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Article

Perceptions of Sustainability and Functional Aspects on Liquid Carton Board Packaging Materials *versus* Competing Materials for Juice Applications in Sweden

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Abstract: This research explores the downstream perceptions of liquid carton board *versus* competing materials in packaging applications for juice. The methodology used is focus groups. The context is sustainability and functional performance, and related potential implications for the beverage industry value chain. The purpose is to get a deeper insight and understanding of functionality in relation to juice beverage packaging. The results confirm that there is no optimal packaging for every juice product, but a multitude, depending on the distribution channel, retail outlet, customer preferences, and context of consumption. There are some general packaging preferences, but the main deciding criteria for purchase seem to be the product characteristics in terms of quality, taste, brand, price and shelf life. For marketing reasons, packaging has to be adopted to the product and its positioning, liquid carton board packaging seem to have some functional advantages in distribution and is considered as sustainable and functional among many consumers. Major drawbacks seem to be shape limitations, lack of transparency, and lack of a “premium look”. To improve packaging performance and avoid sub-optimization, actors in the beverage industry value chain need to be integrated in development processes.

Keywords: sustainability; perception; juice packaging; consumer; focus group

1. Introduction

Sustainability has been a leading principle in forestry for centuries. The concept of sustainable forest management (SFM) has evolved from sustained timber yield and steady forest cover to increasing diversity of goods, benefits, and ecosystem services demanded by society. This extended approach to SFM has been clarified in practice by the development of SFM criteria and indicators for national and international governmental and non-governmental institutions by, for example, [1]. SFM is linked to the core concept of sustainable development, which was introduced in the Brundtland report [2]. Concern about the sustainable use of forest ecosystems and their economic and social contributions have become an issue for forest related stakeholders. Europe's forests provide a wide range of essential ecosystem services, but they are also a resource base for many industries, such as the packaging industry.

The research presented in this article was part of a large European research project; EFORWOOD—Sustainability Impact Assessment of the Forestry–Wood Chain. The project idea was to bring together researchers and practitioners, representing all parts of the forest-based sector, and integrating their knowledge in a project focusing the sector as a whole to study its impact on and possibilities to contribute to a sustainable development in the European society [3]. The main objective of EFORWOOD was to develop a quantitative decision support tool for Sustainability Impact Assessment (SIA) of the European Forestry–Wood Chain (FWC), covering upstream forestry via intermediate industrial manufacturing to downstream consumption and recycling. An FWC is determined by economic, ecological, technical, political and social factors, and consists of a number of interconnected processes, from forest regeneration to the end-of-life scenarios of wood-based products. EFORWOOD produced, as output, tools (see [4]) to support analysis of sustainability performance for forest sector supported value chains, such as packed beverages.

The challenges in governance to manage trade-offs between human needs and, at the same time maintain the capacities of the forests to provide these needs have been studied by [5]. They suggest a participatory process involving different stakeholders to support decision making. A stakeholder-oriented approach is crucial when FWC sustainability is assessed according to [6]. Consumers, professional users, and businesses buy and use products with full or partial origin in the forest. Commodity type FWC products (e.g., liquid carton board) from the FWC-based processing and manufacturing industries are typically distributed to interacting value chains (e.g., packaging and beverage industry) for further processing and value adding. A key aspect for the FWC sustainability is to understand the perception of forest-based materials and products, and their impact on overall functional performance and sustainability in interacting final-product value chains. Such a holistic view is supported by [7], when they emphasize the need to address sustainability at a strategic, not only operational, level in the companies. How different value chain actors apply a different logic in terms of the value creating packaging attributes and their consequences, have been studied by [8]. They discuss the value creation process and the need for suppliers to understand their customers' processes further downstream. Based on this, they suggest further research to extend the value chain and explore how consumer value different packaging attributes. This paper aims to add knowledge and understanding in this context.

The roles of food packaging have been proposed as protection/preservation, containment and waste reduction, marketing and information, traceability, convenience, tamper indication and other functions [9]. The roles relate to both upstream and downstream aspects, whereby this paper will primarily focus on the consumer related downstream aspects. In line with the findings of [8], these downstream aspects are however of vital importance to take into account for upstream actors such as packaging suppliers and beverage producers, to develop competitive and attractive product and packaging solutions for value creation with a holistic view. Some general advantages and disadvantages for different packaging materials are suggested by [9]; whereby glass is disadvantageous in terms of heavy weight, but advantageous in terms of ability to withstand high processing temperatures, that it can be produced in many shapes and is transparent. Plastics offers considerable design flexibility, is inexpensive, easy to print, lightweight and can be given a wide range of physical and optical properties. Paper board offers strength and durability, is renewable, easy to print and can be laminated with plastics and aluminum to acquire good barrier properties, but the possible shapes are somewhat limited. This paper focuses on the downstream perceptions and performance of FWC-based *versus* competing materials in the beverage packaging sector for juice applications.

