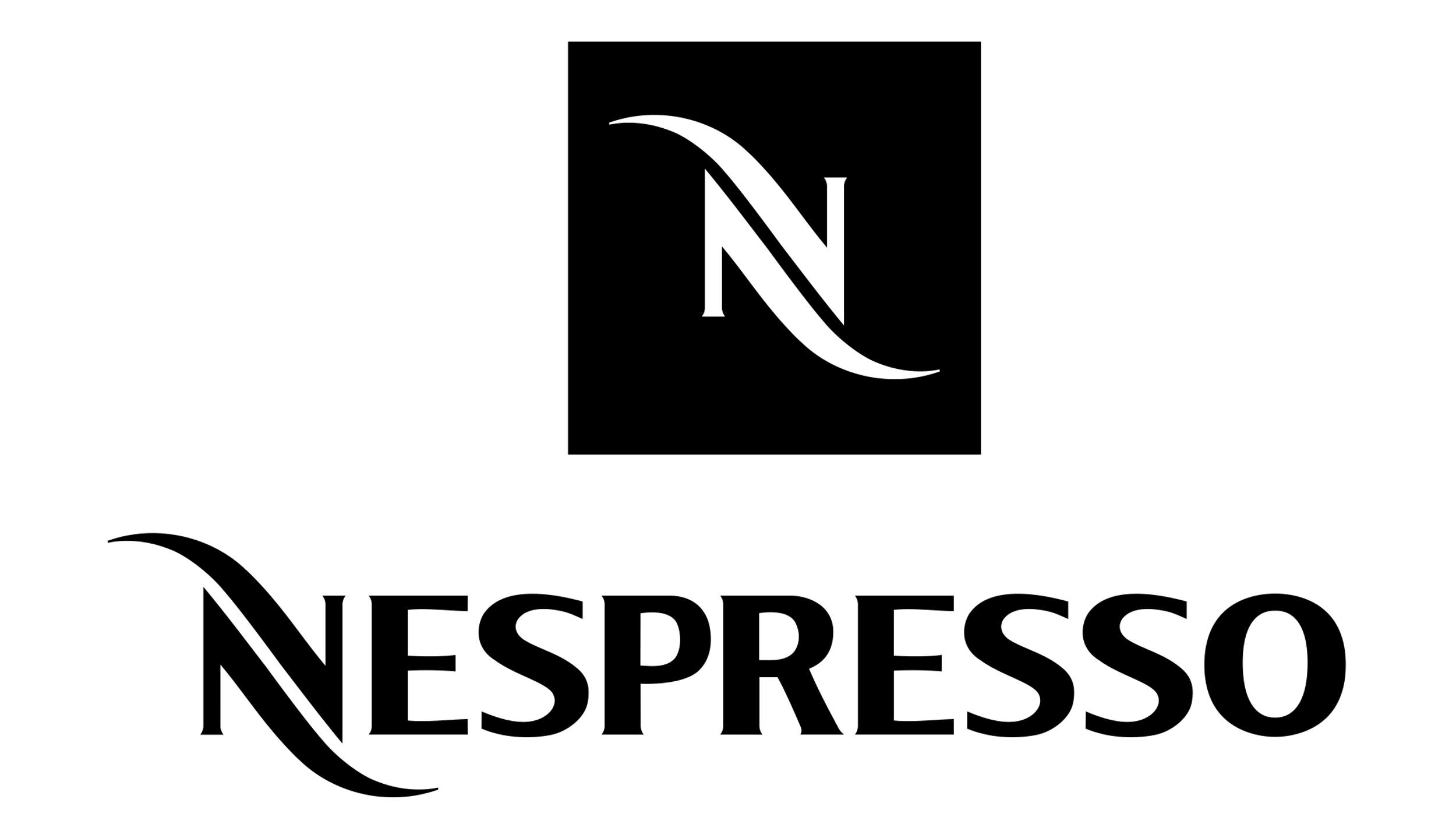
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**​​Business In Society – Sustainability Audit – Group 4**

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“Sustainability Audit and Prototype for Nespresso Company”

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1 Executive Summary

The main objective of this project is to evaluate Nespresso’s sustainability practices, and to propose a data-model prototype that helps the company to address their challenges. Our goal is to analyze Nespresso’s operations, identify its key sustainability issues, develop a tailored model that both aligns with the company’s commitment to achieving long-term environmental and social impact, and adds to where their current plan has weaknesses.

