

# Sustainability issues in using paper and board in packaging research paper exampl...

[Education](#), [Sustainability](#)



This paper discusses the sustainability issues of using paper and board as packaging material. The succeeding sections first begin with a definition of packaging followed by a description of the selected packaging material which is paper and board. After which, the specific sustainability issues in the use of paper and board are discussed. The paper concludes by providing a summary of the points discussed and presenting the authors' insight about the use of this particular packaging material.

## **Definition of packaging**

Packaging refers to “ all products made of any materials of any nature to be used for the containment, protection, handling, delivery, and preservation of goods from the producer to the user or consumer” ( NIEA, 2010). Depending on its function, packaging can be classified as primary, secondary, or tertiary. Primary packaging is that material that is used as part of the product being sold like the box where juice powder is contained. Secondary packaging is also referred to as the group packaging and this is where the individual boxes containing the product are placed together. The tertiary packaging is also called transport packaging and this is the material used to bring a product from the production site to the end user or consumer. The packaging industry is a huge business. In 2009, the global packaging industry was said to have employed more than five million people and was estimated to have reached \$429 billion (SPC, 2011).

There are at least two purposes in packaging. One is to protect the product and the other is to provide information (CBI, 2012). Protection means making sure that the product reaches the consumer at its expected quality.

Information on the other hand refers to data provided to the consumer about

the product. The packaging can also be used as a way for the company to monitor not only the location of the product but also the existing quality of the product. Ray (--) enumerates six purposes of packaging and these are (a) contain merchandise; (b) protection; (c) identification; (d) help sales promotion; (e) reusable-recyclable; and (f) bring distribution efficiency. Item e in this list will be discussed further in the succeeding sections of this paper.

## **Description of the packaging material**

The most frequently used materials for packaging are paper and board.

There are at least six types of paper and board used in the market today as secondary packaging. These are (a) kraft paper, (b) boxboard, (c) corrugated board, (d) liquid paperboard, and (e) moulded paper (Verghese, Crossin & Jollands, 2012).

Kraft paper is used in the making of labels, inserts, cartons, boxes, bags, sacks, sheets, and trays. There are different grades of kraft paper, such as unbleached, bleached white, heavy-duty, and natural brown. This material can also be coated to expand its use. Coating refers to the addition of new substances to the paper such as laminating the paper with wax, resins, and polymers. Kraft paper when coated results to new kinds. One is parchment paper used in packaging butter and margarine. Another is glassine which is used to line biscuits and wrap fast foods and baked products. The other is greaseproof paper which is used for the packaging of food with high oil content. The coating of the paper has improved the capacity of the packaging to contain the grease or oil of the product or its barrier property. According to Raija (2003) barrier properties, a vital requirement in a food

packaging material, refer to permeability of gases, water vapor, and aroma compounds. Ling (2011) defines barrier property as the “ rate at which a gas or water vapor pass through a membrane” (p. 162).

Kraftpaper is constructed as a single sheet and its grammage is 10-20 g/m<sup>2</sup> (Verghese, Crossin & Jollands, 2012). Grammage refers to the paper density or grams per square meter (g/m<sup>2</sup>) or just gsm. This is the measurement of the weight of the paper (Sherin & Evans, 2008).

Corrugated board or fiberboard weighs 250-1, 500 gsm and are multi-layered, sometimes made with fluting. This type of material is used in the production of shipping boxes and cartons, pallets, edge protectors, trays, separators, and corner blocks for bracing (Verghese, Crossin & Jollands, 2012). According to the Global Industry Analysts, Inc (2012), demand for corrugated board is increasing in developing economies such as that of Russia, Poland, China and Brazil. The economic growth in these countries has resulted in customers growing preferences for fast food and also convenience foods. These products require packaging made from corrugated boards. Another reason for the demand of this type of material is the increasing popularity of online shopping. Products bought online are shipped to customers using packaging made of corrugated boards.

Boxboard can either be a folding boxboard, cartonboard, or paperboard. These are made as single or multi-layered and paper density ranges from 120 to 800 gsm. This type of material is usually used in folding cartons, and in milk and juice cartons. Liquid paperboard are made either as single layers or as multi-layered materials. The multi-layered kind would have polymer and an optional aluminum foil. Weight of the material ranges from 300-400

gsm and these are used in the packaging of fresh milk, long-life milk and juice, as well as in wrapping soap and aseptic products. Moulded paper is the last type and this can either be moulded pulp or moulded fibre. Moulded paper is the material used in producing egg cartons, takeaway drink trays, other food service packaging as well as the cushioning for electronic products ((Verghese, Crossin & Jollands, 2012).

## **Life cycle of paper and board**

Before paper and board becomes packaging material, these first come from natural sources. The life cycle of paper and board begins with the growing and harvesting of trees which produces the forest fiber. Then pulping is done to extract the fiber. Two options follow; either kraftliner medium production or semi-chemical fluting production. Either way, the results of these processes would continue into the manufacturing into paper. The paper will then be converted into the packaging component, then filled and use as a packaging component. After being used, disposal of the packaging can take several forms: as landfill, waste to energy, composting, litter, or for recycling. When recycled, paper first goes through de-inking then goes back to the manufacture into paper step. Apart from trees, paper can also be sourced from starch from other plant sources. These stages in the life cycle of paper and board were presented in a chart by Verghese, Crossin & Jollands, (2012, p. 228 ).

## **Issues in Sustainability**

As the previous section has presented, paper and board are used in a wide range of packaging products. Thus, it is expected that such material would

also have a corresponding volume in terms of waste as these are often disposed of when products contained in the boxes or wrapped in the papers are being utilized. Disposal of waste paper products is one main sustainability concern when it comes to paper and board packaging.

