

Food For Thought: How Packaging Can Be Decreased and Improved to Reduce Food Waste

Maya Kapur

Integrative Seminar: PUFY 1011 A04

Professor Dylan Gauthier

May 7, 2018

Packaging contributes to complex problems such as threatening the lives of sea animals and to the emissions and toxic chemicals that further global warming. As a society, we cast aside the issue of food waste; however, packaging has an important role in and of itself but also in accordance with discarded produce. Packaging takes many different forms such as plastic wrap, mesh fruit bags, or cardboard boxes. Research is currently being done to replace these materials mentioned with those that are eco friendly. While packaging is important for protecting food and extending shelf life, ultimately it often does not fulfill this job. People are not conscious about its environmental effects, which, according to the Environmental Protection Agency (EPA), leads to packaging accounting for 45% of waste brought to landfills every year; therefore, we should consider possible solutions, further research, and finally implementation to reduce food packaging and food waste as an environmental issue.

There are two ways that packaging relates to food waste — the physical containment of the item, and the way that we as humans interact with the food items in the process of packaging waste. The main role of food packaging is to protect food from damage or biological factors such as mold and insects and extend its shelf life. Ignazio Blanco, of the *Journal of Thermal Analysis & Calorimetry*, explores how packaging can reduce food waste. He suggests that in order to do so, we need “packaging that provides better protection and shelf life for fresh produce as it moves from farm to processor, adoption of new packaging materials and technology to extend shelf life of fresh and processed food, [protection from] damage in transit/storage due to packaging failures, [and] improved design of secondary packaging to ensure it protects the food through the supply chain.”¹ Even though packaging is meant to protect food items in these ways,

¹ Ignazio Blanco, 2016, "Lifetime prediction of food and beverage packaging wastes," *Journal Of Thermal Analysis & Calorimetry* 125, no. 2: 809-816, *Academic Search Complete*, EBSCOhost (accessed March 27, 2018).

often times produce still get damaged whether it be biologically or physically by the ironically insubstantial material of the packaging. Therefore, more food is discarded and more packaging is thrown in landfills. It is not only packaging itself that can present a change in reducing waste both in food and packaging but we must also consider human involvement and interactions. The *Journal of Cleaner Production* published a study in which the authors analyze consumer behavior and the environmental effects with two packages of minced meat — a lightweight plastic tube and styrofoam tray. The results show that the tube is the best alternative because while there is less food waste using the tray, the tube has a longer shelf-life and therefore the amount of packaging that is thrown away is reduced.² With this information in consideration, we need to either create a system for better recycling of such packaging materials or use environmentally friendly materials that have a longer shelf life in protection against mold or bugs and bruising.

As a country, we can consider both private businesses and federally enacted systems or regulations as a solution to both waste of food and packaging. For example, Walmart reported an article describing their packaging scorecard, which allows them to track their progress on their goal to reduce packaging by 5% across its global supply chain of 60,000 worldwide suppliers.³ As the world's top retailer, Walmart has successfully proved that it is possible to reduce waste as well as conserve resources by establishing specific limits and goals to follow. The categories that the scorecard strictly tracks are greenhouse gases, material value, product to package ratio,

² F. Wikström, H. Williams, and G. Venkatesh, 2016, "The influence of packaging attributes on recycling and food waste behaviour – An environmental comparison of two packaging alternatives," *Journal Of Cleaner Production* 137, 895-902, *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

³ 2007, "Wal-Mart Cutting Packaging," *Pollution Engineering* 39, no. 2: 16, *Academic Search Complete*, EBSCOhost (accessed March 29, 2018).

transportation, recycled content, recovery value, renewable energy, and innovation. In comparison, their direct competitor Amazon is now challenging Walmart to be the world's top vendor and, over the past 10 year, has reduced packaging waste by 16% in 2017 alone. However, business are only one half of how we can reduce waste. Another is creating systems or regulations. The United States can look towards other countries that have been successful as a model for our own. Another guide that the United States can follow is Finland's model for a new recycling system. It assesses quantity and quality of plastics that the packaging materials use. In addition, "the sustainability of the whole recycling chain needs to be assessed prior to launching operations so that the chain can be optimized to generate both environmental and economic benefits to society and operators."⁴ If this country puts checkpoints in place to assess materials as Finland does, we would be able to create a more successful system to prevent contributing or raising the amount of packaging that ends up in landfills every year. Another guide that the United States can consider is set by Canada through federal policies and requirements. In their analysis of Canada's systems that relate to food waste and packaging, the authors Dewees, Donald, and Hare focus on source reduction, which is known as waste prevention or pollution prevention, and is defined by the Maryland Department of the Environment as the elimination of waste before it is created. It involves the design, manufacture, purchase or use of materials and products to reduce the amount or toxicity of what is thrown away. The article also explores the justification of well-designed recycling programs, and promotion policies. Specifically, the government introduced a deposit refund system for soft drink containers in 1971. Furthermore,

