International Baccalaureate Diploma Programme

Extended Essay

Research Question:

WHAT IS THE EFFECT OF USING EMAIL TO SEND SHOPPING RECEIPTS IN BIG MARKET CHAINS ON DEFORSETATION RATE, BETWEEN THE YEARS 2017 TO 2022, REFLECTING TO THE WORLD BY TAKING WALMART'S OBTAINED DATA AS A BASE REFERENCE?

Subject of Essay: Environmental Systems and Societies

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INTRODUCTION

Since I was a little kid, my sensitivity for the environment was always a top priority in my life. Growing up surrounded by people who tried to help living beings in need and concerned about protecting the environment; my worldview has shifted to an ecocentric point of view over the years. From planting trees to volunteering to groups that have a green initiative, I have always tried to find ways to reuse and use sustainably produced materials as much as possible. As an upcoming communication design student, I have participated in programs that aimed for a more sustainable future and helped them design products for campaigns. My passion for nature, specifically trees, ensued after visiting the “Eymir River '' for the first time when I was ten years old. With its beautiful colors, huge fascinating leaves and unique patterns; trees have always been fascinating me and make me feel like I am in another universe. An environment surrounded by trees created a safe space for me to focus on my thoughts and clear my head.

The escalating demand for paper, with a rise in deforestation, emphasizes the need for practical solutions that can address environmental concerns without requiring significant disruptions on daily life. Recognizing the ever present habit of throwing out market receipts without consideration, I became motivated to explore avenues for reducing this paper waste and therefore, bring some awareness to my community. During a recent visit to the United States, I observed an effective yet seemingly simple practice adopted by some supermarket chains – the usage of digital receipts, sent via email. This environmentally conscious shift could potentially serve as an impactful means of subjugating deforestation associated with traditional paper receipts. Notably, major

market chains like Walmart currently rely on physical receipts made from a potentially toxic material, BPA, impeding recycling and even posing health risks when in contact with the skin.

In an effort to demonstrate the ecological impact of paper-based receipts, this research concentrates on impactful market chains, using Walmart as a case study. Walmart, being one of the most frequently used grocery stores in the United States, is uniquely embedded to provide accurate data representative of consumer habits in the middle-class demographic. The goal of this research is to investigate the annual consumption of receipt paper by large market chains and to evaluate the corresponding deforestation implications. As a result, the study aims to motivate people for the adoption of electronic receipts as a viable and eco-friendly alternative, offering the potential to decrease environmental harm while ensuring operational efficiency, with broad implications for Walmart and similar entities globally.

One of the biggest market chains, Walmart, has an average of 34,285,714 customers daily, leading to a gain of 1.5 billion dollars a day.[1]This information demonstrates the fact that a customer buys an average of 9 items in a day that is approximately a 14 inches (35 centimeters) receipt per customer.[2] I will be investigating if the top ten market shareholders in the World, like Walmart, were to start sending their shopping receipts via email (like some local business stores do) how many trees would be saved from being cut down in the years 2017 to 2022. I will be mostly collecting my base data from the

[1] Walmart releases Q4 and FY23 earnings. (2023, February 21). https://corporate.walmart.com/news/2023/02/21/walmart-releases-q4-and-fy23-earnings

[2] Everything you should know about receipt paper size. (n.d.). PosPaperRoll. https://pospaperroll.com/blog/everything-you-should-know-about-receipt-paper-size/

website “Statista " which is generally considered a reliable source for statistics and market research. It provides access to a wide range of data and insights across diverse industries and topics[3]. The website Statista claims that they gather information from reputable sources, including government publications, academic research, industry reports and surveys.

RESEARCH QUESTION

WHAT IS THE EFFECT OF USING EMAIL TO SEND SHOPPING RECEIPTS IN BIG MARKET CHAINS ON DEFORESTATION RATE, BETWEEN THE YEARS 2017 TO 2022, REFLECTING TO THE WORLD BY TAKING WALMART’S DATA AS A BASE EXAMPLE?

AIM

The purpose of this research is to determine the effect of using email to send shopping receipts in in market chains on deforestation rate and reflecting it to the world by taking Walmart’s statistics as a base. This way, it can be seen the amount of deforestation is happening because of a small unconventional material.

HOW MANY TREES ARE BEING CUT?

