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SUSTAINABLE AND ECO- APPEARANCE IN PACKAGING

ECODESIGN OF HYBRID PAPERBOARD TRAY

Graduation Project   10.9.2009   Ville Kolppo

ABSTRACT

Graduation project for Stora Enso involving ecodesign of hybrid paperboard tray packaging. Main focus is try to find elements of packaging that communicates from its environmental friendliness. How material, form and printing features influence consumers and study consumer behaviourism towards packaging and consumption. Design case is to produce different packaging examples as eco-concepts. The concepts are premium- and bulk- packaging.

Focus of this work is at literary part of research. Second part deals with executing and variation of eco-concepts. Own research survey as complementary for other studies. Graphical- and verbal communication is presented but are secondary in this study. Survey and majority of other research examined at this work are global but the focus is in national level.

There can be found interesting links for environmental messages from this packaging solution as it is very versatile and suitable for multipurpose packaging. Combining graphical elements and structural design has a crucial meaning in packaging development process. As a conclusion it can be said that lack of genuinely environmentally friendly products is the main cause that consumers can not carry out their own values at purchasing situations.

TIIVISTELMÄ

Opinnäytetyö, tilaajana Stora Enso Packaging, käsittelee kartonkisen hybridipakkauksen ekodesignia. Työn pääasiallinen tarkoitus on löytää uudesta pakkaussovelluksesta elementtejä, jotka kommunikoivat pakkauksen ympäristöystävällisyydestä. Kuinka Materiiaalit, muodot ja painotekniset tekijät vaikuttavat kuluttajamielipiteisiin ja tutkia käyttäytymistä pakkauksia ja kuluttamista kohtaan. Suunnittelutehtävä on tuottaa erilaisia pakkausesimerkkejä ekokonseptien muodossa. Konseptien aiheet on jaettu premium- ja bulk-ryhmään.

Painopiste työssä on kirjallisessa osassa. Toinen osa käsittelee ekokoseptien toteutusta ja soveltamista. Lisäksi oma tutkimuskysely täydentää työssä käytettäviä aikaisempia tutkimuksia. Graafinen ja verbaalinen kommunikaatio, sekä sen tutkiminen on esitelty, mutta on toisarvoinen tässä työssä. Kysely ja valtaosa muusta tutkimusmateriaalista työssäni on kansainvälistä, mutta aihetta tarkastellaan kuitenkin pääosin kansallisella tasolla.

Tutkittavasta pakkausratkaisusta on löydettävissä mielenkiintoisia yhtymäkohtia ekologisiin viesteihin. Pakkaus on tuotteena monikäyttöinen ja soveltuu laajaan primäärituoteskaalaan aina elintarvikkeista elektroniikan pakkaamiseen. Graafisten elementtien ja rakenteellisten ratkaisujen yhdistämisellä on keskeinen merkitys pakkauskehitysprosessissa. Yhteenvedossa mainitaan yhtenä tärkeänä seikkana aidosti ympäristöystävällisten pakkausten ja tuotteiden puutteen olevan merkittävä syy siihen, miksi kuluttajat eivät voi toteuttaa omia arvojaan mukailevaa kuluttajakäyttäytymistä.

CONTENTS

1. INTRODUCTION: ECOLOGY AND SUSTAINABLE DEVELOPMENT

1.1　Background for the study - Briefing analysis

Why and who?

This work was introduced to me from behalf of Stora Enso Packaging by designer Noora Nylander and Sales Manager Teemu Karhu from DeLight Solution. Work concentrates on new packaging innovation combining carton board and plastic materials in a pressing - molding process. Packaging is mainly suitable for tray and container type of use.

Under the pressure of predominantly increasing change in environment, economy and globalization companies have to fundamentally examine their standards of activity and methods. This involves also communication. There is need to communicate with customers about producers ecological and sustainable values. Companies communicate their environmental message through different media, but they seem to be overlooking one central means of communication: the product itself (Hassi, Kumpula, Riuttanen 2007, 9). This work is meant to be as a tool for sales and marketing to design new genuinely sustainable packaging solutions and communicate their environmental values by offering visual clues and non-verbal design language to distinguish the green products and packaging.

Key requirements

New packaging product that will replace products that are already in the market. How can product communicate about its environmental friendliness. How material, form and printing features influence consumers. Usability is secondary feature in this study but is still considered as an important feature in ecodesign.

Design case

Different product solutions and examples.
Eco-concepts:
Premium-packaging vs. bulk-packaging.

Research problem

Research problem is to find elements from visual- and design language that communicates to consumers about sustainability and ecology of packaging. Define guidelines to develop eco-concepts.

Methods and structure of the study

Focus at literary part of research. Second part deals with executing and variation of eco-concepts. Own research survey as complementary for other studies. Graphical- and verbal communication is presented but secondary in this study. Survey and majority of other research examined at this work are global but the focus is in national level.

1.2   Definition of sustainable development

Organic production, sustainable development, ecology and fare trade. Confusing new terms for today's consumers. Terms that are difficult to define especially when making buying decisions at the market shelf. Sustainable development has been defined as follows: "Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987.)

Sustainable development includes ecological-, social- and economical sustainability. From these aspects ecological sustainable development is the most studied and whole notion of sustainable development is often assimilated to ecological sustainable development. Ecology as a science studies relations of organisms and environment. In other words, knowledge about nature's economy. Word -ecology as a term has spread its meaning to more lifestyle, ideology or some other action to carry out sustainable development rather than strictly branch of bio-science.

Ecological sustainable development should be understood as a part of more wider concept with aspect of social-, cultural- and economical development. This study is focused to examine ecological image of products/ packaging and communication about their environmental values. Therefore it is reasonable to limit these economical and social factors out of this study even they all influence on each other. Ecological sustainable development is to conform economical growth to natures boundary conditions. Sustainable economical development is possible only by based on ecological ground. (UNED Agenda 21. Rio conference proclamation)

Sustainable product design is more than ecodesign. Ecodesign is environmental conscious product development. In ecodesign process environmental criteria is included to other basic criteria in product development. Basic criteria of product development are functionality, productivity, usability, safety, reliability, ergonomics, esthetics and ecology. (Tischner, Charter 2001, 263)

Sustainable design includes also social and ethic responsibility. Sustainable development is even more wider concept as it is combining also impacts of production and consumption. (Tischner, Charter 2001, 263)

Figure 1. represents the relations of ecodesign, sustainable product development and sustainable development.

Product design basic criteria: functionality, profitability, usability, safety, reliability, ergonomics, aesthetics.