We selected Nespresso as the focus of our project because of its influential role in the premium coffee market. Its main ongoing sustainability initiative is the AAA Sustainable Quality Program, which in short is a program that monitors and governs the future sustainability goals of the company. Within this report, Nespresso emphasizes two main interests. Firstly, that of the quality of the coffee produced, making sure it of a high standard. Secondly, that while the coffee is produced at a high level, is done sustainably. By assessing this report, Nespresso has provided our team with the opportunity to understand at a greater level how these priorities can be enhanced, to address emerging sustainability challenges and meet increasing expectations in this area.

Preliminary research by our team highlighted the need for an in-depth exploration of Nespresso’s sustainability perspective. As part of this project, we were able to meet and discuss the matter with the Head Sustainability Manager from Nespresso Spain, Nayara Fuentes. Her expertise and insights played a crucial role in helping us clarify our findings and validate our approach. Additionally, her input inspired us to refine our strategies and develop a more impactful prototype tailored to Nespresso’s needs. We believe that this collaboration was of great importance, pertaining both to developing our own understanding of Nespresso’s sustainability effort, but also to tailor our prototype to issues that Nespresso were facing, allowing us to create a model that had a greater impact on the company.

2 Company Overview

Nespresso is a subsidiary of the Nestlé Group, a premium coffee brand known for its high-quality coffee capsules and innovative coffee machines. Founded in 1986, Nespresso revolutionized the coffee industry by popularizing the single-serve capsule system, which offered consumers a convenient, high-quality coffee experience at home (Nestlé, 2023). Today, Nespresso operates in over 80 countries, with a strong retail and online presence that has positioned it as one of the most recognizable names in the global coffee market (MarketLine, 2023).

Financially, Nespresso contributes significantly to Nestlé’s revenue, with annual sales estimated at approximately 5-6 billion CHF (Nestlé Annual Report, 2022). The brand has high profit margins, and premium pricing strategy. This enables Nespresso to sustain a profitable business model while supporting ongoing innovation and sustainability initiatives. However, as a premium brand, Nespresso faces growing pressure to address environmental and social challenges within its supply chain, driven by increasing consumer and investor demand for transparency and responsibility (Euromonitor, 2022).

3 Key Sustainability Challenges and Goals

The coffee industry faces significant sustainability challenges due to its environmental impact and reliance on complex global supply chains. Coffee cultivation is highly resource-intensive, requiring substantial water and energy use, while contributing to deforestation, soil degradation, and loss of biodiversity. Additionally, climate change is increasingly impacting coffee-growing regions, resulting in reduced yields and putting pressure on established farming practices (International Coffee Organization, 2022). These factors highlight the urgent need for sustainable approaches to secure the future of the industry and support both environmental and economic resilience.

3.1 Nespresso’s AAA Program

The coffee industry has increasingly embraced certifications such as Rainforest Alliance, Fair Trade, and USDA Organic, which signal adherence to ethical and sustainable practices. Nevertheless, Nespresso has identified that these industry-wide certifications may not fully encompass all sustainability aspects. In response, Nespresso has developed the AAA Sustainable Quality™ Program, tailored to address specific challenges within its supply chain. This approach enables Nespresso to implement stringent standards and swiftly respond to evolving environmental and social concerns.

Established in 2003 in collaboration with the Rainforest Alliance, the AAA Sustainable Quality Program aims to secure a high-quality coffee supply while fostering environmental stewardship and improving farmers’ livelihoods. It is built on three pillars: quality, ensuring high standards for coffee beans; sustainability, minimizing environmental impact; and productivity, bolstering farmers' economic stability (Nespresso, 2023). The program provides farmers with training, technical support, and financial incentives to adopt sustainable practices, such as shade-grown coffee, crop rotation, and soil conservation. These practices mitigate the environmental impacts of coffee farming and strengthen resilience to climate variability. Beyond environmental concerns, the coffee industry must also address social sustainability. Many coffee-producing regions are in developing countries where farmers face low wages, limited education, and inadequate healthcare. The AAA Program tackles these issues through fair compensation and community support initiatives, fostering a more equitable and resilient supply chain.

Our audit of Nespresso’s AAA Sustainable Quality™ Program revealed that, while commendable in its attention to the financial well-being of farmers, it falls short in addressing comprehensive environmental sustainability. The program’s primary emphasis on improving farmers’ economic conditions is undoubtedly beneficial for local communities and supports social sustainability; however, it does not sufficiently address the ecological challenges inherent in coffee production. This disconnect suggests that the program, despite its strengths, does not fully align with global sustainability benchmarks focused on long-term environmental impact.

One key area of concern is the program’s regenerative land practices. Although the AAA initiative aims to source 10% of its coffee organically by 2030 and has pledged to plant over 12 million trees, these measures, while positive, do not directly confront the root causes of environmental degradation in the coffee industry. Planting trees contributes to carbon offsetting and helps combat deforestation, but without deeper systemic changes, such as transitioning to widespread organic farming and implementing soil health strategies, the long-term impact on emissions and ecosystem resilience remains limited.

