

# Sustainable Packaging: Environmental Friendliness and Profitability Can Be Bedfellows

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In this age of consumerism, the majority of nations in the world are suffering from the increasing amount of packaging waste; while many scholars have developed ways to make packagings sustainable, such as biodegradable plastics and recycled materials, most companies refuse to use environmentally friendly packaging because they believe it will decrease their profits. In this essay, Song shows three reasons why companies can pursue environmentally friendly packaging and business profits at the same time: these reasons include positive public reputation produced by environmentally friendly packaging, optimization of the amount of packaging material used, and profitable cost-benefit ratio of sustainable packaging. Therefore, companies must incorporate sustainable packaging, with the incentive of profitability, to protect the environment and to increase companies' profit.

## Introduction

In the age of consumerism, manufacturers need to package most goods they sell to increase durability and to attract customers to buy the products. As the size of the world economy grows, the number of goods that humanity produces increases every day, and the amount of packaging needed also increases. Consequently, packaging waste is becoming a huge problem. Negative environmental consequences of packaging waste include abiotic depletion (or exhaustion of nonrenewable natural resources), acidification, eutrophication, global warming, human toxicity, and photochemical oxidation. (Pires, Sargedas, Miguel, Pina, & Martinho 2017) Eutrophication is "gradual increase in [the] concentration of ... plant nutrients in an aging aquatic system ... [that increases] concentrations of algae." (Encyclopædia Britannica 2011)

Photochemical oxidation is smog in the earth's atmosphere caused by a reaction between emissions from fossil fuel combustion and the sunlight. (Baumann & Tillman 2014)

Since packaging is necessary to protect consumers from possible diseases or crimes, many scholars have developed ways to make packaging sustainable: durable yet environmentally friendly. Such ways include using biodegradable plastics and recycled materials. However, many companies are reluctant to make packaging more environmentally friendly; they claim that using sustainable packaging will reduce companies' profits. This research paper aims to disprove these companies' claims by showing that pursuing environmentally friendly packaging can minimize costs and maximize revenue. To achieve this aim, this paper incorporates several disciplines including psychology, mathematics, and economics; it introduces marketing benefits of environmentally

friendly packaging, optimization of the amount of packaging material used, and cost-benefit analysis of sustainable packaging.

### **Marketing Benefits: Maximizing Company Image**

The first approach to pursuing environmentally friendly and profitable packaging is the psychological approach. Green packaging has marketing benefits that are significantly influential. Modern consumers care about not only the price and quality of a product but also the ethical reputation of a company, so companies can advertise the environmental friendliness of their products to improve their reputation. Dr. Esmailipour, a professor in the Department of Marketing Management in Persian Gulf University, and his student Rajabi (2016) conducted statistical analysis to conclude that consumers' environmentally friendly attitude "impacts positively and significantly on his [or her] sensitivity towards recyclability of the product packaging." (p. 41) This result suggests that if a manufacturing company makes two exactly the same products but packages them in two different containers—one of which in environmentally friendly packaging and the other in traditional packaging—then customers are more likely to purchase the product in the environmentally friendly packaging material. The researchers further suggest that companies should make customers "aware of ... green packaging through advertising." (p. 41) Advertising can make customers more easily notice companies' effort to minimize pollution and waste, and consumers will buy more products from those companies. This marketing effect of green packaging will increase the revenue of the companies, and thus the profit of the companies. While green packaging can be more costly than traditional packaging, increased revenue due to green marketing can help companies cover the costs and possibly make more profit.

However, not just companies' reputation on environmental friendliness but also individual packaging affects consumers' purchase. According to a survey done by Statista in March 2017, 59% of total 980 respondents reported that they "prefer products with little packaging" when they buy

products. Shockingly, 9% of 980 respondents stated they "[do not] buy [a] product if it comes with too much packaging." It is important to note that there is a possibility of overestimation as there may be a social desirability bias. In other words, some people may have answered that when they buy products, they care about the level of packaging even though they do not because they have an unconscious desire to portray themselves as good individuals. Still, these figures are sufficiently high to suggest that the environmental friendliness of packaging attracts customers and brings marketing benefits.