Objective and Scope

With the overall research question being “How to actively address sustainability issues for the FWC with a holistic view on interacting value chains and markets?”, the main objective for the research presented here is to explore the downstream perceptions of liquid carton board *versus* competing materials in packaging applications for juice. This will be done in the context of sustainability and functional performance, and related potential implications for the interacting beverage industry value chain and other upstream actors.

The purpose is to gain a deeper insight and understanding of sustainability and functionality in relation to beverage packaging for juice in Sweden, within a EU context, to support decision makers in the sustainability, marketing, and business management processes.

2. Empirical Section

This section reports from the qualitative research findings in focus groups with consumers as participants. The aim was to explore the perceptions and preferences of Swedish consumers to different beverage packaging applications and materials for juice and put them into context of corresponding perceptions and preferences for professional users and Spanish consumers.

Focus groups are group discussions organized to explore a specific set of issues. The group is focused in that it involves some kind of collective activity such as viewing a film, examining a message or simply debating a particular set of questions [10]. Group discussions in their widest sense are a popular method for data collection in qualitative research [10]. According to, for example, [11], crucially, focus groups are distinguished from the broader category of group interviews by the explicit use of the group interaction as research data. This was considered advantageous to gain a rich and broad understanding of consumer perceptions and preferences in line with research objectives, and, hence, focus groups were selected as an appropriate method.

The focus group sessions were carried out in Sweden with a total of 15 participants. Juice (packaging materials) was in focus in the discussions, and all participants were regular buyers of packaged juice products, which was one basic participant criteria. Focus group participants were further selected to be evenly distributed as regards age and gender, and were divided in two focus groups based on age; Young people (18–35 years old) and Mature people (36–65 years old). Each focus group session lasted 2 h and took place at the Innventia Usability Lab in Stockholm. The discussions were facilitated by B.N. and S.P., audio was recorded and notes were taken.

As setting for the focus group discussions, different type of juice packages (functionality and materials) were positioned on the table in front of the participants, see Figure 1. The participants were asked to focus on the packages and not the content. The following protocol was used to organize the discussions:

- Individual reflection over the concept of “environmentally friendly”
- Could you share your opinions about the packages on the table?
- If we consider these packages—disregarding their content—could you tell us which one of them you would select and why?
- Is your purchase decision influenced by the material of the product/package? What material do you prefer and why?
- Would you consider the different alternatives in front of you as “environmentally friendly”?
- Where (at which store) do you usually buy this kind of product?
- Who in your household makes the decision on which product to purchase?
- What makes you choose this particular product? (Price, quality, availability, attitudes, family requirements, *etc.*)
- Which one(s) of the parameters determines your choice?



Figure 1. The juice packages.

As part of the research method, the results obtained are then compared to, and discussed in, the context of similar research carried out in Spain within the EFORWOOD project [12]. The same focus group protocol was used in both countries, and the questions for the focus group protocol were developed jointly between the Spanish research group and the authors of this paper. The research findings are also compared to, and discussed in relation to preferences and needs among professional users.

3. Results and Discussion

3.1. Environmental Friendliness

The initial part of the focus group centered on the participants' own definitions of being "environmentally friendly". The definitions given by the individuals had a lot in common. Participants in both age groups mentioned public transports, reuse/recycling of the products, and an active choice of eco-labelled products—as essential parts of being "environmentally friendly". The Young group also mentioned that the products should be produced, distributed and "waste handled" in a way that would not harm the environment. The Mature group further stressed that the materials used should be easy to sort for household waste separation, biodegradable or not harmful to the environment, and that the production should be carried out at local/regional production sites (in order to cut transport distances) with minimized resources in a way that would not harm the environment.

3.2. Perceptions of Different Packaging Materials

Functional and eco-friendly packages were preferred in both age categories, but the participants chose products and packages primarily based on context of use, taste, and price along with product shelf life. Fiber based juice packages were considered to be light to carry, have high functionality and easy to fold for waste handling and recycling compared to glass bottles. Glass was considered a fragile and heavy material. However, it was considered transparent, easy to recycle, and with a more luxurious feeling. Plastic bottles were considered to have advantages in reclosability and reusability compared to fiber-based packages.

The participating Swedish consumers generally recognized themselves as environmentally conscious, preferring paper and cardboard packages in front of plastic, glass and metal. Paper and cardboard packages were considered easy to recycle, biodegradable and compressible—which means lower quantities of waste—the manufacturing processes were also supposed to be less energy consuming than for both metal and glass packages.

