage of one variable depends on another.

The Chi-Square Test was used to test the hypothesis of interdependence between the variables of a contingency table. This test can determine if there is a significant difference between the predicted and observed values of a data set also known as frequencies.

Applying this chi-square test for a contingency table enables the determination to the degree of relationships or associations between two variables. It does not provide information on direction so this must be inferred from the results contained in the contingency table.

The research examined the cross tabulation to see the researched elements of the table, the actual ones and the expected. Actually, what the contingency table analysis (Pearson chi-square) does is test whether the observed frequencies are statistically significant from the expected frequencies, in order to reject $\text{Sig.} \leq 0.05$, or retain $\text{Sig.} \geq 0.05$ the null hypothesis.

Phi Value or Cramer's V defines the association between variables, in other words, it is simply a Pearson Correlation Analysis which tests essentially the same hypothesis.

Cronbach's Alpha (CA) is a coefficient that measures the reliability of a measurement scale made from one to five. In this scale, one is completely unimportant and five is very important.

From a scale or a composite score, the estimate of internal consistency associated with scores can be divided. Reliability is critical because, in the absence of reliability, it would be impossible to have any validity associated with the scores of the scale.

Quality is not directly observable e.g., when people decide in which store they will buy their products. Variables to questions such as: Is near my home? What are the opening hours? Is it an everything store?

Essentially, some recommendations state that the CA level of 0.70 may be an acceptable minimum for a scale that is recently developed (Nunnaly and Bernstein 1994). There are reasons to believe that there is no real justifiable citation. Lance, Butts, and Michaels (2006) claimed that the 0.70 criterion articulated by Nunnaly and Bernstein (1994) is actually misleading. By contrast, they suggested that basic research should rely upon scales that yield scores with a minimum reliability of 0.80. In cases where important decisions are being made based on scores from a scale, reliability in excess of 0.90 should be expected (Lance, Butts, and Michels 2006). However, this research will use a CA level equal to 0.70.

Another section to pay attention to during analysis would be the corrected item-total correlations, which, for a good scale, should have a range between 0.30 and 0.70 (Ferketich 1991).

Principal Component Analysis (PCA) is a statistical technique for synthesizing information, or for reducing the size, in this case the number of variables. Before a database with many variables, the objective will be to reduce these variables to a smaller number, losing as little information as possible (Terrádez 2000). In other words, there is a data reduction

technique that creates components or factors that allow for interpreting a large series of data within a smaller number of components. This can be meaningfully interpreted.

It is crucial to pay attention to the correlation matrix to see if there is a positive or negative relationship between variables.

The Kaiser-Meyer-Oklin (KMO) is an effective size measurement that determines whether or not we should perform a PCA. By rule of thumb, anything above 0.70 is considered high, anything below 0.40 is considered low.

The communality table is the proportion of variance that has been accounted for by the common factors of one variable. Communalities range from zero to one; zero means that the common factor cannot explain any variance. The closer the value is to one the more the common factor will explain all of the variances.

The data from the total variance explained is very important. It is possible to find the initial eigenvalues, where we can find the cumulative of variance or the percentage of variance. This can explain the number of principal components we should use for the analysis. It is critical to understand that we want to reduce the amount of information without losing important data.

In order to help us identify the nature of the components, we will use an oblique rotated factor solution. This allows our factors to correlate, We are then going to interpret the pattern matrix.

4.2 Results of the H1

H1 *The perceptions towards novel food products' consumption depend on consumers' habitual food consumption preferences.*

When asking people on the streets of Maribor which brand of coffee they drink, they provided a uniform response. People of Maribor were asked the question, Are you willing to consume novel products, such as: functional, genetically-modified, ethnic, organic and/or convenience products? Different opinions arose. There is a possible trend in the consumer preferences. Whereas for some people the products' origins is important, for another population, the nutritional facts are fundamentally important. The habit of eating at home is ingrained within the Slovenian society. The fact is that it is rare for people to eat in restaurants during weekends. Also certain misconceptions that certain products, such as genetically-modified or functional food can harm your

Table 4.1 ANOVA Results between Variables: Society, Products, and the Interactions between Them

| Source | Sum of Squares | df | Mean Square | F | Sig. |
|------------------|----------------|----|-------------|-------|-------|
| Society | 15.90 | 3 | 5.30 | 5.52 | 0.001 |
| Products | 369.94 | 4 | 92.48 | 96.38 | 0.000 |
| Products-Society | 10.94 | 12 | 0.91 | 0.95 | 0.495 |

health or change the routine of life, directly influence habitual food consumption preferences.

Firstly, we tested H1: The perceptions towards novel food product's consumption depend on consumers' habitual food consumption preferences. We used the following techniques: ANOVA, Pearson Correlation, Chi-Square, CA and PCA.

Please, Indicate How Often You Buy Novel Products

We sought to analyze the presence of novel food within the diets of a group of people from the city of Maribor. The study's variables were the society ($N = 200$, women and men aged 18–55), the new products ($N = 5$, organic products, convenience food, probiotics, products for cooking ethnic food, and genetically-modified food), and how often the products are consumed.

Table 4.1 shows the results of the technique. A two-way ANOVA found that within the population of women and men between ages 18 and 55 a significant effect in the consumption of new products is evident, since the p -value is $0.001 \leq 0.05$. The study also reported that new products also had a significant effect $p = 0.000 \leq 0.05$. This can be appreciated in the differences that appear between products in table 4.2. Finally, the interaction between the two variables shows no statistically significant differences $\text{Sig.} \geq 0.05$ as it has a value of 0.495. In other words, we can say that there is a difference in the mean consumption between society, there is a difference in the mean consumption between new products, and there is no interaction on consumption between society and new products.

Nevertheless, this research focused on analyzing the society from the city of Maribor aged 18 to 55. We have included two more independent studies, based on two groups. Each has a particular result, the genders, male and female, and the ages, between 18 and 35 and between 36 and 55. We thought it might be interesting to analyze the results between

Table 4.2 Estimated Marginal Means of Product Consumption between Variables Society (Women and Men 18–55) and Products

| Category | Organic | CF | Probiotics | Ethnic | GMF |
|-------------|---------|------|------------|--------|------|
| Women 18–35 | 3.26 | 1.70 | 2.40 | 2.06 | 1.66 |
| Men 18–35 | 3.48 | 2.02 | 2.26 | 2.24 | 1.86 |
| Women 36–55 | 3.08 | 1.48 | 2.32 | 1.72 | 1.50 |
| Men 36–55 | 3.50 | 1.70 | 2.08 | 1.92 | 1.60 |

what women and men think and what the younger people think in comparison with older people. Throughout this study, we will perform the analyses of the two previously mentioned groups: gender and age.

A two-way ANOVA found that the gender ($N = 200$, women and men) had a significant effect in the consumption of new products the p -value showing a result of $0.017 \leq 0.05$, the study also reported that the new products also had a significant effect showing a p -value $0.000 \leq 0.05$, paying attention to the post hoc analysis. We can see that 16 of 20 categories between products were marked as significant. Finally, the interaction between gender and new products showed no statistically significant differences $\text{Sig.} \geq 0.05$ as it has a value of 0.081 . In other words, we can say that there is a difference in the mean consumption between genders, there is a difference in the mean consumption between new products, and there is no interaction on consumption between gender and new products.

A two-way ANOVA for the variable age found that the age ($N = 200$, 18–35 and 36–55) had a significant effect on the consumption of new products $p = 0.001 \leq 0.05$ while the new products showed a value of $p = 0.000$ just the same as the variable gender. Finally, the interaction between age and new products threw a p -value of $0.712 \geq 0.05$, which tells us that it is not statistically significant.

From Which Commercial Establishments Do You Acquire Food?

The chi-square tests the assumption that there is an association between whether or not a majority of the population, and thus the society, go to a specific store to buy their goods. In the study the variables were society ($N = 200$, women and men 18–55), and where the people, or society buy their food; Market Shops, Hypermarket, Supermarket, Mini-Market, Specialized Stores, or the Outdoor Market).

Table 4.3 tells us that based on the Pearson Chi-Square analysis the p -value, which is 0.085 , tests whether the cross table is statistically sig-

Table 4.3 Chi-Square Analysis for the Variables Society (Women and Men 18–55) and Market Shops (Hypermarket, Supermarket, Mini Market, Specialized Stores or Outdoor Market)

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 19.168 | 12 | 0.085 |

NOTES * 2-sided. 0 cells (0.0%) have expected counts of less than 5. The minimum expected count is 6.77.

