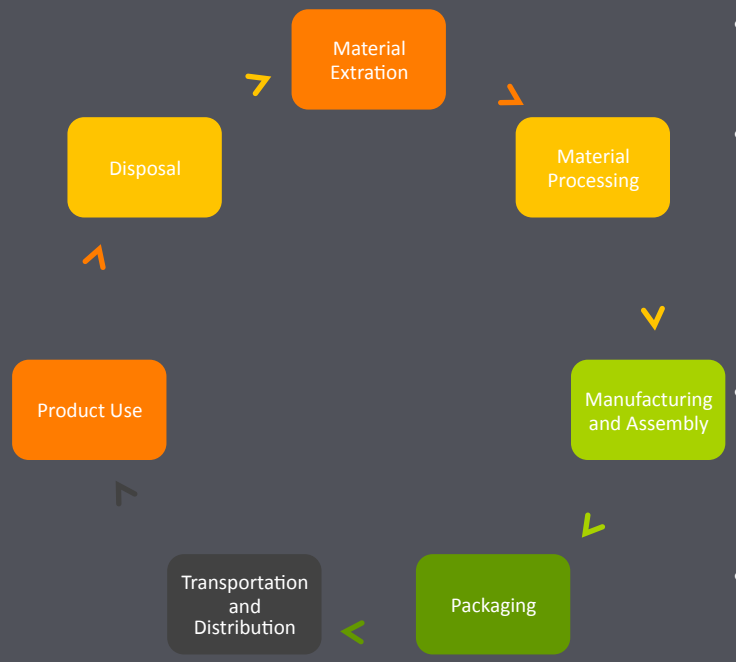
Life Cycle Assessment



Key Findings

- Consumers are questioning the environmental impacts of disposable facial tissues.
- Cotton handkerchiefs, a predecessor to Kleenex®, are regaining popularity as a reusable alternative.
- While consumer concerns mostly center on the issue of disposal, a recent Life Cycle Analysis conducted by Ecosystem Analytics, Inc., demonstrated that the end-of-life impacts for both disposable facial tissues and cotton handkerchiefs make up a very small percentage of the total environmental impacts.
- When considering the complete life cycle, the resource-intensive production of a cotton handkerchief may negate the environmental benefits gained from choosing a reusable product (Ecosystem Analytics, Inc. 2012).
- The choice between particular brands may ultimately be more impactful on the environment than the choice between tissues and handkerchiefs.

Disposable Tissues or Reusable Handkerchiefs?

By Emily Fish

Introduction

Facial tissues, first introduced by Kimberly-Clark Worldwide, Inc. in 1924 under the name Kleenex®, were initially intended as a more convenient tool to remove cold cream. Within about five years, Kimberly-Clark realized the potential for advertising their product as an alternative to the cotton handkerchief. Today, as the Kleenex® brand searches for new ways to balance high quality and economically and environmentally sustainable practices, many environmentally conscious consumers are choosing to return to the traditional cotton handkerchief. Oftentimes this choice is at least partially based on the idea that rarely disposing of a single handkerchief is easier on the planet than frequently disposing of the equivalent number of disposable tissues. This seems to be an important consideration given that a 2007 report revealed that affluent households in the United States use an estimated 5,600 disposable tissues each year (Madsen 2007). Interestingly, a full Life Cycle Assessment comparing tissues and handkerchiefs found that disposal was only one piece of the story and in fact, once production is considered, the environmental differences between the two products were marginal (Ekstrom 2012).

Facial Tissue Production

The production of facial tissues is a complex process requiring heavy machinery as well as a significant amount of water. Initially, pulp is mixed with water to facilitate decomposition into single fibers. After additional water is added, the single fibers are collected into sheets, and the

water is either recycled or treated and discharged – oftentimes a single production facility will recycle some of the water and treat and discharge the rest. The sheets are dried and plied together with several other sheets. These thick sheets are then further processed into the final product. Lastly, the sheets are cut, folded, and placed into boxes ready for consumer purchase (Kleenex® 2013). The details of this process are subject to vary slightly between companies, and the environmental impacts can vary depending on decisions made at each point in the process, but the overall amounts of water and specialized machinery necessary to produce facial tissues are not remarkably flexible (The European Tissue Paper Industry Association 2013).

An important point of variation amongst companies is the wood source used in the production of pulp. It has been estimated that roughly 50% of the pulp used in the paper industry comes from recycled fiber (Essential Supply Products Disposable Paper Solutions 2010). A brief comparison exemplifies the differences between brands. Kleenex®, for example, reports that their facial tissues are almost entirely comprised of virgin fiber because "it provides the superior softness consumers expect from a premium facial tissue product such as Kleenex® facial tissue" (Kleenex® 2013). Conversely, companies such as Seventh Generation, Inc. manufacture facial tissues from 100% recycled paper, available in natural products stores as well as many major supermarkets at comparable prices to the popular Kleenex® brand. In fact, Seventh Generation reports that "if every household in the US replaced just one box of 175-count virgin fiber facial tissue with our 100% recycled product we could save: 385,000 trees, 140 million gallons of water, a year's supply for over 1,100 families of four, and 990,000 cubic feet of landfill space, equal to over 1,500 full garbage trucks" (Seventh Generation, Inc. 2013). Additionally, Seventh Generation products are whitened without the environmentally harmful chlorine and bleach used in the traditional production process (Seventh Generation, Inc. 2013).

