The Swiffer Sweeper Wet is a quick and convenient way to mop the floors without having to fill a bucket of water, rinse and wring out a mop head, or use too much elbow grease. But convenience often has a cost.

Gianfranco Zaccai of Continuum presents his innovative Swiffer Sweeper design.

Convenience is often a perceived challenge to sustainability but this does not have to be the case. The Designer, Gianfranco Zaccai of Continuum, who created the Swiffer line of wet and dry floor sweepers for Proctor and Gamble in 1999 had several goal in mind: to assess and disrupt the amount of water, detergent, and energy used in mopping a floor and rinsing a floor and to disrupt the process of setting up and cleaning the mop itself which was found in many studies to take more time, effort, and cleaning than it takes to actually using the mop to clean the floor itself.

BACKGROUND : The creation of a single use disposable cleaning pad was this designer's innovative solution to the inconvenience of rinsing and wringing out a mop between uses. This solution of utilizing single-use cleaning pads has however created a sustainability problem as the pads come in individual plastic pouches that are disposed of and the individual cleaning pad is used once and then disposed of as well. The packaging of the cleaning pads themselves are excessive and unnecessary and the single use nature of the cleaning pads creates a clear design problem.

SP ANALYSIS : The ingredients found inside of a box of Swiffer Sweeper x-large wet mopping cloths are as follows: Purified Water (Cleaning Agent), Butoxypropanol (Removes dirt and soils from floor & traps on cleaning pad), Alkyl Polyglycoside (Removes dirt and soils from floor & traps on cleaning pad), Dialkyl Dimethyl Ammonium Chloride, Polyoxyethylene castor oil, Linear Alkylbenzene Sulfonate (sodium salt), Acrylic Copolymer, Various Fragrances, Methylisothiazolinone (Preservative), Chloromethylisothiazalone (Preservatives Protects product from microbial contamination), Polydimethylsiloxane (Processing Aid)

I performed a side-by-side Life Cycle Analysis through Sustainable Minds to see how proposed changes to a reusable system with reduced recyclable packaging and eco-conscious cleaning solution would affect the ecological effects of Swiffer Sweepers use. This LCA is based on a model where the typical user sweeps/mops their floors once per week at a total rate of 52 times per year. Personally, i sweep once per week and mop once every two weeks. You may find that you clean the floors more or less than the average assumption of once per week.

Swiffer Sweeper Wet

Overview | Assessment goals | Assessment scope | Concepts

Functional unit: 1 year of use

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	Impacts / functional unit mPts/func unit	CO_2 eq. kg / functional unit CO_2 eq. kg/func unit	Performance improvement from reference mPts	Performance improvement from reference %	Units of svc delivered Svc. Units	Assessment type
Reference Single use cleaning cloth Copy Declare as: | Final	0.080	1.4			52	Estimate
Lowest impact Reusable cleaning cloth Copy | Delete Declare as: Reference | Final	0.027	0.26	+0.053	+66%	52	Estimate

Life Cycle Analysis - Side by side comparison of current single use system and proposed reusable system.

Concept overview | System BOM | Results

Single use cleaning cloth

Description

Mopping is done once per week in the typical US household.
One single-use cleaning cloth is used per per. One single-use cleaning cloth comes individually wrapped in plastic exterior with aluminum interior packaging.

Impacts per functional unit	**0.080** mPts per 1 year of use
Total amount of service delivered during the lifetime of the product	52 x 1 year of use *mopping is done once per week on average*
Impacts of total service delivered	4.1 mPts
Assessment level	Estimate
Methodology	SM 2013

Greatest impacts

SBOM input	Polyester fabric
Impact category	Carcinogenics
Life cycle stage	Manufacturing

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Declare as: Final

Created: March 22, 2019

Image not provided

Total impacts by impact category

Chart.

Impact category	%
Ecological damage	
Acidification	5.03
Ecotoxicity	7.19
Eutrophication	3.6
Global warming	25.27
Ozone depletion	0.02
Resource depletion	
Fossil fuel depletion	20.24
Human health damage	
Carcinogenics	26.36
Non carcinogenics	4.59
Respiratory effects	1.85
Smog	5.84

Breakdown of Single-Use System

Concept overview | System BOM | Results

Reusable cleaning cloth

Description

reusable cleaning cloth with eco-detergent

Impacts per functional unit	**0.027** mPts per 1 year of use
Total amount of service delivered during the lifetime of the product	52 x 1 year of use
Impacts of total service delivered	1.4 mPts
Assessment level	Estimate
Methodology	SM 2013

Greatest impacts

SBOM input	Woven cotton fabric
Impact category	Carcinogenics
Life cycle stage	Manufacturing

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Declare as: Reference | Final