Table 4.4 Attendances of People at Market Shops, between Variables: Society (Women and Men 18–55) and Market Shops (Hypermarket, Supermarket, Minimarket, Specialized Stores or Outdoor Market)

| Category | Hypermarket | Supermarket | Minimarket | Specialized stores | Market |
|-------------|-------------|-------------|------------|--------------------|--------|
| Women 18–35 | 36 | 37 | 13 | 10 | 6 |
| Men 18–35 | 41 | 33 | 25 | 10 | 6 |
| Women 36–55 | 31 | 32 | 20 | 13 | 15 |
| Men 36–55 | 35 | 34 | 7 | 7 | 5 |

nificant from what we expect the frequencies to be. We, in fact, cannot reject the H_0 and conclude that there are no statistically significant differences ($p \geq 0.05$) between the frequencies. Although in table 4.4, it seems to be significant. In other words, there is no statistically-significant association between society and market shops (where the people buy their supplies). The symmetrical measure's data tells us that the Phi value has a weak positive association equivalent to 0.215 between the people (females and males aged 18 to 55) and the places they choose to buy their goods.

The chi-square tests the assumption that there is an association between whether people go to a specific store to buy their goods and whether they are women or men (gender). Talking about the gender, we are interested in the results for the continuity correction. The significance value $p = 0.355$ is above the alpha level 0.05. This tells us that there is no statistically significant association between gender and market shops. The same, that there is no statistically significant differences between age (in this case 18–35 and 36–55) and places where people buy their supplies at market shops. As it has a p -value equal to 0.399 above the alpha level 0.05. The association according to the Phi value is telling us that there is a positive weak correlations of 0.103 and 0.099 between gender, age and the places where people choose to buy their supplies, respectively.

Table 4.5 Chi-Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variables Within Society (Women and Men) and Places Where People Eat During the Week

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 20.857 | 9 | 0.013 |
| Phi | 0.259 | | 0.013 |

NOTES * 2-sided. 0 cells (0.0%) have expected counts of less than 5. The minimum expected count is 13.32.

Where do People Eat During the Week?

The chi-square tests the assumption that there is an association between whether people and society eat in a specific place or not. The research tried to use 6 categories although, because two of them presented low results (less than 5), we had to eliminate them to avoid violation of one of the more important principles of the chi square analysis.

The study variables were society ($N = 200$ women and men 18–55) and where they ate with the options being; at home with my family, at home alone, at work, in a restaurant. Table 4.5 is based on the Pearson Chi-Square analysis. The p -value is 0.013 and tests whether or not the cross table is statistically significant from what we expect the frequencies to be. We can reject the H_0 and conclude that there are statistically significant differences ($p \leq 0.05$) between the frequencies. Thus, society has different preferences for the places they choose when eating.

Symmetrical measurement data shows the Phi value, which explains that there is a positive, low association equivalent of 0.259 between the people (females and males with ages between 18–55) and the places where they normally eat during the week.

For gender the p -value is 0.161. This tells us that there is no statistically significant association between gender and preferred place to eat. This means that both females and males equally prefer the places when having lunch. In the age group, the Pearson Chi-Square Analysis gives us a p -value of 0.003. This means that there are statistically significant differences as the p -value is lower than alpha. In other words, people within the age groups between 18–35 and 36–55 have different preferences when choosing where they are going to eat during the week.

PCA Regarding Attitudes towards Food, New Products and Techno Innovations

The polled population was asked if they could show their levels of agreement with certain statements. Twenty-three assumptions were submit-

Table 4.6 Communalities, Variables Submitted to Principal Component Analysis

| Statement | Extraction |
|--|------------|
| 1 Food can always be a source of pleasure | 0.623 |
| 2 The appearance of food influences me | 0.440 |
| 3 I like to eat delicious things during the week | 0.519 |
| 4 I finish my meals even when I do not like the taste | 0.151 |
| 5 I enjoy cooking | 0.663 |
| 6 I like to try new recipes | 0.748 |
| 7 Money spent on food is money considered well spent | 0.471 |
| 8 When I travel, I like to try the local food | 0.514 |
| 9 I always try new and different kinds of food | 0.670 |
| 10 If I do not know the food, I do not try it | 0.441 |
| 11 I like food from different cultures | 0.521 |
| 12 When I am not at home, I try new food | 0.419 |
| 13 I eat almost everything | 0.301 |
| 14 I would like to try new, ethnic restaurants | 0.562 |
| 15 Homemade food is the best | 0.218 |
| 16 Functional food can provide health benefits | 0.363 |
| 17 I'd be willing to buy new food even if I no little about it | 0.668 |
| 18 Compared to my friends, I am the one who consumes more new products | 0.507 |
| 19 I trust genetically-modified food | 0.653 |
| 20 I prefer a routine life to an unpredictable life | 0.363 |
| 21 Genetic technology can provide solutions to global food problems | 0.648 |
| 22 I like novelties which bring changes to my daily life | 0.549 |
| 23 When I am bored, I always try new challenges | 0.477 |

NOTES Extraction method: principal component analysis.

ted to PCA, the KMO effect size measurement was given a value equal to 0.821, which was considered a trustworthy value to conduct the principal component analysis. Table 4.6 shows the communalities that have a total influence on a single, observed variable from all the factors associated with it. Basically, the table looks for the extraction. Based on 4 components that have been extracted the communalities represent the percentage of variance that has been accounted for by the component's analysis. It is equal to the sum of all the squared factor loadings for all the factors related to the observed variable. The communality can be derived at for each variable by taking the sum of the squared factor loadings for each of the factors associated with the variable. Therefore, for variable number one the formula would be $0.093^2 + 0.702^2 + 0.172^2 + 0.177^2 = 0.623$ and for variable number twenty-one, it would be $0.017^2 +$

$0.035^2 + 0.805^2 + 0.029^2 = 0.648$. The value ranges from zero to one where one indicates that the variable can be fully defined by the factors and has no uniqueness. In contrast, a value of zero indicates that the variable cannot be predicted at all from any of the factors. We can see then that variable number six has the largest amount of variance. This has been explained by the component analysis solution, 0.748 equals the rounded 75% of the variance in this sixth variable, which tells us that its variability has been accounted for by this four-component model while variable number four is very weak as it has 15% of its total variability which has been accounted for by this four-component-factor solution.

Norman and Streiner (2008) provided justifications for PCA:

1. *Eigenvalues*. The sum of the eigenvalues should account for at least 50% of the variance.
2. *Retention of factors*. If the eigenvalue-one test was used, there may be too many factors. The ideal procedure would be to use the scree test, which is often a better criterion than the eigenvalue-one test.
3. *Number of variables per factor*. Each factor should be composed of a minimum of three variables; if there are fewer, the factor should be discarded or ignored.

At the beginning, PCA suggested 7 factors using the eigenvalue-one test, although this decision violated the second statement of Norman and Streiner, as well as the assumption of at least three variables per factor (3rd statement) plus the fact that they were making no contributions to the components in any discernable, meaningful ways.

Table 4.7 suggests using four factors or principal components. As they were extracted according to the rounded 50% total variability explained in the data, it seems reasonable to keep these four. Subtracting one more would take us to 6% of the variability. We would have rounded 44% of variability, but this violates statements one. In the case of adding one more factor, this would increase the variability to 55% but, again, we would violate the third statement. In order to avoid this, we would have to discard one factor which would lead us to embrace four factors.

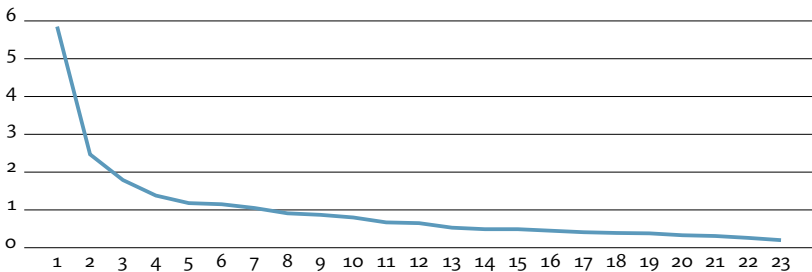
With four factors, it is true, we would be violating the third statement, as we can see that factor number 3 has just 2 variables – 17 and 18 – with representative data, anyway this decision is supported by figure 4.1, which shows that the point of inflection is in the fourth factor.