Regardless, it is important for companies not to exaggerate their effort for environmental friendliness. If a company advertises its effort to protect the environment without actually putting enough efforts, customers may respond with buying fewer products from the company. According to Verghese, Lewis, and Fitzpatrick (2012), inaccurate environmental claims can make "a business ... accused of 'greenwash.'" They define greenwashing as "actions ... to make people believe that ... [the] company is doing more to protect the environment than it really is." (p. 110) The researchers conclude that customers are sensitive to six types of inaccuracies in companies' claims of environmental friendliness. They are "hidden trade-off," or exaggeration, "no proof," "vagueness," "irrelevance," "fibbing," and "lesser of two evils," or stressing slightly less environmental effect of a product. (p. 124) These types of inaccuracies are not necessarily illegal or false, yet customers may respond by avoiding buying such products. Companies must be careful to be honest because the mass media has increased the transparency of the society, and the general public easily knows that the companies are not entirely honest with consumers. Hence, while companies should actively invest in using costly but sustainable packaging and advertise environmental friendliness for marketing benefits, they should not exaggerate any facts, or consumers may accuse the companies of greenwashing and cause marketing backlash.

### **Optimizing the Amount of Packaging: Cutting Down Unnecessary Costs**

The second approach to achieving more

environmentally friendly packaging without losing profits is mathematical: optimizing the amount of packaging material used. Companies are known for using excessive packaging because insufficiently packaged goods result in customer complaints. These customer complaints can be costly both directly and indirectly. The direct cost is wages of customer service department workers and cost of exchanges or refunds. The indirect, long-term cost is losing revenue due to losing customers. To prevent such cost, manufacturers tend to use excessive packaging.

However, calculus-based mathematics can help manufacturers optimize the amount of packaging material used. As prominent mathematicians, Dr. Onay and Dr. Cetin (2016), from the Department of Quantitative Methods in the School of Business in Istanbul University, put it, “two mathematical models [can] optimize the packaging usage [by] minimizing the packaging waste when it is at the maximum level in the environment.” (p. 126) The researchers argue that the perfect application of this mathematical analysis can reduce packaging waste by 86.8% in Turkey. If all manufacturers in the world practice this optimization technique, then global waste production may be decimated. Some may claim there are limitations because it is difficult for manufacturers to conduct difficult mathematical analysis that involves differential equations, and hiring mathematicians is costly. However, significantly excessive packaging means that the cost companies can save by optimizing the amount of packaging material is greater than the cost of hiring mathematicians. Also, companies have to process mathematical analysis only once unless they change the products or develop new products.

In addition to the cost saved by minimizing the packaging material, companies can spend less on storage and transportation. While packaging material may not be strikingly heavy, the volumes of products are heavily dependent on packaging material. Optimizing the packaging material means that the volume of packaged products is also minimized; goods with minimized packaging requires less inventory storage for companies and hence saves storage cost. Transportation cost, on the other hand, is also dependent on volume. Especially if it is an airplane or freight shipping, the cost difference between two different volumes

is huge. Also, transportation cost is sensitive to weight, and use of glass or metals for packaging material can further increase the transportation cost. Minimizing packaging material by mathematical optimization also decreases the transportation cost. The mathematical optimization technique thus decreases companies’ material cost, storage cost, and transportation cost. Simultaneously, it promotes environmental friendliness by reducing package waste and usage of raw materials.

### **Economics of Future: Costly Traditional Packaging vs. Evolving Sustainable Packaging**

The main reason why companies are reluctant to make their products’ packaging more environmentally friendly is traditional packaging is much cheaper than sustainable packaging. However, the total cost of traditional packaging will eventually become greater than the cost of sustainable packaging. Governments are increasing regulations and taxes on the use of traditional packaging material to prevent both exhausting raw materials and damaging the environment. The purpose of government regulations and taxes is to internalize the negative externalities of pollution. When a company uses plastic packaging, the cost is not only given to the company itself but distributed to the members of society because of environmental impacts. Since the company does not suffer from the total social cost, the company uses plastic packaging more than what is market-efficient. The way to counter this externality is to internalize the cost with regulations and taxes. A prominent economist, A. C. Pigou (1877 – 1959), developed this theory and supported the imposition of environmental protection taxes. (Encyclopædia Britannica 2017) Increasing awareness of the importance of protecting the environment across the globe is resulting in a trend where many countries increase their taxes. According to the World Bank, in 2017, there will be 44 carbon tax implementations worldwide, which covers about 23% of total carbon emission. Compared to 2 carbon taxes (<1%) in 1990 and to 20 carbon taxes (approx. 5%) in 2011, there is a drastic jump in global carbon taxation trend. (World Bank 2016, p.13) In the long-run, these taxes and regulations will increase the cost of using

traditional packaging. Using sustainable packaging can prevent an increase in taxation.