Created: March 22, 2019

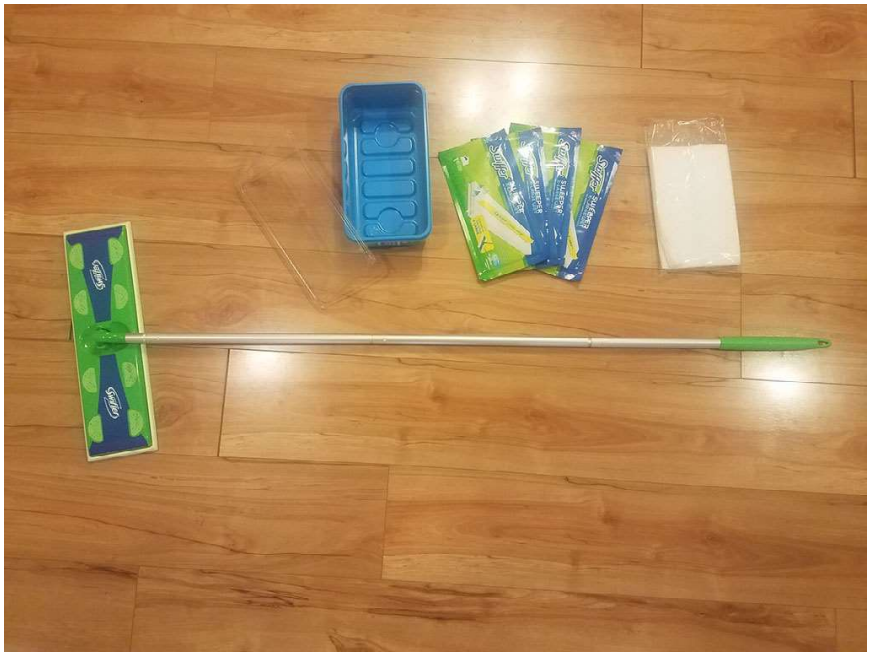
Image not provided

Total impacts by impact category

Chart.

Impact category	%
Ecological damage	
Acidification	3.66
Ecotoxicity	19.66
Eutrophication	5.82
Global warming	13.98
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	4.68
Human health damage	
Carcinogenics	39.4
Non carcinogenics	6.78
Respiratory effects	3.67
Smog	2.34

Breakdown of Reusable System



Compelling Vision: While the amount of time, energy, and water/detergent used during the actual cleaning process is decreased from the original mop and bucket system by Gianfranco Zaccai's Swiffer solution, this is only a bandaid to a much bigger problem. The question I am asking is, while the Swiffer solution does some good, compared to the effects of traditional mopping, what ways could this design be improved to do the most good? Gianfranco Zaccai defines sustainability as "In my view, the concept of sustainability cannot be limited to environmental issues. Finding the "right thing to do" won't help much if most people won't do it. We need to find the best thing to do that many people will do—because it's enjoyable, beneficial, and engaging for them—and that is economically viable."

CREATIVE RECOMMENDATIONS :

1) Because the main material that is being cleaned off of mop-able flooring is dust, I propose that Swiffer switch from single-use to employing a reusable electrostatic fabric cleaning cloth to reduce material use and disposal concerns.

2) Development or partnership with a certified eco-friendly floor cleaning detergent (Attitude Nature+Technology Floor surface cleaner) would make vast improvements to the chemical effects of the current Swiffer brand detergent.

3) Return to the original design of a multi-use sponge-type mop to decrease waste and packaging. Sometimes the original system is the correct option. This however limits innovation.

4) Explore possibilities of learning from nature through biomimic design of a natural sponge or natural sponge alternative or look to the cat's tongue and it's textured cleaning potential for a reusable design option as an alternative to the single-use polyester cleaning cloths.

5) Swiffer could market and brand all natural cleaning solutions instead of the chemical-laced options they currently provide. Making money is the bottom line after all so providing alternative cleaning solutions would continue their validity and expansion as a brand.

6) Swiffer could promote education for diy all-natural household cleaners and use this promotion of natural solutions as a marketing effort to sell reusable cleaning cloths to consumers. Education is everything.

7) Reevaluating how the individual single-use cleaning cloths are packaged would show immediate improvement without affected the current intention of the design. Before the wet detergent is added the wet mopping cloths are essentially the same as the dry mopping cloths and therefore shipping and packaging in general could be reduce by separating the liquid from the cleaning cloth to reduce the need for individual packaging on each single-use cloth.

8) Revisiting how the Swiffer sweeper itself is assembled to allow for a household towel or cloth to be used for dusting and mopping could provide the same cleaning effects while allowing for diversity within the system. This is not a smart business idea for a corporation who is trying to sell more products but universal design is the way of the future and should always be considered.

9) Making sure that reusable cloths are washer safe or submersible and can be easily and effectively cleaned is essential to avoiding the need for users to return to the days of hand-rinsing and wringing out.