Eco-design = product design + ecology

Sustainable design = Eco-design + social and ethical responsibility

Sustainable development = sustainable design + production and consumption
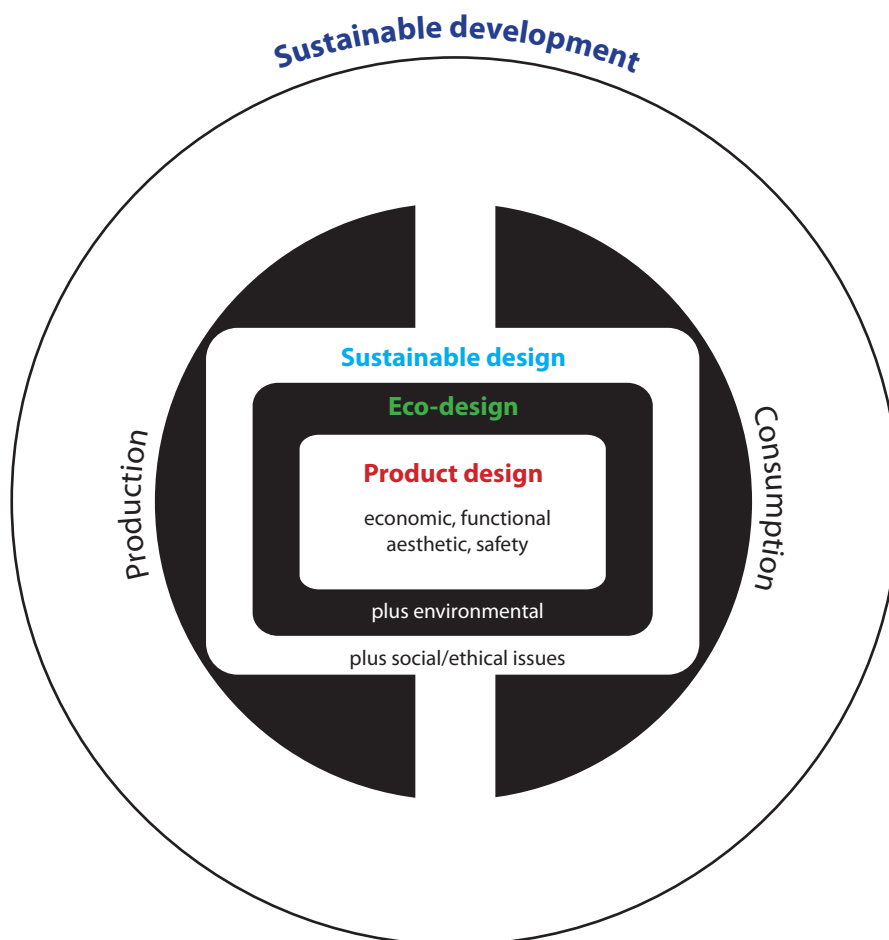(Tischner, Charter 2001, 263)

Figure 1. Sustainable development, Tischner, 2000.

2. CONSUMERS, PACKAGING AND ECOLOGY

2.1 What ecology means to consumers?

From sustainable developments point of view the problem is that consumers knowledge about ecology, sustainable products and services, their manufacturing and logistic processes is relatively poor.

Conclusions are often strongly driven by emotions and images. Major role in this kind of thinking is often guided by misleading or one-sided eco-marketing and it has been called also by such terms as "green washing". (More about this subject in chapter: 2.5 Green Marketing)

Ecological communication of administrative organizations, wide range of different eco-labels and lack of plausible standards decreases the reliability of discussion about environmental friendliness.

These matters has often noted to be so complex that it is difficult for consumers to develop any fact based principle to their decisions. (Hassi et al. 2007; Nereng 2003).

2.2 Packaging and ecology

Nowadays when people are discussing about ecology of packaging they tend to react trough negativity. Packaging is commonly considered to be as an obligatory evil or even unnecessary rubbish that people, from some reason, have to buy along with the product. Many consumers are surprised that share of packaging from primary products CO_2 emissions is relatively minor. <10% (approx. 4% groceries). Source: (MTT) /Tilastokeskus)

Furthermore, communication about purpose and justification of packaging is not realized to be part of very serious brand building information. Example from this kind of thinking is Lush, witch at side of their paper bag explains the role of the bag as part of the whole production chain. Amount of "unnecessary" plastic and difficult opening, example at electronics packaging ('clamshell-packaging') are things that customers doesn't seem to relate as a part of theft protection by demands of trade companies. They rather think that those are manufacturers methods to make it difficult for customers. If 6000 americans are sent to emergency room every year as they try to open these kind of packaging It would be reasonable to inform consumers about these features in packaging and why they are made like that.

As long distant transportation of imported foods or shopping bags, also packaging has become downright myth of environmentalism. Consumers perception about what is truly significant of environments behalf are contradicted with new research results. (Tiede 3/2009 Lähiruoka ei palloa pelasta) Obviously such mixed signals as research results about biodegradable plastic bags surprisingly large carbon footprint compared to paper- and recycled plastic bags (Suomen ympäristökeskus ja Lappeenrannan teknillinen yliopisto, 2009) are making consumers even more confused.

2.3   Communicating environmental friendliness

"The better you understand an idea, the more likely you are to take part in the idea and adopt it as your own." (Birt, 2008) Problem is, as I earlier mentioned, lack of information among consumers about sustainable development or altogether about ecology. It is difficult to influence or argue over such matter which is relatively unknown. Marketing people understand that creating connections to consumers as building brand loyalty is based on demonstrating product key messages. To achieve a connection to product as an economical or at least emotional level, consumers have to understand something about the product. (Birt, 2008).

It is rather odd that there still isn't any information in packaging about products life cycle method or share of packaging as part of products environmental impacts. Presenting transparency of a production chain is considered to be an important aspect also from marketing perspective. Growing movement towards companies transparency and social responsibility has brought lots of new information publicly available. However all this information flood makes it difficult for consumers to find knowledge about products according to their individual needs. One major problem to solve is how can it be made easier to guide consumers to specific information they need.
(Birt, 2008)

2.4   Product information in packaging and recycling

Ecological information should meet consumer as part of the product. packaging is unquestionably the best surface for this sort of information. Consumers are demanding product information to packaging. This matter came out by consumer workshop arranged by MTT, which subject was accountability of a production chain. The most highlighted aspect from the workshop was the need of information about products and their origin. Accurate content, constitution, origin of the product and traceability far to the production chain are information that consumers are demanding.

According to results of the workshop, product information should appear as lucid and understandable packaging markings. This information should be quickly and easily exploited when making buying decisions. At the same time people where aware of the contradiction between free space and broad information needs at packaging. From this point of view fast and easily sighted different markings or labels would be the answer at many cases. (Forsman-Hugg, Katajajuuri, Paananen, Pesonen, Järvelä, Mäkelä, 2009)

When making buying decisions, consumers do not generally speaking go searching information about products ecological features from the internet or literature. (Hassi Et al. 2007).
Different kind of web based publications are good tool to bring information to consumers and they enable to build brand image, but especially when we are talking about groceries or retail products, consumers interest towards producer is not often so significant that they would go to internet and orientate oneself to corporations production policies. (Birt, 2008) Television marketing has also focused more (partly because it is very expensive) to create rapid emotional image than presenting hard facts.