As of 2020, the United Nations reported a yearly global deforestation rate above 7 million hectares.[4] The scale of this deforestation depends on factors such as tree density per hectare which typically ranges from 1,500 to 2,500 trees. The UN's definition encompasses two main aspects: “the direct human-driven conversion of forested land

[3] Statista. (n.d.). Statista - the statistics portal. https://www.statista.com/aboutus/our-researchcommitment#:~:text=Statista%20is%20your%20trustworthy%20and,to%20make%20the%20best%20decisions

[4] United Nations Statistics Division. (n.d.). — SDG indicators. https://unstats.un.org/sdgs/report/2023/Goal-15#:~:text=Global%20forest%20coverage%20decreased%20from,grazing%20for%2038.5%20per%20cent).

into non-forested areas" and the "transformation of forests into different land uses."[5] In both cases, the outcome is a reduction in tree canopy cover, staying below the critical threshold level of 10 percent. The paper and pulp industry that manufacture office paper supplies, glossy papers, tissue, paper based packaging and more uses between 33% and 40% of wood supplies worldwide. Deforestation is driven by particular factors, and when these elements come together, they worsen their effects on the environment. Furthermore, deforestation disrupts natural carbon-capturing mechanisms that play a critical role in minimizing the rising levels of greenhouse gas emissions.[6] Reports from the United Nations and tools like carbon footprint calculators reveal a concerning inclining trend in the greenhouse gas emissions. The primary causes of deforestation, responsible for the most significant portion of forests cut down, can be summarized as the top four industries:

1) Farming
2) Grazing and Feeding Livestock
3) Drilling
4) Mining

THE CONNECTION BETWEEN DEFORESTATION AND CLIMATE CHANGE

The US government reports that deforestation has a significant impact on greenhouse gas emissions, accounting for approximately 12% of the total emissions. Fully grown trees

[5] United Nations Statistics Division. (n.d.). — SDG indicators. https://unstats.un.org/sdgs/report/2023/Goal-15#:~:text=Global%20forest%20coverage%20decreased%20from,grazing%20for%2038.5%20per%20cent).
[6] Ritchie, H., & Roser, M. (2023, December 28). Deforestation and forest loss. Our World in Data. https://ourworldindata.org/deforestation

store carbon in their branches, trunks, leaves, roots, and forests serve as important carbon repositories in their soil, aiding in the absorption and reduction of carbon emissions from the atmosphere. When deforestation occurs, a highly considerable portion of this stored carbon is released in the form of CO2, an impactful greenhouse gas. Slowing down deforestation is widely recognized as a cost-effective strategy to mitigate overall greenhouse gas emissions.[7] Furthermore, a collective statement from UN authorities in the environmental, developmental, and agricultural sectors emphasized the vital role that forests play in the global fight against climate change.[8] Forests come by with a unique ability to capture and retain carbon dioxide, absorbing it at a rate equivalent to about one-third of the annual emissions resulting from the burning of fossil fuels. Halting deforestation and restoring damaged forests have the potential to contribute significantly, potentially up to 30%, to addressing the climate crisis. They also stressed the urgency of the situation, highlighting that 2020 represented a critical turning point in humanities' seek of a sustainable future. A decline in greenhouse gas emissions was imperative to prevent the most vital consequences of climate change.

To provide a point of view on the staggering scale of tree removal, if all the trees cut down each year were stacked, with each stack measuring just 3 meters (10 feet) in height, they would span the distance from Earth to the moon and back about six times.[9]

[7] The True cost of reducing greenhouse gas emissions – IMF F&D | DECEMBER 2019. (2019, December 1). IMF. https://www.imf.org/en/Publications/fandd/issues/2019/12/the-true-cost-of-reducing-greenhouse-gas-emissions-gillingham
[8] Martin. (2022, July 28). Climate Action - United Nations Sustainable development. United Nations Sustainable Development. https://www.un.org/sustainabledevelopment/climate-action/
[9] Cheng, Y., Oehmcke, S., Brandt, M., Rosenthal, L., Das, A. J., Vrieling, A., Saatchi, S., Wagner, F., Mugabowindekwe, M., Verbruggen, W., Beier, C., & Horion, S. (2024). Scattered tree death contributes to substantial forest loss in California. Nature Communications, 15(1). https://doi.org/10.1038/s41467-024-44991-z

HYPOTHESIS

From my research suggesting that Walmart is the top supermarket shareholder globally[10] and it has about 15 million customers daily, just in the US[11]; my hypothesis is that there will be approximately 90,000 trees on average that had been cut down for Walmart's grocery receipts. By extending this hypothesis I am expecting about 1% impact on the paper industry globally.