10) Swiffer could invent and market a solar powered variation of the "Roomba" mopping robot where the charging station for the Roomba is affixed to a window and would provide clean energy for the Swiffer robotic sweeper. After all, the Swiffer Sweeper was invented to take the work out of housework so why not create an affordable and sustainable version of the Roomba that could corner the market.

11) Promoting an overall societal and lifestyle change to ensure that shoes are left outside of the home and are not the culprit of tracked in dirt and debris on floors will greatly reduce the amount of times per month that the floors will have to be swept and mopped.

12) Ensuring that all packing, single-use cleaning cloths, and liquid cleaning solutions are bio-restorative or will return to nature will alleviate user concerns about excessive waste in landfills and easy breakdown of materials to alleviate recycling issues.

13) Focusing on flooring as a self-cleaning by taking a page from data server room design where flooring has raised perforated floor tiles that allow for negative pressure to automatically collect dust and dirt and funnel it towards a baseboard centralized vacuum system that would serve as a repository for dust and dirt to be disposed of monthly instead of weekly.

14) Going to the source by promoting the use of boot scrubbers outside of the home and surface shields on flooring surfaces to provide easier cleaning with minimal detergent to reduce usage of cleaning cloths and harsh chemicals.

15) Going back to nature where interior flooring is of natural origin (think sand as a flooring) would be good for the skin, reduce pressure on the feet and body as a whole, and remove the need for cleaning of man-made flooring all together.

16) Pretending the floor is lava will instantly reduce the need for single-use floor cleaning cloths as nothing will negatively effect the pristine conditions of the floor through direct contact. Until levitation is invented/discovered this is not a feasible solution but my fun-loving and quirky mind would not stop me from including it as a possible solution.

PRIORITIZED RECOMMENDATIONS :

1) The priority is placed on developing and employing a reusable electrostatic fabric that will mesh seamlessly with the current method of cleaning cloth attachment so as to maintain the usability of Swiffer sweeper handles that are current in use and that will continue to be produced. A life cycle analysis of the original single-use concept and the proposed reusable concept with natural cleaning solution yields results that show that the reusable option with natural cleaner poses a viable solution to the problem with noticeable environmental benefits. This design change could be implemented within a year and would take minimal design change as only the cleaning cloth material would be effected, not overall design. This option could continue to be a good return on investment as the Swiffer brand would be able to sell multiple reusable cloths and adapt the patterns and color choices seasonally or for various rooms/uses. Cleaning solutions would still be able to be marketed and provided to work hand-in-hand with the reusable cleaning cloths.

2) Learning from nature and altering the materials used to ensuring that materials are bio-restorative and will naturally break down and return to nature is a goal to achieve. This will ensuring that all packing, single-use cleaning cloths, and liquid cleaning solutions will return to nature, and will alleviate user concerns about excessive waste and recycling issues and well as concerns about chemical use and runoff into the soil. Natural items like lemon and tea tree oil are accepted for their anti-microbial effects and could be utilized as alternatives to harsh chemicals in cleaners. This solution to the problem would take more research but could be implemented within 1-5 years and would make way for further changes within the home goods and sanitation industry as a whole. This strategy most closely aligns with the concepts of sustainable design as it completely reimagines material use to not only be less bad for the environment but to be neutral or positively giving back to the ecosystem through composting.

3) Looking to technology as a viable option for continuous cleaning without much human effort can be a viable and intriguing option. Focusing on designing flooring that learns from the human body and employs a porous grid material and system that can effectively funnel dust, dirt, and liquid into a trap would alleviate the need for surface cleaning and cleaning supplies all together. Changes on this magnitude are really going back to the building materials industry and would require a close pairing between Proctor and Gamble and the flooring industry to ensure that Proctor and Gamble would stay relevant and find ways to insert themselves into the

solution instead of pushing them out of the market entirely. Many years of innovation and lobbying would be required to ensure that porous flooring and in-baseboard catches were to code and feasibly implemented. As technology and building materials change this solution would be able to adapt to the overall system changes and benefit from increases in feasibility and lowered cost due to technological innovation.

CONCLUSION :

In conclusion, more effective product packaging with less individually wrapped parts would decrease the carbon footprint as smaller packaging and less materials would mean that shipping would be more streamlined, less material waste would be created and cleaner materials would be used which would effectively offset the negative impacts of harsh chemicals on the environment and users as a whole. More holistic methods and natural cleaning solutions are better for the human body and the plants and animals they come in contact with. Smarter and safer materials choices instead of synthetic petroleum-based polyester electrostatic fabric reduce the use of carbon-intensive non-renewable resources, where more than 70 billion tons of petroleum are used to make polyester per year. Using a cotton or hemp substitute which take less than half of the energy to

produce would be a smart and safe alternative. Natural fibers are much less water-use intensive during production, and have better absorption qualities than the non-breathable polyester and polyester blends do. With some small changes to the design, Swiffer can truly give cleaning a whole new meaning.

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