Role of accountability labels is obvious though confidence towards them has encountered an inflation. Reason for this is mainly the large number of different certificates. Therefore there must to be found elements from visual and form language that supports eco-labels by communicating sustainable methods and also environmentally friendliness of packaging. Complex information can easily estrange consumers. They need clear proof and indications to support information that is on the packaging and products. Information should contain links that are easy-to-understand. We only remember 20% of what we read but 40% of what we see. Even the most complex information can be made more understandable by visual links and examples. (Birt, 2008)

Consumers need tools to evaluate accountability of their own decisions. Genuine discussion and interaction is needed between corporations and consumers. Consumer also sees ones role as kind of a supervisor that contributes to development of accountability in our society. (Forsman-Hugg, Katajajuuri, Paananen, Pesonen, Järvelä, Mäkelä, 2009)

In EU producer is responsible of its products and partly of them packaging after consuming. (EU waste policy with its inclusion in the 1996 Community Waste Strategy) Therefore it would be sound to see communication at packaging about how important material is for manufacturer to get back to reprocessing. One example is liquid packaging board reprocessing in finland. Cartons estimated annual recycling volume is 5000 tons in finland. Many research show that approx. 12 000 tons is burned at homes mostly at rural areas. (Pakkausteknologia - PTR ry, 2004).

Utilization of fiber based packaging (recycling+use as energy) still was 88% in year 2005 (Pakkausalan Ympäristörekisteri PYR Oy) Receiving and processing recycled carton material in finland seems to be profitable business according to highly developed recycling system. Nevertheless big part of carton waste ends up out side of the recycling system to landfills and particularly to be burned at household fireplaces. Whereas almost 90% of plastic bottles are recycled as supported by collateral system. From the consumer point of view it would be good to know that carton as a CO_2 containing material should be processed at energy efficient reprocessing plants to prevent particulates and CO_2 emissions. Recycling is the most recommended disposal method for carton packaging. Efficiency of recycling depends on collecting system (Stora Enso, Mari Hiltunen 2009). As part of other packaging the instruction is weak as well. In many plastic packaging that should be collected to energy waste bins there is only notification that the package can be disposed by burning. Waste is a product as well as any other products produced by organization and in that case waste has a value too. (Reynnels 1999). Value of waste could emerge to consumer as justifiable quality feature of packaging. When consumers realize from package appearance that it doesn't belong to landfill or to be burned, but to be recycled, existence of packaging after primary products consumption is justifiable. Consumer is no longer end user according to packaging.

2.5   Green marketing

Green marketing is often incorrectly associated with superficial 'green hype'. Companies assimilate them selves and their products to environmentally friendly image without genuinely doing anything to upgrade methods or products to more ecological level. This kind of inappropriate behaviour has caused irreplaceable harm and loss of credibility to those genuinely environmentally accountable marketing acts. This is the reason why many consumers are generally sceptical of all green marketing activities. (Cude 1993; Davis 1994).

Consumers are pushing companies to produce and develop more green products and services. (Polonsky, 283, Charter, Tischner, 2001) On the other hand, listening too much consumer assessments could be negative impact to sustainable development (Polonsky 2001). True green marketing is more comprehensive than just promoting green products or organizations ecological qualities.
It puts companies under an obligation to accurately evaluate the commerce between consumers and organization (Polonsky 2001).

Environmental movement existed since 1960, but environmental marketing is still rather new phenomenon. The concept of green marketing is from early 70's but it came to more common knowledge not until 90's. (Peattie 1992, 46) Common marketing is usually up-to-date in many cases but potential of green marketing is still not widely realized. (Hassi, Kumpula, Riuttanen 2007, 23)
As research shows true green marketing is difficult to put into practice. (Shrum, McCarty & Lowrey 2001, 81) Green consumers should be treated cautiously because they are deliberative intellects which easily switch brand as they lose trust to certain company or product. And when that happens they usually take many consumers with them. (Shrum et al. 2001, 81)

Despite that number of environmentally concerned (green) consumers is rapidly growing, companies shouldn't necessarily target their green marketing solely to this segment. Even the "green consumers" don't purchase products or services solely because their environmentally friendly values. Green product wins only when it can compete in price and quality (Ottman, 1997).
After all, In this comparison products environmental friendliness can be decisive impact as making purchasing decisions. Consequently in marketing, for example the quality and usability features of product should be emphasized and promote the environmental friendliness or recyclable features as added value. Also fragmentation of markets is not necessarily a true problem. Basic behaviour of people is surprisingly alike even in other cultures and social groups. Fragmentation could be more like a mirage of consumer based marketing idealism then real problem. Organizations who wishes to become more closer to peoples everyday life in home economics, should question their current marketing conceptions. (Korkman, Pantzar, 2007).

One new significant group among pro-environmentalist consumers is neo-greens. For them eco-lifestyle is like a new luxury and they are not prepared to give up convenience or quality of life for environment. Sacrificing the comfort is not nature protection for neogreen consumers. (Pink 2006, Kaarto 2006) This group could lead the way for the future masses of green consumers. (Hassi, Kumpula, Riuttanen 2007, 23).

2.6   'Green-hype' and it's negative impacts to consumers

In article Green is Dead: A Designer's Perspective, Wendy Jedlicka writes that earlier companies felt that sustainable values in their products were too alternative and too far from mainstream consumers. Companies rather continued production that were known to be on non-sustainable ground simply because fear of loosing market shares. It was not until some companies completely changed their strategic direction that the whole industry started to change. One example that Jedlicka mentions is company from cosmetics branch, Aveda, witch started to talk straight to customers about the significance of natural beauty. Relations of human, health and nature and how there is no space for toxic chemicals in this equation. Nowadays it is hard to find self care products that would not sort of work from natural perspective. Same kind of phenomenon can be seen also at retail markets as strong growth of organic products sales.

According to Jedlicka there should be only carefully thought, functional and healthy products offering alternatives to consumers. This kind of healthy competition could push environmentally friendly product manufacturers to produce even better products, not only those that are purchased because they are green. (Jedlicka, 2006)

Despite all the current discussion about sustainability short-sighted and unsustainable marketing is still common practice. Apparently almost naive green leaf at background of companys self certified eco-label still impress share of consumers. The problem is how to recognize genuinely sustainable business activity from artificial green washing.

"As with any maturing system, there will come a day when we won't have to talk about sustainability. Not because it's dead, but because it's simply just another part of good business. "-Green is Dead: A Designer's Perspective by Wendy Jedlicka 2008.

Main focus in this study is not find out the real environmental impacts of packaging but to discover patterns from that visual language witch can be adapt to communicate about ecological issues.
It is still important to understand what are those truly environmentally friendly and sustainable characteristics in packaging. Only by recognizing those features can new non-verbal codes to be found. These codes enables the communication about ecological or non-ecological features of packaging in a desirable way.

I am not going to discuss very profoundly about three levels of green marketing, (strategic, quasi-strategic and tactical) but these levels could be used to define that gradual change that company needs to go through as it engage to different environmental goals. (Polonsky 2001, 286). In tactical green marketing it is essential that consumer finds some sort of logical link between product and organizations green marketing activities. Consumers might react sceptically towards organizations actions if there is no such links to be found. For example jeans manufacturing company donates part of the profit from each sold pair of jeans to support a tree planting project. Such activity certainly would be more suited for paper company. (Polonsky 2001, 286). There is often campaign advertising included with packaging that doesn't relate to the product or even company methods in any aspect.

Marketing works only when consumer believes the marketing claims. Transparency is the best method to achieve credibility says J. Ottman in article, Rules of Green Marketing, and continues: Company can achieve significant advantage in a long run by opening it's processes to public criticism. correspondingly, trust of consumers can lost by concealing production procedures. (Ottman, 2008)

According to Ottman, There is no such thing as 'green product'. Every product uses material, energy and produces waste. Some products are more efficient then others, and only in some circumstances. Taking this knowledge to customer is one of the green marketing roles, Ottman stresses.

