EFORWOOD

Sustainability Impact Assessment of the Forestry - Wood Chain

Project no. 518128

EFORWOOD

Tools for Sustainability Impact Assessment

Instrument: IP

Thematic Priority: 6.3 Global Change and Ecosystems

Deliverable D5.2.4
Summary analysis report on consumers, wood based products and substitutes in the light of the forestry-wood chain sustainability concept including the identification of hot spots

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Final version

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Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Contents

1. Introduction

M5 is the EFORWOOD module focused on consumption research. M5 has a role as consumers´ and customers' pulse detectors. The importance of consumption as a market-driver must be taken into account when researching the sustainability of forest-based industries. Producers need to be closer than ever to markets and end-users, as globalisation implies new challenges and threats for European industries. Consumers and customers are key players for implementing sustainable policies within forest-based industries: the assimilation or refusal towards products may be crucial for the sustainability of forest-wood chains in next years.

2. Objectives

The main objective of present deliverable is to provide an analysis on the behaviour and perception of consumers towards wood based products and their substitutes from the point of view of the forestry-wood chain sustainability concept.

Other objectives:

- to convert former qualitative WP 5.2 research results quantitative, and useful for further analysis of the European consumers.
- to appoint strengths and weaknesses of the FWC at its´ final link as well as the possible knowledge gaps.
- To suggest possible actions that can reduce weaknesses and increase strengths of FWC.

3. Methodology

As present study is based on the results of the deliverable D 5.2.3. which was elaborated upon gathered market information, expert interviews and focus groups, the methodology used in the different parts of this study is suited to the results obtained from the deliverable mentioned hereabove.

The results of the research on consumer perceptions are qualitative (D5.2.3). To obtain the objectives of present document – further analysis – it was important to quantify and prioritize these results by using a technique called factor analysis. Factor analysis is a statistical method that is used to describe variability among the data observed. As factor analysis is an interdependence technique, the complete set of interdependent relationships are examined. The factor analysis originally was of psychometric use, but later on it spread in

sciences of behaviour and other fields that are handling great amount of data such as product management, marketing, social sciences, operations research, that gives a structured format to obtain multiple inputs on a particular issue, and to identify the priorities.

Using factor anaysis the first step was the evaluation of the importance of those aspects which are driving the purchasing decision making processes of consumers and customers of the chosen FWC products: furniture, books and juice packages, pellets.

This evaluation was carried out by the experts of M5; who are the technical partners of Eforwood M5 module specialized in market and consumer research. (Experts of Pöyry, STFI-Packforsk, and AIDIMA).

- Pöyry has almost 50 years of experience in forest industry engineering and consulting. Today, forest based bioenergy is an integrated part of forest industry, together with it's more "traditional" product lines, pulp and paper and solid wood based products. Pöyry has made market studies for 25 years and sustainability/environmental analysis linking also consumers' view for 15 years."

- STFI-Packforsk has for many years been an important contributor to the global research in the pulp and paper area.

- AIDIMA is one of the most prestigious technology institutes of Europe that is specialized for wood, furniture and packaging, having 25 years of experience in research activities in the furniture industry, and 14 years in the field of research activities on the consumers attitudes.

As there is strong relation between the three pilars of sustainability and the consumers´ behaviour; this link is evaluated as the impact on sustainability of costumers´ behavior by the experts who took part in this phase of the work. The majority of real-life situations can be described by using diagrams consisting of a set of points . The two dimensions of the diagram are:

- Importance for the consumer during the purchasing decision making process evaluation: from 1 to 5, where the variable 1 is showing the hot spots of the less importance, 5 is showing the maximum importance
- Impact on one of the pilars of sustainability, evaluated by external experts from 1 to 5, where the variable 1 is showing the hot spots of the less importance, variable 5 is showing the maximum importance. The estimation of sustainability impact of different key aspects is based on the literature review that has been made in previous report, PD 5.2.1. and the expertise of the evaluators

The set of points obtained by using the variables described above is providing us a perceptual map where the most important hot spots are analysed.

The document also contains gathered data on socio-economic characterization of the European consumers.

4. Sociodemographic characterization of European consumers

4.1 Habitants of Europe

There are 493 million inhabitants living in the European Union, this means the third largest market after China and India.
(Source: Eurostat,)

4.1.1 Age structure of European Inhabitants

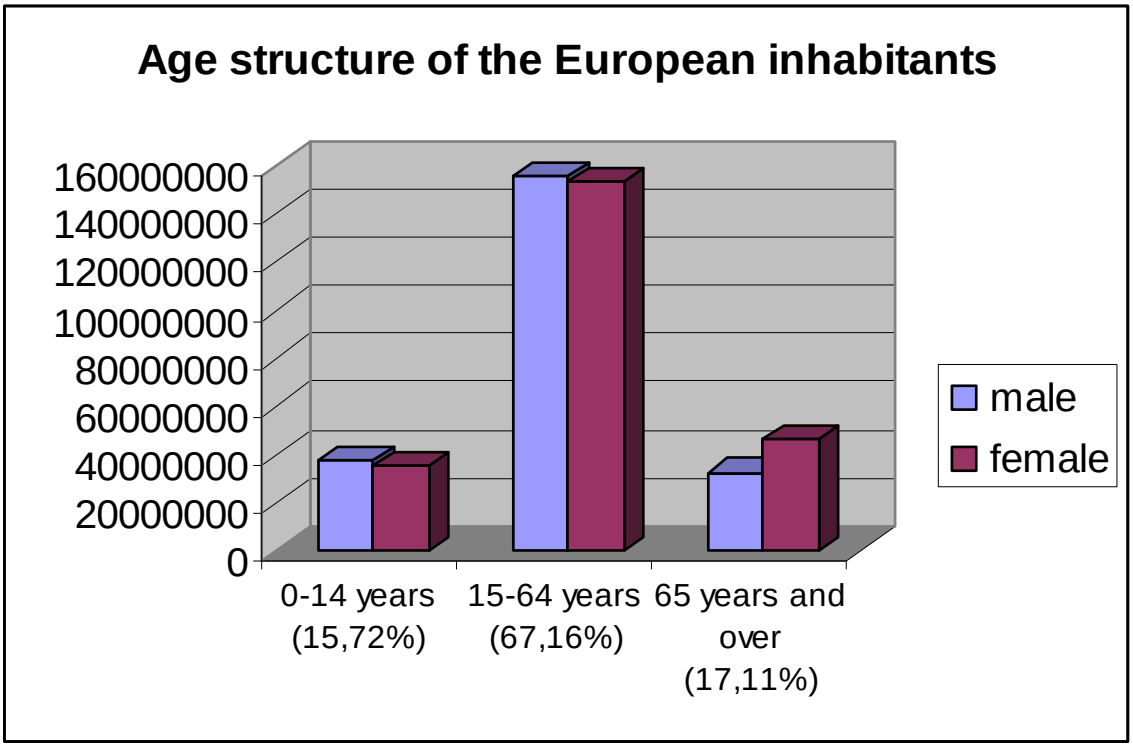

Figure Nr.1.: Age structure of European inhabitants (2007 est., source: CIA)

4.1.2 Aging population and life expectancy

The developed world's share of the world's population is shrinking — from 30 % in 1960 to 19 % in 2003 . 80 % of the human population on Earth is living in the developing world.

Europeans are living longer. Babies born in 1960 could be expected to survive to the age of about 67 (men) and 73 (women). Babies born in 2002 are expected to live much longer – till they are over 74 (men) and over 81 (women).(Source Eurostat)

4.2 Living Standards

Standards of living in Europe have improved significantly over the past decade. Based on the PPS, which makes international comparisons possible, EU standards of living are among the highest in the world.

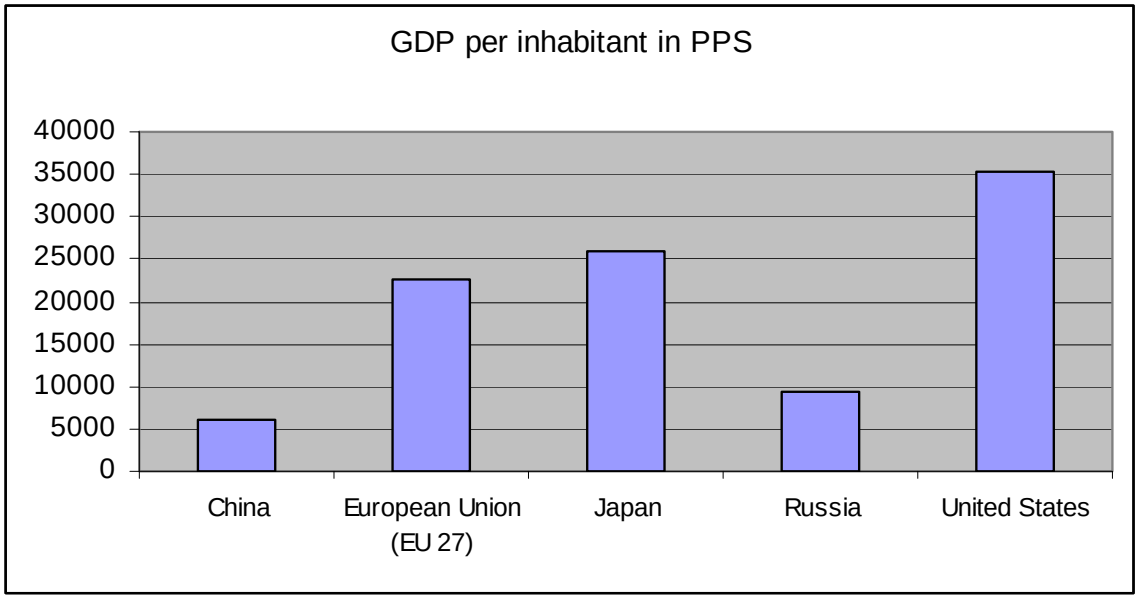

Figure Nr. 2.: GDP per inhabitant in PPS, 2005, Source:IMF, Eurostat

One of the most important available statistical indicators is the comparison of real GDPs of the different countries in Purchasing Power Standards (PPS) for a certain period of time. It is an important analytical tool to compare the level of economic development of different countries.The economic activity of the EU member states is usually compared on the base of GDP per capita. With the fact the GDP of numerous countries can not be expressed and compared by the use of national currencies or by the use of a common currency such as the Euro based on the exchange rates – due to the problem of each country´s different price level – the correction is based on the calculation of the price of a basket of goods and services. The basket that gives a picture of all the economic activities (foreign trade, final consumption, investment, etc...) in each country, is considered as a unit of account, and it worths a PPS a PPS (Purchasing Power Standard), so the currencies of the different countries can be expressed in PPS. This way the GDPs of the different countries can be compared directly in PPS, in terms of volume and the countries could be ranked by wealth produced per capita. As the comparison of GDP in PPS is regularly repeated in the EU, it is easy to analyze the growth rates of different countries between certain periods.

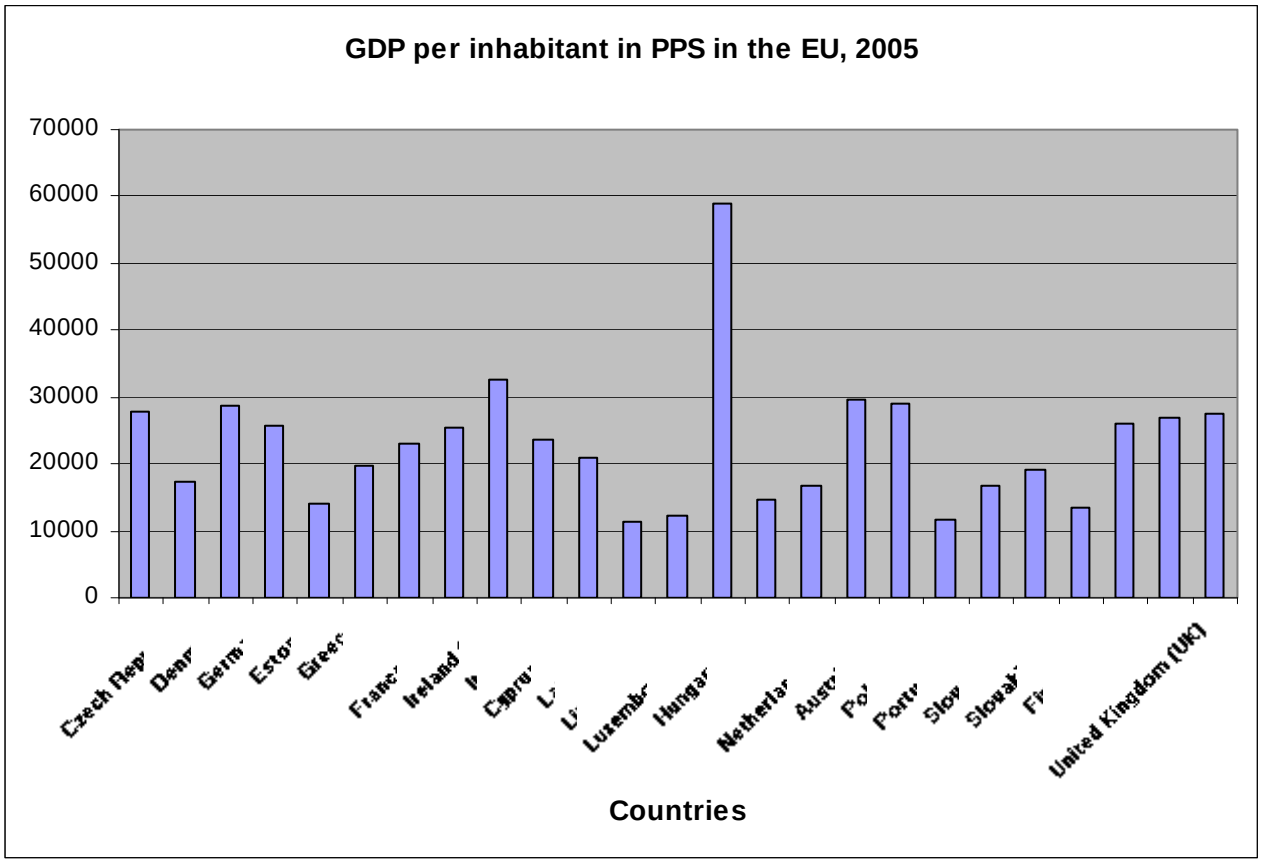

Figure Nr. 3.: GDP per inhabitant in PPS in the EU 2005. Source: Eurostat

Standards of living in Europe have improved significantly over the past decade. In 1995, GDP per inhabitant in PPS (Purchasing Parity Standards) for the EU-25 was 15 200. Ten years later it had grown to 23 400.

In European countries, standards of living are among the highest ones of the world.

The living standards in the EU varies from country to country. GDP per inhabitant (in PPS) is highest in Luxembourg and lowest in Latvia. The EU is striving to strengthen the EU's economy, make it more competitive and create more jobs.

Growth rate of real GDP per capita %

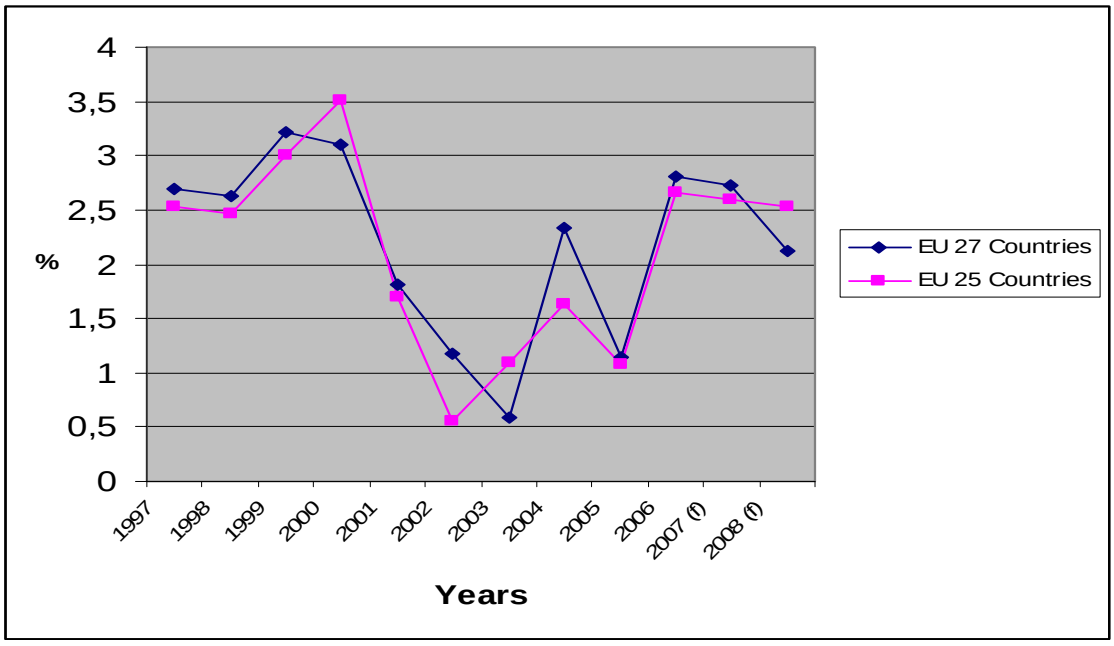

Figure Nr. 4.: Growth rate of real GDP per capita %,(f) Forecast, source : Eurostat

Consumption expenditure at constant prices

index 1995 = 100

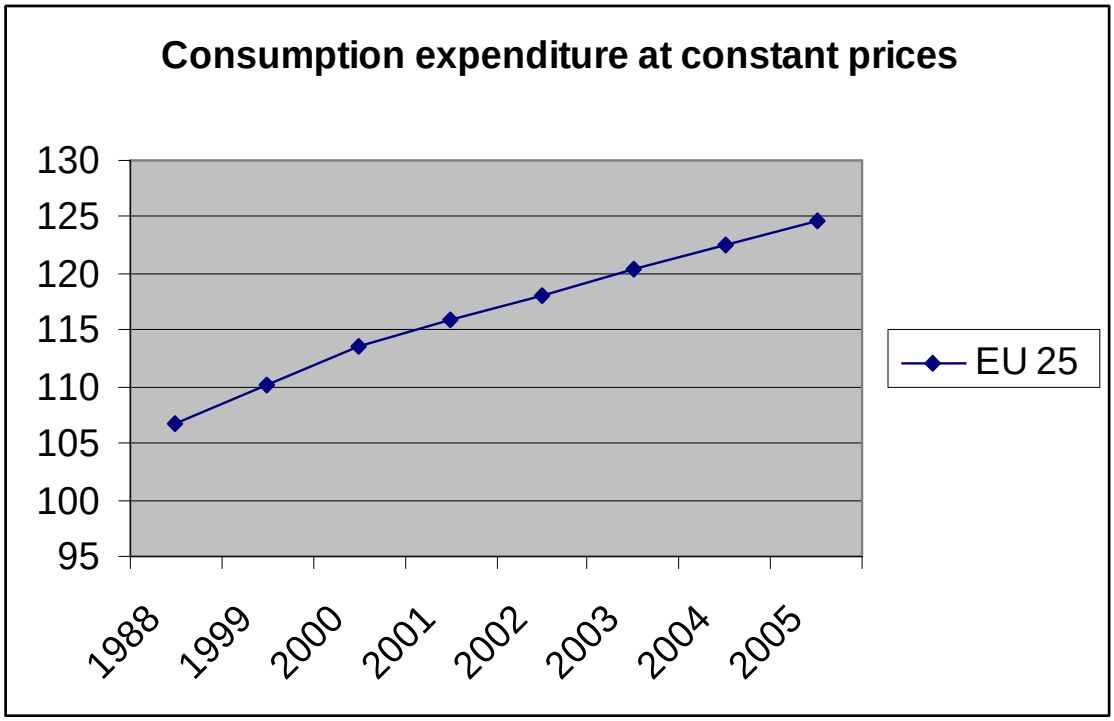

Figure Nr.5.: Consumption expenditure at constant prices (f) Forecast, Source: Eurostat

There is a growth to be observed at the data concerning the expenditure at constant prices. The base is the data from 1995 (100) then in 10 years we can see a very significant, 24.7 % increase for the EU 25 countries.