VARIABLES

INDEPENDENT VARIABLES

Customer rates throughout the years 2017 and 2022.

The annual income of Walmart throughout the years 2017 and 2022.

The top ten supermarkets' shareholding percentage.

Dependent Variables

The number of trees that was used for the receipts.

The amount of items that were bought every year between 2017 and 2022

The average receipt length that is needed for the average shopping rates.

The overall impact rate receipts hold in deforestation.

[10] Editorial. (2024, February 28). Top 10 supermarket retail chains in the United States. ESM Magazine. https://www.esmmagazine.com/retail/top-10-supermarket-retail-chains-in-the-unitedstates238904#:~:text=Walmart%20is%20the%20largest%20supermarket,Walmart%20Supercenter%2C%20and%20Sam%27s%20Club

[11] Topic: Walmart. (2023, November 8). Statista. https://www.statista.com/topics/1451/walmart/#topicOverview

Controlled Variables

Table 1: Controlled Variables

Variable	Significance	How to control	Value
The data will be taken from Walmart.	The data interpretation will be more reliable if it is based on the same market chain.	I will be looking at Walmart's data during this research.	Since it is one of the biggest market chains, Walmart will provide a more accurate outcome for the research.
The average size of a sheet of a receipt: 80 feet (24 meters)	The size of a receipt sheet may vary. However the most common size of a receipt is 24 meters.	The calculations will be made based on this size of the receipt sheet.	Since the most common size will be used in calculation, there will be a generalizable result.
The cost of items will be taken as average (4.15 dollars per item)	Some items may be more expensive than others and some can be cheaper. To prevent the variable outcomes of the receipt lengths, I will be assuming that an	The items prices will be calculated based on the average price.	The outcomes of my calculations will be more general, since an average supermarket's item will also be near 4.15 dollars.

	average price of an item is 5 dollars.		

BACKGROUND INFORMATION

Market receipts, a commonly used item in daily shopping, are typically made from thermal paper. This leads to a common misconception that they are recyclable. However, this is not the case due to their composition. Receipts incorporate chemicals like Bisphenol A (BPA) and Bisphenol S (BPS), used in thermal paper for inkless printing. [12][12] Another chemical, Pergafast 201, found in these receipts, is potentially toxic to aquatic life with long-term effects. Research by the Ecology Center has highlighted these harmful impacts, offering solutions for companies using Bisphenol in receipts and guidelines for individuals handling them. [13][13] Bisphenol A, identified by the U.S. EPA as toxic to the reproductive system, can be quickly absorbed through the skin and enter the bloodstream. [14][14]

Although Bisphenol S is not as toxic as BPA, it has a similar absorption rate, making it equally concerning upon human exposure. The presence of these chemicals in receipts

[12] BPA and BPS in thermal paper | Minnesota Pollution Control Agency. (n.d.). Minnesota Pollution Control Agency. https://www.pca.state.mn.us/business-with-us/bpa-and-bps-in-thermalpaper#:~:text=The%20receipts%20we%20receive%20when,Bisphenol%2DS%20(BPS)

[13] Wu, L., Zhang, X., Wang, F., Gao, C., Chen, D., Palumbo, J., Guo, Y., & Zeng, E. Y. (2018). Occurrence of bisphenol S in the environment and implications for human exposure: A short review. *Science of the Total Environment*, *615*, 87–98. https://doi.org/10.1016/j.scitotenv.2017.09.194

[14] Statista. (n.d.). *Statista - the statistics portal*. https://www.statista.com/aboutus/our-research-commitment#:~:text=Statista%20is%20your%20trustworthy%20and,data%20into%20information%20and%20insights.

not only presents health risks but also obstructs their process of recycling. [15][15] Moreover, these receipts should be separated from other paper materials, like newspapers or magazines, to simplify paper recycling and prevent contamination from BPA and BPS. Switching to a Bisphenol-free option is also not completely cost-effective and sustainable. Bisphenol provides a longer shelf life to receipts, a feature that its alternatives might lack, and even Bisphenol-free receipts can contain other chemicals that inhibit their recyclability. Therefore, the move towards bisphenol-free receipts, while less harmful to the environment and human health, cannot be considered as the best alternative solution. The issue demands a multi-dimensional approach, involving technological innovation, legislative measures, and increased public awareness. [16][16] Digital receipt systems present a promising alternative, reducing paper waste and eliminating the risks of exposal to Bisphenol. Additionally, government regulations limiting or prohibiting the use of harmful chemicals in receipts could obligate companies to embrace safer practices. Continued research into environmentally friendly and recyclable materials for receipts is essential. Along with this, educating the public about the risks associated with Bisphenol-containing receipts and the correct disposal methods is important. By adopting such a comprehensive strategy, significant development towards a sustainable and health conscious future can be made, surpassing beyond the limited scope of Bisphenol-free alternatives.