Dressing up product to green appearance emphasizing only it's ecological features is not necessarily no longer relevant or up-to-date method as communicating environmental values. As it has been revealed by studying consumer groups, that for example for so called green customers and especially neo-greens, it is important that product communicates primarily about status, quality and functionality. Ecology is extra value not a superlative. Also seen from the packaging graphic designs perspective outcome is often too obvious.

SELF-CERTIFICATION SCHEME

Figure 2. green-leaf-eco-enviro-logo-compilation, www.andrewkinnear.com, 2009.

Figure 3. www.sungreenpower.com/

Figure 4. spcdesignlibrary.org

GreenChoice 100 is made from 100% recycled fibres, is also 100% recyclable and is the first and only recycled paperboard that is 100% carbon neutral with 100% of the energy used in its manufacture offset with clean renewable energy.

As can be concluded from pictures above, communication about environmental friendliness in primary product and packaging sometimes contains conflicting information. First one advertises primary products ecological features when the other package is environmentally friendly in it self, but product inside is probably not. For consumers this difference is not always self-evident. If there is something at the package that points at environmentally friendliness, it is often seen as entirety.

As I earlier mentioned in chapter 1.2, environmental impact of packaging especially in groceries is marginal, but still if packaging solution is marketed as ecological, it definitely influences also consumers image of content and brand altogether. There should be itemized information at packaging for consumers to help separate and realize the proportion of packaging and primary products environmental impact. In other words, environmental impact of a product and packaging should be presented separately.

Sustainable developed packaging attributes:

- minimized use of material

- logistically optimized, lightness

- minimized use of printing inks and lacquers

- usability, functionality, easy to open

- easy to recycle

- minimized use of toxic substances in materials

- protection

- low energy consumption, using renewable energy

- Maximizes the use of renewable or recycled source materials

- Meets market criteria for performance and cost

Table 1. Sustainable developed packaging attributes, Kolppo 2009.

2.7   Recycling and disposal

Recyclable or made out of recycled materials is ecological for most consumers. However it is hard for consumers to see the difference between packaging made out of recycled materials and those that are recyclable, even these are often exclusive of each other (Young, 2008). According to Young, consumers around the world offers one answer to question what makes packaging environmentally friendly? -The answer usually is recycling. Clear majority of all consumers draw a conclusion that package is eco-friendly if it's made of recycled materials. This view distracts consumers not to see other qualities of packaging like quantity of used material both in primary and secondary packaging (Young, 2008).

New British standard for recycling label distinctly divides different material of packaging according to their recycling system. "Customer confusion is the biggest barrier to improving recycling rates. Replacing a potentially confusing array of symbols and messages with a single, standardized logo will help customers recycle more of what can be recycled." -British Retail Consortium director general Stephen Robertson. Nowadays the different and local recycling systems certainly complicate the use of this label. So before there is developed standards to recycling, there should be consistent with recycling systems.

Recycling labels and products visual and design elements should be designed to work together. Materials and their reuse or recyclability should be more distinctive features. Visual differentiation to material parts of packaging to support recycling labels.

Figure 5. www.onpackrecyclinglabel.org.uk

Figure 6. Alpen packaging, Kolppo 2009

"Recycle Now iconography by incorporating standard messaging showing each component of the packaging; the type of material it is made from; and the likelihood that a consumer's local authority will recycle the packaging materials." (Source: www.onpackrecyclinglabel.org.uk)

Among the U.K. retailers that have signed on to participate in the program are Asda, the Co-operative Group, Marks and Spencer, Sainsbury's, Tesco, and Waitrose. Committed manufacturers include Associated British Foods, Britvic, Kellogg's, Premier Foods, Rachel's Organics, Robert Wiseman Dairies, and Weetabix. (Source: www.greenerpackage.com)

To study products communicating features and to create guidelines to environmental communication, it is necessary to understand the basics of semiotics. (Hassi, Et al. 2007, 40). Products can be analyzed from four different points of view: material, structure, efficient cause and purpose (Vihma 1995, 50, Hassi, Et al. 2007). According to these matters, products can be seen to consist from four interacting dimensions: technical and structure-dimension (syntax), material-dimension (hyletics), communication-al-dimension (semantics) and dimension of use (pragmatics). (Vihma, 1995, Hassi, Et al. 2007)

Syntactic dimension consist of fysical structures and how they connect to each other. Technical function and how product can be projected by technical drawings and structure models are part of syntactic dimension. It contains an analysis of technical structure and visual details: joints, seams, openings, crossing forms, textures, graphics and colors. Details can also be described as visual composition: simplicity of form, complexity, symmetry, balance, dynamics and rhythm. (Klöcker 1980,85, according to Vihma 1995.)

Hyletic dimension, or in material-dimension product can be analyzed trough material and especially the features and essence that can be sensed by touching.

Semantic dimension is communicational part in this analysis. It aspires to find answers what product represents, how the products purpose is presented or expressed and what kind of an environment it seems to belong to. Products expressive and representing qualities are central factors in semantic dimension. (Vihma 1995, 56.)

Pragmatic dimension means dimension of use. It comprehends the whole life cycle of a product. (design, marketing, manufacturing, sales, consumption, legislation and history.) In this dimension product is studied example from aspects of ergonomics or sociology. Pragmatic dimension indicates Who is user or what kind of situations product is used. This includes aesthetics of use, and also environmental and economical impacts to sales and production. (Vihma 1995, 53)

According to Wihma, product semantics concerns products non-verbal communication. Products can be also designed to communicate non-verbal information about themselves and users can understand these messages about use and function of a product. Visual language can be used as a tool for strategic communication when sending specific encoded messages to consumers. (Karjalainen 2005, Vihma 1995).

Transparency and honesty, highlighted In future product design, drives the design language to traditional direction where the product is designed to communicate about product itself and it's use, rather then about the designer that emphasizes his or her own style from product to another. (form follows function) Also the semantic ability to read forms is developing and in future consumers are demanding more justified forms. There can no longer be any 'extra' material only for speciality of forms or material solutions.

Key questions in analyzing semantic dimension:

- **What does the product represent?**

- **How is the purpose of a product expressed or presented?**

- **What kind of environment does a product seem to belong to?**

  (Klöcker 1980,85, according to Vihma 1995.)

Table 2. Key questions in semantic dimension, Kolppo 2009.

3.1   Empathic and emotional design

Purpose of this work is to find links from visual- and design-language that connects peoples images from products to environmentally friendly attributes and primarily define what those attributes are.
It is important to understand how customer images develop from different materials, colors and forms, and why there is individual differences.

Everything we do or think, we do trough our emotions. (Norman 2004) Our emotions reflects to what we do and how we do it. (Norman 2004). Emotions guides us to make decisions, usually away from bad towards good. (Norman 2004, 7). People tend to reason Both, big or small decisions by trying to smother their emotions. However, emotions and intuition has a big role in our selections
even if we sometimes would like to deny that fact. As a matter of fact, without emotions, example in some brain injury cases it has been proven that even the smallest decision is overwhelmingly difficult to make, when connections to brains emotion center are damaged (Tekniikka ja talous, 2008).