The data from the pattern matrix, which is presented in table 4.8, seems to be high enough to suggest the population has a strong pat-

Table 4.7 PCA 50% of Total Variance Explained by 4 Components

| (1) | (2) | (3) | (4) | (2) | (3) | (4) | (2) |
|-----|------|-------|--------|-------|--------|--------|-------|
| 1 | 5.85 | 25.42 | 25.42 | 5.846 | 25.415 | 25.415 | 5.249 |
| 2 | 2.47 | 10.74 | 36.16 | 2.471 | 10.743 | 36.159 | 2.284 |
| 3 | 1.79 | 7.80 | 43.96 | 1.795 | 7.804 | 43.962 | 1.949 |
| 4 | 1.38 | 5.99 | 49.96 | 1.379 | 5.994 | 49.956 | 3.185 |
| 5 | 1.18 | 5.11 | 55.07 | | | | |
| 6 | 1.15 | 4.98 | 60.06 | | | | |
| 7 | 1.05 | 4.56 | 64.61 | | | | |
| 8 | 0.91 | 3.96 | 68.57 | | | | |
| 9 | 0.87 | 3.77 | 72.34 | | | | |
| 10 | 0.80 | 3.50 | 75.84 | | | | |
| 11 | 0.67 | 2.93 | 78.77 | | | | |
| 12 | 0.65 | 2.80 | 81.57 | | | | |
| 13 | 0.53 | 2.30 | 83.87 | | | | |
| 14 | 0.49 | 2.13 | 85.99 | | | | |
| 15 | 0.49 | 2.11 | 88.10 | | | | |
| 16 | 0.45 | 1.94 | 90.04 | | | | |
| 17 | 0.41 | 1.79 | 91.83 | | | | |
| 18 | 0.39 | 1.71 | 93.54 | | | | |
| 19 | 0.38 | 1.65 | 95.20 | | | | |
| 20 | 0.33 | 1.44 | 96.64 | | | | |
| 21 | 0.31 | 1.34 | 97.97 | | | | |
| 22 | 0.26 | 1.14 | 99.12 | | | | |
| 23 | 0.20 | 0.88 | 100.00 | | | | |

NOTES Column headings are as follows: (1) component, (2) total, (3) percentage of variance, (4) cumulative percentage.

**Figure 4.1** PCA Four Components Suggested According to the Point of Inflection

tern. We have data from 0.423 to 0.789. We can use an effective size for approaching, rule of thumb is to use levels between 0.3 and 0.4 as



Figure 4.2 Percentage of 200 People (Society) with Positive and Negative Willingness to Consume GMO

a common rule to determine whether a variable is contributing to the component in a meaningful way. The first factor in the pattern matrix seems to show a positive predisposition to new tendencies; it is easy to observe that respondents are willing to try new habits regarding consumption; if we pay attention to the first four variables, we can see high-component-loading levels. This affection to try new products or new habits seems to trade with not only for the first four, but with the rest of the variables together with the lowest loading components.

The second factor proves that people desire to have habits or products of a high standard that would satisfy them in their apparent, exigent needs. This can be seen in variables number twelve with a loading equal to 0.702. Interestingly, for variable number thirteen there is a fairly high ratio equal to 0.688. It is not surprising to see that the average response was 4.26 in this study. It may be related to another question of this research where it was discovered that the majority of respondents chose at home as their favourite place to eat. Variables from the second component, although they are lower than the first one, seem to load quite nicely.

The third factor presents technological innovations as the principal idea. It looks like it is the factor that makes people uncomfortable. Not surprisingly if we view figure 4.2, which is telling us that GMF is the less popular food between the polled populations by asking the people directly if they were willing to consume them. The answer was clear, 82% of votes were against their consumption.

The fourth factor involve variables 20, 21 and 22. These variables refer to a willingness to cook for pleasure, number twenty and twenty one reflect a high loading both above 0.80. This is why people probably prefer to eat at home rather than go to a restaurant as it is clear that both women and men, as well as young and old, have the same feelings about this factor number four.

Do You Consume Novel Products?

Chi-square analysis purports to be capable of revealing whether a society shows consumers that some products can be divided into five cate-

Table 4.8 PCA Pattern Matrix Explained by 4 Components

| | | | | |
|----|---|-------|-------|-------|
| 1 | I'd be willing to buy new food, even if I haven't heard about it before | 0.789 | | |
| 2 | I would like to try new, ethnic restaurants | 0.760 | | |
| 3 | I always try new and different kinds of food | 0.694 | | |
| 4 | I like novelties which bring changes to my daily life | 0.672 | | |
| 5 | I like food from different cultures | 0.668 | | |
| 6 | If I don't know the food, I don't try it | – | | |
| | | 0.637 | | |
| 7 | When I travel, I like to try the local food | 0.629 | | |
| 8 | Compared to my friends, I am the one who consumes more new products | 0.594 | | |
| 9 | I eat almost everything | 0.504 | | |
| 10 | I prefer a routine life to an unpredictable life | – | 0.340 | |
| | | 0.458 | | |
| 11 | When I am not at home, I try new food | 0.446 | | 0.354 |
| 12 | Food can always be a source of pleasure | | 0.702 | |
| 13 | I like to eat delicious things during the week | | 0.688 | |
| 14 | The appearance of food influences me | | 0.607 | |
| 15 | Functional food can provide health benefits | | 0.538 | |
| 16 | Homemade food is the best | | 0.423 | |
| 17 | Genetic technology can provide solutions to global food problems | | | 0.805 |
| 18 | I trust genetically modified food | | | 0.796 |
| 19 | I finish my meals even when I don't like the taste | | | 0.368 |
| 20 | I like to try new recipes | | | 0.826 |
| 21 | I enjoy cooking | | | 0.816 |
| 22 | Money spent on food is considered money well spent | | 0.343 | 0.507 |
| 23 | When I am bored, I always try new challenges | 0.414 | | 0.452 |

NOTES Extraction method: principal component analysis. Rotation method: Oblimin with Kaiser normalisation.

gories of new food, as used in this research. At the beginning, we meant to use eleven products. Due to the low consumption, however, fair trade coffee, and genetically-modified soybean were excluded from the analysis. In order to satisfy one of the rules of the chi-square analysis, the expected values should not be less than five.

The chi-square tests the assumption that there is an association between whether people and society consume a specific product or not.

Table 4.9 Chi-Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variables Gender (Women and Men) and Novel Product Consumption

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 15.887 | 7 | 0.026 |
| Phi | 0.160 | | 0.026 |

NOTES * 2-sided. 0 cells (.0%) have expected a count less than 5. The minimum expected count is 15.41.

The variables were, society ($N = 200$, women and men 18–55) and eight products: proactive margarine, bio bread, frozen pizza, curry, light cookies, macadamia nuts, fresh pasta and basmati rice.

Moreover, chi-square's significance is 0.188, which is higher than the alpha level. There is no statistical significance regarding the relationship between society and people consuming a specific product. In other words, there are no statistically significant differences $\text{Sig.} \geq 0.05$ between the frequencies. Divided into two groups, women and men, we did the same experiment for gender in Maribor. Table 4.9 reveals different societal data. The chi-square tested the assumption of whether or not gender is associated with the consumption of a specific product. The results proportioned by Table 4.9 reveal a p -value of $0.026 \leq 0.05$ below alpha. We can conclude that there are statistically significant differences between frequencies. In other words, women and men did have different consumptions regarding specific products. The symmetrical measurement data, which is essentially a Pearson Correlation, tells us that the Phi value has a very weak positive association equivalent to 0.160 between genders (females and males aged between 18 and 55) and the consumption of a specific product.

For the last part and the assumption, determining whether age (18–35 and 36–55) is associated with the consumption of a specific products. There were no statistically significant differences between age and the consumption of a specific product as the p -value was above the alpha level, with the corresponding 0.527. In other words, both ranges of ages 18–35 and 36–55 equally consume the specific products.

Willingness to Consume FF, GMF, EF, OF, and CF

Respondents were asked directly if they were willing to consume five new kinds of food used in this research. The analysis was made using the chi-square test. At the beginning of the research we gave six cat-

Table 4.10 Chi Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variables Society (Women and Men 18–55) and Willingness to Consume EF

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 13.174 | 3 | 0.004 |
| Phi | 0.257 | | 0.004 |

NOTES * 2-sided. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.25.

Table 4.11 Percentage of 200 People (Society) with Positive and Negative Willingness to Consume EF

| Willingness | Women 18–35 | Men 18–35 | Women 36–55 | Men 36–55 |
|-------------|-------------|-----------|-------------|-----------|
| Pro | 47 | 46 | 37 | 37 |
| Against | 3 | 4 | 13 | 13 |

egories for possible answers. These possible answers to questions 15, 17, 19, 21 and 23 are: no, probably not, maybe, probably yes, yes and I already consumed this. However, during the collection of answers, we figured out that the results were becoming very low in some categories, which made us change the format of the electives, going from six possible answers to just two. In the end, we had the possibility of choosing between for in the case of willingness to try, and against in the eventual rejection of the product. In changing the format, we were able to fulfil one of the requirements of the chi square analysis. This part defines that there should not be any value in the expected cells below the number five.

The variables were: Society ($N = 200$, women and men aged 18 to 55, and the five types of products, FF, GMF, EF, OF, and CF). The chi-square tests the assumption as to whether there is a correlation between the consumption willingness of FF, GMF, EF, OF, CF and society. The study variables of the five types of products were studied separately.