4.2.1 Employment

In 2005 , 63.8 % of people of working age in the EU-25 had jobs. However, the employment rate varies across the EU. It is also different for men and women.

Employment rate, 2005

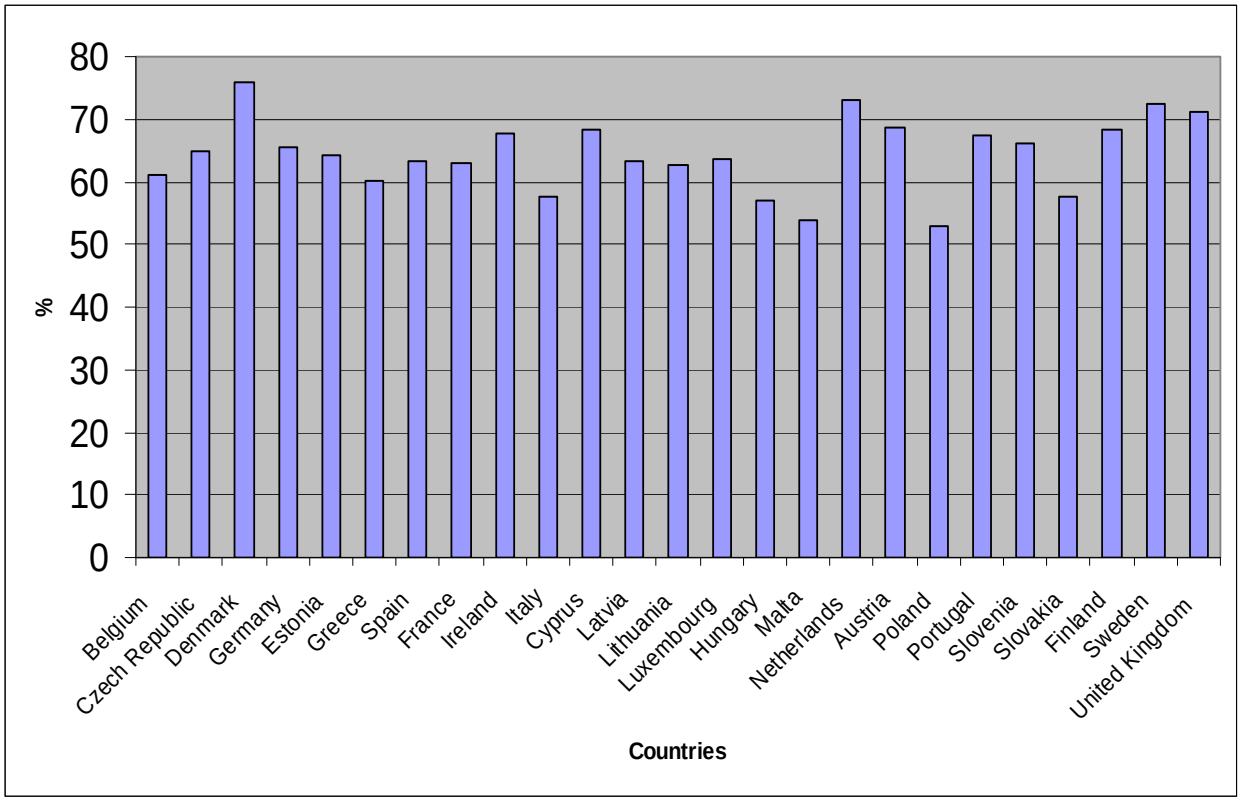

Figure Nr. 6.: Employment rate, 2005 Source: Eurostat, Labour Force Survey, annual average

Employment is quite balanced within the EU 25, meaning that in the majority of the countries, the 60-70 percent of population that is able to work is employed. There are four countries appearing with outstanding employment rates, which have more than 70% of their labour force employed : Denmark, the Netherlands, Sweden and the United Kingdom. There is only one country among the old EU members, which does not reach the 60 percent: Italy.

Hungary, Malta, Poland and Slovakia have joined the EU in 2004 and they are in the group of the lowest employment rate, that are having this number under 60 percent.

4.2.2 Unemployment

Tackling unemployment is vital for the EU. The unemployment rate varies from one country and region to another. In 2005 Ireland had the lowest level of unemployment while Poland had the highest.
Overall, 8.7% of the EU's labour force was unemployed in 2005 , compared with 5.1% in the United States.

Unemployment rate, 2005

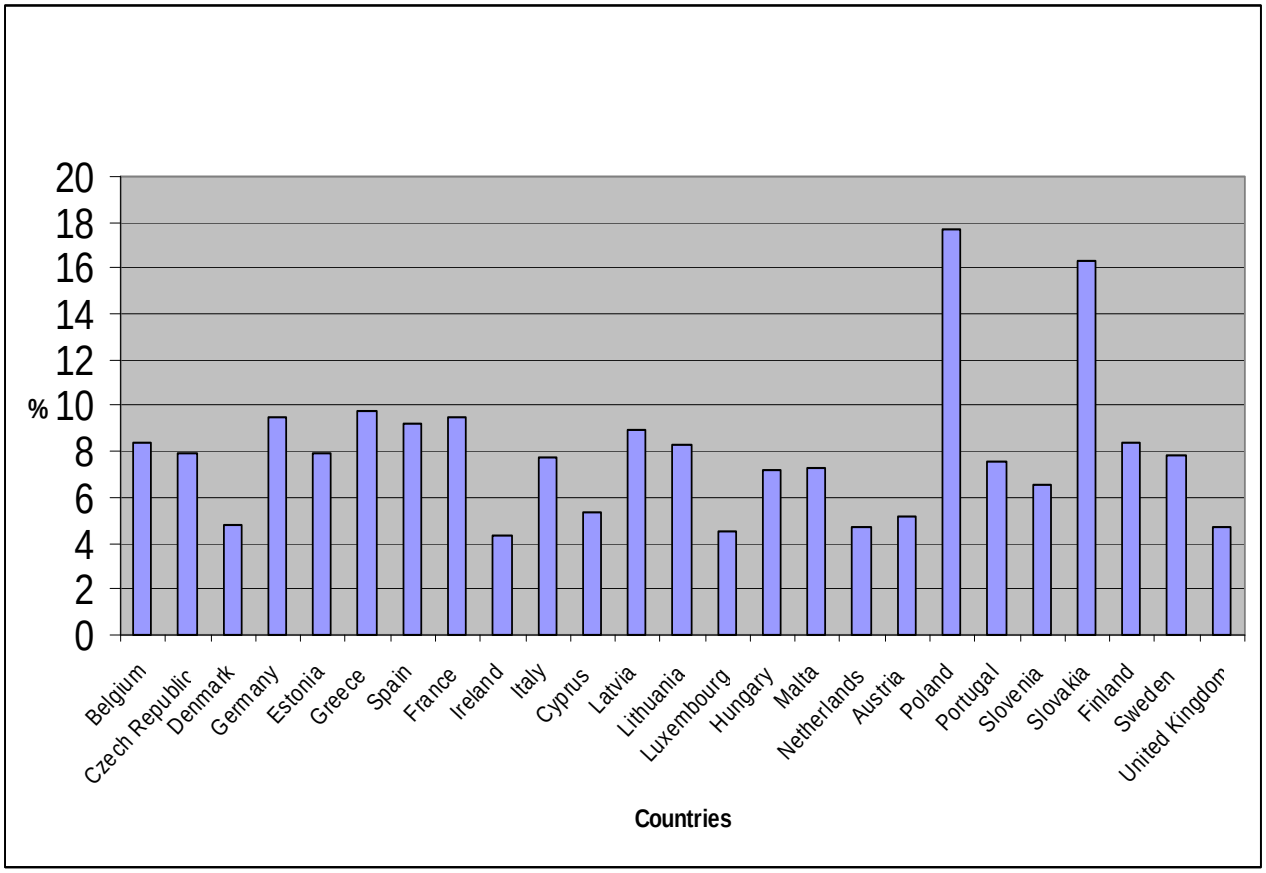

Figure Nr. 7.: Unemployment rate, 2005 Source: Eurostat

The unemployment rate of Poland and Slovakia in 2005 were very high in comparison to the other EU countries, with a rate over 16%. Within the EU Ireland, Denmark, Cyprus, the Netherland, Luxembourg, Austria and the UK have a relatively low unemployment rate: under 6%.

4.2.3 Education

The most up-to-date data available on education is from 2003

Total public spending on education as a percentage of GDP, 2003

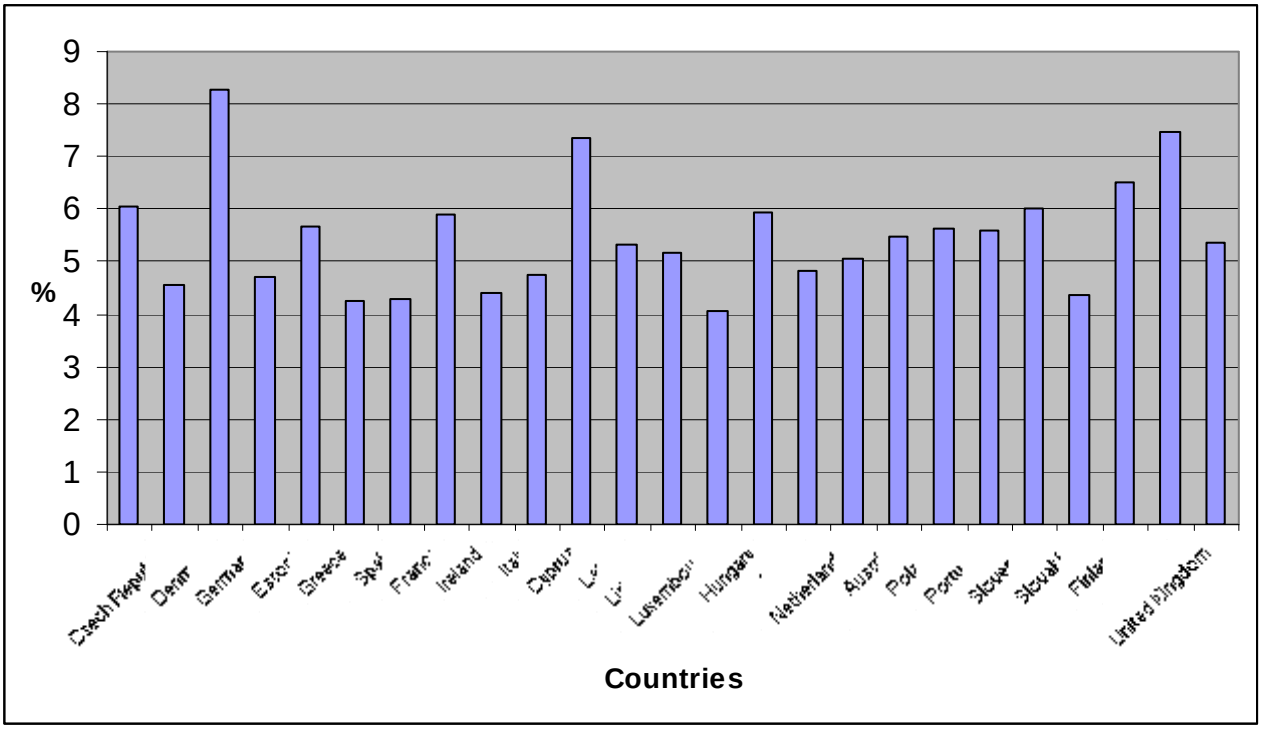

Figure Nr. 8. :Total public spending on education as a percentage of GDP, 2003 Source: Eurostat

Education beyond the minimum school leaving age – and especially at university level – is the key to a satisfying career for many people, and is essential in giving the EU a well-qualified workforce. The good news is that, in most EU countries, more and more 18-year-olds are studying.

Percentage of 18-year-olds in education (all levels), 2004

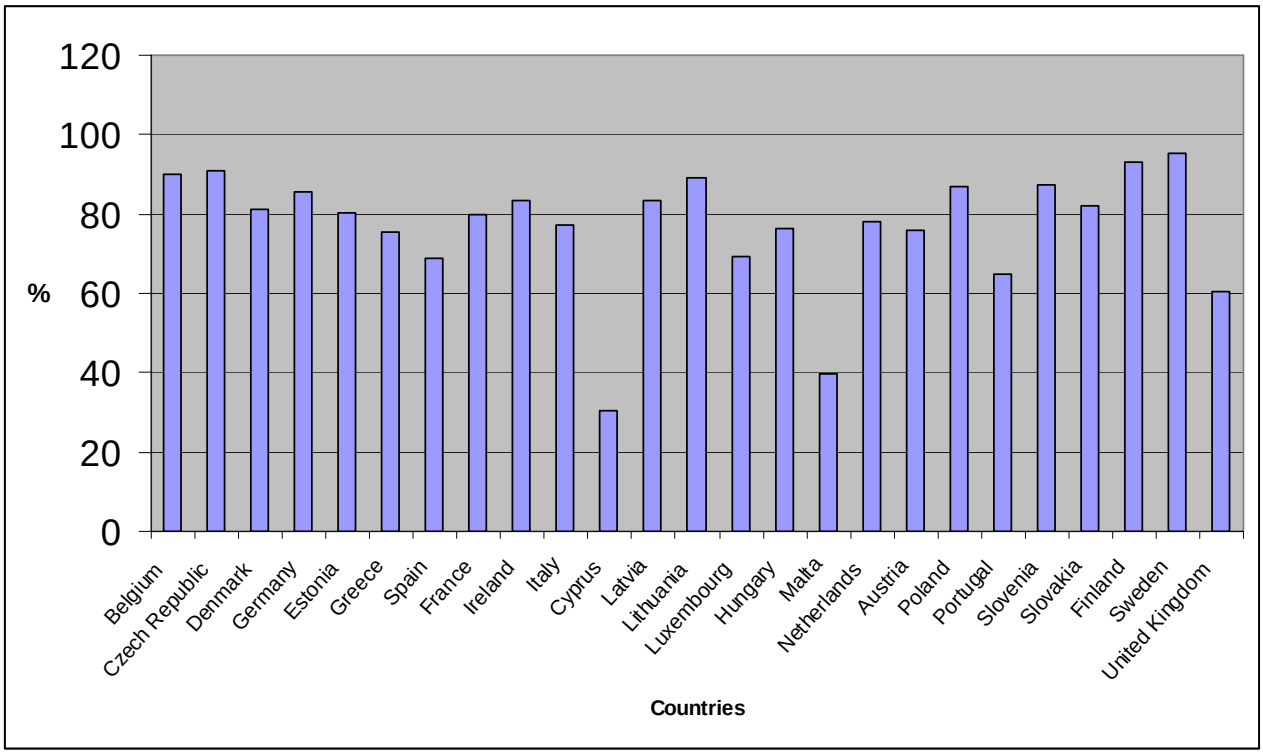

Figure Nr. 9.: Percentage of 18-year-olds in education (all levels), 2004. The figures hereabove do not include independent private institutions. Luxembourg and and Cyprus: most students study abroad and are not included - Source: Eurostat

Unemployment rate, by educational level, EU-25, 2005, for people age 25-64

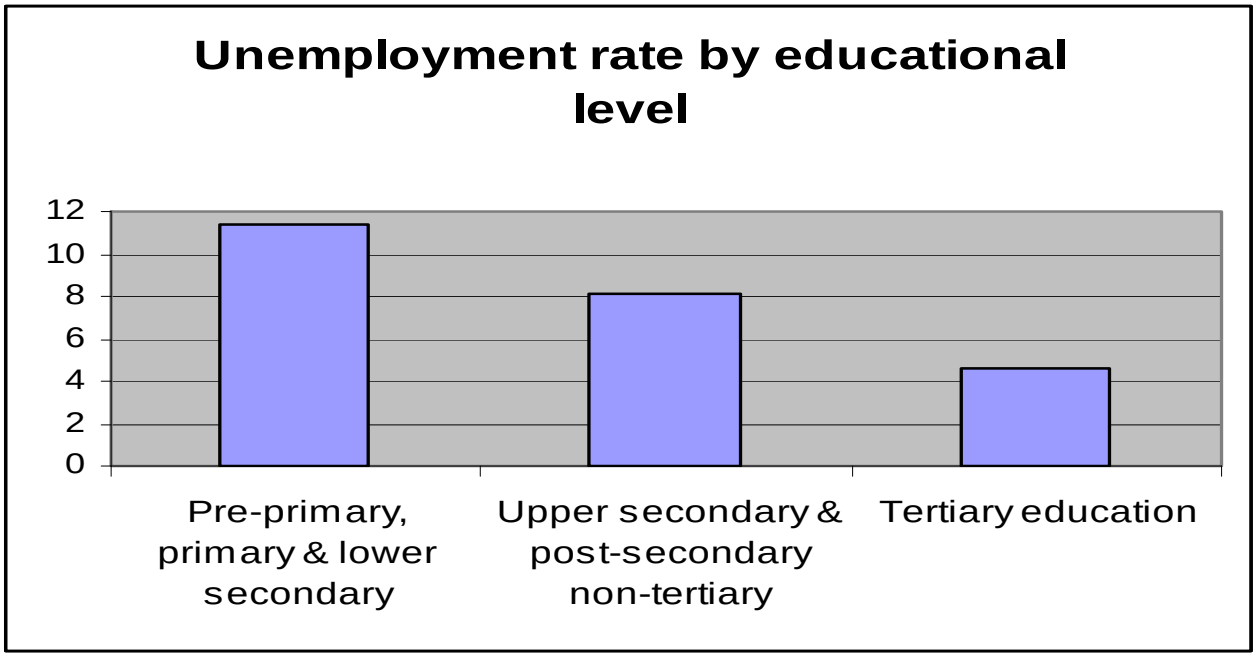

Figure Nr. 10.: Unemployment rate, by educational level, EU-25, 2005, for people age 25-64, - Source: Eurostat, Labour Force Survey, Spring

According to the data obtained on the population characteristics of the EU, it can be seen that the EU is having a well-qualified labour force, a population with stable incomes that generate high consumer demands.

4.2.4 Social care

All European countries aim to be fair and caring societies although each member country has a different form of social model.
European social protection systems are designed to protect the most vulnerable members of the society and are based on the payment of tax revenues (for example; pension, health care and unemployment benefits). The amount spent on social expenses is different in each country.