Overall, carton based packages were generally preferred and considered as more environmentally friendly than both glass and plastic packages. The Mature group especially emphasized the lightness, effectiveness to transport and store, and that it will be broken down if left in the nature. The Young group stressed the ease of recovery as material or energy.

According to [12], many Spanish consumers perceive glass as the most functional packaging material, especially older people. Bottles made of glass give the best aesthetics and appearance, and make an impression in the consumer's mind that, not only the packaging, but also the juice inside, is of the highest quality. However, according to some consumers, especially younger ones, glass bottles were considered too fragile and heavy. Carton packaging along with metal packaging were typically ranked in the middle by the consumers and plastic packaging were ranked in the bottom. However, plastic bags, mainly

because of being unusual in retail trade in Spain and also because they were more of a novelty, ranked somewhat higher among some consumers. Among younger consumers, many perceived that the most functional packaging for juice was the carton-board-based because they were convenient to use in everyday life, as they are lightweight, easy to transport, and easy to store. Plastic bottles were also ranked higher by some for being lightweight, and easy to recycle.

Attitudes towards another beverage category, namely milk packaging in Northern Ireland in the areas of form, function and appearance have been explored by [13]. Their results showed that many consumers had a strong preference towards glass packaging, but with some negative aspects such as heavy weight and the need to wash the empty bottle. Fiber-based packaging was not very popular based on the view that it did not maintain quality as good as other packaging, it was associated with lower quality ultra-high-temperature (UHT) treated milk and its lack of transparency. If consumers could view the product through the pack, they had more trust in the product quality.

Beverage industry research [14] indicates that, for processors, plastics is growing but glass has a “gourmet look”, natural feeling and inspires quality. Aseptic packs are a big issue, not the least among juice processors. All processors have multiple packaging sizes and the variety of sizes is increasing among a large number of processors. At the retail level, the processors emphasize presentation and consumer preference balanced against cost. Sustainability is an area of increasing attention and packaging decisions typically involve senior management.

3.3. Deciding Criteria for Purchase

Different packages were preferred depending on the context of use. The flavor and quality of the product (including taste, sugar content, preservatives, brand, *etc.*) were essential for the purchase, but price, type of package, and the weight of the product can have an influence on which product and package is selected. The smaller—ready to drink—packages were preferred “on the go”. For consumption over a longer period of time, the larger (1–2 L) packages were suggested as good alternatives, together with juice in a concentrated form (200 mL).

Important packaging aspects influencing the choice were appearance, environmental issues relating to both material and transport, the amount of material, ease to carry and transport from store to home, storage functionality (whereby small packs and reclosable packs were considered easier to store in the refrigerator), ability to keep the quality of the content (barrier and reclosability), waste handling, ease to “flatten”, and eco-labels.

The Mature group put forward the quality and the price of the product, as well as the shelf life, as the most important points. The handleability of the packaging was also important, and so was the function, e.g., reclosability.

The Young group stressed that the price and size of the packaging, as well as the quality of the product were important. Where the juice will be consumed affects the Young group consumer’s choice of packaging to a large extent. When it is to be consumed “on the go”, a small sized bottle with screw cap was considered to be the best choice. For consumption in the home, 1 L liquid carton board packaging or 200 mL concentrate packaging (small ones are easier to carry) were primarily chosen.

Spanish consumers have similar deciding criteria for purchase according to [12]. For mature consumers, the most important factor in juice-buying is the quality of the content, followed by the price.

Packaging plays a role, not the least of which is to catch the attention of the consumer. Younger consumers show a similar pattern but place some more emphasis on price and packaging novelty.

Professional users seem to show a slightly different profile according to [12]. For the hotels the most important point is the high quality of product itself and the functionality of the packaging. It should as a minimum fulfill legal environmental requirements. No preferences towards fiber-based packaging were noted. In mini-bars and in restaurants, generally, the preferred packaging was a small-sized glass packaging. However, during breakfast and in the bar, juice is often served from large sized, labor saving “industry packaging” placed in tap machines. Hospitals put emphasis on product quality and price. The packaging should possess high quality to protect the product. Retailers and wholesalers stress variation of packaging size, as well as functionality, in order to satisfy different segments, trends, and market needs. The positive aspects of fiber-based packaging mentioned by retailers were that it is relatively cheap, and easy to expose, transport and recycle. The negative aspects of fiber-based packaging were that it is more difficult to form into a unique design. These results are in line with the findings of [8], where adequate packaging size can be used as one example. The retailer, not only values adequate size for the consumer, but also strongly emphasizes packaging to suit shelving and replenishment in-store.