The Pearson Chi-Square tells us that the observed frequencies in FF are not statistically significant from the expected frequencies because the p -value is equal to 0.184, which is higher than the alpha level $p \geq 0.05$.

GMF did not change at all in comparison with FF. The p -value had a corresponding number of 0.330 above alpha. Because of that, we rejected the statement that there is an association between society and the willingness to consume genetically modified food.

Table 4.12 Percentage of 200 People (Society) with Positive and Negative Willingness to Consume OF

| Willingness | Women 18–35 | Men 18–35 | Women 36–55 | Men 36–55 |
|-------------|-------------|-----------|-------------|-----------|
| Pro | 45 | 44 | 46 | 42 |
| Against | 5 | 5 | 4 | 8 |

Since chi-square tests the assumption of a significant statistical relationship between society and willingness to consume ethnic food we can, in fact, state that according to table 4.10, there is a very strong, significant effect due to $\text{Sig. } 0.004 \leq 0.05$ at the 1% level. In other words, society has a different willingness to consume ethnic food. Phi value tells us that the association between variables is positive and weak, according to the 0.257 found. The best way this significant effect is made visible is through table 4.11. We can see that around 83% of 200 people polled would be prepared to try ethnic food. It is worth mentioning how similar the answers were between women and men. We consider that 84 women would like to try EF and 83 men would like to try it as well. Both groups were confirmed at 100 people. This is totally in contrast to the GMF. We mentioned before that 82% of people were willfully against trying these foods.

The willingness to consume organic food was tested and the results surprisingly tell us that there is no statistical effect, as p -value is 0.633, which is above the alpha level $p \geq 0.05$. In other words, the observed frequencies between society and willingness to consume ecological food are not statistically significant from the expected frequencies. Table 4.12 shows us an apparently big difference. Finally, the convenience food had no significant effect on the demonstrated p -value equal to $0.076 \geq 0.05$. Therefore, there is no statistically significant relationship.

The former results obtained, with the exception of ethnic food, indicate that the general public would be equally willing to consume functional, genetically-modified, organic and convenience foods.

The chi-square test shown in table 4.13 tests the assumption that there is an association between whether the population is willing to consume FF, GMF, EF, OF, CF and the genders (women and men).

A Chi-Square Test of Independence was used to analyze the data between the willingness to consume FF as one variable and the gender of the participants as the second variable. There was a significant effect $p = 0.031$. This tells us that there is a statistically significant association between gender and willingness to consume FF. This means that women

Table 4.13 Chi Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variables Gender (Women and Men) and the Willingness to Consume FF

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 4.634 | 1 | 0.031 |
| Phi | -0.152 | | 0.031 |

NOTES * 2-sided. 0 cells (.0%) have expected the count less than 5. The minimum expected count is 41.50.



Figure 4.3 Percentage of 200 People Divided by Gender with Positive and Negative Willingness to Consume FF

tended to be more willing to try FF over men and men tend to be less willing than women to consume FF. The data is graphed in figure 4.3. The Phi value, within the symmetrical measurement tables, gives us a very low negative coefficient (-0.152) which tells us that the variables tend to go in opposite directions.

With respect to the GMF, the p -value from the Chi square obtained was 0.577, which rose above the 0.05 alpha level. The difference between the observed and expected values was not significant. We can conclude that the number of women who are willing to try GMF does not significantly differ from the number of men who are willing to consume them. Statistically, it is a 50/50 relationship.

For the EF, the test defines there is no significant difference between the gender and the willingness to consume ethnic food, since we have a p -value equal to $0.849 \geq 0.05$. It can be interpreted that there was no significant difference between the variables. Females and males were equally willing to consume ethnic products.

The Chi square's significance for the organic and convenience food was $0.268 \geq 0.05$ and $0.091 \geq 0.05$ respectively. Therefore, there was no statistically significant relationship between the gender and the willingness to consume both ecological and convenience foods. Females and males were both equally ready to consume both types of food.

The chi-square tests the assumption that there is an association between whether the population is willing to consume FF, GMF, EF, OF, CF and the ages (in the test ages 18 to 35 and 36 to 55).

Table 4.14 Chi-Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variable Age (18–35/36–55) and Willingness to Consume EF

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 13.101 | 1 | 0.000 |
| Phi | -0.256 | | 0.000 |

NOTES * 2-sided. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.50.

The analysis of the output states that the p -value was $0.886 \geq 0.001$. This means that we cannot reject the assumption of no association between gender and willingness to consume functional food or, equivalently, that the proportions of younger and older people who have the will to consume FF are the same.

GMFs were submitted to tests and the results tell us that there is no statistically significant difference between the observed and the expected frequencies. We can claim that both young and old groups have an equal will to consume GMF as the p -value was $0.094 \geq 0.05$.

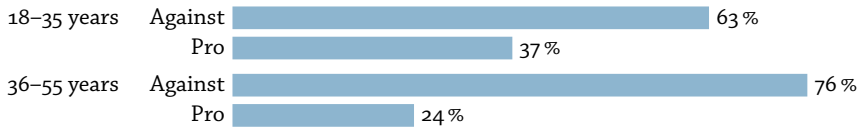
The next analysis involved ethnic food. These foods presented a significant effect when they were tested. Having the society itself as a variable. A significant effect for this study presents itself. The p -value from the test was 0.000. This means that it is statistically significant at the 1% level. Therefore, there is evidence to reject the assumption that there is no association between age and willingness to consume ethnic products. The results can be seen in table 4.14. The Phi value, which tested the strength of the association between variables in this case, was negative and low.

Using the data given by the output for organic food when performing a Chi square analysis, the p -value is equal to 0.825, which is above alpha. Hence, there is no real evidence that the age of the people varies in the questioning of the willingness to consume ecological products. In other words, both groups of people with ages ranging from 18 to 35 and from 36 to 55 have an equal disposition to consume organic food. Finally, the convenience food shows us a p -value of 0.046, which is under the alpha level, as evident in table 4.15. There is a very small probability of the observed data under the assumption of having no relationship. It seems to be that older people tend to have a differing readiness to consume convenience food than the younger people. 76 people aged 36 to 55 said they were unwilling to try it and 24 said yes. The results of the younger people are: 63 said no and 37 accepted the CF (figure 4.4).

Table 4.15 Chi-Square Analysis and Symmetrical Measurement Data Showing Phi Value for Variables Age (18–35/36–55) and Willingness to Consume CF

| Category | Value | df | Asymp. Sig.* |
|--------------------|--------|----|--------------|
| Pearson Chi-Square | 3.986 | 1 | 0.046 |
| Phi | -0.141 | | 0.046 |

NOTES * 2-sided. 0 cells (.0%) have expected count less than 5. The minimum expected count is 30.50.

**Figure 4.4** Percentage of 200 People Divided by Age with Positive and Negative Willingness to Consume CF

Indicate the Level of Agreement for Statements Regarding FF, GMF, EF, OF, and CF

People were asked to respond in accordance with their level of agreement with a certain statement. In this section, CA analysis was applied to a series of thirty assumptions, six in each section, which related to the five types of products to be studied (FF, GMF, EF, OF, and CF). The CA studies for each product were conducted separately from each other. The assumptions which are listed in table 4.16. Their intention was to gather information on the willingness of the polled people, regarding these five novel products. The questions tried to be as uniform amongst the five products as possible, although it was not always possible because products have different and specific compositional characteristics.

The CA reliability coefficient is equal to 0.723 in the variables associated with the FF. This value was obtained after deleting the first, second and fifth assumptions. This procedure was done because the corrected item's level and the CA level's correlation were under 0.20.

After the modification of the question, the level was raised to above 0.70. This means that 72% of the variance used in the composite score by combining those 3 items would be considered as an internally-consistent, reliable variance. The corrected items' total correlation coefficients were all over 0.2, as seen in the items' total statistics in table 4.17. We could state that the result of 58% of the polled people as willing to consume FF, is reliable.