Some manufacturers, as well as many consumers, are hesitant to pursue recycled products because they fear that will take away from the high quality softness of the more traditional product (Blackburn 2009). Companies like Seventh Generation that produce recycled products have worked hard in recent years to ensure a high quality product that can compete with major brands known for high quality like Kleenex®. In fact, several customer reviews on Seventh Generation's website praise their products for surprising softness (Seventh Generation, Inc. 2013). In reality, some consumers will be more likely than others to do without a particular softness, fragrance, or other perk in order to lighten their ecological footprint on our natural environment, but even small sacrifices may lead to incredible environmental gains, as in the case of Seventh Generation products.

Life Cycle Analysis (LCA) Methodology

A LCA performed by Ecosystem Analytics, Inc. in 2012 provides data as to the costs and benefits of facial tissues and cotton handkerchiefs.[1] Authors organized their results into four major categories for comparison: climate change, human health, ecosystem quality, and resources (Ecosystem Analytics, Inc. 2012).[2] As part of their LCA, Ecosystem Analytics reviewed the "production, transport to retail, use, and disposal of the products and retail packaging" (Ecosystem Analytics, Inc. 2012). Figure 1 compares the LCA results for tissues and handkerchiefs for each of the four categories.

LCA Results

- Handkerchief total environmental impacts on the LCA's four major categories are 5 to 7 times higher than the impacts from facial tissues due to high production impacts.

[1] Whereas a previous but similar LCA concluded that reusable handkerchiefs are remarkably superior to disposable tissues in respects to their impacts on the environment, that LCA has since been criticized for including a limited number of areas of impact and assuming an extremely long handkerchief lifespan (520 washes) (Ecosystem Analytics, Inc. 2012).

[2] The key to producing such an influential and trustworthy LCA was the use of a defined functional unit based on previously published reports to allow cross-comparisons between the products: "the number of nose blows per surface area for an average American adult over 1 calendar year, encompassing the use pattern during 4 respiratory illnesses (896 nose blows) and daily use during well period (337 nose blows)" (Ecosystem Analytics, Inc. 2012).