## **Sustainable packaging definition**

Sustainability is defined in Environmental Science as “ the quality of not being harmful to the environment or depleting natural resources, and thereby supporting long-term ecological balance” (dictionary. com).

According to the US EPA (n. d.) “ sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations (epa. gov). Therefore, economic activities such as packaging, from production of the material to disposal should not be harmful to the environment for it to be sustainable. There is a set of criteria that the Sustainable Packaging Coalition (SPC) has enumerated to determine whether packaging is sustainable. These include packaging to be (a) “ beneficial, safe & healthy for individuals and communities throughout its life cycle,” (b) “ manufactured using clean production technologies and best practices;” and (c) effectively recovered and utilized in biological and/or industrial closed loop cycles” (SPC, 2011, p. 1).

## **Product is beneficial, safe and healthy**

A major concern in the use of recycled paper and cartons is the contamination of food products. In 2010, there was a case discussed in Germany of mineral residues found in carton boxes. Laboratory examination

showed that a substantial amount of the mineral oil have migrated into the foods (BfR, 2010). This contaminant was found to be damaging to the liver and lymph nodes according to studies on animals. The packaging product, whether from fresh sources or recycled paper have to be made free from contaminants to ensure the safety of the end users or the customers.

Going back to the earlier stages of the life cycle of paper and board (see section on life cycle), there are also sustainability issues in the initial stage of growing and felling of trees. In many developing countries where trees are felled and processed for paper and other products, issues such as deforestation, displacement of indigenous communities, and unfavorable labor practices are common. Sustainably managed forests are beneficial for communities in these parts of the globe, and with sustainable sources, the supply for the paper and board would also be ensured.

### **Product is manufactured using clean technology**

The life cycle of paper and board requires various stages of production that would need plenty of energy, water, and other resources. For it to be considered a product of clean technology, the production process should minimize environmental degradation. For example, the felling of trees would be more environment -friendly if this is done in forest farms and not from primary or second-growth forests in developing countries. Forest farms have mechanisms of planting forest trees in specific cycles to maintain a continuous supply.

Processing plants need to likewise install measures that would prevent toxic chemicals or waste products to contaminate the land, water, or air. Paper

companies are notorious for contributing so much pollutant in the environment. According to studies, the most polluter industry in the world is the pulp and paper industry. (Thomson et al, 2001 and Sumathi & Hung, 2006 as cited in Ince, Cetecioglu & Ince, 2011). This industry uses a lot of water, even from freshwater sources (Pokhrel & Viraraghavan, 2004 as cited in Ince, Cetecioglu & Ince, 2011). At this point in man's history where demand for water has increased tremendously because of increasing population and growing industries, the use of fresh water by paper companies has negative implications to the health of the environment. The communities sharing the same water sources would also be negatively affected. Apart from water use, these companies also produce waste products that contain large amounts of harmful chemicals. Thus, the disposal of wastewater and solid wastes need to be done responsibly to minimize adverse environmental effects.

The holistic approach when it comes to packaging is now gaining popularity. This means that companies decide on what material to use by taking into account the whole life cycle of the packaging product (CBI, 2011). Aside from the costs and availability, how the material was produced including the impact of the production to the environment would be taken into consideration.

### **Product is disposed of properly and sustainably**

As paper and board are the most widely used packaging materials, these also create the most waste products. The earlier section on the life cycle shows that paper and board can be disposed of as landfills or to produce



energy from waste. Since paper is biodegradable it can be used in composting. The most sustainable use is recycling, however those that are not qualified for recycling ends up as litter. Recycling of paper products can generate new packaging materials without felling additional trees. Thus, using recyclable materials, like paper and board, contributes to less trees cut down to make paper. Since trees take years to grow and mature, having recycled paper provide for the constant demand of paper is advantageous for the environment and beneficial for the general population.

There are at least two concerns related to recycling. One is the use of mixed materials, the additives in the packaging material, and another is the availability of recycling facilities. Combination of materials to improve the capacity of paper and board, such as enhancing the barrier properties of the material, sometimes lead to difficulties in the recycling of the product. As regards recycling facilities, it is important that there are mechanisms in place to facilitate the recycling of paper products, otherwise, the use of paper would only contribute to more waste making it a non- environmentally-friendly practice. According to CBI (2011), “ effective recovery implies the significant collection and recovery of material at the highest value that is economically feasible.” Therefore, it is important that materials reach the recycling facilities when these are still in good condition to be economically feasible.

Recycled packaging is already an accepted practice in the market today. CBI (2011) notes that more than half of all the products displayed in supermarket shelves are packaged using recycled materials. Packaging companies have also integrated the recycling element into their production

and have provided mechanisms to facilitate the transport of materials to recycling facilities. This may be through labels specifying the materials contained in the packaging materials, instructions for recycling, or indicating to which recycling facility the material can go. Some companies have even included means to bring back the packaging materials after delivering their products to stores and commercial establishments. These strategies address the sustainability issue regarding recycling.

## Conclusions

This paper showed that paper and board are the most widely used materials in packaging. The different types of paper and board are kraftpaper, corrugated board, boxboard, liquid paperboard, and molded paper. The process of producing these packaging materials begin in the growing and felling of trees then proceeds to pulping and bleaching then to the manufacture of paper. Once utilized as packaging material, paper and board are discarded as litter, materials for compost, landfill, and waste for energy, and most importantly for recycling. There are at least three sustainability issues in using paper and board. For the packaging material to be sustainable, the product has to be (a) beneficial, safe, and healthy; (b) manufactured using clean technology; and (c) disposed of properly and sustainably. The materials contained in paper and board are environment-friendly, however, to be truly sustainable, the manner and methods of producing it, as well as the mechanisms for effective disposal of the waste product has to be in place to ensure the sustainability of paper and board.

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