⁴ Helena Dahlbo, Valeria Poliakova, Ville Mylläri, Olli Sahimaa, and Reetta Anderson, 2018, "Recycling potential of post-consumer plastic packaging waste in Finland," *Waste Management* 71, 52-61, *Academic Search Complete*, EBSCOhost (accessed March 30, 2018).

“Ontario regulations require that 30 percent of all soft drinks be sold in refillable containers.”⁵

Therefore, there is a corresponding reduction in the number of containers produced and subsequently discarded into the landfill. These regulations, as well as federal systems and business goals all are able to reduce environmental harm.

Research has also proven to be effective in the innovation of packaging material alternatives. In the *Walailak Journal of Science & Technology*, *Kemija U Industriji*, *Technologica Acta*, and *BioResources*, each article explores multiple possibilities for new packaging materials. The options discussed include activated carbon, poly(lactic acid)/nanocrystalline cellulose composite material, corn starch-based edible films, and pulp fibers, cellulose nanofibers, and regenerated cellulose films. These alternatives naturally degrade and have non-toxicity, absorption potential, and low cost. In addition, they are flexible, strong, and their thermal and mechanical properties satisfy FDA requirements. Furthermore, they are good barriers for oxygen, carbon dioxide and water vapor. These materials could be the future replacement for packaging such as plastic wrap, mesh fruit bags, or cardboard boxes. Therefore, these new inventions can prolong shelf-life as well as maintain the quality of food.^{6 7 8 9} These packaging possibilities are better overall for food waste and are environmentally friendly

⁵ Donald N. Dewees, and Michael J. Hare, 1998, "Economic analysis of packaging waste reduction," *Canadian Public Policy* 24, no. 4: 453, *Academic Search Complete*, EBSCOhost (accessed March 29, 2018).

⁶ Siriporn Chaemsanit, Narumol Matan, and Nirundorn Matan, 2018, "Activated Carbon for Food Packaging Application: Review," *Walailak Journal Of Science & Technology* 15, no. 4: 255-271, *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

⁷ J. X. Li, 2017, "Application of Green Environmentally Friendly Materials in Food Packaging," *Kemija U Industriji* 66, no. 11/12: 611-615, *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

⁸ D. Šuput, V. Lazić, A. Jelić, Lj. Lević, L. Pezo, N. Hromiš1, S. Popović1, and M. Nićetin1, 2014, "The Influence of Different Composition and Thickness on Physico-Mechanical, Structural and Barrier Properties of Starch Based Edible Packaging Films," *Technologica Acta* 7, no. 1: 80-86, *Academic Search Complete*, EBSCOhost (accessed March 27, 2018).

⁹ Su Yanqun, et al. "Prospects for Replacement of Some Plastics in Packaging with Lignocellulose Materials: A Brief Review," *Bioresources* 13, no. 2 (May 2018): 1-27, *Academic Search Complete*, EBSCOhost (accessed March 28, 2018).

themselves. It is necessary that we invest in the implementation of new packaging for our environment and the waste we create.

Packaging is meant to protect food; however, during production and how long food lasts, produce can often get damaged. In addition to this, due to low shelf-life, an excessive amount of packaging is discarded in the landfill. As a country and with private businesses, reducing waste through systems and regulations is a good solution to both food waste and packaging waste after production. However, with the research in new and improved packaging materials, these innovations should now be put on the market. These changes can truly make a difference to the environment by reducing carbon emissions and toxic chemicals that contribute to global warming.

Annotated Bibliography

2007. "Wal-Mart Cutting Packaging." *Pollution Engineering* 39, no. 2: 16. *Academic Search Complete*, EBSCOhost (accessed March 29, 2018).

This article expands on Walmart's progress on their goal of reducing packaging by 5% across 60,000 suppliers worldwide. They want to conserve resources of an initiative of 5 years. This is interesting because it shows the possibility to make an impact in a large corporation which is one solution to the issue of packaging waste.