Moreover, the reliance on these isolated initiatives indicates that the AAA Program may lack a holistic strategy that integrates regenerative agricultural principles capable of reducing greenhouse gas emissions more substantially. Studies indicate that widespread adoption of organic and regenerative farming practices could lead to a significant reduction in carbon emissions and promote greater biodiversity (International Coffee Organization, 2022). However, the AAA’s incremental goal of reaching 10% organic sourcing does not reflect the urgency needed to meet broader environmental targets or the company’s commitment to achieving net-zero emissions by 2050, and even further, does not reach our goal we will set later in this memo.

The findings from our deep dive into the AAA framework show considerable room for improvement. Effective sustainability practices should move beyond incremental targets and address systemic changes that mitigate climate impacts at scale. Comprehensive measures, such as investing in scalable training programs for farmers in organic practices and transitioning to agroforestry systems that enhance carbon sequestration and soil health, are crucial. These actions not only contribute to climate resilience but align better with international sustainability standards and consumer expectations for corporate environmental responsibility.

3.2 Biggest sustainability Challenge of Nespresso

Nespresso faces a critical sustainability challenge in reducing greenhouse gas (GHG) emissions throughout its value chain, with particular emphasis on Scope 3 emissions. These emissions represent approximately 95% of Nespresso's total carbon footprint, contributing 1,464,000 tons of CO₂ out of a total 1,484,000 tons of annual GHG emissions (Nespresso, 2023). Scope 3 emissions primarily originate from indirect activities, such as coffee cultivation and processing, which are fundamental to the company's operations but occur outside its direct control. These emissions are heavily influenced by conventional farming practices that utilize synthetic fertilizers, energy-intensive techniques, and land-use changes, including deforestation. Effectively addressing Scope 3 emissions is vital for Nespresso to meet its sustainability objectives, align with international climate targets, and uphold its commitment to achieving net-zero emissions by 2050 (Nestlé, 2023).

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*Figure 1 – Nespresso’s Pathway to Net Zero 2021-2023 (Nespresso Sustainability Report, 2023)*

However, Nespresso has demonstrated its commitment to climate action by submitting its targets for Science-Based Targets initiative (SBTi) approval in 2023. This milestone aligns the company with global efforts to limit global warming to 1.5°C and achieve a net-zero economy. Despite a carbon peak in 2021, Nespresso successfully reduced its emissions to 1.1 Mt CO₂eq by 2023, matching its 2018 baseline. This progress highlights the impact of its ongoing sustainability initiatives, which have begun to offset emissions growth through targeted GHG reduction strategies.

This progress further reinforces the importance of scaling initiatives like increasing the share of organic coffee in the supply chain. Organic farming practices offer a promising pathway to continue reducing Scope 3 emissions, which represent a significant portion of Nespresso’s overall carbon footprint.

Our team evaluated various dimensions of Scope 3 emissions to pinpoint the most significant area for intervention. We initially assessed two primary sustainability challenges: the emissions generated by coffee cultivation and the environmental impact associated with aluminium use in Nespresso’s coffee capsules. Annually, Nespresso consumes approximately 30,000 tons of aluminium for capsule production, with 80-85% sourced from recycled materials (Nespresso, 2023). Although recycling aluminium reduces the need for virgin resources and mitigates emissions, our analysis determined that the environmental footprint of coffee farming posed a more pressing issue, contributing 39% of total Scope 3 emissions, compared to 24% from packaging production (Nespresso, 2023).

A graph of a graph showing the growth of a global gas company

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*Figure 2 – Emissions Breakdown of a cup of Coffee (Nespresso Sustainability Report, 2023)*

A cup of coffee with text and numbers

Description automatically generatedThis finding shows the greater significance of emissions linked to agricultural practices, which not only impact climate change but also influence the livelihoods of coffee farmers (Sustainable Coffee Challenge, 2022). Consequently, we concluded that prioritising green coffee production as the focal point of intervention would yield the most meaningful reductions in Scope 3 emissions.

Targeting the significant Scope 3 emissions from coffee production offers a key opportunity for substantial GHG reduction. Promoting organic and regenerative farming practices can reduce reliance on synthetic fertilizers, improve soil health, and enhance carbon sequestration (International Coffee Organization, 2022). These measures align with Nespresso’s AAA Sustainable Quality™ Program, which provides farmers with training, technical support, and financial incentives to promote sustainable practices (Rainforest Alliance, 2023).