Table 4.16 Thirty Assumptions Divided into 5 Sections Regarding FF, GMF, EF, OF, and CF

| | |
|----|--|
| 1 | Functional kinds of food are very expensive |
| 2 | I didn't know that functional food existed |
| 3 | Normal food already provides enough health benefits |
| 4 | I don't need nutritional supplements |
| 5 | It's difficult to find functional food where I buy my supplies |
| 6 | I believe that functional food can affect my health |
| 7 | Genetically-modified food is very expensive |
| 8 | I didn't know that genetically-modified food existed |
| 9 | I am satisfied with the food I consume |
| 10 | Genetically-modified food does not interest me |
| 11 | It's difficult to find genetically modified food where I buy my supplies |
| 12 | I believe that genetically modified food can affect my health |
| 13 | Ethnic food is very expensive |
| 14 | I didn't know that ethnic food existed |
| 15 | I am satisfied with the food I consume |
| 16 | Ethnic food does not interest me |
| 17 | It's difficult to find ethnic food where I buy my supplies |
| 18 | I believe that ethnic food can affect my health |
| 19 | Organic food is very expensive |
| 20 | Organic food is currently a fashion |
| 21 | Organic food has the same taste as the other foods that are not organic |
| 22 | Organic food does not interest me |
| 23 | It's difficult to find organic food where I buy my supplies |
| 24 | Organic food spoils quickly |
| 25 | Convenience food is very expensive |
| 26 | Convenience food is currently a fashion |
| 27 | Convenience food lacks nutrients |
| 28 | Convenience food does not interest me |
| 29 | It's difficult to find convenience food where I buy my supplies |
| 30 | I prefer fresh food |

The CA reliability coefficient was equal to 0.773 in the variables associated with GMF, this value was obtained after deleting assumptions seven, eight, nine and eleven from table 4.16. This procedure was done in order to reach the minimum level of reliability.

After modifying the variables the level was raised to above 0.773, which is considered as an acceptable level. This means that 77% of the

Table 4.17 Corrected Correlation Coefficients for FF

| Statement | (1) | (2) | (3) | (4) | (5) |
|--|------|-------|-------|-------|-------|
| 'Normal' food already provide enough health benefits | 5.57 | 2.567 | 0.602 | 0.508 | 0.576 |
| I don't need nutritional supplements | 5.96 | 2.129 | 0.679 | 0.547 | 0.458 |
| I believe that functional food can affect my health | 6.75 | 2.739 | 0.384 | 0.164 | 0.829 |

NOTES Column headings are as follows: (1) scale mean if item deleted, (2) scale variance if item deleted, (3) corrected item-total correlation, (4) squared multiple correlation, (5) Cronbach's alpha if item deleted.

Table 4.18 Corrected Correlation Coefficients for EF

| Statement | (1) | (2) | (3) | (4) | (5) |
|---|------|-------|-------|-------|-------|
| I didn't know that ethnic food exist | 3.65 | 1.697 | 0.531 | 0.285 | 0.642 |
| Ethnic food does not interest me | 3.26 | 1.508 | 0.535 | 0.288 | 0.644 |
| I believe that ethnic food can affect my health | 3.36 | 1.719 | 0.562 | 0.316 | 0.610 |

NOTES Column headings are as follows: (1) scale mean if item deleted, (2) scale variance if item deleted, (3) corrected item-total correlation, (4) squared multiple correlation, (5) Cronbach's alpha if item deleted.

variance used in the composite score by combining those 2 items would be considered as internally consistent reliable variance. The corrected items' total correlation coefficients were all over 0.2 as can be seen in the item total statistics table 4.18.

The reliability coefficient for section EF was 0.720. This value was obtained after deleting the assumptions thirteenth, fifteenth, and seventeenth as cited in table 4.16. This procedure was done because the CA did not reach the minimum level of reliability. After modifying the question, the level was raised to above 0.720. This means that 72% of the variance used in the composite score by combining those 3 items would be considered as internally consistent reliable variance. The corrected items' total correlation coefficients were all over 0.20, ranging from 0.531 and 0.562 as can be seen in table 4.18. Something to pay attention to is the correlations between the items, it is possible to see that the associations between items work nicely between them as the coefficients were within the ranges 0.441 and 0.479, we can say that there is a moderate positive correlation as it can be seen in the items total statistics table 4.19.

Not surprisingly, the OF has a CA level equal to 0.457. If we pay atten-

Table 4.19 Inter Item Correlation Matrix for EF

| Statement | (1) | (2) | (3) |
|---|-------|-------|-------|
| I didn't know that ethnic food exist | 1.000 | 0.441 | 0.476 |
| Ethnic food does not interest me | 0.441 | 1.000 | 0.479 |
| I believe that ethnic food can affect my health | 0.476 | 0.479 | 1.000 |

NOTES Column headings are as follows: (1) I didn't know that ethnic food exist, (2) ethnic food does not interest me, (3) I believe that ethnic food can affect my health.

tion to the correlation matrix, we can see many negative values between variables. This is a sign that different opinions arose during the study. We tried to modify this value by deleting some items in the question. The results were not good enough to reach the minimum value of reliability. Obviously, the differences in opinions of the population were really significant during the research. Unfortunately, because of the lack of time, it was impossible to conduct, for example, Rasch's model or some other analysis that would tell us how the subsets and the items for each subset behaved during the measurements.

The CA level for the CF was equal to 0.715. This value was obtained after deleting three assumptions: the twenty-fifth, twenty-sixth and twenty-ninth from table 4.16. It is interesting to mention that in every case where we deleted variables, the assumptions regarding the expense and the difficulty in finding a product were involved. This tells us that both assertions did not coincide with the reliability of the research. After modifying the variables the level was raised to above 0.715, which is considered an acceptable level. Based on the low statistically significant results obtained by statistical techniques, ANOVA, Chi-Square, PCA and CA, we were determined to reject H1, which says: The perceptions towards novel food products consumption depend on consumers habitual food consumption preferences.

4.3 Results of the H2

H2 *The perceptions towards novel food products' consumption are influenced by food consumption experiences and economic factors.*

Importance of Price, Nutritional Facts, Quality, and Freshness When Buying Goods

In this first section, we asked the respondents if they could indicate, from four aspects, the level of importance of each quality when they buy food. The lowest level indicates not important at all and the highest

Table 4.20 Factor Matrix between Quantitative Variables: Price, Nutritional Facts, Quality, Freshness and Society

| Variables | | (1) | (2) | (3) | (4) | (5) |
|-----------------------|-----|----------|----------|---------|---------|---------|
| (1) Society | (a) | 1 | -0.262** | 0.061 | 0.047 | 0.030 |
| | (b) | | 0.000 | 0.391 | 0.507 | 0.673 |
| (2) Price | (a) | -0.262** | 1 | 0.092 | 0.031 | 0.046 |
| | (b) | 0.000 | | 0.195 | 0.667 | 0.522 |
| (3) Nutritional facts | (a) | 0.061 | 0.092 | 1 | 0.317** | 0.295** |
| | (b) | 0.391 | 0.195 | | 0.000 | 0.000 |
| (4) Quality | (a) | 0.047 | 0.031 | 0.317** | 1 | 0.459** |
| | (b) | 0.507 | 0.667 | 0.000 | | 0.000 |
| (5) Freshness | (a) | 0.030 | 0.046 | 0.295** | 0.459** | 1 |
| | (b) | 0.673 | 0.522 | 0.000 | 0.000 | |

NOTES Row headings are as follows: (a) Pearson correlation, (b) significance (2-tailed). $N = 200$. ** Correlation is significant at the 0.01 level (2-tailed).

indicates very important. The variables involved were: society ($N = 200$, women and men between 18 and 55 years), price (reasonable price for the product), nutritional facts, quality (product quality) and freshness (expiration date). The correlation technique was used to analyze this question. Because we had five variables, we also had ten correlations to analyze, so we focused on the correlations that would be statistically significant.

Table 4.20 shows that the correlation coefficient between the variables society and good price of the product is negative and weak $r = -0.262$. We found a p -value equal to 0.000 which means that it is greatly statistically significant ($p \leq 0.01$). One useful rule of thumb for estimating the importance of the r value is to calculate the square of the correlation coefficient. That is to say calculate R^2 . This squared result will give us a rough percentage for the amount of variation in the final result which is directly attributable to the other variable. If we square -0.262 we obtain 0.068 or 6.8% rounded 7%, with this value we can claim that there is 7% of the society for whom the price of the product is important. That is, both variables go in opposite directions, with the decreasing of society's age, the more important will be the price of the product.

The second pair of variables, which were submitted to the correlation analysis were society and nutritional facts. We can say that the relationship was not statistically significant as we had a p -value equal to 0.391 ≥ 0.05 . For the last two pairs of variables society-product quality and

society-expiration date, the results were the same. There were no statistically significant differences between them. These significant values for each one were 0.507 and 0.673, respectively. We found that one pair of variables out of four were statistically significant. This pair of variables is society with price.

We can see in table 4.20 that the following pairs of correlations between good price of the product with nutritional facts ($0.195 \geq 0.05$), product quality ($0.667 \geq 0.05$) and expiration date ($0.522 \geq 0.05$). The three pairs were not statistically significant because all of the values were above the $\alpha = 0.05$.