Spending on four types of social protection per inhabitant in PPS EU-25 (2004)

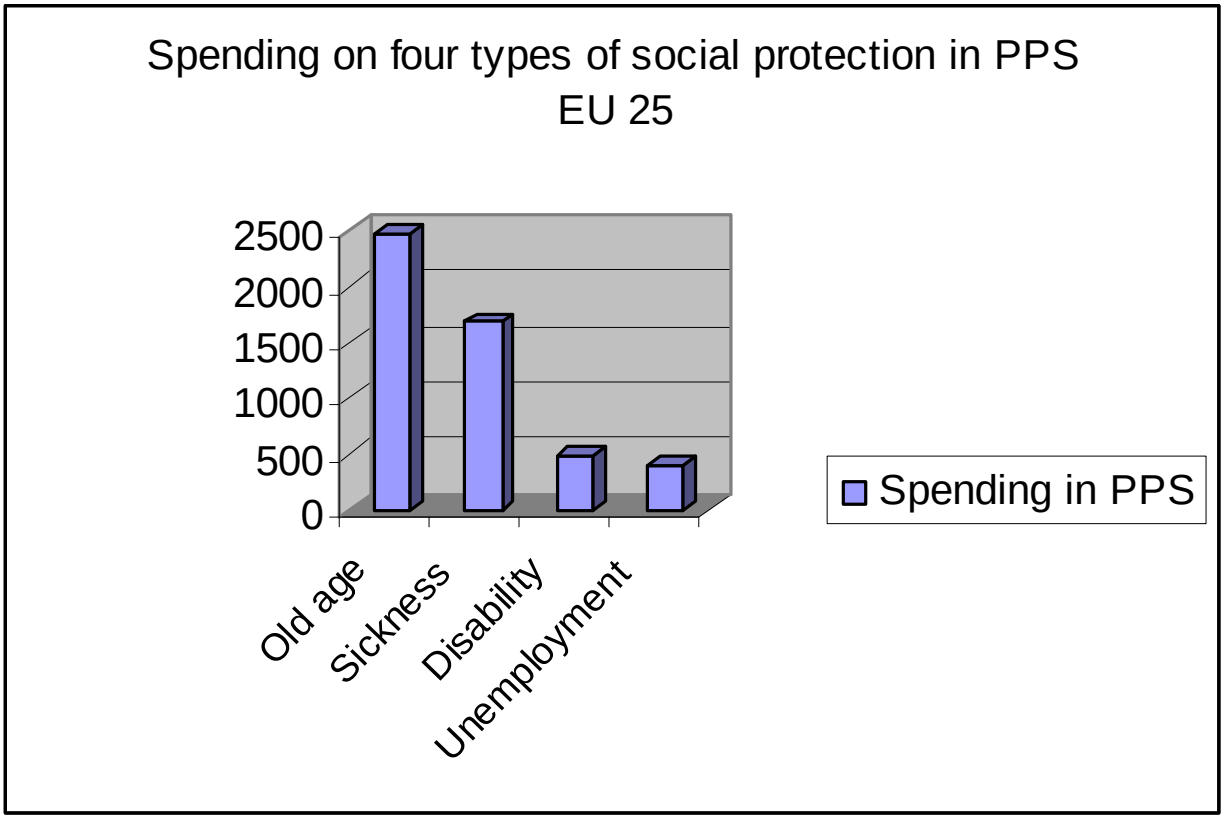

Figure Nr. 11.: Spending on four types of social protection per inhabitant in PPS EU-25 (2004)

For sake of the well being of future generations the fact of the aging population in Europe has to be taken into account, and the social protection systems should be re-designed and modernised in accordance with this trend.

Health Care

Although Europeans are living healthy and long lives, they should protect themselves of the major single death causes: heart disease and cancer.

More men than women die of these diseases in the EU, and the ratio of their occurance is changing by country to country.

The states have to spend great amount on health care due to the effects of aging population and the changing lifestyles.

5. Perception on wood based products

During the former research work conducted within work package 5.2 there was a difference made between the end users and the professional buyers, and there were identified different consciousness levels of end-consumers.
Our former results are also reflecting that in Europe consumers are not valuing only the price and functionality of the products, but intangible assets as well (emotional, social, experience, meta-preferences) and there is also the phenomenon of cultural homogenization, and the globalization of the markets to count with.

The non- conscious consumers have ambiguity about wood as environmentally sound material.
Among the conscious consumers there is a common perception of the end users that wood is environmentally sound.

5.1 Furniture

5.1.1 End Users

The previous study has been carried out mainly in two countries Spain and Sweden. Results that were gathered during survey differ from country to country and therefore should not be generalized on EU level.

Spain
According to the group of elders wood as material is clean, nice, natural and long lasting. The weight is not ideal. Aluminium is easy to clean, but it is not having as good appearance as wood. Wood is expensive, wood is a material that is carrying a value , only glass is estimated to be more expensive. The materials of highest quality are wood and glass, they are followed by the aluminium. Wood and glass are the most prestigious ones as materials, but wood is not unequivocally the first one in the ranking.
Glass is seen as the most aesthetic material Wood is positioned as the second most aesthetic, and some people have ranked it as the second one .
The materials socially most accepted are wood and glass, followed by the aluminium.

The members of the group that consisted of younger people have stated that aluminium is a very functional material for producing furniture, and this is their opinion about the plastic as well. Rattan and cardboard are the less functional ones. Wood and glass are ranked as medium functional materials. Wood and glass are estimated to be the most expensive ones. Some people have indicated wood as the material of the highest quality, but some of them have

indicated aluminium to be at this position of the ranking, and wood was put by them into the middle of the ranking. Spanish consumers have indicated beyond doubt glass to be the material of design furniture, followed by wood and aluminium. The members of the group have agreed on that wood is unequivocally the most prestigious material for furniture.

Advantages of solid-wood furniture in comparison to the substituting products, are the followings: good quality, nice design, warmth, it is a long-lasting material, convenience, social acceptance.

Disadvantages of solid-wood furniture are the followings: high price, maintenance of a living material (humidity, dry…), transport/ disposal.

Sweden

For elder consumers it is important that the furniture's fit into the style of the home. The design and look of the furniture's are important as well as the quality. Many consumers prefer Nordic wood and likes environmentally friendly materials in their furniture's. It is important that the furniture's feels right, attract the consumer in the right way.

The quality, the function and the price are important for consumers when they buy furniture's as well as that the furniture's should be comfortable.

It is considered to be a problem to transport old furniture's to the recycling station, it is heavy and there is a need of a car. When they deliver new furniture's it would be preferable if they took care of the old one's at the same time.

There is a demand/wish for more environmentally labelling and classification of furniture.

Wood is a genuine material and is considered to be an environmentally friendly material. The wooden furniture's have a better look compared to plastic furniture.

For younger consumers the most important key point is the design and look of the furniture's in combination with the price. Other factors that are important are quality and how well the furniture fit into the home. Furniture's that are made of wood are considered good but to "dark and heavy" look are not preferred. Plastic furniture is not popular. Furniture's made of wood are considered to have a nicer look compared to plastic furniture's and are lighter compared to metal furniture's. Wood is a nice material and can easily be redesigned (repaint, adjust its' size, add a screw etc).

5.1.2 Professional buyers

Spain
In the “contract market” suppliers are required a high degree of specialization, not just concerning the manufacture of products, but also in relation to services connected with it. A hotel, as a client, does not just expect the products, it will also demand their installation.

The supplier may present a quote adequate to the client’s budget, good products and a reasonable service. But there are other aspects that determine the allocation of projects. Due to time factors, the flexibility of suppliers is particularly important, flexibility concerning the adaptation of the product design to the project specification and the manufacturing capacity. The exact timing of delivery is also of great importance. Besides, a previous acquaintance with suppliers (especially for international chains) and certain exclusivity are also important.

Quality of the product is another criteria used for the choice of a supplier. Sometimes hotel businesses have a quality department that defines the characteristics of products, however it is those responsible for purchases or projects that decide at a later stage. In some cases, the characteristics of products are defined at the time of the installation project or are detailed when dealing with the supplier. Quality is an essential aspect that determines often what is purchased, but those responsible for purchases in the hotel trade lack objective criteria to determine if a piece of furniture has the quality required. It is surprising that they, despite having some knowledge concerning furniture materials and finishing, do not contrast the quality of furniture. Usually the supplier’s name and previous experience of it at other projects is enough for the hotel trade client to trust the quality of furniture. Ignition chances and response to fire of the different elements in a hotel installation, especially mattresses, is the only aspect concerning technical specification that interests those responsible for purchases in the hotel trade.

Sweden
For the traditional hospital, the most important key point is the price as well as the function in order to satisfy different demands such as wash ability and the ability to pile up the furniture’s during room cleaning. Good wearing qualities are important as well as the supplier agreement.

For the modern hospital, the most significant aspect was design of peaces that suites to the total image of the hospital. Material that peaces were made of did not play any role.

For the hotels, the most important key point is the price. The quality and the design are also important. Environmental aspects are considered, but definitely not significant. Advantages of solid wood furniture compared to other substitute raw materials are: design capabilities, adaptation to projects, ordering systems. Disadvantages of solid wood furniture are the following: fast wearing out process, old image for modern establishments, and there is a need for adaptation to safety conditions for public use of furniture.

Professional buyers are not considering sustainable aspects when purchasing furniture, although may show communicating labels related to environmental concern.

5.2 Fibre based packaging

5.2.1 End Users

The previous study has been carried out mainly in two countries Spain and Sweden. Results that were gathered during survey differ from country to country and therefore should not be generalized on EU level.

Spain
Members of group of elders generally are not very satisfied with the characteristics of packaging of cardboard, and they seemed to be very neutral towards this material. They are not sure if it is recyclable or not. Packaging of juices made of cardboard is not heavy, easy to carry, and to store, but it seems to be relatively expensive way of packaging. The members of the group perceived as the most functional one the glass packaging, but according to some other opinions this material is too fragile and weights a lot. The paper-bsed packaging along with aluminium packaging is situated in the middle of the ranking. Concerning the price the members agreed on perceiving as the most expensive material for packaging juice is the bottle made of glass, that is followed by cardboard-boxes as the second most expensive packaging material for a juice. The cheapest material for juice packaging is perceived the plastic bag. According to some opinions, the material of the best quality for packaging juices is perceived to be the bottle made of glass, but some other opinions have ranked this material to be of the worst quality, because of its weight and the risks of accidents that could be caused by being fragile. At this aspect we have to note, that bottles made of glass are making an impression in the consumers that not only the packaging, but the juice inside of the packaging is of the highest quality; this characteristics of the material used for packaging are transmitted to the product itself. Plastic bags and plastic bottles are perceived to be the materials of the lowest quality. Cardboard and aluminium packaging are considered to be of a medium quality, without any extreme characteristics in this aspect.
According to the group, the best appearance as material for packaging juices are having the bottles made of glass.The group also ranked very high the plastic bags, mainly because of being unusual in retail trade in Spain and also because it is a novelty in packaging for the final consumers. Plastic bottles are perceived to be the less attractive way of packaging from the point of view of aestitics. Plastic bottles are followed by cardboard packaging in the ranking of materials of juice-packaging, meaning the second less attractive way of packaging juices is paper. Aluminium is perceived to have an acceptable

appearance, is situated by the members of the group in the middle of the ranking, it is considered to be more attractive than tetra brick packaging. Socially most accepted material for packaging juices, according to the perceptions of the focus group is glass-bottle, followed by paper and aluminium package.

Members of group of youngers are influenced by the commodity of the use of packaging, they are influenced by the novelty of the packaging and the price is also very important for them when they are buying juice. It is convenient to use tetra brick package, it is not heavy and it is easy to transport and store. Cardboard-juice-box is seems to be relatively expensive, and recycling it is also expensive, more expensive than glass packaging. It is not fragile, and they like the ones that is possible to close again. The members of the group did not have any perception about the appearance of cardboard juice boxes, they preferred the glass bottle. The members of this groups have perceived that the most functional packaging for a juice is cardboard box because of being convenient for using it in the everyday life, it is of lightweight, easy to transport, and easy to store. The cardboard-juice packaging was followed by glass packaging, even if the perceptions of this material were negative from the point of view of functionality, because of being a material heavy and fragile. The packaging of plastic bottles were ranked in the middle. According to the opinions of some group members: it is lightweight, and it is easy to recycle. glass packaging for juices are the most expensive ones. A bit less expensive but still perceived to be expensive, is ranked the cardboard packaging. In the middle of the ranking is situated the aluminium packaging for juices, and the lowest price estimated by the group is having the plastic bag and plastic bottle packaging. The group considers as materials of the best quality for packaging juices are cardboard and aluminium. Plastic bottle as material is also perceived to be a material of very good quality, following cardboard and aluminium in the ranking. The material for juice packaging perceived to be of the worst quality: glass bottles because of being fragile. Plastic bags are also considered to be of low quality because of the possibilities to splotch all over.
The bottles made of glass are perceived to have the best appearance. Plastic bottles and aluminium are considered in different ways. According to some perceptions plastic bottles are very attractive materials for packaging juices, so ranked right after glass bottles, but according to other opinions aluminium is the one that should follow glass bottles in the present ranking. Cardboard packaging is very neutral for Spanish consumers, they are not really like it, but also not refusing it. Glass bottle is perceived to be the material of the highest social acceptance, and also cardboard-juice-packaging is considered to bear a high social acceptance as material for packaging juices.

Sweden
Members of group of elders consider fiber based juice packages light to carry and to be an environmentally god alternative of package. It will be broken down in the nature and is an effective package to transport and to store. Cardboard packages were considered as more environmentally friendly than both glass and plastic packages. Fibre-based products and packages were preferred based on environmental reasons.

For group of youngers the most important key point is the price and size of the packaging as well as the quality of the product. Where the juice will be consumed effects the consumers choice of packaging. When it should be consumed “on the go”, a small sized bottle with screw cap is the choice. For consumption in the home 1l liquid board packaging or 2 dl concentrate packaging (small ones are easier to carry) are chosen.
The survey could identify some common findings:

• Consumers have a practical yet responsible attitude towards packaging
• Consumers like paper and board packaging best
• Plastic packaging has some important advantages in the consumers’ eyes.
• Consumers say that visual impact is an important but not decisive factor when buying a product
• Consumers still perceive over-packaging to be a problem, but this does not prevent them from product purchasing, and environmental issues are not a decisive factor in consumers’ purchasing decisions
• Consumers believe that paper and board is the most environmentally-friendly packaging material

• Consumers say they would like to see an environmental rating on packaging
• Consumers’ views on communicative packaging showed national differences. In general however, consumers prefer silent than audible interaction with packaging
• Consumers claim they would be willing to pay a premium for more functional or more environmentally friendly packaging

The most significant aspect while talking about the gap between end-user expectation and satisfaction reached is in package functionality. Having in our mind that European population getting older, this aspect might be of crucial character while describing possible future for fiber-based packaging.
The three most appreciated features in a pack indicated by the interviewees in the three surveyed countries are:
• Legible print
• Easy to open
• Recyclability

5.2.2 Professional buyers

The general perception on fiber-based big size packages is that they are easy to recover but they are heavy compared to some of the other alternative packages for juice. Some business buyers from the hotel group presented the opinion that they don’t see either advantages or disadvantages with fiber-based packages compared to other materials. However, while dealing with small packages in mini-bar, glass packages are preferred due to having higher image.
For the retailers and wholesalers the perception on fiber-based packages is that they are cheaper, easier to expose, less problem with leakage, easier to transport and easier to recycle than other materials. Fiber-based packages have good printability, have good functionality in the refrigerated display counter

and are easy to handle. The disadvantage with fiber-based packages is that it's not so easy to vary the design, it's a rather boring packaging, hard to get a unique shape of the packaging and not so flexible. The fiber-based packages has a lower image compared to plastic and glass bottles.

The major findings regarding packaging sector, with emphasis on juice packaging purchased in segment B2B are as follows:

- Packages should be functional and adjusted for current trends
- Fiber-based packages posses low image
- No major advantages with fibre-based packages have been identified in opinions

5.3 Printed materials

5.3.1 End Users

Spanish consumers are considering paperback editions to be the most ecologic ones, and the most functional ones, because of their size, weight, and price. Electronic books are also well seen mainly by the young group, the adults do not like because it is tyring the eyes more than the paperback editions, or other printed books.

Regarding the books, pocket books were preferred by Swedish participants in the survey. The main reasons for their choices were weight, price and environmental aspects. Even though the downloaded format was considered as environmentally friendly, the young group selected the pocket book as the most environmentally friendly format for the books. The main reason for not selecting the electronic format was the usage of batteries and the electronic equipment to enable listening.

Summarising the results for books market indicates that availability of the product is the main issue and this leads to development of new sales channels such as pocket books shops everywhere, internet, e-trade and every day commodity warehouses.
Since the general living pattern is shortage of time new expectations of printed editions have been developed. Books are treated as a fundamental source of information, which is complemented with other sources such as MP3, sounds books, DVD, internet etc.
Competitiveness from e.g. Asia is growing regarding printing and publishing services. This trend is based on local lower costs, acceptable quality and better logistic system.
Generally, no strong requirements regarding sustainability aspects have been recognised. No particular willingness for extra pay for sustainability has been detected.

5.3.2 Professional buyers

Paper books catches the readers attention in a unique way, are pleasant to read, feels safe and the paper book have a long tradition as a information messenger. Visual memory works better with paper books compared to other teaching aids. Paper books can easier get damaged, take a lot of space to store, will sometime rather quick become out of date, are not so easy to update compared to other teaching aid and are expensive. To read a paper book demands time, you have to hold it in your hand and can't do anything else at the same time. The vital issue is content and variation of books. Since customers can choose can choose titles by themselves, this demand is totally fulfilled by providers that follow trends. Wholesalers require environmental labeling and certificates for papers and those requirements is strongly increasing. Accessibility of books is required. Purchasing channels, both traditional and internet based should be well developed.

5.4 Pellets

5.4.1 End users and professional buyers

Traditional alternatives for heating are oil, gas and electricity heating. Most of the interviewees had some of these options in use before choosing the pellet heating. Renewable alternatives for heating recognised by the interviewees are woodchip heat, heat from firewood, geothermal heat, solar heat, heat from wind energy, heat from peat, agricultural bio energy (straw, reed canary grass), and heat produced by energy from waste.

The benefits of pellets compared to other heating options are environmental friendliness and costs. Private users often rank environmental friendliness above costs whereas medium-size users consider costs as the most important benefit. Independence from fossil fuels was also seen as a benefit. The opinions on the importance of utility and performance and social value of pellets vary. The image is not seen as an important benefit of pellets.

The factors the consumers experience as sacrifices in pellet use are mainly time and effort and high investment costs. Pellet heating requires more maintenance and repair than oil heating, some time has to be spent in cleaning ash, and storage of pellets requires room. The investments costs are experienced to be high, but the actual use of pellets is considered inexpensive.

Finding information of product properties is not seen as disadvantage of pellet use, but in some cases difficulties have occurred in finding a designer of pellet heating system or pellet supplier. Psychological costs are not experienced as a problem. In one case a pellet consumer was named freak because of his heating choice, but this was only right after the decision and was not experienced as a disadvantage.

Pellets are seen to have competitiveness compared to other heating options in the future. Explanations users have for their opinions are for example stable price development (this far), increase of oil and electricity prices, limitedness

and insecure availability of fossil fuels, good availability, lack of other good options and development of technologies related to pellets. One barrier in the competitiveness of pellets mentioned is that pellet heating system requires more interaction, like maintenance and cleaning, by the operator.

The interviewees define the concept of sustainability environment-oriented, but agree with three dimensions that were presented during the interview. In pellet heating purchase decision making process, cost and environmental sustainability are on the top of list of the most important factors with some exceptions. In this context, cost refers to costs for the consumer, when economic sustainability covers economic welfare of the whole society.

Economic and social sustainability are not as significant as environmental sustainability. Economic sustainability is considered to have slightly more importance in purchase decision making process than social sustainability. Social sustainability consists of factors such as labour conditions in the pellet industry and corporate social responsibility of the producers. Possible brightening of one's own image does not affect the decision of choosing pellets. The figure 31. shows the main heating purchase criteria according to the interviews.

Differences between countries occur in small-scale users' opinions on importance of performance of pellet heating system. Finnish small-scale users consider it more important than economic and social sustainability whereas German and Spanish small-scale users do not see performance very important. Especially Finnish medium-scale users see economic sustainability as one of the main reasons in choosing pellet heating. They want to support Finnish economy and employment.

The advantages of pellets are the followings: it is a combustible that is environmentally sound, ecologic, and from the point of view of sustainability is satisfying the criteria. Low running cost compared to oil/gas energies, and it is not depending on fossil fuels.

Disadvantages of pellets are the followings: there is a bigger one-time investment (pellet heating system), and a large storage (space) facility needed. The maintenance and cleaning are requiring time, effort and money.

6 Hot spots on sustainability

6.1 Identification of hot spots

Agreed definition in M5 teleconference, and quoted from a letter of the M5 coordinator: “Hot spots indicate strengths or weaknesses in the FWC with regards to sustainability. Hot spots point out areas of action and in some cases need for further studies where knowledge gaps exists.” Related to consumption.

Hot spots were identified for each product group for further analysis. The identified hot spots are affecting the consumption of products of forest based industries. The hot spots are the key aspects that are influencing the behaviour of the consumer during the purchasing process, which are of different importance levels. There are strong links between the three pilars of sustainability and the consumers´ behaviour; which link is evaluated as the impact on sustainability of costumers´ behavior by the experts who took part in this phase of the work and the results are represented in the charts of the chapter 6.4. of present document.