Despite these efforts, Nespresso's Scope 3 emissions remain challenging to reduce amid growing global coffee demand. Without targeted action, traditional farming methods may exacerbate climate change, impacting temperatures, weather patterns, and land suitability for cultivation over the next two decades (International Coffee Organization, 2022). Expanding sustainability initiatives could reduce emissions and support a resilient supply chain, aligning with Nespresso’s net-zero goal (Nestlé, 2023) and setting a strong industry standard.

*Figure 3 – Key Metrics from Nespresso’s AAA Sustainable Quality Program, SVTI Graph (Nespresso Sustainability Report, 2023)*

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4 Goal Assessment and Strategy

Nespresso’s core sustainability objective is to significantly reduce its carbon footprint, with a particular focus on Scope 3 emissions, by incorporating a higher share of organically sourced coffee into its supply chain. Organic farming practices, which eliminate synthetic fertilizers and promote soil health, have been demonstrated to produce lower greenhouse gas (GHG) emissions compared to conventional methods. This strategic shift aligns with Nespresso’s broader commitment to environmental stewardship and its goal of achieving net-zero emissions by 2050 (Nestlé, 2023). Currently, Nespresso’s total GHG emissions amount to approximately 1,484,000 tons of CO₂ annually, with Scope 3 emissions comprising 1,464,000 tons—representing about 98.7% of the company’s carbon footprint, largely attributed to coffee cultivation (Nespresso, 2023). Studies indicate that transitioning to organic farming can lead to up to a 30% reduction in GHG emissions, driven by enhanced soil carbon sequestration and decreased reliance on chemical inputs (Sustainable Coffee Challenge, 2022).

**Main Goal: To achieve a 10% reduction in Scope 3 emissions by 2030, with a targeted 30% reduction in emissions specifically from coffee production through the adoption of organic practices.**

4.1 Vision and Measurable Criteria

Our vision is for Nespresso to set a benchmark in the coffee industry for GHG emissions reduction through sustainable sourcing and farming practices. By increasing the share of organic coffee, Nespresso aims to build a more climate-resilient and environmentally responsible supply chain. This objective aligns with the *Future-Fit Break-Even Goals*, particularly those focused on ensuring that natural resources are managed responsibly, minimizing operational emissions, and promoting socially equitable practices.

The following Key Performance Indicators (KPIs) will be used to measure progress:

1. Total Scope 3 Emissions Reduction
   1. Track the annual decrease in total Scope 3 GHG emissions to confirm that the transition to organic farming practices is contributing to a tangible decline in Nespresso’s carbon footprint.
2. Emissions Per Kilogram of Coffee
   1. Measure reductions in CO₂ equivalent emissions per kilogram of green coffee, reflecting improvements in production efficiency and sustainable practices.
3. Organic Coffee Sourcing Percentage
   1. Monitor the growth in the proportion of organic coffee as part of the overall supply chain to assess Nespresso’s long-term dedication to sustainable sourcing.

This strategy is bolstered by empirical findings that underscore the environmental benefits of organic coffee production, which include lower emissions and improved ecosystem resilience, positioning Nespresso as a leader in sustainable coffee practices.

4.2 Transparency and Reporting

To ensure credibility and accountability, Nespresso should enhance the transparency of its sustainability reporting. This includes detailed breakdowns of emissions reductions from increased organic coffee sourcing, and progress on each KPI. Currently, Nespresso’s reporting outlines broad sustainability achievements but lacks specific data on organic sourcing and its direct impact on emissions (Nespresso, 2023). Offering clearer insights into these areas will allow stakeholders to gauge Nespresso’s progress and prove its commitment to reducing its environmental footprint.

4.3 Benchmarking Against Industry Peers

Compared to other leading brands in the coffee industry, Nespresso has the potential to lead in emission reduction through a strong focus on organic sourcing. Starbucks, for instance, promotes ethical sourcing primarily through its C.A.F.E. Practices program, which emphasizes social responsibility, fair trade, and environmental stewardship. However, organic coffee is not a central component of Starbucks’ sustainability strategy, which instead includes initiatives like regenerative agriculture trials and the development of climate-resilient coffee varieties (Starbucks, 2022).

Similarly, Lavazza’s sustainability efforts, driven by the Lavazza Foundation, emphasize fair trade and sustainable agricultural practices. While Lavazza has made significant advancements in social and environmental sustainability, its focus on organic coffee sourcing is relatively limited (Lavazza, 2022). This strategic gap presents Nespresso with an opportunity to distinguish itself by integrating organic coffee sourcing as a pivotal element of its sustainability and carbon reduction agenda.