Contrary to the last variable, the nutritional facts are correlating accurately with the remaining peers product quality and expiration date. We can see in the matrix that between nutritional facts and product quality there is a low, positive association equivalent to 0.317. The significance level tells us that it is statistically significant or, as considered reliable, different from zero because p is equal to $0.000 \leq 0.05$. This means that both variables move in the same positive direction.

The pair nutritional facts and freshness (expiration date) is statistically significant as well with a p -value equal to $0.000 \leq 0.05$. It has a low positive correlation equivalent to 0.295, these two variables move positively in the same direction. The last pair between product quality and freshness expiration date tells us that there is a moderate relationship between variables equivalent to 0.459. This is the highest of these ten correlations. Apparently people are concerned about both variables. This is also telling that both are moving in the same direction. The significance level p is equal to 0.000.

Nevertheless, this research focused on analyzing the society from the city of Maribor with justified ages between 18 and 55. We have included two more independent studies, based on two groups, each with their particular results. These two groups are gender ($N = 200$, male and female) and the age ($N = 200$, 18 to 35 and 36 to 55) because we thought it would be interesting to analyze the results between what women and men think and what the younger people think against the older people. Throughout this second hypothesis, we will perform the analyses of the two previously mentioned groups, gender and age.

In discussing gender and because we focused on the correlations and significance levels, we will resume and present the concerning results. The variables were the same as the last experiment except we exchanged the subject society with gender.

In this case, the outputs that define the correlations were from negligible to no correlation at all. The significance levels were all above the alpha 0.05. The rest of the peers between variables were the same as the last experiment. For this reason they will not be explained.

For ages 18 to 35 and 36 to 55 as well as for the rest of the variables, the research formed almost the same results as society. The only statistically-significant association found was between age and good price for the product. The value for the Pearson correlation was $r = -0.301$ at the alpha level of 5%. Because we had a negative value for the level of association, we could say that they are moving in opposite directions. Age influences price, so the younger population think differently about this variable than the older population. The rest of the values were not statistically significant and the corresponding associations were minimal. The pair age and nutritional fact presented a very low positive correlation.

How Often Do You Read the Quantitative Information That Appears on the Food Label?

The variables that accompanied this analysis were: the society ($N = 200$, men and women aged 18 to 55, nutrients (nutritional composition), vitamins and minerals and calories. The correlation technique was used in this analysis. Because we had four variables, we also had six correlations to analyze. We focused on those correlations that were statistically significant. There is no statistically significance association within the four variables since the p -values were all above the alpha level. Two of the correlations were very low and negatives between the association's society-nutritional composition and society-calories. The last variable society-vitamins and minerals had a very low, positive association.

The next variables were nutritional composition and vitamins and minerals. In this case, it is visible that there is a moderate, positive, strong correlation as $r = 0.673$. We can also see there is a significant effect as the p -value is equal to 0.000 ($p \leq 0.05$). These variables move in the same direction. We can interpret that variables nutritional composition and vitamin-minerals as labels that are seen by the people in the same way. When someone pays attention to the first one, the same person also pays attention to the second one. We can see the same effect between nutritional composition and calories. A significant effect is present ($p \leq 0.05$) with a correlation coefficient equal to 0.669.

For the last pair, we can see that there is a positive, moderate asso-

Table 4.21 Factor Matrix between Quantitative Variables: Nutrients, Vitamins and Minerals, Calories and Gender

| Variables | | (1) | (2) | (3) | (4) |
|---------------------------|-----|----------|---------|----------|---------|
| (1) Gender | (a) | 1 | -0.154* | -0.194** | -0.170* |
| | (b) | | 0.030 | 0.006 | 0.016 |
| (2) Nutrients | (a) | -0.154* | 1 | 0.673** | 0.669** |
| | (b) | 0.030 | | 0.000 | 0.000 |
| (3) Vitamins and minerals | (a) | -0.194** | 0.673** | 1 | 0.613** |
| | (b) | 0.006 | 0.000 | | 0.000 |
| (4) Calories | (a) | -0.170* | 0.669** | 0.613** | 1 |
| | (b) | 0.016 | 0.000 | 0.000 | |

NOTES Row headings are as follows: (a) Pearson correlation, (b) significance (2-tailed). $N = 200$. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

ciation between variables vitamins-minerals and calories as we have a value of 0.613. If we square 0.613, we can say that 0.375 or 37% of the society scrutinize these labels when they buy food. This is statistically-significant according to p -value 0.000

In speaking about gender and because we focused on the correlations and significance levels, we will resume and present the concerning results. The variables were the same as in the previous experiment, we just exchanged society for gender. The results are shown in table 4.21. We obtained some very interesting results. Contrary to society, we found that all six correlations were significant at the 5% alpha level.

We can see the cumulative results of gender-nutritional composition, gender-vitamins and minerals-gender-calories. All of these cumulate. It is interesting that all correlations are negative. This tells us that either women or men are paying attention to labels but not both. The correspondents coefficients were, -0.154, -0.194, -0.170 respectively.

It seems surprising how much the results can change on the basis of gender or age. In this section, we can see that the correlation between ages 18 and 35 and ages 36 and 55) and nutritional composition, vitamins-minerals and calories all have non-significance values since they are above the alpha level at 5%. The rest of the values are exactly the same as they were in the gender and society values.

What Makes People Choose between Several Different Establishments?

The respondents were asked if they could indicate the grade of importance of some aspects when they decide in which establishment they

Table 4.22 Analyzed Aspects Using CA

| | |
|---|---|
| 1 | Location (It is near home) |
| 2 | Hours (Opening hours) |
| 3 | Buy (I buy all the products there) |
| 4 | Selection (It has a great variety of products) |
| 5 | Discounts (They make discounts in many products) |
| 6 | Friendly (Customer service) |
| 7 | Wait (I don't have to wait for a long time when paying) |

will buy their products. The scale to measure the importance was made from one, totally unimportant, to five, very important. This section is a combination between quantitative and qualitative variables. This is why it will be used to measure both hypothesis, H₂ and H₃. The study variables are presented in table 4.22.

CA analysis for this study has a level equal to 0.709. This means that 70% of the variability in this composite score, which tries to measure aspects of importance when choosing a place to buy goods, combines those 7 items that are considered as a true score-variance or an internally-consistent, reliable variance. In other words, the variables are reliable.

It is interesting to pay attention to the correlation matrix. All the variables are positive and working together. There is some relevance to see in table 4.23 a positive-moderate correlation (0.449) between variables one and two. It seems that people pay special attention to these two quantitative variables. Variables like number three and two have a coefficient equal to 0.374, or variable four and three with a correlation coefficient equal to 0.494 which is positive and moderate. Another one that shows a good correlation is the quantitative, variable number seven and a the qualitative, variable number six. In general, it looks like the people have uniform answers, as well as no negative values. This is not difficult to figure out if we see that the means are all between 3.3 and 3.7 with the exception of the third variable. Finally, table 4.24 shows that corrected item total correlation coefficients are all over 0.2. They go from 0.392 to 0.512, which tells us that all the assumptions are reliable.

Based on the low statistically significant results obtained by the two statistical techniques Pearson correlation and CA, we determined to reject H₂, which states: The perceptions towards novel food products' consumption are influenced by food consumption experiences and economic factors.

Table 4.23 Inter Item Correlation Matrix Regarding Aspects When Choosing a Place to Buy Goods

| Item | Location | Hours | Buy | Select. | Disc. | Friendly | Wait |
|-----------|----------|-------|-------|---------|-------|----------|-------|
| Location | 1.000 | 0.449 | 0.292 | 0.190 | 0.156 | 0.171 | 0.217 |
| Hours | 0.449 | 1.000 | 0.374 | 0.376 | 0.153 | 0.159 | 0.197 |
| Buy | 0.292 | 0.374 | 1.000 | 0.494 | 0.111 | 0.135 | 0.135 |
| Selection | 0.190 | 0.376 | 0.494 | 1.000 | 0.367 | 0.203 | 0.224 |
| Discounts | 0.156 | 0.153 | 0.111 | 0.367 | 1.000 | 0.337 | 0.314 |
| Friendly | 0.171 | 0.159 | 0.135 | 0.203 | 0.337 | 1.000 | 0.453 |
| Wait | 0.217 | 0.197 | 0.135 | 0.224 | 0.314 | 0.453 | 1.000 |

Table 4.24 Corrected Correlation Coefficients Regarding Aspects When Choosing a Place to Buy Goods

| Item | (1) | (2) | (3) | (4) | (5) |
|-----------|-------|--------|-------|-------|-------|
| Location | 20.10 | 13.202 | 0.398 | 0.243 | 0.682 |
| Hours | 20.35 | 12.842 | 0.462 | 0.309 | 0.666 |
| Buy | 20.74 | 12.847 | 0.402 | 0.312 | 0.682 |
| Selection | 19.93 | 13.231 | 0.512 | 0.378 | 0.658 |
| Discounts | 20.59 | 13.329 | 0.375 | 0.238 | 0.688 |
| Friendly | 20.11 | 13.345 | 0.392 | 0.253 | 0.683 |
| Wait | 20.30 | 12.925 | 0.411 | 0.257 | 0.679 |

NOTES Column headings are as follows: (1) scale mean if item deleted, (2) scale variance if item deleted, (3) corrected item-total correlation, (4) squared multiple correlation, (5) Cronbach's alpha if item deleted.