6.2 Differences between product categories

Hot spots are synthesized from the documents on the three product groups provided by the WP partners. This way we can quantify their weight influencing the consumption of each product group.
The synthesized hot spots are considered as key aspects at the consumers decision making process, and consumers´ behaviour in each product group.
There were estimated the hot spots´ importance at the consumers´ decisions and behavior in a scale of 1 to 5 (1 meaning no importance, 5 meaning very high importance) in each product group.

6.3 Evaluation of impact of hot spots to sustainability and their importance for consumers

Second step is to assess the impact of these key aspects – with a scale from 1 to 5 (1 meaning no importance, 5 meaning very high importance) – to the three pilars of sustainability. The evaluation of the impact of each key aspect to sustainability is a constant value for each product group, estimated by the experts of Pöyry, STFI Packforsk and AIDIMA.

The results of quantifying the weight of the hot spots of consumption of the different product groups can be combined with their estimated impact on the sustainability of the FWC, of all the three dimensions of it.

By the quantified information we have obtained by combining the consumption data with their estimated impact on the three dimensions of sustainability we can demonstrate the consumption related consequences in each product group. In the annex Nr. 1. can be found all the key factors of the buying process and their impacts on the three pilars of the sustainability. Herebelow we are analyzing the compressed general data of the impacts on sustainability of the consumers´ behaviour that we have obtained from the charts of the chapter 6.4.

6.4 Analysis of the results obtained from the charts

6.4.1 Furniture

6.4.1.1 B2C

At the analysis of the hot spots on furniture consumers we selected the hot spots that from the point of view of importance to the consumers are changing with the highest dynamism. In case of B2C the most dynamic hot spots are those that are meeting the requirements of consumers. The furniture buyers currently have high expectations.
With the fact the lifestyles in Europe are changing, the consumers are not expecting only a functional furniture, but also a flexible product that could be adapted to the changes in the consumers´ lifestyles. They are not only expecting a functional and flexible product but also a multifunctional one that can be fit into the concept of optimizing living spaces.
The consumers of the 21st century are also expecting emotional values apported by the furniture, and also as the function of their home is changing, it is a place for relaxing, these characteristics also should appear in a modern furniture.
To provide security is also an expected value that a furniture should contain.
Furniture buyers are also demanding during the buying process a unique experience that the distributor should provide.
We also should assume that furniture is loosing its former priority in the ranking of household spendings.
Safety and health is also a value that is getting very important, and this aspect should be examined very well in B2C.
As price is also a decisive aspect at the furniture buying, the producers should not enter into a price-competition with the low cost country manufacturers, but they should differenciate their products and this way apport value for the consumers.

Economic sustainability

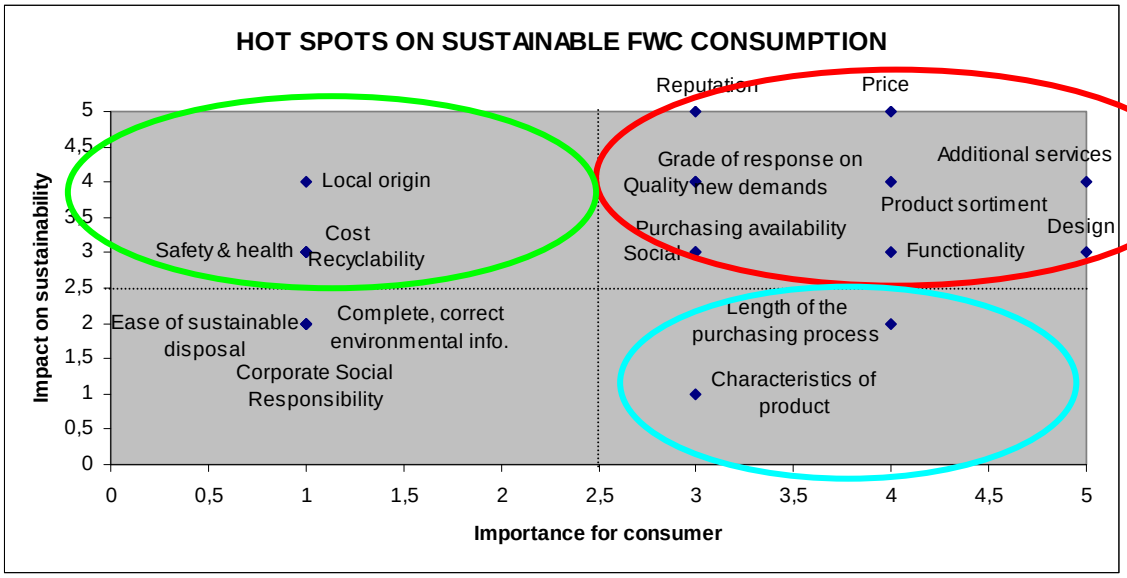

Chart Nr. 1.

The chart above represents the economic sustainability and shows the detected knowledge gaps of consumers as well. These fields are within the zone of the green circle and they have a great impact on economic sustainability but without a significant consumer interest. These aspects are the followings**: local origin, costs of waste management/recovery, safety and health, recyclability.** The interest of consumers towards these aspects should be increased and the company has to meet these risen interests of their buyers.
In the red zone are the aspects that are very important for the consumers and are having a great impact on economic sustainability. These are the aspects where furniture industry, in case is not fulfilling the requirements of it´s buyers should get stronger, and make efforts to meet the consumer demands for sake of economic sustainability. Red zone factors: **reputation, price, grade of response on new demands on European macro trends, quality, social acceptance, functionality, product assortment, design, additional services, purchasing availability.**

Local origin: is not important for the buyers but from sustainability point of view it has great impact with the fact the maintenance of local productive activities are ensuring that the activities will not be expanded using more, new resources and are creating new partnerships, increasing the competitiveness of local industries. There is also an important characteristic of this hot spot that the companies should communicate it for their clients and this way it could get increased importance for them, and increase the economic sustainability of their products this way.

Safety and health: as European buyers are having a growing interest in the products´ influences on their health, they are more and more exigent in this question, so the consumption of the products that are fulfilling the criteria is growing. This aspect is having a great impact on economic sustainability

because meeting the regulations is increasing the production costs and weaken the price-competitiveness of the producers, but together with the growing consumption and offering a product with a value that is differentiating it from the cheaper competitors, the industry might increase competitiveness, and it's economic sustainability.

Grade of response on new demands created by European macro trends: is having a high importance at the buying process, and have high impact on economic sustainability; there are very deep changes to be observed nowadays in Europe; the population is ageing, one-person households are very common, the family models are not traditional anymore, time is a limited asset, that is very valuable, people are more mobile, and there are new migration trends that are also giving new colours to the traditional tastes. According to these changes the homes are changing, the structures of the homes are changing, the lifestyles are changing, the consumers´ preferences are changing. From economic point of view these new demands should be detected and there should be quick actions realized to reach sustainable prosperity. This aspect is connected to the functionality of the furniture.
Price: Is very important for the buyers as it is a very deciding criteria for them. It has an impact on economic sustainability, because the competitiveness of the European producers are depending on their ability to adopt their prices and products to the new, globalised competitive environment, where they have to compete with the imported goods from low cost countries. This competition can be won only by taking into account the quality/price ratios, cause European consumers want products of high quality, with values provided.

Reputation: is a weapon in the product differentiation. As the European furniture manufacturing companies have no opportunity to enter into a competition with the cheap imported products from the emerging countries, they should focus on the reputation as a tool to provide the consumers a product that is meeting their changing demands.

Design: To meet the changing consumer preferences, the companies have to include in the design of their products an other hot spot that is also showing great dynamism which is functionality, into the direction of multi-functionality. The consumers of the 21st century like surprising solutions. Companies which have recognized this demand an add details which are meeting the requirements have a great opportunity to increase their economic sustainability.

Length of purchasing process: Consumers´ changing lifestyle and their limited time does not allow long waiting periods, they do not want to waste too much time by selecting it, and they would like to have immediate access to the selected product, and not waste too much time by selecting it.
Even if this hot spot is not appearing to have a direct impact on the economic sustainability at the moment, this aspect should be taken into consideration as a

factor that is very important for the consumers that could increase the competitivity and through it the economic sustainability.

Social Sustainabilty

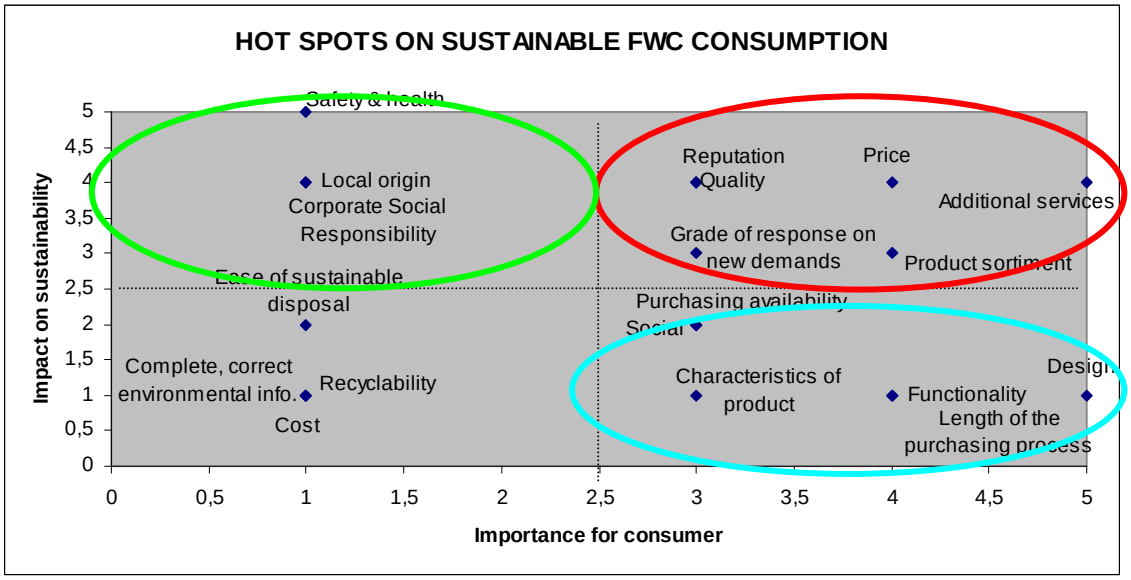

Chart Nr. 2.

The chart Nr. 3. is showing the aspects that are influencing the social sustainability of the furniture industry. The grade of the influence of these aspects is different, we are taking into account the ones that are having a great impact on social sustainability. According to their importance for the consumers they are also differenciated. The aspects in the red circle are the ones with high importance for the consumers and of great impact on the social sustainability. Companies should be keen on meeting the requirements that are expressed for sake of being socially sustainable. The aspects that are crucial to buyers at their decision making process and are also having a great importance from the point of view of social sustainability are the followings: **additional services, product sortiment, price, reputation, quality, grade of response on new demands created by European macro trends (ageing population, one-person-households, time shortage, mobility, migration).**

The green field shows the aspects which consumers should pay more importance to in the future due to the high level of their influence on social sustainability. It is supposed that after the consumer importance level increase or in the meantime the industry is developing itself to be able to serve the interests of social sustainability. These aspects of the green circle are the followings: **safety and health** – which is an aspect with the highest grade of impact on social sustainability – , **corporate social responsibility, local origin.**

Former research activities of Eforwood within WP 5.2 differ conscious and non-conscious buyers. In case of conscious buyers there are detected a high importance of the aspect: safety and health at the decision making process.

Safety and health: This aspect has very high impact on social sustainability, and there is a growing consumer interest to be observed in case of furniture, as the European living standards are getting better. Buyers are living together with their furniture, and they expect them not to contain any material that could harm their health or cause them injuries. It is also important at the buying process not to buy products that are causing health problems during the production for the manufacturing persons. Modern consumers are refusing those products that can not meet the safety and health regulation at consumption and at production. This hot spot is in close relation to other hot spots such as **functionality** and **design** as well; **functionality** is an aspect that is important but has no significant social sustainability impact, even if together with the **design** it can be seen as an aspect with high influence to it with the fact the ergonomics of a furniture is affecting the users´ health. Design will be analyzed later on as an individual hot spot that might influence social sustainability and not only through ergonomics.

Corporate social responsibility: is a concept in which producers take into account the interests of the entire society by taking responsibility for the impact of their activities on consumers, employees, communities and the environment in all aspects of their operations. It is supposing voluntary steps to improve the quality of life of employees and their families as well as for the local community and society at large. For consumers it is not important at the buying process, but due to it´s great impact on sustainability, the furniture industry should inform their buyers to have this concept as a criteria for the future to increase the interest of end users.

Local origin: is very important for the well being of European communities where furniture production provides living for numerous people of the employed European population, so this aspect has a very high impact on social sustainability, end users should have more information on the topic to consider it as a decision making factor at purchasing, and as a factor to maintain workplaces in Europe. **Local origin:** production based on local resources, also means a more effective transport system, this way less harmful emissions, less transport costs, so contributes in a very active way to ecological economic and social sustainabilities. In case customers would prefer furniture of local origin, local producers would have an advantage at the local market compared to the producers of products of non-local-origin. It would give a boost to the sales of furniture of local origin, and the producer enterprises could arrange new investments, their expansion to further markets is not necessary.

Additional services: As European consumers at furniture buying are expecting more than a product, they would like to receive extra services such as maintanence after buying, transport before and after use. This way additional services give further working opportunities for more people and not only to the ones that are working directly in the sector, that is why this aspect is considered to have high impact on social sustainability, and consumers demands are high

concerning this aspect, so industry should pay attention to this factor and deepen their envolvement in this aspect.

Product assortment: is important for buyers and to provide them a great variety of products is supposing great producing and storing capacity that is accompanied by an increased number of workers, and also those could have increased buying options as well of lower incomes.

Purchasing availability: This hot spot is related, or could be related to three other hot spots: the **local origin, length of purchasing process** and the **product assortment.** The increasing demand on a short delivery time and opportunities to select from a great variety of goods due to consumers´ lifestyle changes detected in Europe, the availability and assortment of a product are depending on the storage capacities in case it is delivered from a long distance, or on local production to keep short delivery times. As the local origin and product assortment are having great impact on social sustainability through generating workplaces, this hot spot is changing dynamically and for the near future it is foreseen to impact sustainability of a higher grade than the evaluated level.

Design: Design, as explained earlier is increasing social sustainability but not only through the aspects of ergonomics, but through the requests of consumers for additional services. A furniture as a product has to carry more values than an individual product, it has to presented at the sales points in an adequate way, and the distribution has to take into consideration the growing interest of consumers for intangible values that mean interior design that is generating the necessity of skilled human resources.

Environmental Sustainability

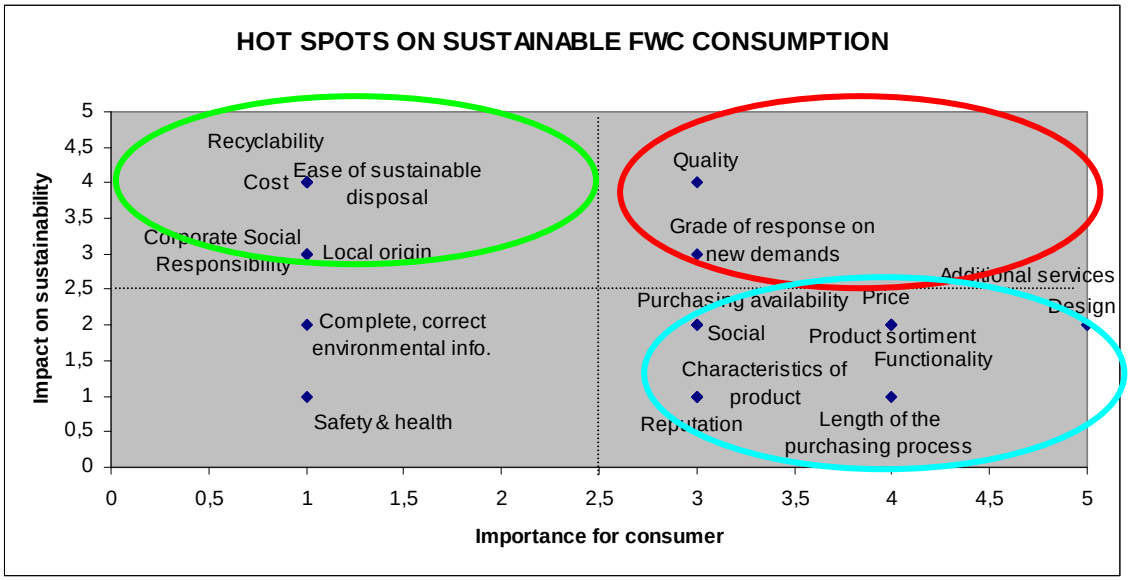

Chart Nr. 3.

The chart Nr. 4 represents the aspects that are having impact on the environmental sustainability. The red fiels aspects are the ones that are taken into consideration by the consumers and are having significant impact on this pilar of sustainability. These aspects are: **quality, and the response grade on new demands created by European macro trends.** The green field contains the aspects which have to be increased from the point of view of consumer importance because are influencing at a very high level the environmental sustainability. These are the following aspects: **costs of waste management/recovery, ease of sustainable disposal, recyclability, local origin, corporate social responsibility.**

Costs of waste management/recovery: high impact on environmental sustainability, but consumers are not taking into account this aspect when they are purchasing furniture. It is not important for the end users, until they do not have to bear it. The waste management costs are increasing the final product-price, this way weakening competitiveness, but as soon as consumers get aware of their responsibility in this matter, or the producers would bear the waste management costs, and would inform their buyers about it, this aspect could become a factor that is a decision making one becoming a differing aspect at purchasing.

Ease of sustainable disposal and recyclability: Has really high impact on environmental sustainability and the dynamism in other sectors of this hot spot is very high. This dynamically changing trend has not appeared yet in the furniture industry, but there could be observed slow initials of it. These are also aspects that are generating additional services and in the future might increase competitiveness. Through informing the consumers of the importance of these aspects and creating value for them through providing products that are recyclable and through the service that is making them easy to get rid of their old furniture, these hot spots will become important for the consumers as well when they are selecting their future furniture.

Local origin: production based on local resources, also means a more effective transport system, this way less harmful emissions, less transport costs, so contributes in a very active way to ecological economic and social sustainabilities. In case customers would prefer furniture of local origin, local producers would have an advantage at the local market compared to the producers of products of non-local-origin. It would give a boost to the sales of furniture of local origin, and the producer enterprises could arrange new investments, their expansion to further markets is not necessary.

Quality: consumers are looking for products of high quality as their demands are increasing in this aspect, those products will have long term competitiveness which have the expected durability and consumers can not complain concerning the quality. This also means that those companies

producing furniture of high quality will have buyers in the future that ensure their future prosperity, and production will not cease to exist. The quality is also meaning no emission at all during the use of furniture.

The contribution of furniture to the environmental sustainability is mainly based on the manufacturing of it. First of all the emission of hazardous materials. Here we can have a long list of emissions. We can talk about the level of emissions to the atmosphere of volatile organic compounds, wood particles, etc… flow of residual waters, other residues like varnish rests, board rests. Noise is also a hazardous emission during the manufacturing processes that is causing problems for the environment. An increased consumption of resources and raw materials during the producing processes of furniture is also causing charges for the environment. The consumers should be aware of the existence or non-existence of these factors as well at product selection. Technology development in this sense is extremely important, to improve the environmental sustainability.

6.4.1.2 B2B

Professional furniture buyers who usually represent hotels, hospitals, schools, offices and any kind of furnished public places have different criteria as customers for the furniture industry than B2C clients. Their preferences are based on additional services. Hot spots related to additional services are the ones that are changing with the highest dynamism in this segment.
As producers´ B2C market is decreasing due to the globalisation and to the increasing competitiveness of the emerging countries´ furniture industry, the manufacturers are obliged to turn to this market segment and extend their activities in accordance with the demands of this group of customers.
Manufacturers have to change their former approach and they should develop their services in accordance with the special requests of their new target group.