ENVIRONMENTAL EFFECTS OF BPA AND BPS

[15] Semerjian, L., Alawadhi, N., & Nazer, K. (2023). Detection of bisphenol A in thermal paper receipts and assessment of human exposure: A case study from Sharjah, United Arab Emirates. *PLOS ONE*, *18*(3), e0283675. https://doi.org/10.1371/journal.pone.0283675

[16] Segovia-Mendoza, M., De León, C. T. G., García-Becerra, R., Ambrosio, J. R., Nava-Castro, K. E., & Morales-Montor, J. (2020). The chemical environmental pollutants BPA and BPS induce alterations of the proteomic profile of different phenotypes of human breast cancer cells: A proposed interactome. *Environmental Research*, *191*, 109960. https://doi.org/10.1016/j.envres.2020.109960

BPA's environmental impact goes beyond its immediate surroundings. It leaks to ecosystems, and extends globally; affecting not just local wildlife but also contributing to much larger ecological imbalances.[17] This chemical's ability makes it a particularly sneaky pollutants as it mimics natural hormones. Its presence in ecosystems disrupts the natural balance, potentially leading to long-term changes in wildlife populations and behaviors. Unlike some pollutants that degrade relatively quickly, BPA can remain present, allowing its harmful effects to accumulate over time. This persistence poses a significant challenge for wildlife conservation efforts. Small organisms like plankton, which form the base of the aquatic food web, can absorb[18] BPA, which is then passed up the food chain as these organisms are consumed by larger animals. This bioaccumulation not only affects the health of individual animals but can also lead to wider ecological disruptions, for instance changes in population dynamics and community structures within these ecosystems. The widespread use of plastics and the resultant BPA pollution also raise questions about the sustainability. In conclusion, the environmental and health impacts of BPA are far-reaching and versatile. Addressing this issue requires a concerted effort from manufacturers, policymakers, researchers, and consumers.[19] By working together to reduce reliance on BPA-containing products and improve waste management actions, we can decrease the harmful effects of this chemical that is present everywhere and move towards a more sustainable future.

[17] *Risk Management for bisphenol A (BPA)* | *US EPA*. (2023, April 11). US EPA. https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-bisphenol-bpa
[18] *Receipt deceit: Toxic chemicals in receipt paper*. (n.d.). Ecology Center. https://www.ecocenter.org/our-work/healthy-stuff-lab/reports/receipt-deceit-toxic-chemicals-receipt-paper
[19] Ld, S. S. M. R. (2024, January 29). *What is BPA? Should I be concerned about it?* Healthline. https://www.healthline.com/nutrition/what-is-bpa

METHODOLOGY

There is not any other alternative research done or article written related to this research even though there is some research done for the toxicity of market receipts. Consequently, I have created a method to obtain reliable data and will be doing interpretations based on this method. The customers will be considered to be from the middle-class, since most people in first world countries are from the middle-class whom have an averagely adequate income and spend accordingly.

I will be using the website “Statista" to obtain trustworthy data for the weekly customer visits to Walmart and number of Walmart stores in the United States. Statista is a trustworthy website, which uses the data from government publications, academic research and more reputable sources.[20] Every month will be considered as 4 weeks and the weekly calculated customers will be then multiplied with 4 for a monthly number of customers. The customers will be considered to be from the middle-class, since most people in developing countries are from the middle-class and spend accordingly. Because of the fact that there is not a completely reliable data present for the sales numbers of market chains that addresses the middle-class, I have decided to get an alternative data and generalize it to all the big market chains. Walmart is a perfect fit for this generalization as it is one of the most common supermarkets in the United States and it has a reliable data source. I will be investigating Walmart’s weekly customer visits between the years 2017-2022 and calculate the average number of customers of Walmart in the United States. 2017 is the year when Walmart became one of the best-selling companies in the