4.4 Results of the H₃

H₃ *The perceptions towards novel food products' consumption are influenced by information on novel food and marketing-promotional activities.*

The goal of H₃ was to analyze the qualitative factors that can influence consumers when they want to purchase a product.

Importance of Package, Geo Origin, Flavor, Knowledge of the Product, and the Brand

The third and final hypothesis surfaces the notion that a relationship may exist between the consumption of goods and qualitative influences and factors. Marketing plays an important role in advertising consumption, promoting branding. Standards for quality foods, with new, specifically-flavored products, will produce some countries with

Table 4.25 Factor Matrix between Qualitative Variables: Package, Origin, Taste, Known Product, Brand and Society

| Variables | | (1) | (2) | (3) | (4) | (5) | (6) |
|-------------------|-----|---------|---------|---------|---------|---------|---------|
| (1) Society | (a) | 1 | 0.103 | 0.253** | -0.177* | 0.044 | 0.229** |
| | (b) | | 0.148 | 0.000 | 0.012 | 0.540 | 0.001 |
| (2) Package | (a) | 0.103 | 1 | 0.175* | -0.029 | 0.261** | 0.319** |
| | (b) | 0.148 | | 0.013 | 0.686 | 0.000 | 0.000 |
| (3) Geo. origin | (a) | 0.253** | 0.175* | 1 | 0.153* | 0.130 | 0.133 |
| | (b) | 0.000 | 0.013 | | 0.031 | 0.066 | 0.060 |
| (4) Taste | (a) | -0.177* | -0.029 | 0.153* | 1 | 0.027 | -0.107 |
| | (b) | 0.012 | 0.686 | 0.031 | | 0.699 | 0.132 |
| (5) Known product | (a) | 0.044 | 0.261** | 0.130 | 0.027 | 1 | 0.326** |
| | (b) | 0.540 | 0.000 | 0.066 | 0.699 | | 0.000 |
| (6) Brand | (a) | 0.229** | 0.319** | 0.133 | -0.107 | 0.326** | 1 |
| | (b) | 0.001 | 0.000 | 0.060 | 0.132 | 0.000 | |

NOTES Row headings are as follows: (a) Pearson correlation, (b) significance (2-tailed). $N = 200$. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

better products than other countries. In this section, we asked the respondents if they could indicate from five choices the level of importance of each item when they buy them, indicating the lowest level as not important at all to the highest very important.

The variables involved were: society ($N = 200$, women and men aged 18 to 55), packaging (package appearance), geographical origin, taste and flavor (how important is the taste?), previous knowledge of product, and branding. The correlation technique was used to analyze table 4.25. Because we had six variables we also had fifteen correlations to analyze. We also focused on those correlations that would be statistically significant.

As introduction, we can say that between the fifteen pairs, eight of them were statistically significant, most of them at the 1% α level.

The first pair of variables between society and how the package appears defines that a relationship between them was not statistically significant. We had a p -value equal to $0.103 \geq 0.05$. The second pair, society and geographical origin, shows a low, positive correlation as we have $r = 0.253$. We can also see that there is a significant effect $p = 0.000$ ($p \leq 0.01$). That is, these variables move in the same direction. Products' geographical origin is important for the society. The third pair is society and flavor/taste importance. Flavor and taste gave us a low, negative

correlation equal to -0.177 at the significance level alpha 5%. This means that these variables move in opposite directions. Previous knowledge of products is not important to the society. We obtained the p -value above the alpha level, $0.540 \geq 0.05$. The correlation was 0.044 , which tells us that there is almost no association at all. The pair society and the brand had a statistically significant effect between variables, ($p \leq 0.01$) and a low, positive Pearson correlation equal to 0.299 . If we would square this data, we would obtain a result equal to 0.052 , which is telling us that for 5.2% of the population, the brand is important.

The pair packaging and geographical origin has a significant effect. The p -value is equal to $0.013 \geq 0.05$ and has a very weak, positive association. This effect defines that the variables move to the same, positive direction. Variables package appearance and flavor/taste importance have no statistically significant effect according to the p -value 0.686 ($p \geq 0.05$). Both pairs package appearance-previous knowledge of product and package appearance/branding have significant effects at the 1% alpha level since both have p -values equal to 0.000 . The coefficient of association is equal to 0.261 and 0.319 , respectively. This means they both have low, positive correlation effect and they will move in the same direction.

Geographical origin/importance of flavor/taste seems to have a significant effect at the 5% alpha level, as the p -value is equal to $0.031 \leq 0.05$. A very low, positive association is perceived according to $r = 0.153$.

Then we have five pairs of variables:

- geographical origin-previous known product,
- geographical origin-brand,
- taste and flavor importance-previous known product,
- taste and flavor importance-brand,
- previously known product-brand.

The first four pairs of variables do not have statistical effect. The pair previously known product-brand was significant as the p -value is equal to $0.000 \leq 0.01$. Apparently, it is more important for the people when looking at the qualitative factors then the quantitative factors. The parameter of eight out of fifteen pairs had significant effects. This represents 53% of the total against 40% of the pairs that had a significant effect in the quantitative factors.

In speaking about the gender factor, we will resume and present the concerning results. We were focused on the correlations and signifi-

cance levels. The variables were the same as the last experiment; we only exchanged society for gender.

Gender (women and men) with the brand, presented a significant effect at the 5% alpha level, $p = 0.005 \leq 0.01$. The coefficient of association was equal to 0.198, which represents a very weak, positive correlation between variables. The rest of the variables between gender and appearance of package, geographical origin, the flavor and taste and previous knowledge of product presented a non-significant effect.

Age presented very interesting information, although the pair of significant variables were the same as the ones we had within the variable society. From the five pairs of variables we had, three (geographical origin $p = 0.000 \leq 0.01$, importance of taste $p = 0.018 \leq 0.05$, the brand $p = 0.027 \leq 0.05$) had significant effects, with the corresponding coefficient of a correlation very similar to society.

How Often Do You Read the Qualitative Information That Appears on the Food Label?

The variables that accompanied this question were: the society ($N = 200$, women and men aged 18 to 55), ingredients and geographical origin. The correlation technique was used to analyze this question. Because we had two variables, we also had three correlations to analyze. We focused on those correlations that would be statistically significant.

The first pair of variables was represented by the society (aged 18 to 55) and the ingredients. The results can be seen in table 4.26. We can see that there was no significant effect in this pair as we had a significance value ($p \geq 0.05$) equal to 0.447. The next pair involved the society and the geographical origin. We can see that the connection between them is statistically significant ($p \leq 0.05$). The correlation coefficient is positive and very low, defining the fact that both variables are moving to the same direction. The last pair is between ingredients and geographical origin. This pair has a very strong, significant effect equal to 0.000 at the alpha level 1%. The coefficient of association is 0.412.

In addressing gender, because we focused on the correlations and significance levels, we will resume and present the concerning results. The variables were the same as the previous experiment. We exchanged society for gender.

In the first pair of variables, we can see that gender and ingredients had a significant effect of 0.001 at the 1% alpha level. The coefficient of correlation was low and negative. These results prove that the variables

Table 4.26 Factor Matrix between Qualitative Variables: Ingredients, Geographical Origin and Society

| Variables | | (1) | (2) | (3) |
|-------------------------|-----|----------|---------|----------|
| (1) Society | (a) | 1 | -0.054 | -0.190** |
| | (b) | | 0.447 | 0.007 |
| (2) Ingredients | (a) | -0.054 | 1 | 0.412** |
| | (b) | 0.447 | | 0.000 |
| (3) Geographical origin | (a) | -0.190** | 0.412** | 1 |
| | (b) | 0.007 | 0.000 | |

NOTES Row headings are as follows: (a) Pearson correlation, (b) significance (2-tailed). $N = 200$. ** Correlation is significant at the 0.01 level (2-tailed).

are going in opposite directions. The next variable gender and geographical origin are not significant. The p -value is equal to 0.270.

With age as the factor, we can say that the results were the same as society. The pairs that involved age and ingredients did not have a significant effect. Finally, age and geographical origin did have a significant effect. The p -value is equal to $0.000 \leq 0.01$, and $r = 0.251$.