Our emotions steers our actions and they are strongly a part of everyday life. Emotions influences to our buying decisions and that how comfortable we feel the product is to use. Studying emotions as part of economics is rather new phenomenon, but justifiable when aim is to increase products usability, customer satisfaction and by that way create competitiveness. (Seppälä, Repo, Virtanen, 2004.)

Interaction with different products creates emotions. There is emotional bonds in form language which are linked to human associations. These are closely linked to persons attitudes and behaviour, like environmental attitudes and behaviour. (Hassi Et al. 2007, 53.)

As said earlier, products can be analyzed from four different points of view: material, structure, efficient cause and purpose. Anyhow, semantic dimension is in key role when finding ways to communicate green values. (Hassi Et al. 2007, 53.) Emotion-based designing explains why products that communicate about environmental friendliness to some people, won't necessarily work the same way to others, or what appeals consumers today, can change in another (Norman 2004, 33.) This explains why It is impossible to design a product that appeals same way to every customer (Hassi Et al. 2007, 47.)

To communicate with foreign language man must first learn the code of language; vocabulary in linguistic language, forms and symbols in design language (Karjalainen 2004, 59). Communication gets even harder when conventional vocabulary is missing, as vocabulary of environmentally friendliness in design language. All languages, verbal and visual are learned (Vihma 1990). This is why it's very difficult to communicate visually or by forms about something that hasn't even learned or defined as a concept, like environmental friendliness.

3.2   Ecological appearance in product design

Quite a small amount of public research is found how products communicate about ecological values, or how consumers perceive the elements that communicates environmental friendliness in products or packaging. Green natural colours and rugged recycled materials, or surfaces that imitates organic forms, surely seems unambiguously natural, but as the knowledge about sustainability, also knowledge about materials and especially joint-materials is very slight. Even thou consumers are more conscious and interested about environmental issues, it is constantly harder in this complex world to educate them or even keep them aware of new solutions and production methods.

Research by Stevels et al. (2001) focused on finding product attributes from consumer electronics which are considered to be links or anchors for environmental messages. According to their study, these attributes are price, reliability, design, durability, brand and usability.

There is many examples where green marketing is been used to emphasize products other advantageous features and environmental friendliness as extra value. Like hybrid car advertisement highlights minimal fuel consumption and long operational radius. Also a carton-less toothpaste packaging is a success story, but how many consumers are aware of ecological impact of this packaging solution?
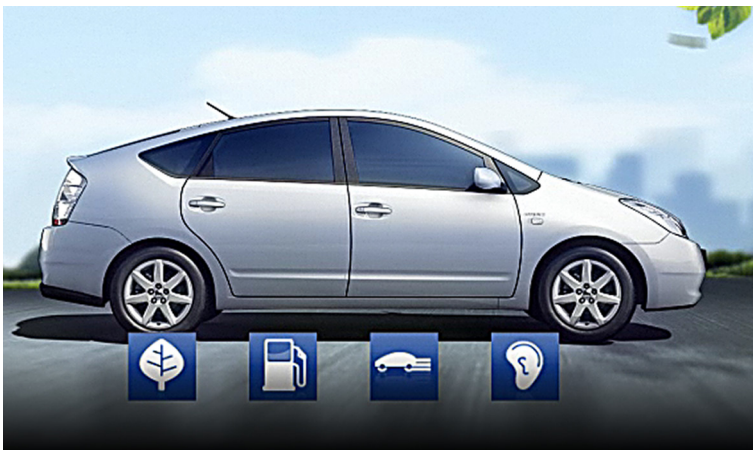

Figure 7. www.toyota.com

Figure 8. www.prodent.com

Environmental friendliness is just one feature among others.

Does the tube of toothpaste really need to go into a box?

4. SUSTAINABLE- AND ECO IMAGE IN PACKAGING DESIGN

Magnitude of packaging as a media is massive. Package is that surface in product where is among attractiveness information about product features with labels and tables. Victor Papanek (1984, 221-222) has noted that for people products outer appearance and form are more significant qualities than content.

Already over ten years it has been three so called eco-trends of packaging. They have come lighter, more easy to recycle and less toxic materials (Pauli Välimäki 1996, 48-49). Reused fibers are becoming popular. Still consumers rather pick more colourful packaging instead of simple, gray reused material packaging (Matti Remes 1997). Packaging doesn't have to look cheap. Ecological can also look commercial (Välimäki 1996, 49). Environmentally concious consumers want advanced, sophisticated and appealing products. To answer to this demand, packaging designers have started to create as simple as possible images and signals around products. Image of ecological product can be created example via correct information and texts, using less produced, less refined material and by plainness or simplicity. Product and packaging can also be designed artificially look like environmentally friendly. In this case designers are going for ecological style (Halko 1996, 51), instead of really trying to create something less harmful or more sustainable.

Artificial ecological style in packaging:

- **natural fibers or wastepaper bits on paper surface (printed in worst case)**

- **showing the structures**

- **emphasize the crafted hand-made style**

- **slogans for nature**

- **green and violet printing**

- **rugged and clumsy appearance**

Figure 9. spcdesignlibrary.org

Table 3. Artificial ecological style in packaging, Kolppo 2009.

People are willing to pay more for well designed product. Ecological products of future generations don't only spare nature during manufacturing process, but consumers want products witch use is also environmentally friendly (Halko 1996, 51). Although, marketing researcher Taina Boström (1996, 8-9) thinks that environmentally aware consumers "forget" their good intentions in buying situation, when the decision is to make between more expensive less environmentally consumptive products and cheaper disposable items. (Manninen, Mäkinen 1997.)
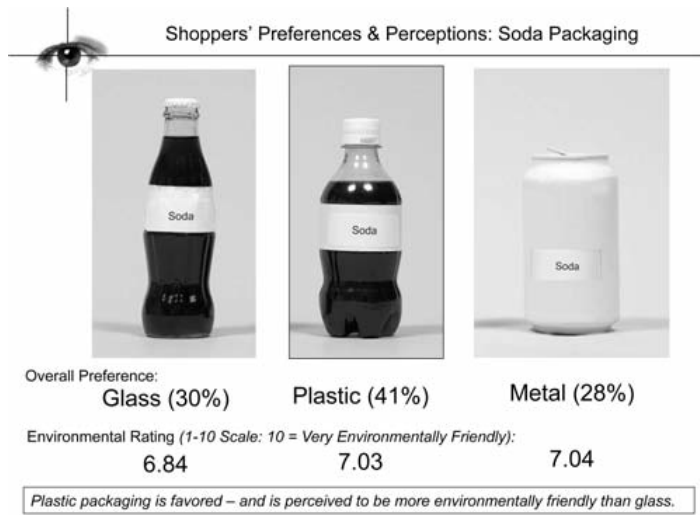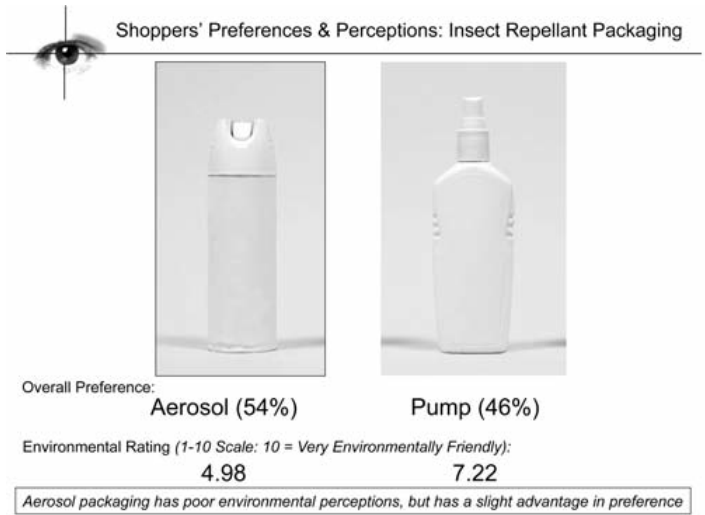
4.1 Quotation from consumer research