[20] *Human exposure to Bisphenol A in Europe*. (n.d.). European Environment Agency. https://www.eea.europa.eu/publications/peoples-exposure-to-bisphenol-a/

United States, beating Amazon. I will use my calculations to verify an average item sale in Walmart daily and the receipt length needed for the number of items. I will be using the 20 meter receipt template for every calculation to obtain an accurate, more general result since it is the most common template worldwide.[21] I will be then comparing the outcome numbers of receipt lengths for the years between 2017 and 2022 and interpret the average number of trees that needed to be cut down in order to obtain these receipts. Lastly, I will reflect these numbers first to the United States, and then the World. Walmart is a safe choice among other market chains to reflect to the whole USA as "it is the most popular grocery chain in USA."[22] To get a more impacting number of cut-down trees, the results in USA will be used as a base reference to mimic the number to the World. With this method, the effect of trees being cut down for receipts on deforestation can be observed effectively.

21 Brazier, Y. (2023, May 25). *How does bisphenol A affect health?* https://www.medicalnewstoday.com/articles/221205

22 Statista. (n.d.). *Statista - the statistics portal*. https://www.statista.com/aboutus/our-research-commitment#:~:text=Statista%20is%20your%20trustworthy%20and,data%20into%20information%20and%20insights.

Risk Assessment

Table 2: Risk Assessment

Ethical risk	There are no ethical risks since only second hand data will be used for during the research. There will be no harm to any living organism**.**
Environmental risk	The out coming results will provide information about how many trees are cut down for receipts annually and will be informative. There are no environmental risks. In addition second hand data will be used, there will be no chemical harm to the environment.
Health risk	There is not any health risk since I will not be using any chemical substances or taking any action that might harm me and my surroundings.

Additional Information For Data Calculation;

An average item at Walmart is estimated to cost $4.15, and “customers typically purchase 13 items per visit.”[23] Each item is estimated to be $4.15 because of the average money a person from the middle-class spends on every item for a weekly budget. This results in an impressive annual sales volume of approximately 419.12 million items. In addition, it is estimated that an average tree can produce around 4.32 kilometers or 5318.5 meters of paper.[24] For this analysis, Walmart receipts are considered to be completely recyclable, with a 100% efficiency rate. However, it is important to note that this assumption might impact the precision of the data. “For the year 2017; there were 13.520 million customers of Walmart in 2017. A 7 item shopping receipt uses approximately 24.3 centimeters of receipt paper.

DATA CALCULATION

For 2017;

There were 13.520 million customers of Walmart in 2017. A 7 item shopping receipt uses approximately 24.3 centimeters of receipt paper. When calculated as:

1 person 819 items

13,520 x 10^3 people 11,072,880 10^3 items

7 items 0.243 meters

[23] Statista. (2023, March 20). *Walmart: weekly customer visits to stores worldwide FY2017-FY2023*. https://www.statista.com/statistics/818929/number-of-weekly-customer-visits-to-walmart-stores-worldwide/

[24] *How much paper does one tree produce?* (n.d.). Sierra Club. https://www.sierraclub.org/sierra/2014-4-july-august/ask-mr-green/how-much-paper-does-one-tree-produce

11,072,880 10^3 items 384,387,120 meters

It can be obtained that approximately 384,387,120 meters of receipt paper had been used for groceries receipts in Walmart.