3.4. Consequences for Upstream Actors

According to [15], firms usually understand the needs of their immediate customers, but it is common that the needs and expectations of downstream customers are neglected. Focus group research findings in this article suggest that there are some general packaging preferences among consumer segments (based on geography, age, *etc.*), but the main issue is still the product itself (quality, taste, brand, price, *etc.*) and the context of consumption (on the go, restaurant, at home, *etc.*). This suggests that it is important for beverage suppliers to understand the final customer’s needs and preferences in different consumption contexts, customer segments, and geographical regions, to be able to choose adequate packaging type and material.

Case studies illustrate the importance of innovative packaging solutions in order to stay competitive [16]. The same studies state that the packaging must fulfill several marketing functions before reaching the final consumer. Focus group results indicate that the choice of material definitely sends messages to consumers regarding the quality of content. Glass packaging indicates high quality products for many consumers. Transparency can also give the consumer a strong sense of quality and assurance, enabling inspection of the contents. A transparent paper-based pack would be an innovation that would clearly increase competitiveness in several segments. In this context, it is important to evaluate innovation consequences throughout the value chain, e.g., from a distribution and retailing point of view.

The issue of globally standardized *versus* locally adapted packaging, and the trade-offs involved, have been studied by [17]. They suggest that in markets where primary packaging is used as a marketing tool, companies ought to consider a more locally adapted packaging strategy. This view is clearly supported by the focus group results, where the differing consumer preferences encountered suggests that packaging solutions ought to be different in different markets and segments. Strategic practice among the world’s largest multinational beverage enterprises also shows that they tend to adopt a regional, rather than a global, approach to product offering and packaging [18]. The important interplay between corporate standards and local conditions is emphasized by [19], and [20] suggests that, not only products,

but also adopted business models are essential to be successful in emerging markets. The research findings here, where the product and packaging needs have been confirmed as very context based, may imply that business models may well also need to be adopted between different developed countries and/or regions (e.g., in the EU).

The possible adoption of eco-design and other advanced strategies for paper-based packaging and other forest-based products is suggested by [21]. These strategies are most likely stretching far beyond only the renewability aspect and may emphasize a differentiated offer to satisfy varying functional and sustainability performance needs in different market segments, well in line with the findings in this project. The findings of [22] support this view, stating that a case study has been able to demonstrate that a business, based on sustainability as its strategy, can survive and positively impact stakeholders' knowledge, attitudes, and actions related to sustainability. In this way, market segments with little focus on sustainability may be developed in a direction where more emphasis is given to sustainability aspects. The focus group results indicate that sustainability is already an important issue for many Swedish beverage (packaging) consumers, but the view seems to be somewhat contrasted across segments. It is also important that the view and weighting of different sustainability aspects, typically, will differ between segments and change over time.

4. Conclusions

The research findings confirm that there is not one optimal packaging for every juice product, but a multitude depending on the distribution channel, retail outlet, customer preferences and context of consumption. There are some general packaging preferences for consumer segments (based on geography, age, *etc.*), but the main deciding criteria for purchase are still the product characteristics in terms of quality, taste, brand, price, *etc.* For marketing reasons, packaging has to be adopted to the product and its positioning, e.g., a traditional premium orange juice may require a glass package whereby a new tropical flavor juice may do well in a new trendy plastic pouch. Liquid carton board packaging for juice seem to have some functional advantages in distribution and is considered as sustainable and functional among many Swedish consumers, who mostly consider themselves as environmentally conscious. In other countries, e.g., Spain, the advantages for liquid carton board are smaller, especially among mature consumers who generally seem to prefer glass. Major drawbacks for carton board compared to glass seem to be shape limitations, lack of transparency, and lack of a "premium look". Plastics packaging has advantages in low weight, shape and reclosability features.

Packaging functionality has to be balanced against cost and sustainability aspects emphasizing the need for a holistic approach to also look at upstream production and distribution processes. Actors along the supply chain need to be integrated and involved in development processes for innovative package designs to avoid sub-optimization and safeguard that a broad view on packaging functionality is present. The research findings here may provide input to jointly develop new innovative and sustainable packaging in order to increase beverage industry competitiveness and product attractiveness for consumers.

To better understand the downstream part of the value chain, further research may qualitatively look deeper into packaging defects and malfunctions that may deteriorate branding, and quantitatively at geographical differences between consumer opinions on macroeconomic and macroarea scales (e.g., Southern, Central, and Northern Europe).

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Author Contributions

C.O., B.N. and S.P. planned and designed the research process. B.N and S.P. performed the research. C.O., B.N. and S.P. analyzed the data. C.O. wrote and edited the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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