Blanco, Ignazio. 2016. "Lifetime prediction of food and beverage packaging wastes." *Journal Of Thermal Analysis & Calorimetry* 125, no. 2: 809-816. *Academic Search Complete*, EBSCOhost (accessed March 27, 2018).

Blanco explores a study that was conducted in which food packaging can help prevent food waste. It discusses the role of packaging — protection while in transit and storage. This is interesting because it shows how important packaging is and can reduce food waste in a more simple manner.

Chaemsanit, Siriporn, Narumol Matan, and Nirundorn Matan. 2018. "Activated Carbon for Food Packaging Application: Review." *Walailak Journal Of Science & Technology* 15, no. 4: 255-271. *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

Packaging made from activated carbon has the ability to naturally degrade, is non-toxic, has absorption potential, and carries low cost. This new invention can prolong shelf-life as well as maintain the quality of food. This is interesting because it proposes a new alternative that has desired qualities which is one solution to the issue of packaging waste.

Dahlbo, Helena, Valeria Poliakova, Ville Mylläri, Olli Sahimaa, and Reetta Anderson. 2018.

"Recycling potential of post-consumer plastic packaging waste in Finland." *Waste Management* 71, 52-61. *Academic Search Complete*, EBSCOhost (accessed March 30, 2018).

The authors explain Finland's example of a system which has the potential to recycle plastic packaging after it has been created and used based on quantity, composition and mechanical quality. Optimization of the sustainability chain is important for both the environment and economic impacts. This is interesting because it proposes a recycling system that could be of more use and better for the environment by the detail set forth in the chain which is a solution that adjusts our system already in place.

Deweese, Donald N., and Michael J. Hare. 1998. "Economic analysis of packaging waste reduction." *Canadian Public Policy* 24, no. 4: 453. *Academic Search Complete*, EBSCOhost (accessed March 29, 2018).

The article expands on Canada's regulations on packaging waste. Specifically, the authors focus on source reduction, justification of well-designed recycling programs, and promotion policies. This is interesting because it is an example of strict regulations that the United States can follow.

Li, J. X. 2017. "Application of Green Environmentally Friendly Materials in Food Packaging." *Kemija U Industriji* 66, no. 11/12: 611-615. *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

Tests have been done on poly(lactic acid)/nanocrystalline cellulose composite material for food packaging. They show that the thermal and mechanical properties satisfy FDA

requirements as well as being environmentally friendly. This is interesting because it proposes a new alternative that has desired qualities which is one solution to the issue of packaging waste.

Šuput, D., V. Lazić, A. Jelić, Lj. Lević, L. Pezo, N. Hromiš1, S. Popović1, and M. Nićetin1.

2014. "The Influence of Different Composition and Thickness on Physico-Mechanical, Structural and Barrier Properties of Starch Based Edible Packaging Films." *Technologica Acta* 7, no. 1: 80-86. *Academic Search Complete*, EBSCOhost (accessed March 27, 2018).

Tests have been done on corn starch-based edible films as material for food packaging. They show that the the films are flexible, strong, moderately flexible with good barrier properties to oxygen and water vapour. This is interesting because it proposes a new alternative that has desired qualities which is one solution to the issue of packaging waste.

Wikström, F., H. Williams, and G. Venkatesh. 2016. "The influence of packaging attributes on recycling and food waste behaviour – An environmental comparison of two packaging alternatives." *Journal Of Cleaner Production* 137, 895-902. *Academic Search Complete*, EBSCOhost (accessed March 26, 2018).

The authors explain how consumer behavior influences the amount of packaging waste created. Specifically they compare two different packages for minced meat — a lightweight tube and a tray — and discover that even if one is more effective, when considering human behavior, the tube is better as it has a longer shelf-life. This is interesting because it gives us insight into the importance of human involvement in the

process of packaging waste. The information is needed so we may better understand the problem and how to approach or fix it.

Yanqun, Su, et al. "Prospects for Replacement of Some Plastics in Packaging with

Lignocellulose Materials: A Brief Review." *Bioresources* 13, no. 2 (May 2018): 1-27.

Academic Search Complete, EBSCOhost (accessed March 28, 2018).

Packaging made from pulp fibers, cellulose nanofibers, and regenerated cellulose films are renewable, sustainable and biodegradable. These are good barriers for oxygen, carbon dioxide and water vapor. This is interesting because it proposes a new alternative that has desired qualities which is one solution to the issue of packaging waste.