Economic sustainability

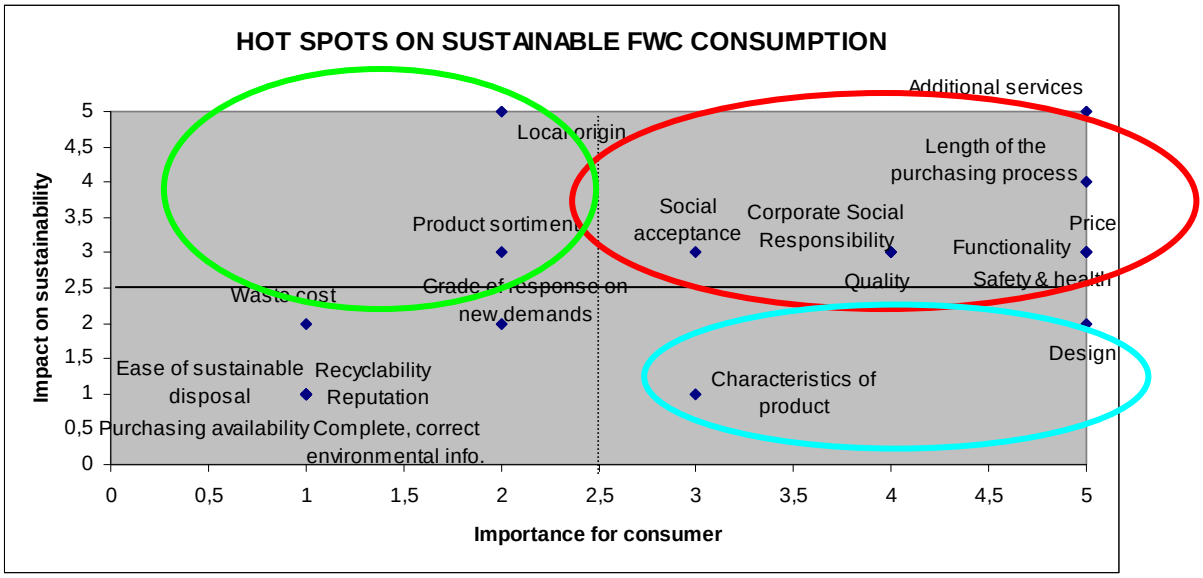

Chart Nr. 4.

In the chart nr. 6., the field marked by the red circle is showing the most important factors taken into consideration by professional buyers and their impact on the economic sustainability, so furniture industry should focus on meeting these factors and developing to meet these demands for sake of an economically sustainable further prosperity.
These aspects are the followings: **Social acceptance, corporate social responsibility, quality, safety and health, functionality, price,** and the outstanding aspects are **additional services and the length of the purchasing process.** The green field is representing the knowledge gaps, where the customers are not aware of the sustainability aspects. **Local origin and product assortment** are these two aspects where the knowledge gaps are detected. These aspects are not valuated by professional buyers in accordance with their impact on economic sustainability.

Local origin: productive activities based on local resources mean a more effective transport system, this way less transport costs. Also means a wider range of **product assortment** and a shorter delivery time **(length of purchasing process)**. Combining the already existing customer preferences with desired ones signed by green colour, **(local origin** and **product assortment**) these aspects are changing with high dynamism and in the future they will turn into hot spots that are bearing high importance for the customers. In case customers would prefer furniture of local origin, local producers would have an advantage at the local market compared to the producers of products of non-local-origin. It would give a boost to the sales of furniture of local origin, and the producer enterprises could arrange new investments, their expansion to further markets is not necessary, so this hot spot contributes in a very active way to economic sustainability, as it is changing in accordance with the preferences of the professional buyers.

Safety and health: concerning this hot spot professional buyers are very exigent, because there are several technical, safety and health standards that the products used in public spaces should meet. This hot spot is quite important of quality point of view as well. In case furniture producers could fulfil the prescriptions and meet the demands of this market segment their competitiveness is getting increased and their economic sustainability is guaranteed.

Additional services: this aspect is having a great impact on economic sustainability because through providing different services is increasing the cross-sectoral cooperation, use of resources could be optimized**.** **Design** could be also an additional service provided by the producers, with the fact the product should fit into the design-concept of the building which requires a passive attitude from the producer, but this is changing: there is a trend to be observed currently that producers also provide the service of interior design, and through the active participation in defining the concept of the interior they could increase the number of products sold, so their competitiveness is growing, and design is becoming an aspect that is not only important at the buying process but it is having great impact on economic sustainability.

Length of purchasing process: Professional buyers are preferring those products that they do not have to wait for, but can have instant access to them. This aspect is supporting to strengthen the **local origin** hot spot as also a very important factor from economic sustainability approach with the fact it means a short payback period, so the profitability of the producers is guaranteed in a shorter time that enables the company to arrange inversions.

Social sustainability

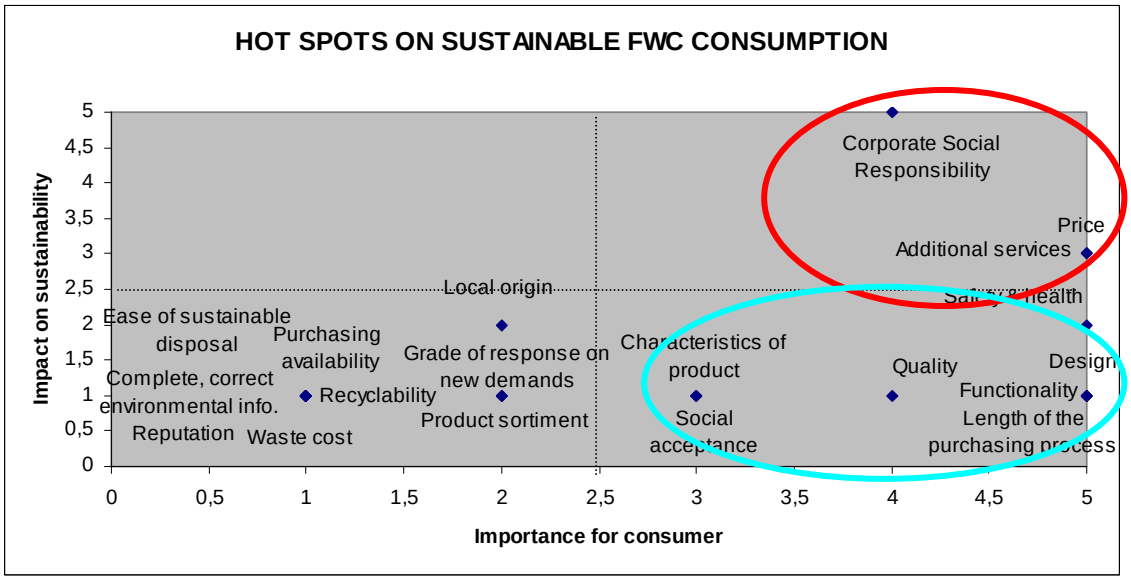

Chart Nr.5.

Chart Nr. 5 shows the poor impact on the social sustainability of the customer preferences. These are: **price and corporate social responsibility, additional services.**

Corporate social responsibility: has great impact on social sustainability with the fact the producers are taking into account the interests of the entire society and buyers also would like to demonstrate publicly that their company is socially responsible. Actually there is a trade-off between the value added by **corporate social responsibility** and **price**. This balance should be provided by the producers. For professional buyers the **price** and **additional services** are the most important aspects. From the point of view of social sustainability these aspects are having great impact, additional services because besides through inter-sectoral cooperations workplaces are created transportation, additional services are giving opportunity to reduce the final **price** of the product.

Environmental sustainability

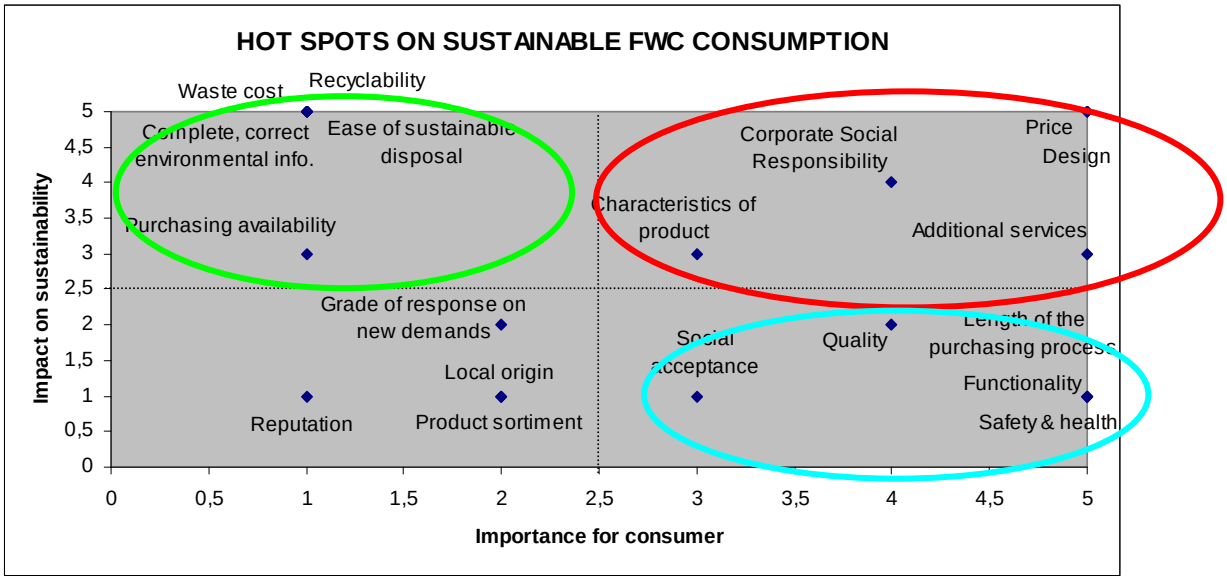

Chart Nr. 6.

The chart nr. 6. is representing the effects on environmental sustainability of the decision making factors and their importance for the buyers. The field surrounded by the red circle is showing those aspects that the industry should meet when they are planning an environmentally sustainable future, these are the following: **Characteristics of products (performance) corporate social responsibility, additional services, design, price**. Design and price have the highest importance and the highest impact on environmental sustainability.
The green line surrounds those aspects which represent the knowledge gap to be covered. These aspects are**: purchasing availability, ease of sustainable disposal, complete, correct environmental information on labels, recyclability, costs of waste management.**

Ease of sustainable disposal: nowadays professional furniture buyers are not taking into consideration the ease of sustainable disposal at the buying process,

but their attitude is changing together with the increasing importance of the **additional services** but it has a great impact on environmental sustainability because getting rid of the used furniture in a sustainable way due to the reduced quantity of waste is obviously environmentally sound and is an essential component of environmental sustainability.

Costs of waste management: even if professional buyers are not considering it as an important factor, and they would like to avoid to bear these costs, it should be taken into consideration with the fact the impact on environmental sustainability is clearly seen.

Recyclability: is also an aspect that has a very important influence on environmental sustainability because the quantity of waste can be reduced by a significant amount, and is also gives an .

Complete correct environmental information on labels: does impact the environmental sustainability but professional buyers should also give an importance to this aspect. The reason why it is not important for the professional buyers is the lack of confidence concerning the information held by the labels.

Additional services: Additional services mean a circle of services that are more centralized getting provided to the buyers. These services are from transport services through installing to the disposal of the used products (**Ease of sustainable disposal**). By providing a well organized and centralized variety of services, the level of harmful emissions could be decreased, also quantity of waste by a modern waste management can be reduced. (**Costs of waste management**)**.**

Corporate social responsibility: has very important impact on social, but also on environmental sustainability. Socially responsible companies are paying attention to the entire society and by reducing pollution and harmful emissions all along the value chain, is already fulfilling the criteria of environmental sustainability so the production is environmentallty sound, this way sustainable. In case the buyer is also respecting the corporate social responsibility rules then also contributes to the environmental sustainability by choosing, consuming a product in an environmentally sound way.

Design: is one of the most important factors for professional buyers in decision making process. The impact of design on environmental sustainability is very high because the design is determining the space occupied by the furniture, that is requiring transport and storage facilities. Closely to design the **Characteristics of products (performance)** is a very important aspect: selecting raw materials that are fitting to the concepts of designers and buyers;

by choosing the most ecological materials for furniture have a great impact on the environmental sustainability.

6.4.2 Fibre based packaging

6.4.2.1 B2C

Economic Sustainability

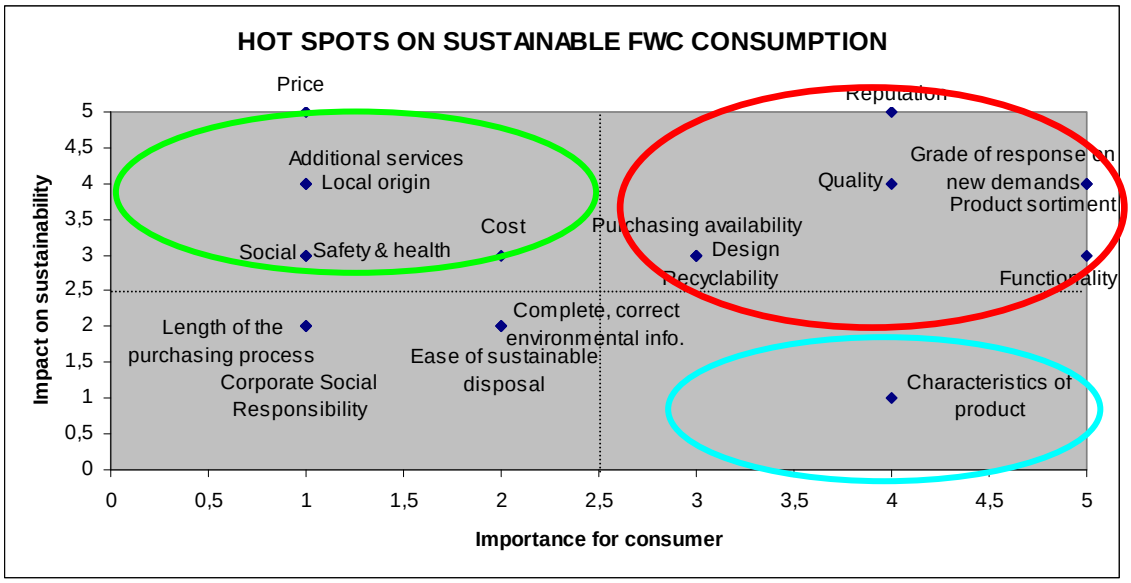

Chart Nr. 7.

Dealing with economic sustainability, we have to mention high **grade of response on new trends** and **functionality** of packaging as having the highest importance for consumers, however they don't posses the highest impact on economic sustainability. Aspect of **reputation** influence sustainability in the highest grade. Other aspects that are placed in the red circle should also be met by the sector in order to secure economic sustainability.
Price, additional services, safety and health as well as **CSR** are of low importance but the have some impact on sustainability in different ways. All of them should be treated as a potential aspects that should be improved by educational, policy related or legislative activities.

Price: Consumenrs are not willing to pay extra for regular packaging because they are focused mostly on the product by itself and not the packaging. But they are sometimes willing to pay extra for extraordinary fuctions that packaging possesses e.g. reclosebility. Price is of the highest importance for economic sustainability so it should be better presented for consumers while new functions, new material properties are added.

Grade of response on new demands: Consumers' life style is being changed, new trends are developed which affects new requirements concerning packaging e.g. small size packaging – "grab-&-go". Sector must know trends and respond to them. The higher grade of response to the new demands the larger segment of market will be satisfied, and therefore it has a significant impact on economic sustainability.

Product assortment, selection: As mentioned previously, there are a huge amount different trends on consumer market concerning life style, food consumptions, goods consumption and those trends request a high variety of packaging. With the large product selection range, the higher number of market segments will be reached and satisfied, and that gives obvious impact on economic sustainability.

Functionality: The right functionality is of very high importance for the consumers, but experts do not realise that it has great impact on economic sustainability. Having in our mind that European population getting older, this aspect might be of crucial character while describing possible future for fiber-based packaging. Experts belive that functionality can modestly influence economic part of sustainability. Reason is that consumer are not willing to pay for it.

Characteristics of product: Characteristics of packages should response consumer requrements, that means to be not too higher, not too lower, but more exact. Difficult to read and excessive/heavy packaging are also among the most annoying features for consumers. The three most appreciated features in a pack indicated by the interviewees are: legible print, easy to open, ease to recyclable.

Social Sustainability

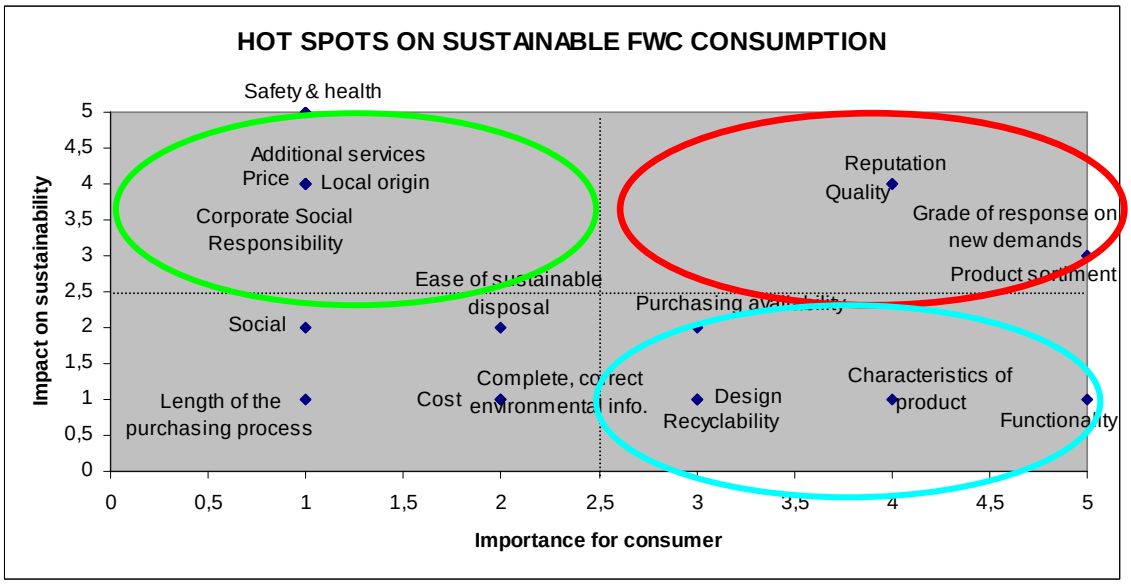

Chart Nr. 8.

Social sustainability of fibre based packaging sector depends on following aspects that are important for consumers: **reputation, quality, high grade of response on new trends** and **product assortment.** Aspects that are placed within the green circle should be recognized as those which have a great potential for movement to the red field.

Safety and health: Consumers do not pay attention how packages are manufactured from the safety and health perspective. Due to well developed regulations and directives for safety and health aspects of production at the factories that must be followed in Europe there are very minor problems with this issue, however it has a great impact on social sustainability of sector in long-terms.

Grade of response on new demands: Consumers' life style is continuosly changing, new trends are developed which affects new requirements concerning packaging e.g. small size packaging – "grab-&-go". Sector must know trends and respond to them. The higher grade of response to the new demands the larger segment of market will be satisfied, and therefore it has a significant impact on social sustainability.

Product assortment: As mentioned previously, there is a huge amount of different trends on consumer market concerning life style, food consumptions, goods consumption and those trends request a high variety of packaging. With the large product selection range, the higher number of market segments will be reached and satisfied, and that gives obvious impact on social sustainability.

Functionality: The right functionality is of very high importance for the consumers. Having in our mind that European population getting older, this aspect might be of crucial character while describing possible future for fiber-based packaging. It's necessary for industry to be recognised as a serious actor on the market, and this includes working with social sustainability issues.