According to international research by PRS, Design Management Review 2008, 80% of interviewed consumers thought that it is manufacturers responsibility to produce more environmentally friendly packaging without passing on expenses to consumers. There can one draw a conclusion that packaging doesn't necessarily need to look cheap, as long as the price doesn't rise. Consumers are willing to pay more for quality but not for ecology. As research shows, consumers think that governments job is to make recycling more extensively available and easier. Consumers see their own role as recyclers. Manufacturers task is to modify environmental friendly packaging affordable. (Young, 2008.)

As one example for outdated knowledge and beliefs that came out of the research was that US consumers perceived the pump-bottle to be significantly non eco-friendly than aerosol bottle. That is because aerosol still believed to be harmful to ozone layer. However consumers thought that aerosol packaging is generally better appealing to it's functionality. In soft drinks, plastic bottle was incorrectly considered to be more environmental friendly than glass bottle. Over 90% of americans assumed that all plastic can be recycled, whereas glass was recyclable by only 74% of respondents.

In britain carton made chewing gum pack got more points from it's carrying and opening/closing features (overall value: 58 % versus 42 %) than plastic pack, but only a few consumers thought that environmental friendliness is decisive factor in their assessment. After all the carton pack perceived to be little more environmental friendly (7.31 versus 6.20).

Chinese consumers felt that transparent plastic shampoo bottle is better for environment than opaque (7.30 versus 7.13). As survey continued it revealed that image comes from belief that clear plastic is easier to recycle and the production takes less material. The opaque bottle in this survey was bigger. In other countries there wasn't significant difference between these results. (Young, 2008.)

This research shows that we know very little about consumer behaviour and thinking according to ecology of packaging. This issue and it's development must be observed in future when the overall knowledge about environmental issues increases. Researcher Steve Young mentions two observations from this research that are influencing to poor success of new environmentally friendly packaging solutions. compromising functionality (protectivity), or packaging simply looks inappropriate or cheap.

Shoppers' Preferences & Perceptions: Insect Repellant Packaging

Overall Preference:
Aerosol (54%)   Pump (46%)

Environmental Rating (1-10 Scale: 10 = Very Environmentally Friendly):
4.98   7.22

Aerosol packaging has poor environmental perceptions, but has a slight advantage in preference

Shoppers' Preferences & Perceptions: Soda Packaging

Overall Preference:
Glass (30%)   Plastic (41%)   Metal (28%)

Environmental Rating (1-10 Scale: 10 = Very Environmentally Friendly):
6.84   7.03   7.04

Plastic packaging is favored – and is perceived to be more environmentally friendly than glass.

In the UK, cardboard gum packaging was favored over plastic, due largely to perceived ease of opening and superior portability; cardboard was also perceived to be more environmentally friendly.

Figure 10. PRS, Design Management Review 2008.

Other American research handles consumers eco-behaviour divided by age groups. (Elin Raymond, President of The Sage Group, Inc., Consumers' beliefs and behaviors surrounding sustainable packaging, Michigan State University School of Packaging) According to Raymond, research shows that consumers are demanding unconditional authenticity at packaging green claims and they recognise the green washing. The study divided consumers to four generational category: "Millennials" (17 to 25 years old), "Gen Xers" (26 to 40), "Boomers" (41 to 55), and "Matures" (56+). Matures was clearly the most eco-friendly group, when youngest, millennials showed least interest towards green behaviorism.

Recycling percentage:

89.7% of Matures
69.6% of Gen Xers
67.6% of Boomers
56.8% of Millennials

75.9% of Matures thought that ecology of packaging has "big impact" in their buying decisions. Whereas 61.7% of millennials group said that ecology of packaging and products has "somewhat of an impact". According to research consumers estimated the most environmentally friendly packaging and products to be glass containers, aluminum cans, products sold in bulk, "cardboard" packaging, paper grocery bags, concentrated liquids, and packaging that is made from recycled materials. Most less environmentally friendly where single-packed, electronic- and toy packaging; hard plastic packaging and bottles; all that is not made from recycled materials; all that can't be recycled; over packaging; most plastic water bottles; plastic foam; takeout containers; plastic can rings; and clamshell containers.

Results mentioned above are partly in contradiction with PRS research, witch concluded that US consumers thought plastic bottle to be more environmentally friendly than glass bottle. There can still be found similarities. Both research shows that consumers see the ecological packaging to be synonym to recyclable packaging. Also Raymond as Young noted the importance of educating consumers and extra information. Raymond says the internet is important target area at this context, especially when targeting green marketing to younger groups (Mohan, 2009).

Consumer attitudes and awareness about environmental friendliness of packaging are somewhat culturally limited. This is due to national and regional differences between recycling systems and outdated knowledge about manufacturing processes and environmental impacts of packaging.

Futupack EKO2010 program (reduction of products total environmental impact by developing packaging - environmental positivity as a tool for packaging design), one goal is to provide an justification to extra value of packaging and improve acceptability about use of packaging (Katajajuuri, MTT, 2009). For example on behalf of products shelf life, material selections or functional solutions of grocery packaging aren't explained so much to customers these days. From the consumer perspective, products are often criticized to be overpacked rather than seeing packaging as a preserving necessity for the product. So how can we inform consumers about these matters? Sheer informative label like verbal information is not enough to catch consumers attention and it is only obstructing even more diminishing package printing area. Along with fact sheets and markings there should be non-verbal messages about functions of packaging and materials. Material and form itself should communicate about it's use and disposal processing. Colours and haptic texture could also be used as material dividing signals, or for the need to separate materials to different recycling systems.

4.2   Research, analyzing and applying

At this work I adapt material from earlier research and studies. Hassi, Kumpula, Riuttanen; Communicating Environmental Friendliness trough Product Design and Appearance 2007 Interdiciplinary master's thesis is based on mobile devices but is in many aspects adaptable to packaging for example behalf of colours and materials. However their research doesn't cover all the areas that are examined for this study, notably the common packaging materials, I decided to publish complementary quantitative survey in the internet.

To get as broad and global as possible sampling I released the survey via Facebook utility to Packaging Design Network. This community consists mainly of professionals from packaging- and graphic industry, students and anyone who is interested about this field. One purpose of this survey was also to get influence of possible professional knowledge and it's impact on images about environmental friendliness of packaging materials. Survey works as a complementary and a comparison for those studies mentioned earlier. The survey can be viewed in its entirety at appendices.