In addition, the current government's estimation of social costs of carbon emission seems to be too low. The government has measured social cost of plastic as \$37 per ton of carbon emission. When calculating the social cost, researchers normally estimate the environmental impact of carbon emission. However, the government should change the estimate of the social cost of carbon emission. According to a relatively recent study by Moore and Diaz (2015) at Stanford University, the social cost of carbon footprint is not \$37 per ton but \$220 per ton. They suggested that global warming causes secondary influence back on the economy at a significant scale. Increasing the social cost estimate of carbon emission means policymakers will have to enforce even higher taxes to internalize a greater externality. Companies can thus save an even greater amount of money by using sustainable packaging.

Some may argue, however, that biodegradable plastics such as polylactic acids (PLA) also emit carbon. While this claim is true, there are two notable advantages of PLA. Firstly, PLA, as a biodegradable plastic, can much more easily be decomposed than traditional plastics like polyethylene terephthalate (PET). (Gupta & Kumar 2007) Secondly, PLA emits much less carbon during the production than PET. Researchers Simon, Amor, and Foldenyi (2016) compared and contrasted the environmental impact of PET bottles and PLA bottles using the technique of life-cycle assessment (LCA). The research result suggests that the amount of carbon emitted during decomposition is similar for PLA and PET, but for production of water bottles that can contain 1000 L of water in total, PET emits 100 kg more carbon dioxide than PLA. This study is credible because the LCA technique that the researchers used is highly reliable. Researchers Varun, Sharma, and Nautiyal (2016) evaluated the LCA technique in assessing the cost of environmental damage. They concluded that "LCA as [the] tool gives ... the opportunity to identify the "grey areas" that affect [the] environment." (p. 134) The stages of LCA include "goal & scope definition," "life cycle impact assessment," "life cycle data interpretation," and "life cycle inventory analysis." (p. 120) These complex stages produce an environmental

assessment that is much more comprehensive than just assessing one part of environmental impact such as global warming.

Combining Simon, Amor, and Foldenyi's research result with the Stanford estimate of the social cost of \$220/ton, it can be concluded that for every 200 water bottles, around \$48 more social cost is produced for PET water bottles than PLA water bottles. That is a difference of 24¢ per bottle. With the addition of social cost of decomposition time, the total social cost of PET is immense. New techniques like LCA can help governments know the total social cost of carbon emission, and these techniques are likely to urge governments to increase regulations.

While there are threats of increasing environmental protection regulations and taxation on traditional packaging materials, the quality of green packaging is enhancing. There are many technological developments that make green packaging more durable. Durability has always been one of the issues for sustainable packaging. However, Ahmed and Varshney (2011) argued that using a new technique called nanocomposition, or adding layers of other materials, can augment mechanical, thermal, and electrical resistance to PLA. Higher durability means fewer consumer complaints, which save huge costs for companies. In addition, companies can use less packaging material because the material itself is much more durable. In other words, companies can save storage and transportation costs.

As a result, traditional packaging will become more and more expensive while sustainable packaging will become cheaper and cheaper. At some point, companies will have to make a change. However, a long-term infrastructural change in a company has much lower fixed cost than a short-term infrastructural change in the company because the company is likely to get cheaper equipment by doing more research over long periods of time. In other words, starting earlier to prepare for a change from traditional packaging to green packaging brings lower fixed costs. Therefore, companies should start seeking this transition to reduce both short-term costs, by spending longer time for research, and long-term costs, by using sustainable packaging instead of traditional packaging.

## Conclusion

This study investigated three approaches—psychological, mathematical, and economical—using more environmentally friendly packaging while not damaging the profits of companies. The psychological approach highlighted the marketing benefits through advertising. The mathematical approach accentuated that the optimization of packaging material can reduce the amount of material used for packaging. The economical approach suggested that companies can save more in the long-run by preparing for the change to sustainable packaging as the regulations are strengthening. Many companies have claimed that solving the problem of packaging waste will reduce their profits. This research paper demonstrates, however, that environmental friendliness does not necessarily go against profitability. Therefore, companies must incorporate these approaches to protect the environment and to increase companies' profit both in the short-term and the long-term.

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