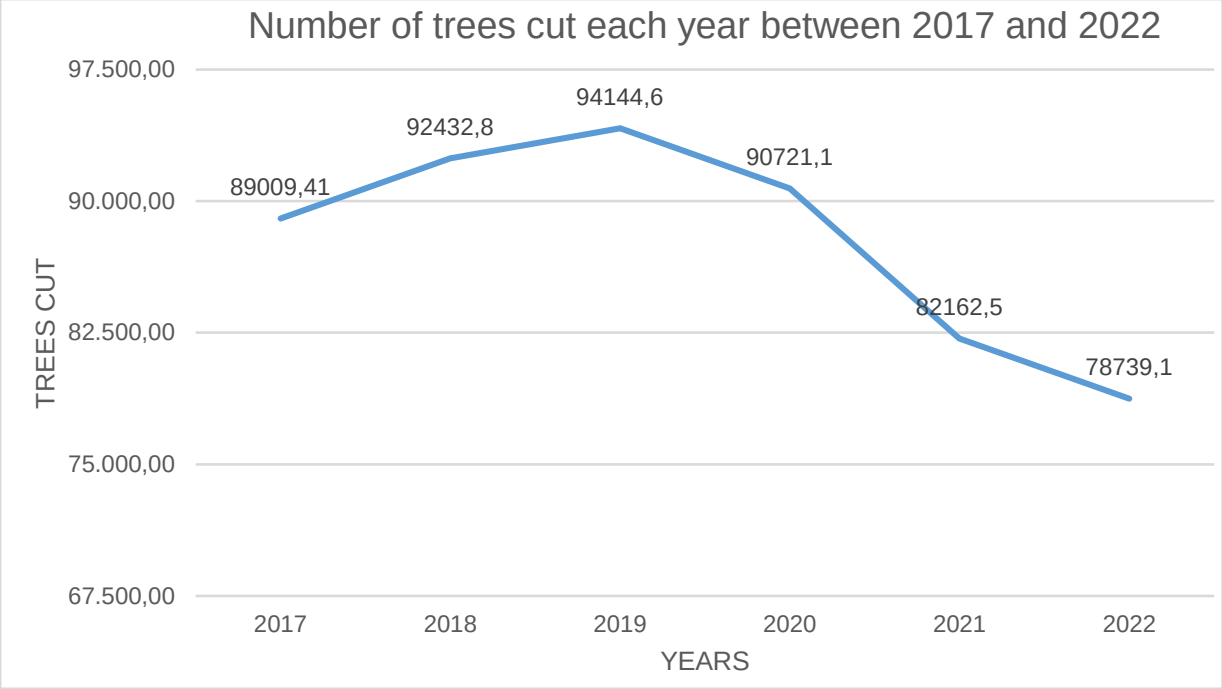
4318, 5 meters of paper = 1 average tree

384,387,120 meters of paper = 89,009.406 trees

Table 3: Calculation of the trees cut between the years 2017 and 2022

YEARS	ITEMS (THOUSAND)	RECEIPT LENGTH (m)	TREES
2017	110.728.80	384.387.120	890.09,41
2018	114.987.60	399.171.240	924.32,8
2019	117.117.00	406.563.300	941.44,6
2020	112.858.20	391.779.180	907.21,1
2021	102,211.20	354.818.880	821.62,5
2022	979.524.0	340.034.760	787.39,1

Graph 1: line graph of the trees cut between the years 2017 and 2022



This result indicates that on average, 89,009.406 trees were used to obtain groceries receipts in the year 2017. Now, I will project the results of Walmart to all the big market chains in USA. Since the paper industry is responsible for approximately 37% of deforestation globally, the number obtained from the United States 'paper industry will provide a clear overview of what rate does it affect deforestation. After obtaining this number, I will be using it as a base reference to find out the rate at which market receipts cover the rate of deforestation. The arithmetic mean of number of trees cut for receipts is found as:

$$\frac{89{,}009.40604+92{,}432.84474+94{,}144.56508+90{,}721.12539+82{,}162.52866+78{,}739.08996}{6} = 87{,}868.25998$$

There are 25 countries Walmart operates in. To get the average number of trees cut for Walmart's receipts globally can be found as:

87,868.25998 x 25 = 2,196,706.5

To get the rate at which the top ten global supermarket shareholders play a role in deforestation, the data found from Walmart will be reflected to the other 9 markets. Walmart takes up approximately 9% of market shareholders globally.[25]

For Costco Wholesale Corporation:

2,196,706.5 trees 9%

732,235.5 trees 3%

For Kroger Company: 3%

For Tesco PLC: 3%

For Schwarz Group (Lidl and Kaufland): 2%

For Aldi Group: 2%

For Carrefour SA: 2%

For Ahold Delhazie: 1%

For Metro AG: 1%

[25] *Largest supermarket chains by market cap*. (n.d.). https://companiesmarketcap.com/supermarkets/largest-companies-by-market-cap/#google_vignette

For Aeon Co., Ltd: 1%

The total number of trees cut from top ten supermarkets is: 6,590,119.5 trees

Since the paper industry covers about 37% of the deforestation rate and 15 billion trees are cut each year;