At following tables I have aspired to specify some attributes collected from research and by means of define the analysis.

NON-ECO AND ECO-PACKAGING
Listed according studies and research surveys

Non-Eco

- all kinds of single packaging
- electronics packaging (clamshell)
- toy packaging
- hard plastic containers, bottles
- enything made out of non-recycled materials
- packaging that can't be recycled
- over packaged products
- plastic water bottles
- plastic foam
- takeout containers
- plastic can rings

Eco

- glass containers
- aluminium cans
- products sold in bulk
- cardboard packaging
- paper crocery pags
- concentrated liquids
- packaging made out of recycled material
- recyclable packaging

Table 4. Non-eco and eco-packaging, Kolppo 2009.

REASONS BEHIND PREFERENCES FOR NON-ECO AND ECO-PACKAGING
Listed according studies and research surveys

Non-Eco

- poor protection
- cheap appearance
- aggressive appearance
- boasting or screaming design
- many colours/ screaming attention
- useless elements
- distraction by design
- technical, industrial packaging
- complicated structure

Eco

- familiar packaging format/ structure
- familiar material
- quality appearance
- balanced design
- plainness/ simplicity
- functionality and usability
- smaller/ compact size
- less produced, less refined material

Table 5. reasons behind preferences for non-eco and eco-packaging, Kolppo 2009.

NON-ECO- vs. ECO- FEATURES
Comparison between materials

Material	Non-Eco	Eco
Plastic	synthetic material, non-renewable, black/ colored, cheap appearance	lightness, recyclability
Aluminium	non-renewable, colored,	lightness, recyclability, pure material
Carton	glossy coatings, printing	matt, lightness, roughness, natural, warm, recyclability, recycled appearance
Glass	heavy, brakeable,	natural, quality, recyclability

Table 6. Non-eco- vs. eco- features, Kolppo 2009.

MATERIAL ECO-APPEARANCE
According to material attributes

Material	Colour	Haptic	Structure	Visual	Total
Plastic	-	+	+/-	-	-
Aluminium	-	+/-	+	+/-	+/-
Glass	-	?	+	+	+
Carton	+	+	-	+	++

Marks: + = good, +/- = medium, - = not so good, 0 = aspect is not relevant, ? = unknown

Table 7. Non-eco- vs. eco- features, Kolppo 2009.

4.3   Eco-appearance in packaging, Materials and textures

In Finland people have get accustomed to fact that almost all of the soft drink bottles, glass and plastic, are recycling. Plastic in this matter isn't imbedded in our minds as absolutely bad material. To find it more odd is that according to research over 90% of population in US assumes that plastics can be recycled and only 74% believes that glass is recyclable (Young, 2008). According to Young, transparent and opaque white plastic was considered to be equal in several countries as measuring environmental friendliness. My own survey shows that black opaque plastic is perceived to be little bit more non-eco than white and transparent plastics.

Aluminium packaging is believed to be generally rather eco-friendly in Finland because of their efficient recycling. The sales figures of aluminium cans in Finland has almost tripled from the year 2004. On the other hand the tax reformation at this time has sturdily increased the supply of cans and soft drink products. Recycling 86 percent of all aluminium cans is still globally a very high rate (PALPA, 2009). From another point of view, my survey shows that aluminium carton composite was considered more non-eco than plain aluminium, when carton was fairly more environmentally friendly than aluminium.

Different carton coatings

Brown uncoated carton board thought to be clearly the most environmentally friendly of all cartons at my syrvey. White carton came naturally second. Aluminium coated carton were seen as little bit more eco-friendly than lacquered or foiled carton. Materials compared in packaging, aluminium coated tray was still considered clearly non-eco. Coloured printed carton were clearly more non-eco then white carton. Also white carton tray partly printed by brown colour was less eco-friendly than white carton tray. Hassi et al. 2007, study noted that less treated and refined material seems more environmental friendly. Also in my survey it turned out that recycled looking mixed paper was experienced environmentally friendly.

Joint materials and confusion

Different joint materials or composites in packaging causes headache to consumers. Especially in contact with recycling it is hard to detect from packaging that contains plastic, aluminium and carton board, how they should be sorted. Finnish carton board processing plant that is able to separate plastics and aluminium from carton packaging is rather new system and the briefing about it to consumers hasn't been very visible. This is one reason why lots of liquid carton packaging still goes to landfills. Just recently there has been some defined recycling information in packaging but for materials or their sorting there is still too little to even read.

Concerning carton board and plastic hybrid packaging I interviewed Valio Oy's packaging development manager Juha Ylisiurua. According Ylisiurua, information at packaging nowadays aims to guide consumers to find more information about products and packaging recycling features from the internet. This method is becoming more common because packaging surface area is limited for unambiguous instructions. As Ylisiurua says: "Nothing is sufficiently large in portion packaging." For example at design of TetraTop package strive for informing that the whole packaging belongs to carton recycling system, Ylisiurua says. This information is still all verbal and somewhat obscure.

At following pages I strive to represent example of developed graphic layout to support recycling information at TetraTop packaging format.

Figure 11. Tetra-Top packaging, Kolppo 2009.

Materials of package are presented in distinctive and strongly visible recycling info-box which stands out from other graphic elements. Recycling labels and products design elements should be designed to work together. Materials and their reuse or recyclability to be more distinct. Visual differentiation to material parts of packaging to support recycling labels.

Figure 12. Tetra-Top packaging, modified graphics, Kolppo 2009.

4.5   Printing properties lacquers and inks

Lacquers are also part of packaging functionality. Friction lacquers, protective lacquers and base lacquers are justified at some cases and even necessary. Then solely for supporting graphical elements lacquers are slightly dubious particularly from the environmental point of view. As my survey expresses, glossy surface is less environmentally friendly than matt surface. Consumers that aren't so aware of printing technics probably don't even notice the matt lacquer coating. Also matt or half matt clay and wax coatings that are used on carton boards are hardly recognizable for most consumers.

Results from my survey refer to that using printing inks does make the packaging less environmentally friendly. Even one colour partly used was interpreted clearly less eco-friendly than blank white tray. Compact colouring of the whole surface with black versus lots of different colours didn't notably differ in ranking. Still for example at designbynature.org (The Australian resource forum for environmentally sustainable graphic design) instructs designers to avoid 100% compact colour printing. This will essentially spare lots of printing colours. Although the loose raster makes the printing look more scruffy and as said earlier, ecological packaging should not look inappropriate or cheap. The reasonable solution could be avoiding large printed areas and unnecessary colouring of surfaces.