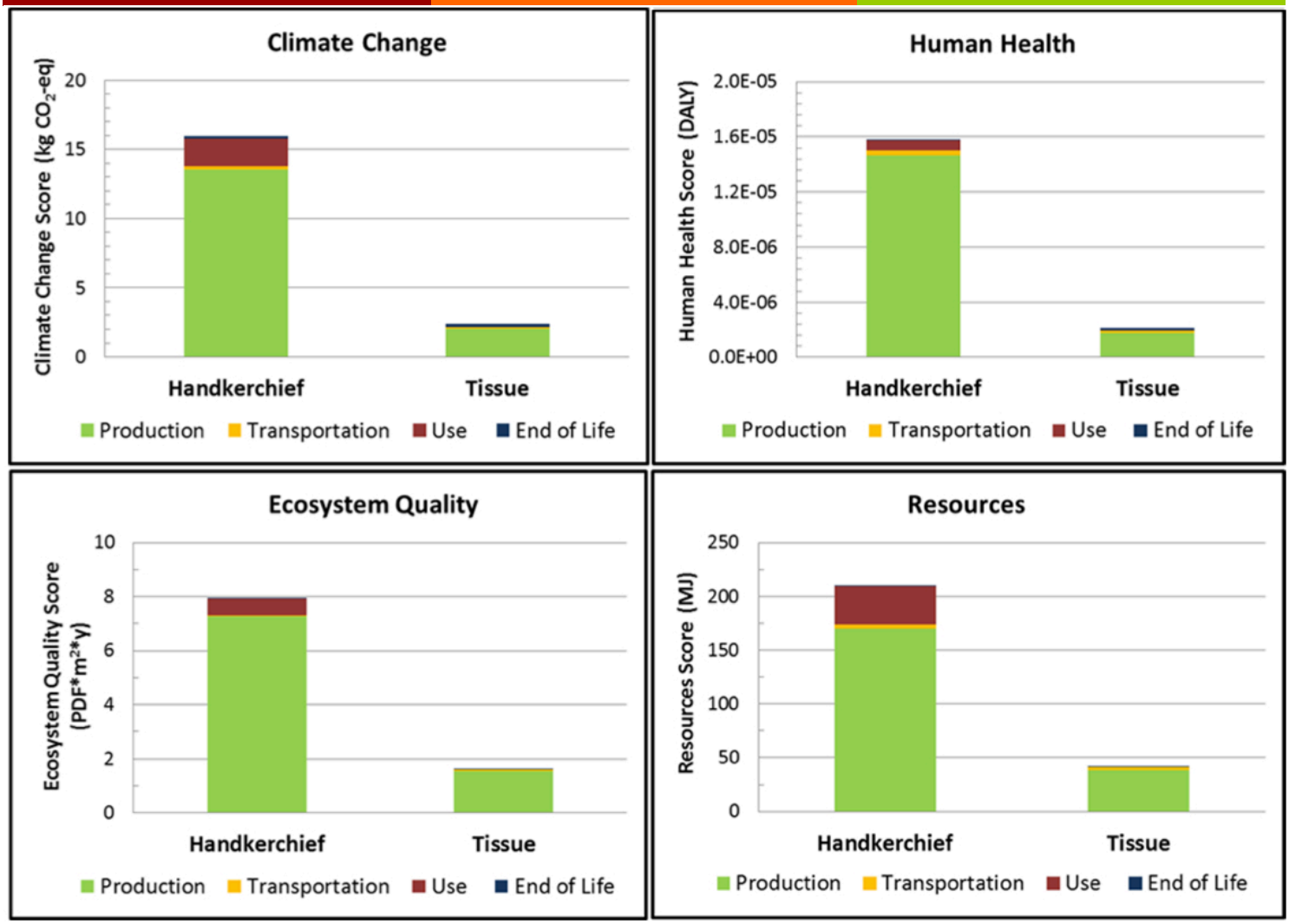


Figure 1: Total Environmental Impacts for the Functional Unit (Ecosystem Analytics, Inc. 2012)

- Overall, Ecosystem Analytics concluded that there were only marginal differences between cotton handkerchiefs and facial tissues.
- The high amount of electricity required in the production of a handkerchief outweighs nearly all of the disadvantages of using disposable tissues.
- Ecosystem Analytics does state that the use of handkerchiefs may be environmentally preferable if used for the product's entire lifetime (50 washes or 9.4 years), but even the associated environmental benefit in that scenario is miniscule (Ekstrom 2012).
- A surprising result from this study is the relative insignificance of both the disposal and transportation phases of each product, suggesting that these should not be areas of major concern.
- Ecosystem Analytics recommends that manufacturers focus on developing production processes that are more energy and water efficient (Ecosystem Analytics, Inc. 2012).

Hygiene

Concerns surrounding issues of hygiene have been raised in conversations about disposable tissues and cotton handkerchiefs. While the issue ultimately boils down to personal preference, several important conclusions have been made about these hygiene issues. A 1994 study showed that disposable tissues contain significantly less bacteria than cotton

handkerchiefs (The European Tissue Paper Industry Association 2013). In short, disposable tissues are the more hygienic option, although is not clear what assumptions were made in the study, including how often a single handkerchief is used and laundered, and whether they are laundered with or without bleach. While this study may now be considered dated, no subsequent studies have been produced on the hygiene of handkerchiefs.

Consumer concern for hygiene is particularly relevant during cold and flu season. When suffering from a cold, the ability to collect the germs in a tissue and dispose of them quickly may be a smart choice. On the other hand, handkerchiefs may help prevent illness by providing a more substantial barrier between an individual with a cold and those in close contact (Main 2013). Individual needs will likely vary throughout the year, but a simple solution is to rely on a supply of 7 regularly laundered handkerchiefs (one week's supply) for day-to-day use and to choose disposable tissues, if preferred, only when actively fighting off a cold.

Conclusions and Recommendations

Facial tissues and reusable cotton handkerchiefs have nominal environmental differences. However, environmental differences are present amongst the varying brands of each product. For example, purchasing tissues made from recycled material may be a simple choice for a consumer concerned with the source of fiber. Similarly, choosing a handkerchief made of organic cotton or hemp, which has an eco-footprint 50% lower than that of traditional cotton handkerchiefs, may be a good investment for someone who already regularly uses handkerchiefs. The type of washing machine used to wash a handkerchief could also have an impact in the long run, as front-loading machines use over 50% less water and up to 85% less energy than top-loaders (Bluejay 2013). Likewise, purchasing a product with less packaging, be it a box of tissues or a pack of handkerchiefs, will likely have less of an environmental impact than that same product fully enclosed in durable packaging.

Resources

- Visit Seventh Generation's website to learn more about their environmentally friendly facial tissue products, along with many other household necessities. - http://www.seventhgeneration.com
- Explore Greenpeace's Recycled Tissue and Toilet Paper Guide (available as a free download) to learn which brands you should be looking for at your local supermarket - http://www.greenpeace.org/usa/en/campaigns/forests/tissue-guide/
- A fun and creative handkerchief product that ensures a clean surface with every use - http://hankybook.com
- Try these 100% recycled tissues in your home or office - http://www.marcalsmallsteps.com/products/facial-tissues
- 14 simple tips for "going green" while washing your handkerchief (and all of your other laundry) - http://www.cleaninginstitute.org/clean_living/cm_julyaug2011_clean_ideas_going_beyong_green_laundry.aspx

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