Based on the statistically significant results obtained by the two statistical techniques Pearson correlation and CA, we determined to accept H_3 , which says: The perceptions towards novel food products consumption are influenced by information on novel food and marketing and promotional activities. There is enough evidence to reject the null hypothesis.

5 Findings

5.1 Findings on Hypotheses Testing

This paper attempted to analyze the diverse factors that can lead some society to choose between one product or another. In this case, we compared certain aspects that gave us valuable feedback that helped us to clarify three hypotheses using a survey.

- Product consumption is due to consumption habits.
- Product consumption is due to quantitative factors.
- Product consumption is due to qualitative factors.

Regarding the consumption habits, which were focused to answer in H₁, we found that when asking the people where they eat during the week, they choose the variable at home with my family. If we composed the question as: Where would you prefer to eat during the week?, another type of answer may have resulted. However, when we asked During the weekends do you go to a restaurant to eat?, the results led us to a resounding 87% of people who said they did not, while the remaining 13% said that they dined in traditional restaurants.

Thus, it seems clear that the respondents prefer the comfort of their own homes instead of going out to find a new, Japanese restaurant. If we could not do this survey in more detail, we would research the level of income of the respondents, which was not asked during this research.

Considering also the current, rough economic situation in Europe, people may be more likely to save money. This assumption could have been answered with the following question. Do you think the country is in a deep, economical crisis? Or do you think that the country will collapse economically? Although it is necessary to look at the unemployment rate to realize that the numbers are alarming, 111,000 people were unemployed in the first quarter of this year and the number is still growing.

Although people do not visit restaurants as often as they used to, they visit the biggest shopping malls and supermarkets where it is eas-

ier to get ethnic products. It would have been interesting to know if people would be willing to eat these kind of ethnic foods in their authentic state, since chain supply companies often sell ethnic products in a European market where there are many restrictions.

On the other hand, household numbers may play a role when deciding whether or not to eat at a certain place. The results indicated that 40% of households are made up of two adults, 22% have four adults, 21% have three adults, 9% has only one member, and the remaining 8% are between five and six adults per household. The higher number of people per household, the higher number of people to feed.

If we see the statistics on how many children per household, we can see that 68% of households have one child, 27% have two children and 5% have three infants per household. Nowadays, to care for one child is expensive, to care for more than one is rare and to care for more than two is a luxury. Again, the incomes of the families would have been a good indicator in answering the question of why people prefer to stay at home rather to go out and eat.

As we mentioned earlier, the food that generated the most respondent excitement was organic food (89%), followed closely by ethnic food (84%), on the other side, the food that has shown to be less popular was genetically-modified food (82%) and convenience food (69%). At an intermediate level, we found functional food with 58% of people in favour.

Organic food as well as ethnic food tend to be more expensive than conventional products, although it is not rare to see a high consumption index. It is already known that degree holders will have more money to spend, resulting in the economic power to buy these foods. According to education, 52% of the respondents have college university degrees. The next group of 33% is educated with vocational, technical or general, upper-secondary levels. 11% possess a master's degree, primary and lower secondary school and, finally, one person has a PhD.

At first, it was thought that the price in the H2 would be the factor of great importance in this study. However, the results indicate that statistically speaking, society does not see the price as a priority, although the mean for price was 3.57 in a scale of 1 being not important and five being very important, was. During the Pearson correlation analysis, the price only took communion in a meaningful way with society, since a highly-significant value equal to 0.000, while the relationship with the other quantitative variables presented values all above the alpha level.

The H3 showed that geographical origin is of great importance. It was

observed in the Pearson correlations that this variable had very good connections practically with all other variables, giving us several interesting facts. It is not strange to see this, as it is well-known that during times of crisis people tend to commit to support local products even further when domestic products are more expensive than foreign. The brand was another interesting variable, which showed enough statistically significant data for the experiment.

It was observed during the research that data can vary substantially from one category to another. For example, the correlations that exist within the times that people look at the quantitative values of the food labels varies. This is statistically significant when we talk about gender, which may indicate that either men or women look at labels, but not both. The results did not show statistically significant differences between young people and adults.

5.2 Contribution to Science and Practice

This research can contribute to science from the theoretical point of view, giving information to the people about what is a FF or GMF. The mysteries can lead to misunderstanding. Because of this, it is important to be timely about new advances and discoveries that scientists make. From the practical point of view, people can surprise themselves according to the answers they proportioned to this research and see that facts are not as they may be imagined.

The present study found interesting data which is telling us that the population of Maribor, according to a 200 people sampled, can be divided into these four groups: 50 women with ages between 18 and 35, 50 men with ages between 18 and 35; 50 women aged 36 to 55 and 50 men aged 36 to 55. People tend to be more concerned about the qualitative variables than about quantitative variables and consumption habits. However, some variables, like taste, the previous knowledge of product, branding, appearance of product and the geographical origin are in the foreground. If this research had focused on the age or gender instead of society, the results would have said that H_2 and H_3 would have been accepted according to the obtained result. H_1 would not have radically changed, but, since we decided to study the society as one entity, the results are as we mentioned before: the acceptance of the third hypothesis and the rejections of the first two.

Some of the limitations we found were that people were uninformed that their food is actually genetically modified. In one question, more

than half (51%) responded they actually consume basmati rice which is known to be created in a genetic way. With a larger sample, we would have obtained more accurate results, however, due to time constraints it was not possible to make a more detailed and thorough study.

5.3 Opportunities for Future Research

The information presented can be valuable in the future as a market research. To import a product to the EU, we have seen that there are specific procedures according to the products people would like to import. There are many factors to take into account when deciding to trade products. Most importantly, the EF and GMF, because each country has their own laws and specifications for labels, nutrition compositions and packaging. What it is important in South America can be meaningless in the EU and vice versa.

We saw that OF and EF are the most popular kinds of food for consumers. According to the statistical sample, on the other hand, GMFs and CFs are not of interest to Maribor's population. It would be interesting to see which products could have the greatest relevance in the Slovenian market and which items would not appeal or be marketable to the Slovenian population. Statistical information is the key for this question. When people are uninformed about what they are buying, many times they would rather skip the new item and resort to the well-known item. If consumers would be aware of the characteristics of the products they would certainly give a chance. Now, on the other hand, the crisis in Europe is to settle now which products are consumed through information. Theoretically, the higher the quality of food products and the greater the distance they must travel from geographical origin to consumers, the more expensive they are. We have seen that consumers tend to buy regional products instead of imports in order to support their local economy.

6 Conclusions

It is interesting how some products have such a good reputation, it is not strange that OF is the most popular in Maribor. It seems that the organic trend has made a very good influence on the Slovenian consumers. Everywhere we can see an organic market and apparently people are prepared to pay the price for these products. Another alternative is that families grow these products at home; it is maybe preferable to finish work at the office and then work in the family garden rather to go to a store.

For the EF, which is the second most popular but no so far from OF, we can conclude that in fact consumers would like to have them in their diet. Maybe to prepare their meal at home with these products but not to go out to eat them as we have seen that the majority of the population prefer to eat at home rather than to go to a restaurant. The affection for homemade food could be related to the fact that people seem to be particularly independent since their childhood years. Almost half of the polled live alone or with one more member in the household, but we have to pay attention that some of the people are students which live alone and then during the weekends they like to go home to spend time with their families. It would be interesting to ask them why they prefer to eat at home. If we compare the situation with another country, for example Mexico the situation is totally reversed, people prefer to go out to have lunch during the weekends rather to cook at home, the assumption is that they prefer to relax during Saturday or Sunday in a bar or restaurant because they have cooked and worked the whole week.

If you do not try you do not know how it tastes. Location is an important issue for the people; a vague example would be mini markets, which are positioned in the city of Maribor. The variety as well as the quantity is much smaller than in big shopping malls. The biggest advantage would be the location of them; it is just necessary to walk perhaps a couple of kilometres to reach one. On the other hand, the most im-

portant disadvantage is precisely what they offer and according to the market prices. Some of them have much higher prices than others (a comparison among different stores). It seems to be comprehensible, a better location plus commodity is equal to the increase in price. However, taking into account an example of a French market chain, which is located outside the city, has more variety of products, since it has the regional products as well as the French ones. If we compare prices we can say that it is a little more economic than the big Slovenian store chains. Hypermarkets had the highest attendance among the polled. However, it would be interesting to ask people which hypermarket they attend the most. That question would be interesting because just talking about opinions; it seems that Slovenes would prefer to support the Slovenian market chains rather than variety of the products or even price.

There is something, which was really surprising and at the same time joyful in some way. The number of people who consume alcohol is not high. However, the best news is not this but the fact that the people who consume it practically never drink it before lunch, which is a remarkable thing taking into account that Slovenia is certainly among the countries with the highest consumption of alcohol per person/year.

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