Aqueous varnish is often the most economical and environmentally preferable coating. They release least (VOCs) volatile organic compounds. Aqueous varnish can be used as printing both matt and glossy finish (designbynature.org). Then it is again another question how many consumers will notice what type of varnish is been used.
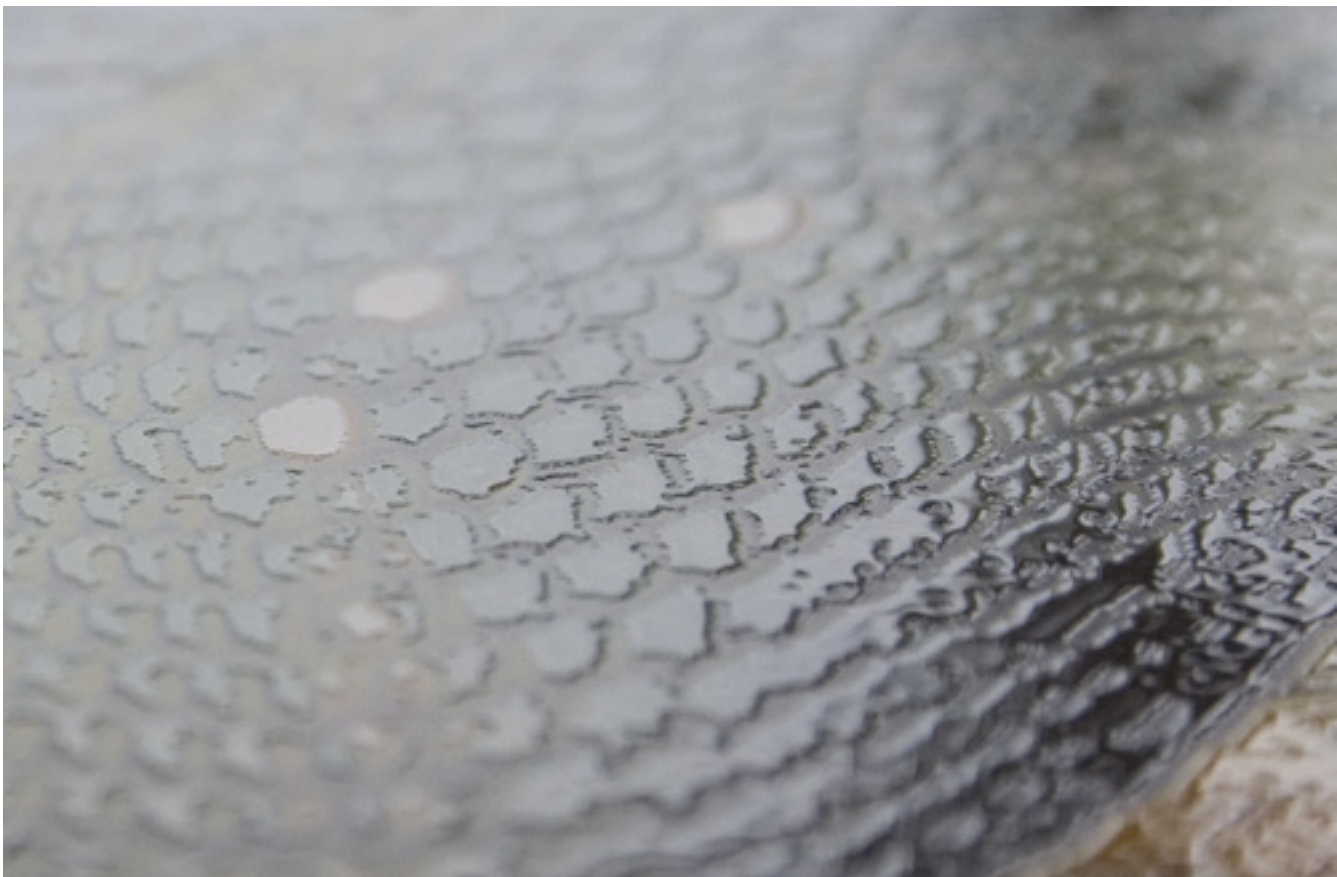

Figure 16. Imitating nature. Offset lacquering from magazine cover. Kolppo 2009.

4.6   Colours as non-verbal signs on packages

Non-verbal signs can be distinguished as size, shape, material, pattern, font, and colour. Up to 90% of all interpersonal communication is non-verbal (Fromkin and Rodman, 1993, Kauppinen, 2005). Although the figure refers to another type of communication, it indicates the impact of non-verbal signs.

(Houston et al. 1987) research has found that non-verbal signs have an impact on memory, and furthermore it has been found that non-verbal signs influence attitudes (Babin and Burns 1997; Mitchell 1986). Colour as one of the inevitable signs of the total appearance of products have an impact on the sales success of a product (Bloch 1995). The value of colours does not only lie in the aesthetics (Oliver 1996). Colours draw attention to themselves. This function is pointed out by implying that colour is the most essential visual element within marketing (Danger 1987b). Colours have the ability to convey meanings particularly when it comes to advertising and packaging as pointing out that some issue is essential (Kauppinen, 2004).

Global studys concludes that the use of colours is influenced by the culture (Huang 1993, Kauppinen 2004). As adapting the study by Hassi et al. 2007, it is necessary to underline that their research is based on national survey. There can be seen that example national colours of Finland influenced their study results as blue and white performed relatively well in ranking. Although blue and white are often connected to general impression of Finland's clear environment. Green is still considered as premium eco-colour as green has been the traditional colour used when communicating environmental friendliness. It concludes that this pro-environmental message is learned, just like blue and white in national level. Consumers, however are becoming skeptical towards green as environmental friendly sign, and use of this colour should be careful. (Hassi et al. 2007)

Even though white went fairly good position in ranking of eco-friendliness, it must be noticed that clean 'cold' white is often seen as chemically treated in paper manufacturing process and brown carton board or paper is perceived as untreated. However, cold colours were generally more eco than warm colours (Hassi et al. 2007). As green also brown is somewhat learned eco-colour. My survey shows that printed brown on white paper is a bit more eco than blue or even green. Colour combinations like yellow, red and black are often interpreted strongly non environmentally friendly (Hassi et al. 2007). This aggressive combination often recur at different warning and instruction signs. Generally speaking, behalf of colours research shows that pure, clear and cold are considered environmentally friendly, whereas warm colours are non-environmentally friendly.
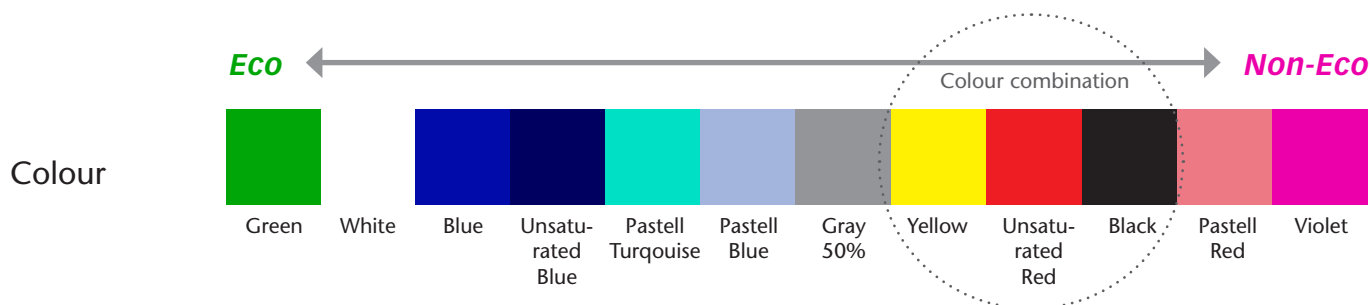

Table 8. Colour ranking according to Hassi Et al. 2007, Kolppo 2009.

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