Environmental Sustainability

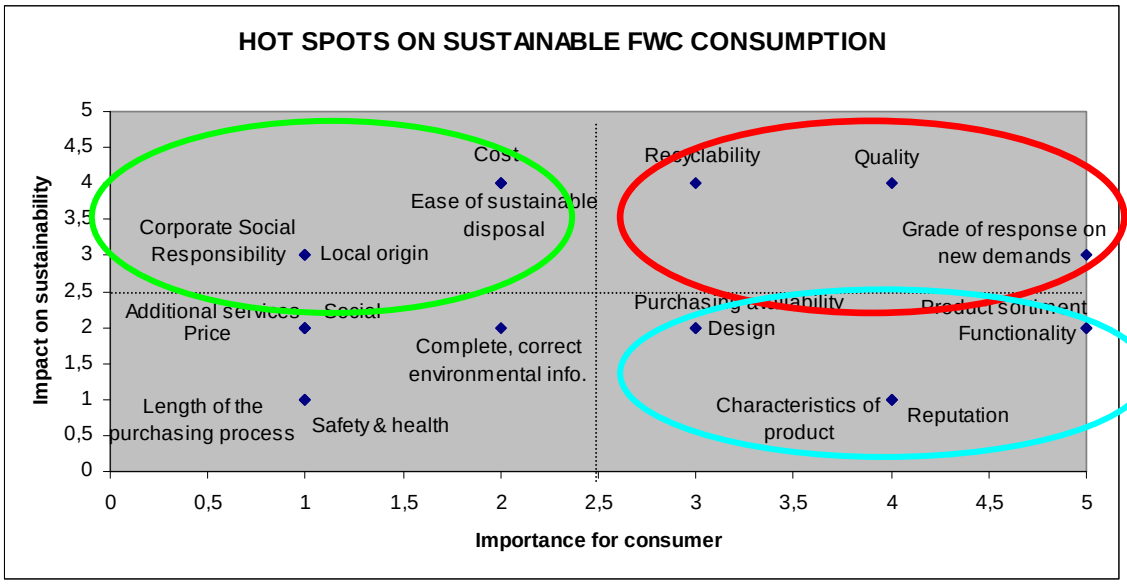

Chart Nr. 9.

Environmental sustainability is highly depending on **quality, high grade of response on new trends** and **recyclability** aspects. Those three key aspects are very important for end-users.
Those aspects that have been recognized within the green field express the fields of knowledge gaps that should be covered.

Costs of waste management/ recovery: Costs of waste management and recovery are not of main consideration for consumers, but does have a high impact on environmental sustainability. Well working systems of collection, sorting and management of waste has a long-term tradition e.g. in Sweden.

Ease of sustainable disposal: Ease of sustainable disposal are not of a main consideration for consumers, but does have a high impact on environmental sustainability. Its of great impotance to have a well working system with a good infrastructure.

Grade of response on new demands: The demographic conditions as well as structure of the society created new trends that have impact on the entire packaging sector in terms of size, material, functions, requirements for shelf life etc. Fullfilling new requrements can directly save resources, energy,

transportations and so on. This has obviously impact on environmental sustainablility.

Product assortment: As mentioned previously, there are a huge amount different trends on consumer market concerning life style, food consumptions, goods consumption and those trends request a high variety of packaging. With the large product selection range, the higher number of market segments will be reached and satisfied, and that gives obvious impact on environmental sustainability.

Functionality: The right functionality is of very high importance for the consumers, but experts' opinion is that it only has a modest impact on environmental sustainability. Having in our mind that European population getting older, this aspect might be of crucial character while describing possible future in the matter of environmetal sustainability of fiber-based packaging.

6.4.2.2 B2B

Economic Sustainability

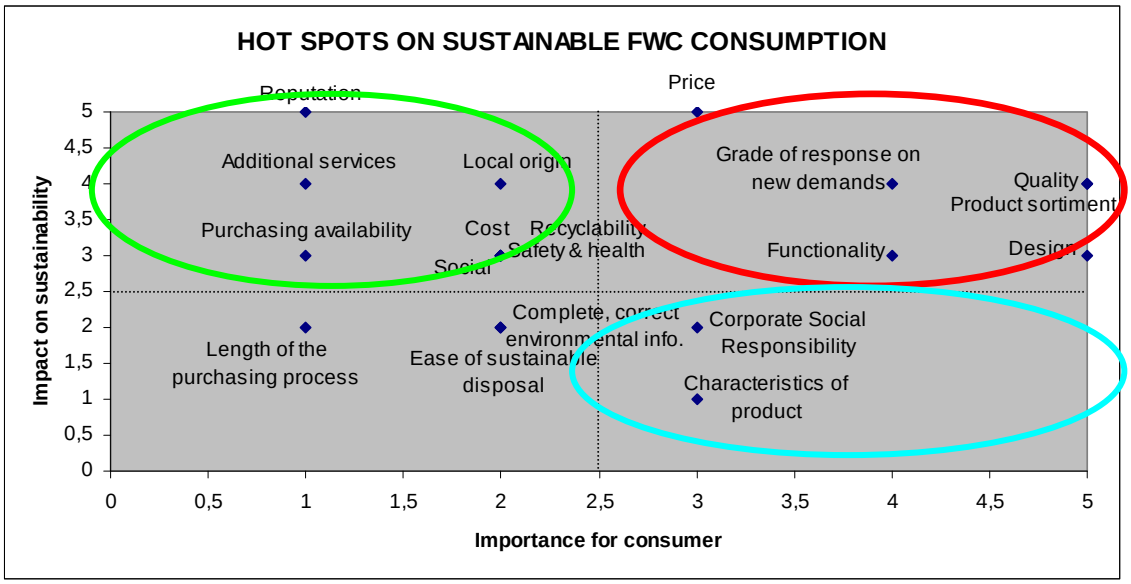

Chart Nr. 10.

Quality, product assortment and **design** are of the highest importance for customers, however influence of **design** on economic sustainability is rather moderate. In the same group, we identified aspect of price witch has the highest impact on sustainability but rather moderate importance for customers. Combination of such different aspects, their impacts and importance can indicate which requirements should be fulfilled by sector in general, but also in

which area each company can improve its performance. **Reputation** possesses very high impact on sustainability but extremely low importance for professional buyers. This area should be taken into consideration for improvement. Aspects within the same category (marked green) should be moved into field marked red in order to secure sustainability.

Reputation: Buying products packaged in fiber-based packaging is considered as environmentaly friendly, which gives status of environmental consciouness. Increasing volume of sold fibre-based packaging has obvious impact on environmental sustainability. Business purchaser are also aware of own "environmental" reputation.

Quality: The right quality of packaging in relation to the product is of greate importance for consumers as well as optimization of packaging. Packages that are not too heavy, not too light, not too thick, not too large, etc. can minimize the use of resources and waste costs and volume. It protects the product in correct way. Business customers are keen to purchase right packaging in order to minimize the amount of product waste.

Product assortment: As mentioned previously, there are a huge amount different trends on consumer market concerning life style, food consumptions, goods consumption and those trends request a high variety of packaging. With the large product selection range, the higher number of market segments will be reached and satisfied, and that gives obvious impact on economic sustainability. Business customers can satisfy the end-consumers and also secure their own economic conditions.

Design: For the retailers and wholesalers the most important key point is variation of packaging size, as well as functionality in order to satisfy different trends such as chilled juices, drink on the go, and health trends. No strong fiber-based packaging preferences have been identified. The disadvantage with fiber-based packages is that it's not so easy to vary the design, it's a rather boring packaging, hard to get a unique shape of the packaging and not so flexible. The fiber-based packages has a lower image compared to plastic and glass bottles.

CSR: Business customers do not pay high attention on Corporate Social Responsibility, but this aspect might be important for further economic development of the region where the sector exists and by that way can assure long-term economic conditions for sustainability for both sector and region.

Characteristics of product: Characteristics of packages should more exactly response consumer requrements. Difficult to read and excessive/heavy packaging are also among the most annoying features for consumers. The three most appreciated features in a pack indicated by the interviewees are:

legible print, easy to open, ease to recyclable. Customers are not willing to purchase packaging that do not respond to consumers' expectations.

Social Sustainability

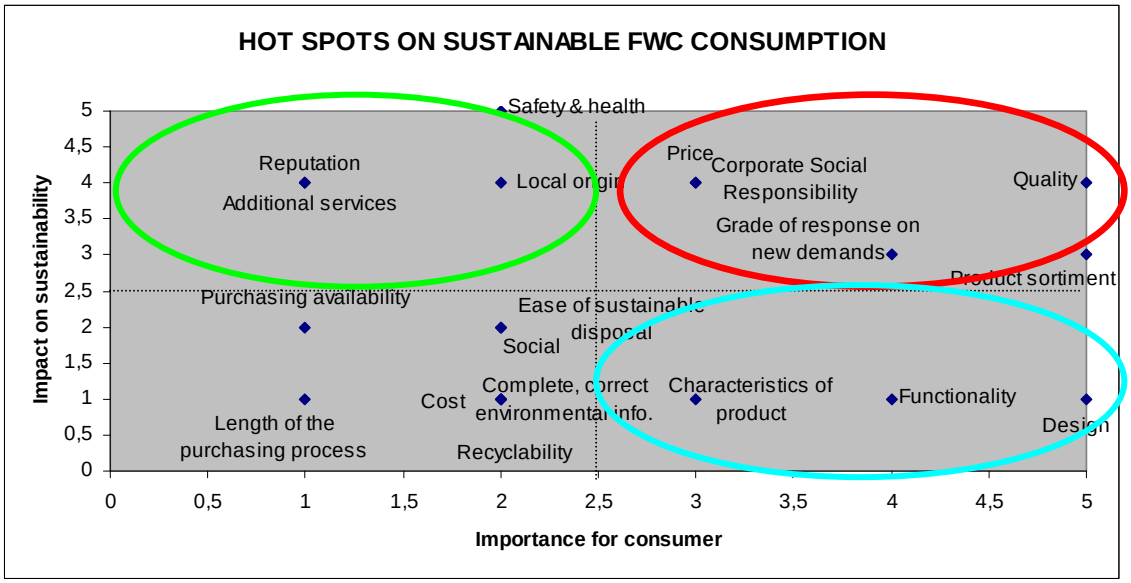

Chart Nr. 11.

Analyzing social sustainability we have to consider **quality** and **product assortment** as having the highest importance for customers. Other aspects are as follows: **price, CSR** and **grade of response on new trends**. Those requirements should be met by the sector in order to assure of sustainability.
Concerning category marked green, so some aspects within this circle should be in future moved to the red field e.g. **local origin** and **safety and health**. Movement requires coordinated activities between sector, local authorities, communities, etc.

Safety and health: Customers pay modest attention to how packages are manufactured from the safety and health perspective. Due to regulations and directives for safety and health at the factories that must be followed in Europe today there are quite minor problems.

Quality: The right quality of packaging in relation to the product is of greate importance for customers as well as optimization of packaging. Packages that are of right quality can carry relevant costs to their functions and support social pilar of sustainability of the sector.

Product assortrment: Customers require that packages industry will satisfy with variety of packages huge amount of different trends on consumer market

concerning life style, food consumptions, goods consumption. Meeting requirements will have an impact of social sustainability.

Design: Customers take design and ergonomic aspects for granted, and expectations are high. Social aspects such as work conditions at warehouse or at retailer are included already in the design stage of the packaging, so this is the reason why impact on social sustainability is also modest.

Environmental Sustainability

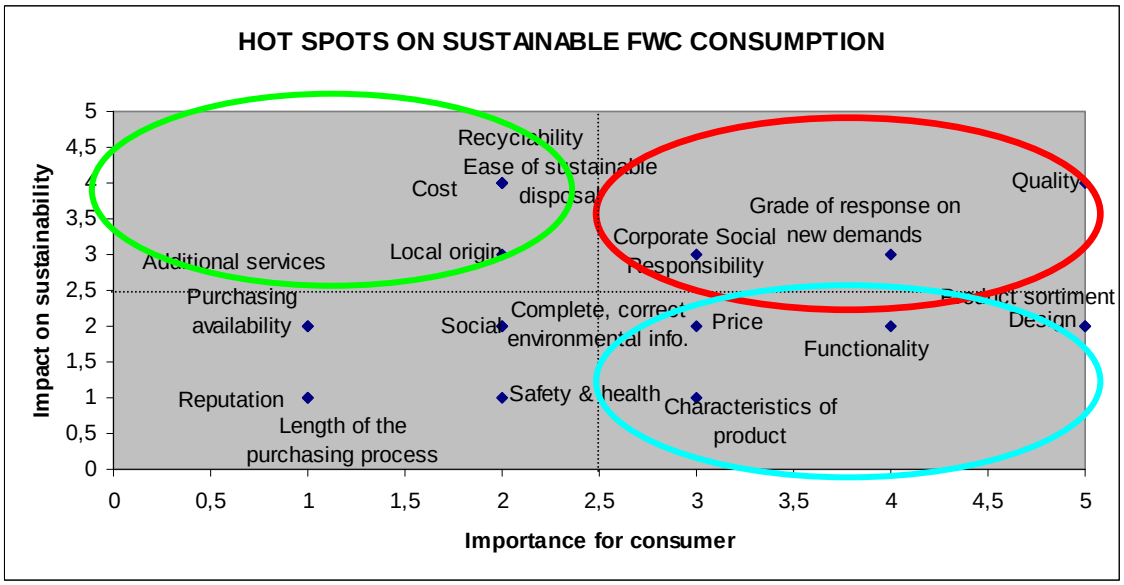

Chart Nr. 12.

Environmental sustainability is highly depending on **quality**, and this aspect is also important for customers. **Grade of response on new trends, CSR** and **social acceptance** posses rather moderate impact but they are of different importance for consumers.
Recyclability, ease of sustainable disposal and **costs of waste management** have the high potential to be moved to the red field. Efforts should be focused on those aspects in order to secure sustainability.

Recyclability: Recyclability is not of highest importance to customers. Collection, recovery and recyclability system is nation-wide regulated and implemented in Sweden, so this is reason why direct impact on sector econmic sustainability is rather modest in this country.

Quality: Environmental sustainability is highly depending on quality, and this aspect is also important for customers. The right quality of packaging in relation to the product is of greate importance for customers as well as optimization of

packaging. For the retailers and wholesalers the perception on fiber-based packages is that they are cheaper, easier to expose, less problem with leakage, easier to transport and easier to recycle than other materials. Fiber-based packages have good printability, have good functionality in the refrigerated display counter and are easy to handle. Proper quality of packaging decreases waste and is positive for the environmental sustainability.

Design: The retailer and wholesailers opinion is that the disadvantage with fiber-based packages is that it's not so easy to vary the design, it's a rather boring packaging, hard to get a unique shape of the packaging and not so flexible. The fiber-based packages has a lower image compared to plastic and glass bottles.

Product assortment: Product assortment are of the highest importance for customers. There are huge amount different trends on consumer market concerning life style, food consumptions, goods consumption and those trends request a high variety of packaging. Satisfying single need will minimize product waste.

6.4.3 Printed products

6.4.3.1 B2C

Economic Sustainability

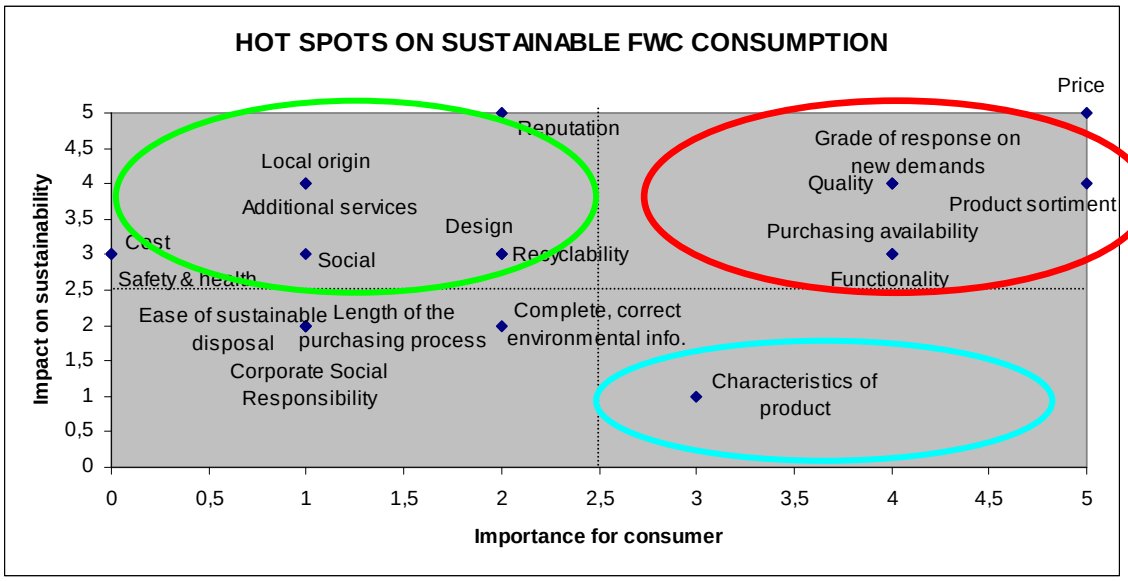

Chart Nr. 13.

For the economic sustainability the most vital aspects, which are also important for consumers are: **grade of response on new demands, quality of products**, which is not the highest one just related to **price** and **purpose of usage,** great **product assortment, functionality** of product and **purchasing availability**. Those aspects are necessary to be met while taking into consideration economic sustainability.

Regarding knowledge gap that need to be covered following aspects should be in focus: **reputation, local origin, additional service, costs, design and recyclability**, and also **safety and health.**

Reputation: Consumers regards paper books to be pleasant to read. Fiber-based books are considered to be environmentally friendly and there is a tradition that books should be made of paper. It's easy to look through a paper based book and to turn back and forward a few pages. Satisfying expectations will secure industry's economic sustainability.

Price: The ranking hierarchy is by the consumers in Sweden is: 1. price and weight (pocket), 2. quality (hardback books), 3. function (sound books). Most consumers prefer to buy paper books, pocket books or hardback books. The choice of book depends on the situation. Pocket books are light, cheap, easy to carry in the handbag and are considered to be the most environmentally friendly paper book alternative. Hardback books stands for high quality and reading for enjoyment.

Product assortment: Books are bought in bookseller's shop, in grocer's store, in department store, in pockets shop and in antiquarian bookshop. Consumers depending on purchasing situations demanding different kind of books e.g. hardback books, pocket books, sound books, etc. Variety of supply of the same title but different kind has a great impact on economic sustainability.

Characteristics of products: When ranking each type of book the pocket book are number one and then hardback books and sound books. Pocket books are cheap and light and you can bring it everywhere. Hardback book gives a better feeling and stands for high quality.

Social Sustainability

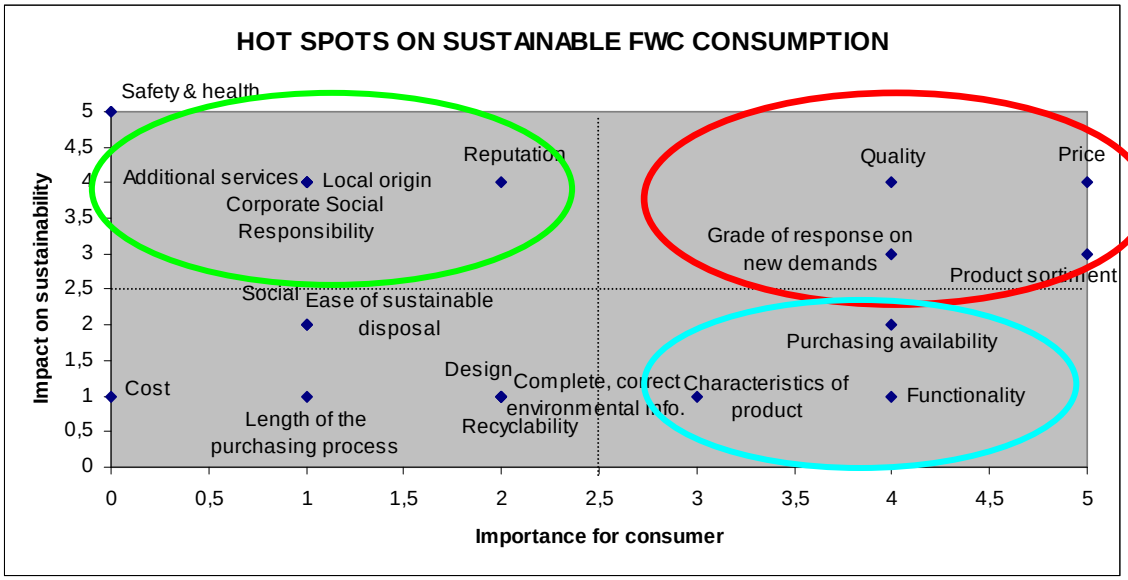

Chart Nr. 14.