(15,000,000,000 x 37) / 100 = 5,550,000,000

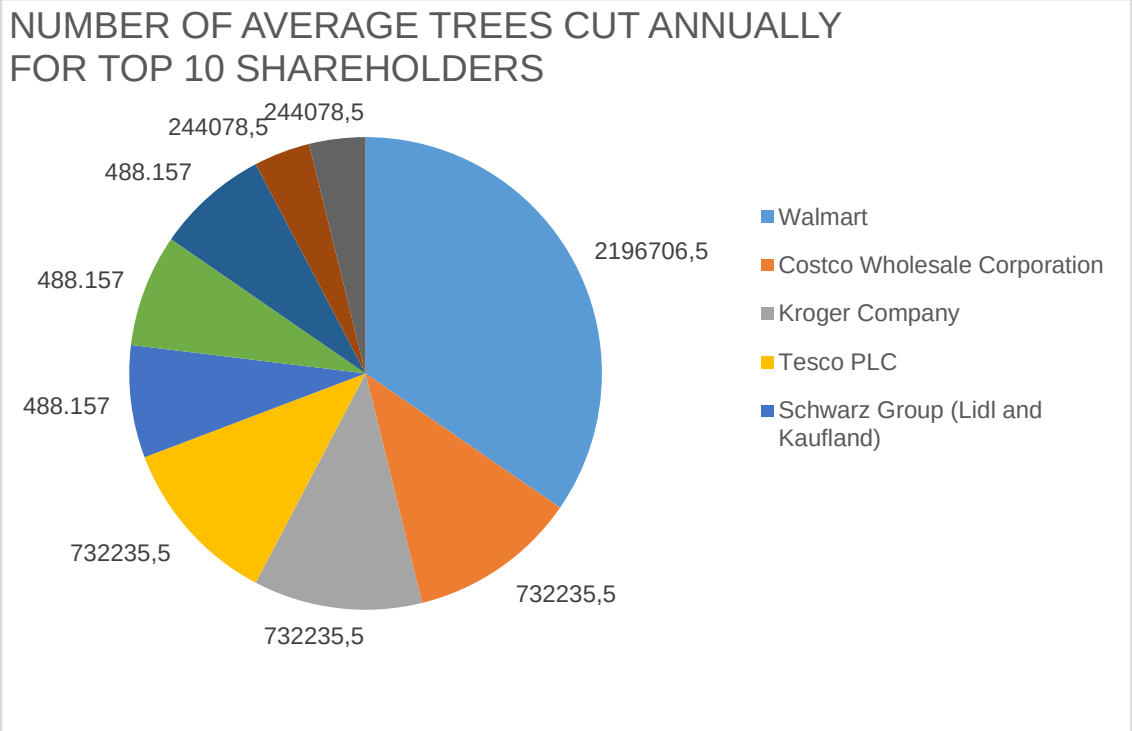
Consequently, to get the number of trees that were cut for receipts in top ten markets will be:

5,550,000,000 trees 100%

6,590,119.5 trees 0.1187%

In sum, it can be seen that approximately 0.1187% of trees were cut annually for the paper industry.

Graph 2: average trees cut annually for top ten shareholders



CONCLUSION AND DISCUSSION

Each year, the number of trees cut for market receipts has remained relatively consistent, ranging between 82,000 and 95,000. The peak was reached in 2019, coinciding with the onset of the Covid-19 pandemic. This spike might be attributed to people stockpiling items such as toilet paper after the first cases were announced globally. Following 2019, 2018 also saw one of the highest numbers of trees cut for receipt production. These two years led to a shift in consumer behavior. While other

businesses like clothing retail saw a decline,[26] the purchase of food items steadily increased.

Looking back at 2017, the increase in trees cut for receipts seemed predictable, given Walmart's rise as the top-selling store that year. In contrast, 2021 and 2022 saw a significant decrease in both the number of items sold and the trees cut down for receipts. This data suggests a potential continuing downward trend in the coming years, barring any major societal disruptions similar to the Covid-19 pandemic. In just six years, about 87,868.255998 trees were cut down solely for market receipts in Walmart, US. This figure highlights the potential for a reduction in tree cutting if market chains adopt alternative methods for issuing receipts. Following this, the rate was further calculated for all the Walmart stores worldwide and a total of 2,196,706.5 trees were cut in 25 countries[27] (places where Walmart has a branch supermarket.) By this number I further found how many trees were cut in the top ten supermarket chains globally. I used Walmart's outcome data, then interpreted that into other market chains. The reason for choosing the top ten markets was to get an accurate result where these markets are the top distributors around the globe, and they have the potential to have a significant environmental impact. With 9%, Walmart was the most shareholder in the supermarket industry. Following that "Costco", "Kroger Company" and Tesco PLC showed a number of 732,235.5 trees cut for their market receipts. These markets are