Quality and **price** of products in combination with **grade of response on new demands** and product assortment play the main role for social sustainability, and are important for consumers.

Safety and health together with **reputation, CSR, local origin** and **additional services** are areas that industry should focus while covering consumers' knowledge gap.

Safety and health: Consumers do not pay any attention to how or where or in which conditions books are manufactured.

Price: There is no identified willingness to pay extra for sustainable products. Technical quality is not the key value while dealing with pocket books. Price should be moderate and related to quality of books and trends.

Product assortment: High quality content, accessibility on the market, strong variation in titles, and combination with other literature sources such as DVD, LP3, CD are recognized consumers demands.

Purchasing availability: Economy is not crucial while buying books, people are more exposed for campaigns' from different media, the availability of books have increased a lot due to internet and the possibility to buy pockets books everywhere e.g. in bookseller's shop, in grocer's store, at internet bookshops, pockets shop and in antiquarian bookshop. By meeting those demands Industry can be a important part in social sustainability.

Environmental Sustainability

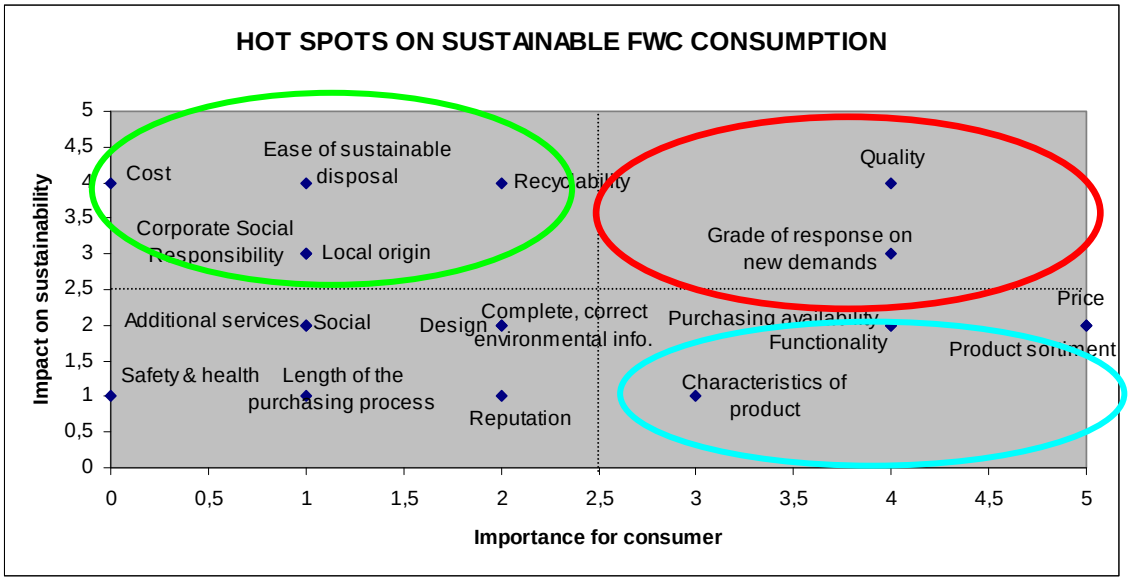

Chart Nr. 15.

For the environmental sustainability **quality** and **grade of response on new demands** is important. Knowledge gap that should be covered exists in following areas: **costs of waste management**, **ease of sustainable disposal, recacybility, CSR** and **local origin**.

Recyclability: Consumers think that because books are made of fibre so they are easy to recycle just as newspapers. It is clearly an advantage for environmental sustainability.

Quality: Following trends have been recognized: higher quality books with color and pictures, more high quality of fact books.

Price: Regarding the books, pocket books were preferred by consumers. The main reasons for their choices were weight, price and environmental aspects. Price should be relevant to the quality and the kind of book.

6.4.3.2 B2B

Economic Sustainability

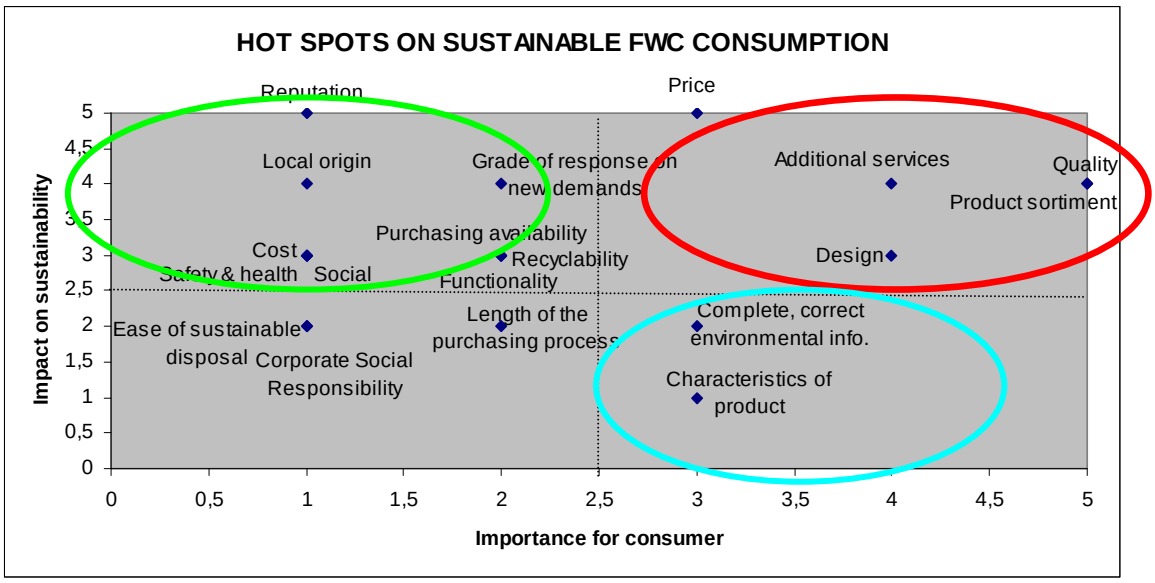

Chart Nr. 16.

For economic sustainability are the most important to be taken into consideration: **quality** and **product assortment, additional service, price** and **design.** Knowledge gap that should to be covered exists within following fields: **reputation, local origin, grade of response on new demands, purchasing availability, recyclability, functionality, costs of waste management** and **safety and health.**

Reputation: Paper books give a total experience, a more visual memory compared to other media. Paper books can be filed away and can also be recycled. Paper books catches the readers attention in a unique way, are pleasant to read, feels safe and the paper book have a long tradition as a information messenger. To read a paper book demands time, you have to hold it in your hand and can't do anything else at the same time.

Product assortment: The vital issue is content and variation of books. Since customers can choose titles by themselves, this demand should be totally fulfilled by providers that follow trends.

Complete and correct environmental info: Publisher and wholesalers request environmental labeling and certificates for papers and those requirements is

strongly increasing. This has obvious impact on economic sustainability. This could lead to exclusion of not certified suppliers.

Social Sustainability

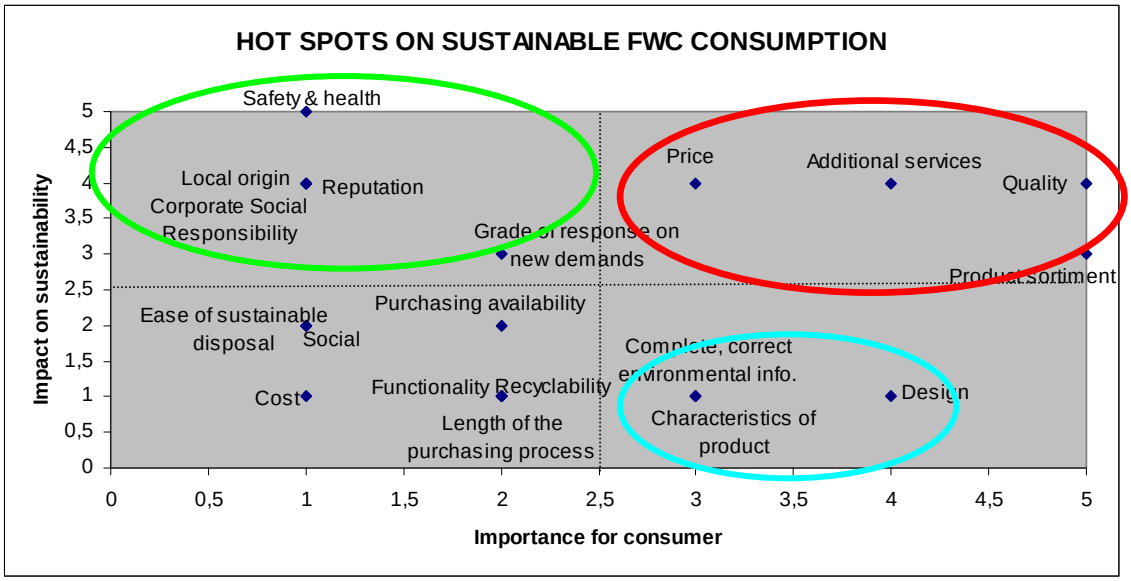

Chart nr. 17.

Social sustainability depends on **price, additional services** and **quality** of printed products**. Product assortment** is very important for customers but has lower impact on social sustainability. There are some aspects that can highly effect social sustainability of the industry, but are of very low importance for the customers. There, educational efforts should be put. **Safety and health** is one of the most important in this category. **Local origin, CSR** and **reputation** as well as **grade of response on new demands** belong also to this category.

Safety and health: Business customers do pay some attention to how or where or in which conditions books are manufactured. Demand of information regarding those aspects is increasing among customers, and this posses impact on social sustainability of the industry.

Quality: The most important for business customers is the quality of the book and then the price. Other demands that are important: trends, image and environmental certificate. Quality should be in relation to type of books and their purpose of use, as well as price.

Design: Following trends have been recognized in education field: more expensive books with color and pictures, more modern kind of fact books, less

text that need to be updated. “Luxury” printing and publishing sector has possibility to improve social status of the local region where they are placed.

Environmental Sustainability

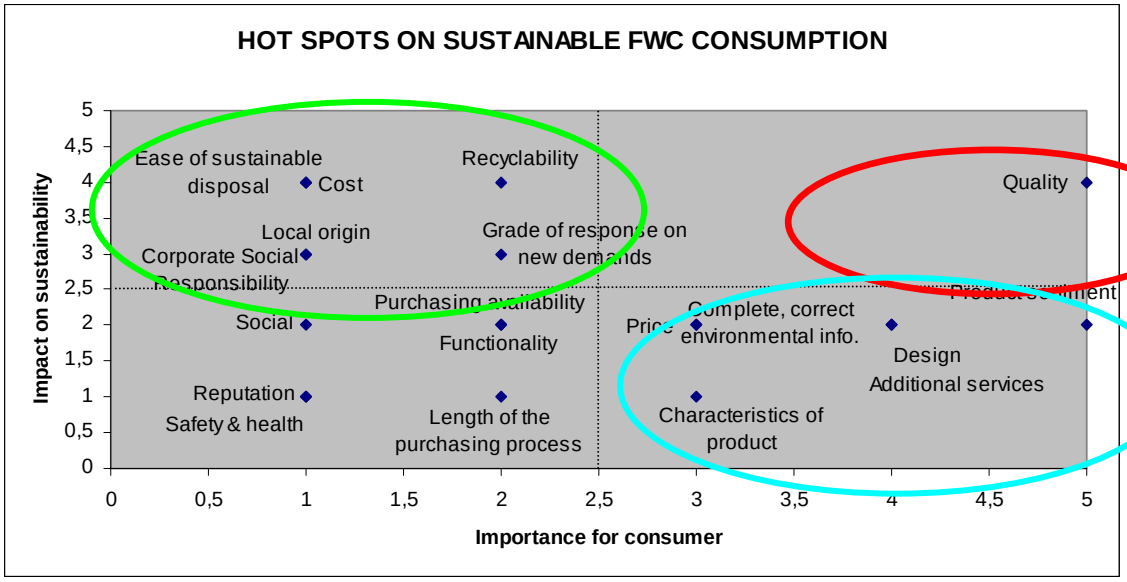

Chart Nr. 18.

To secure environmental sustainability industry need to meet customers’ expectation concerning relevant **quality** of printed products.

In order to have possibilities to move aspects from the green circle to the position of the red circle educational activities should be focused on: **ease of sustainable disposal, costs of waste management**, **recyclability, local origin** and **grade of response on new demands**.

Recyclability/Costs of waste management: Costs of waste management and recovery are not of main consideration for customers, but does have a high impact on environmental sustainability. Well working systems of collection, sorting and management of waste should be implemented generally since they have a high impact on environmental sustainability.

Quality: The most important for Publisher and Wholesalers are the quality of the book and then the price. Paper books catches the readers attention in a unique way, are pleasant to read, feels safe and the paper book have a long tradition as a information messenger. Visual memory works better with paper books compared to other teaching aids. Paper books can easier get damaged, take a lot of space to store, will sometime rather quick become out of date, are not so easy to update compared to other teaching aid and are expensive.
Requirements of updating on short terms conditions create need of more resources, more transportations and therefore has an impact on environmental sustainability.

Product assortment: There is a huge amount of different trends on consumer market concerning life style, goods consumption and those trends request a high variety of assortment. With the large product selection range, the higher number of market segments will be reached and satisfied,
Meeting single need can in the future improve resource usage and give positive impact on environmental sustainability.

6.4.4 Pellets

6.4.4.1 B2C

In the case of pellets consumers are assumed to take purchasing decisions both in investing in the installation of pellet heating system and in buying wood pellets for the use of the heating system. The importance of different aspects for consumers is a combination of key aspects in both decision making phases. In business to consumer case consumers are households.

In the following a list of aspects of purchasing process is analysed by measuring both their importance for consumers and their impacts on sustainability. Sustainability is extracted to three different dimensions of sustainability, economic, social and environmental, and each dimension is observed separately.

The most important aspects, so called “hot spots” are chosen by analysing all the aspects and picking the ones with the highest dynamism, which means the ones that are changing at the moment. These are the issues that the forest wood chain should take into account in maintaining and improving the competitiveness of wood pellets.

Economic Sustainability

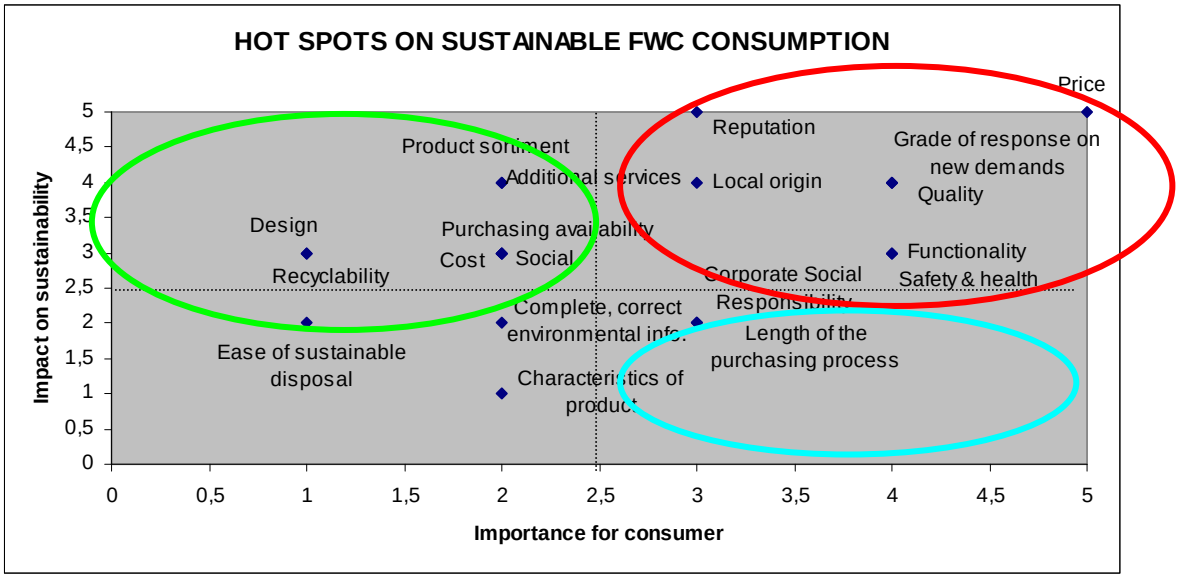

Chart Nr. 19.

The aspects that are important for consumer and have high impact on economic sustainability are **price, grade response on new demands, quality, functionality, reputation and local origin**, as can be seen in the chart nr. 26. These aspects are located in the red circle. Price is clearly the most important aspect from the consumers' point of view, and it is also vital regarding economic sustainability. In the case of wood pellets "response on new demands" means mostly that global warming has created an increasing need of carbon neutral heating options and response on this new demand is easy to use option of wood-based heating, pellets.

The aspects that are considered to have remarkable impact on economic sustainability but no importance for consumer are **design, recyclability, product sortiment, additional services, costs of waste management, purchasing availability and social acceptance.** These aspects are located in the green circle. As pellets produce rather little waste when used in household scale, it is natural, that issues related to waste management and recycling are not very important to consumer. In the rest of the issues some knowledge gap may exist.

The aspects in the blue circle are important for consumer but not so important from the economic sustainability's point of view. These aspects could be used for instance to promote pellets. In the case of household consumers these aspects are **corporate social responsibility** and **length of the purchasing process**.

Of all the aspects, **price** is the most important purchasing criteria for consumers. As the demand grows, the price might rise accordingly, but the difference between oil and pellet price might stay rather stable.

Additional services have high impact on economic sustainability, as well as on the other dimensions of sustainability. Consumers are not used to expect services in this field yet; hence they do not consider them very important. However, pellet heating could be even more attractive heating option than before, if convenient extra services were offered. For instance automatic announcements for the retailer when pellets in the storage reach a minimum limit would ease raw material ordering and delivery process.

Length of the purchasing process is important for consumers, both length of purchasing and installing the pellet heating system and purchasing pellets. The pellet industry should take care that the length will not exceed the length of the other heating option purchase processes remarkably.

Social Sustainability

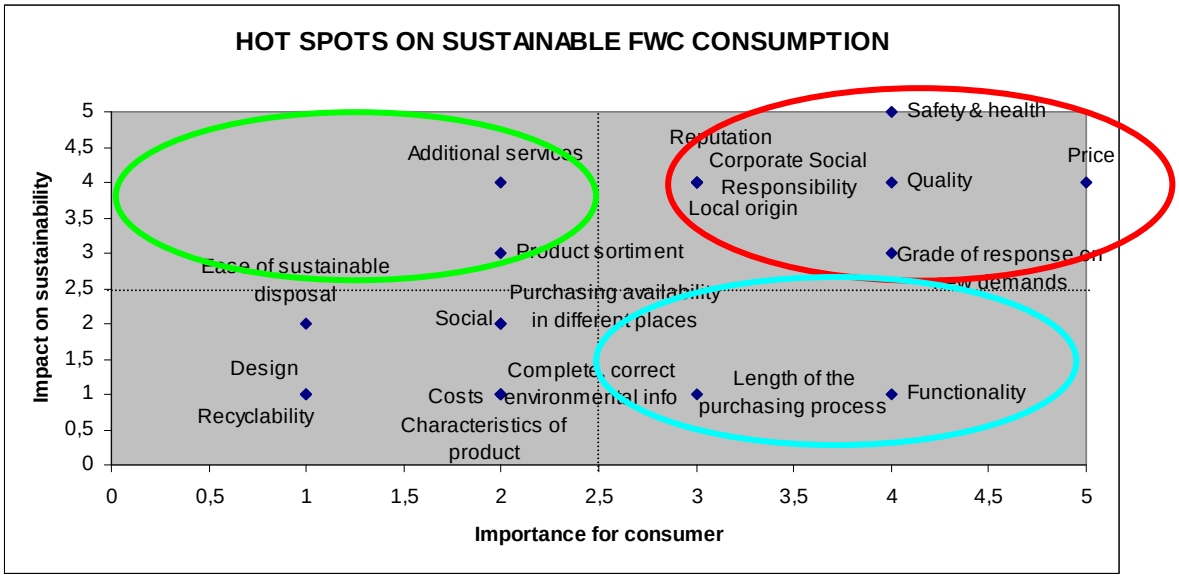

Chart Nr. 20.

The vital aspects when considering social sustainability are **price, safety and health, quality, grade of response on new demands, reputation, corporate social responsibility and local origin**, according to the chart nr. 27.

There are not clearly any issues indicating consumers' knowledge gaps, as the green circle in the chart nr. 27 is rather empty. **Additional services and product sortiment** could however be categorised to be this kind of issues.

The issues important for consumer but not so important for social sustainability are **length of the purchasing process** and **functionality**.

Safety and health are important for household consumers as well as for social sustainability. These issues are mainly taken into account by regulations, but pellet industry should keep this aspect in mind.

Local origin of the product matters to consumers. In addition to social sustainability, it also has high impact on economic and environmental sustainability. The importance of **corporate social responsibility** relates also mainly to supporting the local production.

Environmental sustainability

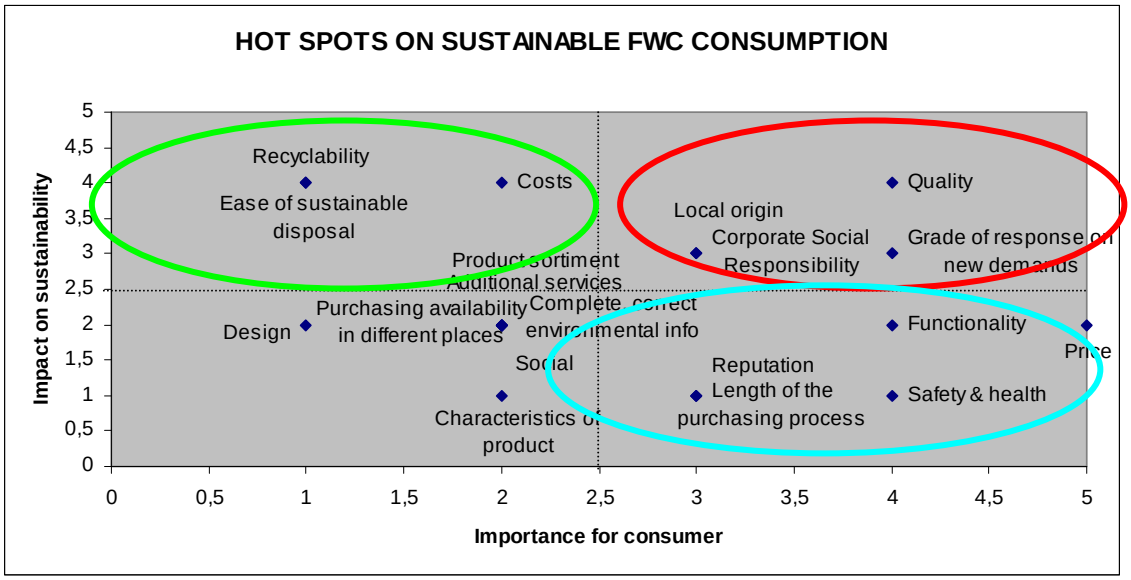

Chart Nr. 21.

The chart nr. 28 shows that aspects that can be detected to be vital for both consumers and environmental sustainability are **quality, grade of response on new demands, local origin and corporate social responsibility.**

The issues in green circle are **recyclability, costs of waste management and ease of sustainable disposal.** All of these are related to waste which is a minor question in pellet use. It can be concluded that no specific knowledge gaps exist among consumers when considering environmental sustainability.

The aspects important for consumers but not so important for sustainability are **functionality, price, reputation, length of the purchasing process and safety & health**.

Quality and **functionality** have almost the same meaning in the case of pellets. When they are of a good quality, the heating system functions well and is easy to use. Due to pellet demand growth weaker raw materials might be used for the production, but the quality should be maintained high enough to prevent disfunctions in the heating systems. Consumers can easily spread a word of poorly working heating system and ruin the good reputation

6.4.4.2 B2B

In business to business case consumers are farm houses, public buildings and business premises. In the following a list of aspects in purchasing process is analysed. Impacts on sustainability are extracted to three different dimensions of sustainability. The most important aspects, “hot spots”, are picked up from the list.

Economic Sustainability

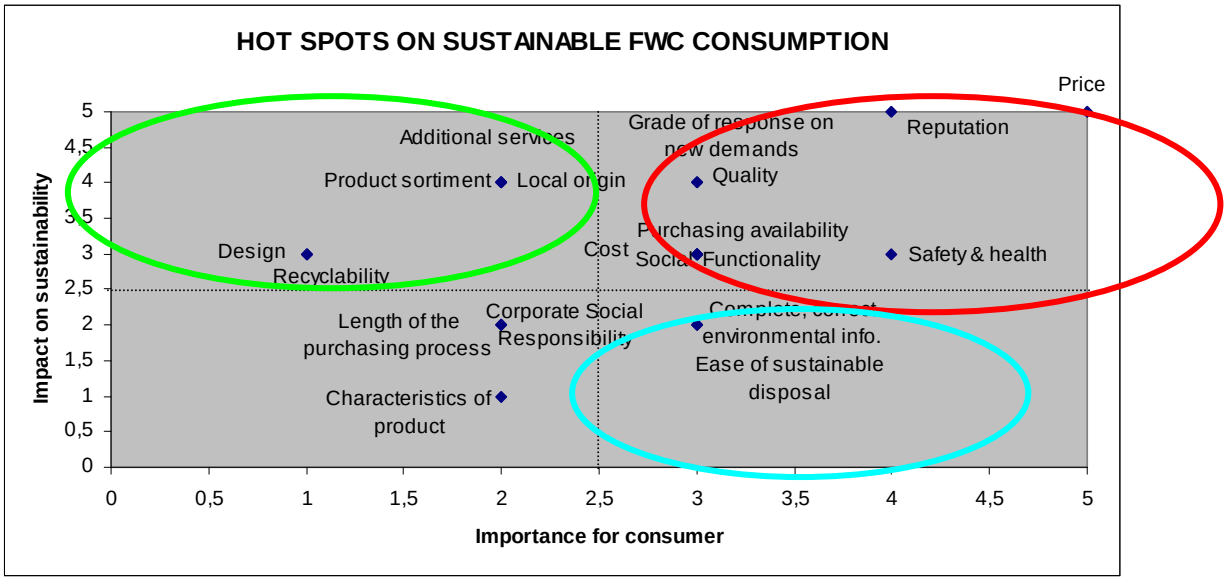

Chart Nr. 22.

Important aspects for economic sustainability are **price, reputation, safety and health, grade of response on new demands, quality and purchasing availability.**

The issues on which business consumers may have knowledge gaps are **additional services, product sortiment, local origin and design.** This is shown in the chart nr. 30.

The aspects that are important for business consumers but not so important for economic sustainability are **complete, correct environmental info** and **ease of sustainable disposal**, which are located in the blue circle.

Price is the most important purchase criteria also in the business to business case. **Purchasing availability** is crucial aspect, too. Availability in different places is not so important, but availability of good quality pellets in general.

Design is an aspect which has high importance on economic sustainability, but consumers do not consider it very important. However, there are opportunities to make pellet heating more attractive heating option by making the use of pellets easier by good-quality design. For instance storage problems could be eased by paying some more attention to storage design.

Ease of sustainable disposal is an important aspect for consumers, as the ash management causes costs.

Social sustainability

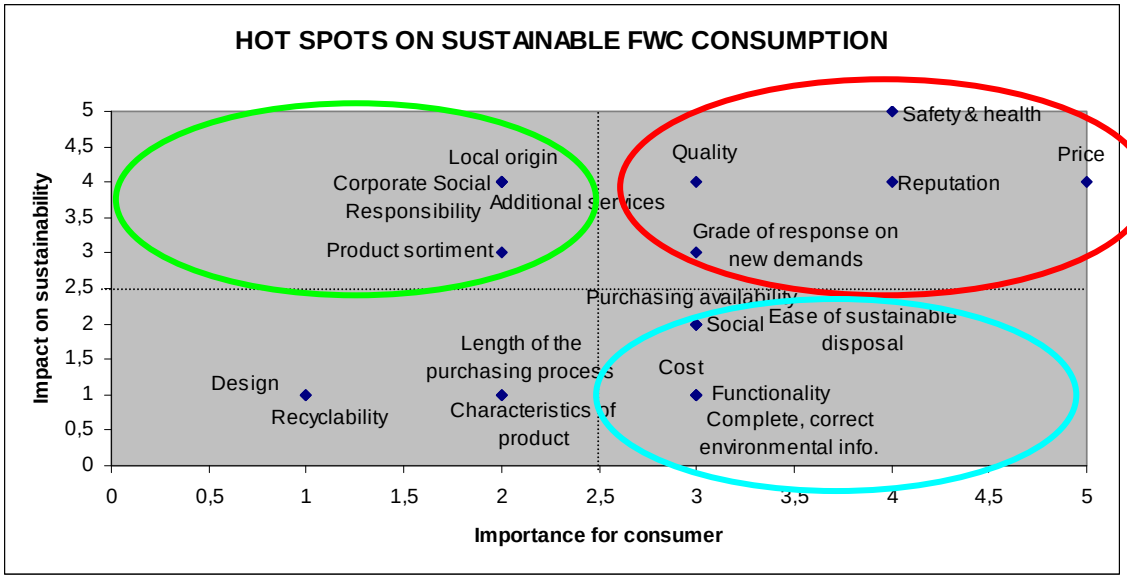

Chart Nr. 23.

From the social sustainability's point of view the vital aspects are **price, safety and health, reputation, quality, and grade of response on new demands,** as shown in the chart nr. 31.

Knowledge gaps that need to be covered may lie in **local origin, corporate social responsibility, additional services and product sortiment.**

The aspects in the blue circle, which could be used to attract consumers, are **ease of sustainable disposal, costs of waste management, social acceptance, functionality and complete, correct environmental info**.

Reputation of the producers is important for the consumers in a way that the producer may not have remarkable image problems.

Consumers consider **safety and health** important and it has high impact on social sustainability. Current regulations mainly take care of it, but the producers should also keep in mind the importance for consumers.

Local origin is not considered as important in business to business as in business the consumer case. Pellets are anyway a tradable market product. On the other hand, **corporate social responsibility** can be important issue in some cases in the sense that domestic production should be supported.

Social acceptance on its side is more important in business to business as in business to consumer.

Environmental sustainability

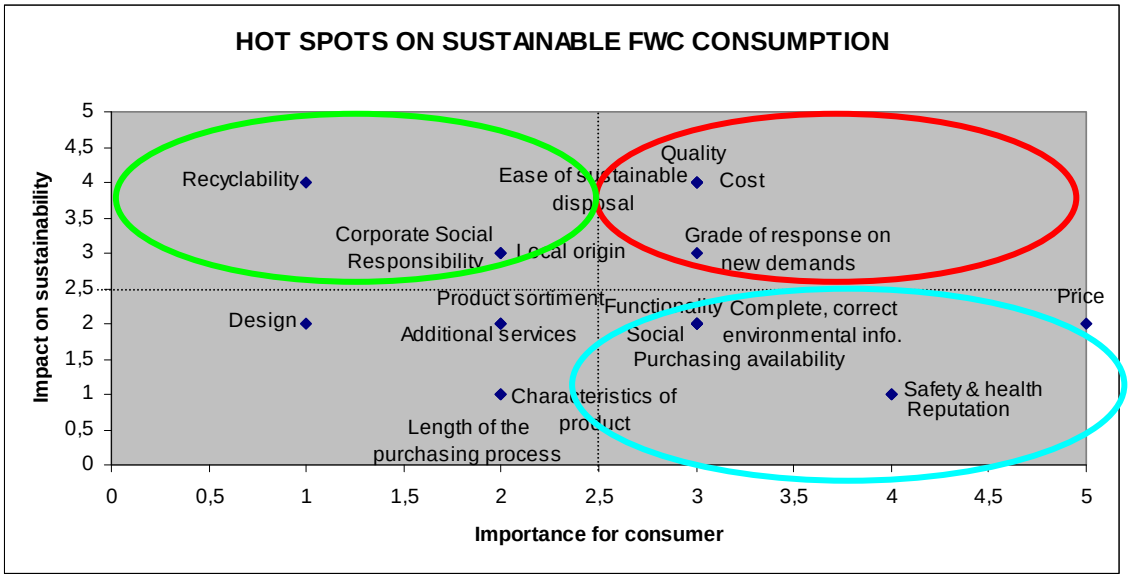

Chart Nr. 24.

The hot spots that are important both for business consumers and for environmental sustainability are **quality, cost of waste management and grade of response on new demands,** according to the chart nr. 32.

The potential knowledge gaps of business consumers can be in **recyclability, corporate social responsibility or local origin.**

The aspects that are important for consumer and less important for sustainability are **price, functionality, complete, correct environmental info, social acceptance, purchasing availability, safety & health and reputation**.

Quality is very important for consumers. It has high impact on environmental sustainability as well as on the other dimensions of the sustainability. Currently

quality certificates ensure the quality, but further quality control could be developed.

Complete, correct environmental info is important for consumers as stamps express the quality of product.

7 Conclusions

Upon the charts that represent the evaluation of the hot spots, as key aspects for the consumers and their behaviour, the level of their importance, the impact of them on the three pilars of sustainability, and also the consumers´ behaviour´s impacts, the analysis is giving the results on knowledge gaps - strengths and weaknesses related to FWC sustainability - areas for action - need for further studies – market arguments for each product category.

The chart herebelow is representing the three pillars of sustainability.
In case the red zones of the charts analyzed in each FWC are containing the same key aspects, it is a common field that means that the aspect is contributing to the sustainable development and not only to one pilar of sustainability.

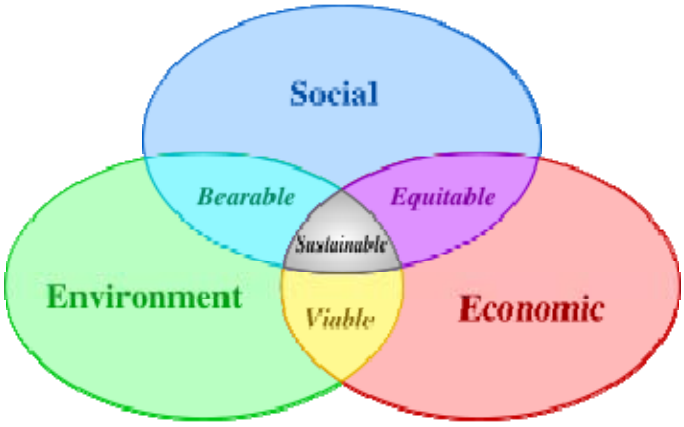

Figure Nr.12.:Scheme of sustainable development: at the confluence of three preoccupations. Source: Wikipedia

Furniture

We detected several areas where the industry needs to act, needs to be developed towards being able to fulfil the demands of the consumers and customers and in the meanwhile cover knowledge gaps that are also detected for sake of a sustainable prosperity.

European industry can not be maintained without taking into account the aspects that are contributing to sustainability, and without gaining competitive advantages that are based on product differentiation and adding value in each life cycle of the product; at the phase of production, at sales, at use and at processes that are following the use; transport facilities and renewal. European industry should apport value to the entire sustainable development and should communicate these efforts to the end users and professional buyers.

Those aspects that are of low importance for the consumers and costumers but have high sustainability impact should be analyzed by the industry how these hot spots – that are real knowledge gaps – should be covered.

Fibre based packaging

There is a difference in cumulated sustainability between the most important aspects for end-users and professional buyers such as: grade of response on new trends and product assortment for consumers, and quality and product assortment for professional buyers. However sector should focus on each part of sustainability while analyzing improvement of performance possibilities.

In order to move high impact aspects from the field of low importance to the field of high importance, sector should close cooperate with other actors such as local governments, local authorities, distributors, transporters, etc. Each part of sustainability should be taken separately into consideration while taking actions due to business models of sector.

We would like to underline that our research has been carried out in a very limited geographical area of EU and shouldn't be generalized automatically without further survey.

Printed products

There are some important conclusions concerning sustainability hot spots for the fibre based industry dealing with printed products.
The main one is that to secure each part of sustainability, aspects within the red circles need to be met since they are of high importance for consumers or professional customers. Of course, each company should do it in relevance with the own business model. *The priority, however should have price, quality, additional services and product assortment while dealing with professional customers, and quality, price, product assortment and high grade of response on new demands while dealing with consumers.* Company should chose the significant part of sustainability (economic, social or environmental) that is necessary to be improved, and take relevant actions regarding own performance.
The second key conclusion is that those hot spots which have high impact on sustainability, but low importance for consumers or customers (aspects marked within green circles) should be moved to the place of red circles. This movement requires educational activities from the industry. Fibre based sector should make choice which part of sustainability (economic, social or environmental) is of importance and cover knowledge gap related to this and to the category of customer or consumer.

Summary of conclusions on printed and fibre based products

The main significant conclusion is, that the result of analysis can differ depending on business environment, country and other internal aspects. Our results are based on surveys carried out in three countries: Spain, Finland and Sweden and shouldn't be taken for granted for the entire Europe. However each company can use the developed survey tool to make the own analysis.

Pellets

There are aspects that can be noted to be very important for consumers, both households and larger-scale pellet users, and that have high impact on all the dimensions of sustainability. These are price, quality and response on new demands. In the case of pellets new demand is considered mainly to be easy to use wood-based heating systems. There exist improvement possibilities related to these vital areas that are found. When looking at the three dimensions of sustainability separately, many other important issues can also be detected.

Knowledge gaps cannot be defined unambiguously. It seems that in business to private consumer interactions issues related to waste management are the major issues in the knowledge gap area, but this is because of the easiness of pellet waste management in small scale – consumer do not have to be extremely interested in that. When concentrating on only one dimension of sustainability at time, some potential knowledge gaps can be found.

Based on the hot spot analysis some unsurprising, surprising and urgent issues can be defined. An unsurprising aspect is price. It is the most important aspect for customers, and it is likely to rise due to the political pressure. The positive environmental image of wood pellets should be developed to be such strong that it would overcome the real price difference between pellet use and other heating options. Another unsurprising aspect is corporate social responsibility. A stakeholder response, which is already showing some signs, is prioritization of forest protection over energy use of wood. This requires virile actions to find the correct balance between different ways of using wood.

The surprising are additional services. Neither consumers consider it important nor have producers put effort on their development, albeit they have potential from the sustainability's point of view, e.g. in optimization of transportation and in creating jobs. Pellet producers could elaborate additional services by allying themselves with mobile phone companies for instance, and produce GPS based services.

The urgent issue is to carefully investigate and secure that the actions concerning pellets in forest wood chain are based on the all three dimensions of sustainability. Random promoting of pellets should be avoided to keep FWC in balance.