[26] *Apparel Industry 2024*. (n.d.). https://www.reportlinker.com/market-report/Apparel/663354/Apparel?term=clothes%20industry&matchtype=b&loc_interest=&loc_physical=1012763&gad_source=1&gclid=CjwKCAiAi6uvBhADEiwAWiyRdt-vze3WnGhh7mQKSuKkhsgjnKc-16JMiMNyonP2GPEo0IZje4sBWxoC2wMQAvD_BwE

[27] *Walmart stores worldwide 2023 | Statista*. (2023, September 25). Statista. https://www.statista.com/statistics/256172/total-number-of-walmart-stores-worldwide/

shareholders for about 3% of global market chains. After these, 488,157 trees were calculated for”Schwarz Group (Lidl and Kaufland)”,”Aldi Group“and “Carrefour SA”. These three market chains each have a market share of about 2% of the global market chains. The last three supermarket brands, Ahold Delhazie, Metro AG and Aeon Co., Ltd show an approximate number of 244,078.5 trees with each holding about 1% of the market shareholders. With these number, it was further calculated that about 0.1187% of the global paper industry is the market receipts. Since this number is only the sum of top ten supermarkets, it can be said that the percentage will be even higher by adding the national and other international supermarket chains.

This substantial number of trees cut for something as seemingly insignificant as receipts underscores the impact the smallest, often disregarded items can have when accumulated. In just five years, approximately 6,590,119.5 trees could have been saved from being cut down for paper receipts. The scale of this impact is noticeable, as the trees saved from just ten chain’s receipt production cover a vast area. This investigation into the environmental effects of market receipts not only revealed their potential harm but also shed light on the broader issue of everyday materials’ environmental impacts. By exploring alternatives like digital receipt sharing, we can make a big environmental difference. Such a shift, while seemingly minor, could lead to substantial ecological benefits on a global scale.

EVALUATION

Even though my research journey into this issue did not uncover other studies or articles specifically addressing this problem in detail, I remain confident in the accuracy of my investigative approach. However, the presence of supplementary information or research aligning with my findings would have undoubtedly strengthened the reliability and support for my conclusions. The in-depth research and various reports I delved into, focusing on the toxicity of chemicals present in receipts, were instrumental in shaping my understanding of their broader environmental impacts. The main source of my data, Statista, is known for its credibility. It sources information from professional reports and scientifically meticulous articles.

A key decision in my research was to approximate the cost of each item to be about 4.15 dollars. This was a critical approximation to simplify the process and minimizing potential difficulties. Nonetheless, I acknowledge that any form of rounding in research can introduce slight inaccuracies. These may not drastically skew the results but could lead to minor discrepancies, especially in quantifying the precise number of trees cut down. To enhance the credibility of future research, a more sophisticated method of data collection could be employed. For instance, a bespoke computer program could automatically perform calculations and accurately track customer purchases over a given period, such as five years. Another aspect worth considering in future studies is the diversity of receipt types used across different stores. While the 20-meter receipt template is widely used, some retailers might opt for alternatives that are more cost-effective or environmentally friendly. Acknowledging and incorporating this variability

could yield results that are not only more accurate but also more reflective of the diverse practices in retail. Lastly, as stated in my research question, I used Walmart's data as a base reference and rounded the numbers accordingly. By reflecting the US. Data to the other 25 countries, I assumed that all the countries had the same amount of sales and customers as the Walmart in USA. I then referenced this outcome data which could also lead to some inaccurate results since not all the supermarkets have same amount of sales.

In conclusion, my research was conducted meticulously, using credible sources and precise methodologies. While assumptions were necessary at certain junctures, I am confident in the reliability of my findings. This exploration has not only provided valuable insights but also sparked further curiosity about the environmental impacts of everyday materials. It has also inspired me to broaden my research scope, perhaps shifting from examining clothing brands to investigating practices within market chains. If we switch to sending receipts via email, it will also be a convenient way for the customers to make refunds or changes which require physical receipts. This way the customer will be able to pull out the digital receipt from their phone and make changes easily. I am increasingly convinced that uncovering these often-overlooked details is essential for making a meaningful difference in the world we inhabit. By bringing these 'little secrets' to light, we can contribute to more informed and sustainable choices in our daily lives and industries.

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