By prioritizing organic sourcing, Nespresso could set a new benchmark in the premium coffee sector, positioning itself as an industry leader in both environmental sustainability and product quality. This approach would resonate with an increasingly environmentally conscious consumer base and enhance Nespresso’s brand equity. As demand for sustainable products continues to grow, adopting organic sourcing as a core strategy would reinforce Nespresso’s commitment to innovation and leadership in sustainable practices, thereby influencing broader industry standards.

5 Prototype Connection

The company’s primary sustainability challenge centers around scope 3 emissions. Analysis of this issue revealed that current trends show majority of scope 3 emissions come from coffee production, specifically non-organic practices. Non-organic coffee farming practices contribute significantly to emissions particularly due to the extensive use of synthetic fertilizers, pesticides, and unsustainable land management. To address this, the formulas developed in this project provide a framework for evaluating soil health, climate factors, hydroclimatic factors and then quantifying the emissions reductions. This approach aims to identify the optimal times and locations to adopt organic farming practices, allowing farmers to transition to sustainable methods while minimizing risks such as pest infestations, reduced yields, or soil degradation.

By combining these models, this framework enables data-driven predictions of soil health and emissions savings under different farming scenarios. The results guide farmers in adopting organic practices strategically, reducing GHG emissions while maintaining farm productivity. This approach directly supports sustainable agriculture and helps to mitigate the climate impact of coffee production.

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The prototype developed by our team is a data-driven solution designed to enhance sustainability in Nespresso's coffee supply chain. It operates through four key steps: gathering data, analyzing data, making data accessible, and delivering actionable recommendations.

Step 1: Gathering Data

The prototype collects a wide range of agronomic and environmental data, including soil health indicators (such as pH levels, organic matter, and nutrient content), hydroclimatic variables (like rainfall, humidity, and water availability), and climate risk factors (e.g., pest and fungal threats). These data points provide a comprehensive picture of coffee farm conditions.

Step 2: Analyzing Data

Using soil health as a case study, the prototype employs a weighted formula to generate a "Soil Health Score," integrating variables such as pH levels, microbial activity, and erosion risk. Advanced mathematical models ensure accurate and relevant insights, translating raw data into actionable metrics.

Below is one of the models we developed for our prototype.

𝑆𝑜𝑖𝑙𝐻𝑒𝑎𝑙𝑡ℎ𝑆𝑐𝑜𝑟𝑒=(𝑤𝑝𝐻⋅𝑝𝐻)+(𝑤𝑆𝑂𝑀⋅𝑆𝑂𝑀)+(𝑤𝑀𝑖𝑐𝑟𝑜𝑏𝑖𝑎𝑙𝐴𝑐𝑡𝑖𝑣𝑖𝑡𝑦⋅𝑀𝑖𝑐𝑟𝑜𝑏𝑖𝑎𝑙𝐴𝑐𝑡𝑖𝑣𝑖𝑡𝑦) +(𝑤𝑁𝑃𝐾⋅𝑁𝑃𝐾)−(𝑤𝐸𝑟𝑜𝑠𝑖𝑜𝑛𝑅𝑖𝑠𝑘⋅𝐸𝑟𝑜𝑠𝑖𝑜𝑛𝑅𝑖𝑠𝑘)SoilHealthScore=wpH​⋅pH+wSOM​⋅SOM+wMicrobialActivity​⋅MicrobialActivity +wNPK​⋅NPK−wErosionRisk​⋅ErosionRisk

A screenshot of a computer program

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*Figure 4 – Preview of Python Script for Soil Health Score Modelling (Python Prototype BiS)*

here *wpH, wSOM, wMicrobialActivity, wNPK,* and *wErosionRisk*are the respective weights reflecting the importance of each factor.

Step 3: Accessibility

The prototype ensures data accessibility through intuitive visualization tools, enabling farmers and stakeholders to interpret complex results. This user-centric design bridges the gap between data collection and practical application, empowering decision-making.

A screenshot of a computer

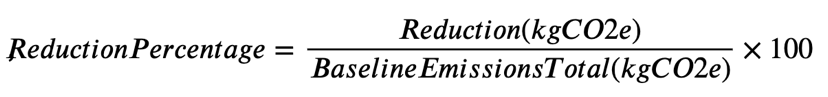
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*Figure 5 – The Interactive Dashboard Showing the Soil Health Status of Different Coffee Farms in the World (Python Prototype BiS)*

Step 4: Recommendations

Based on the analysis, the prototype offers tailored recommendations to improve farm sustainability. Examples include optimizing water management through drip irrigation, addressing soil deficiencies with targeted fertilizers, and mitigating risks like coffee leaf rust with strategic fungicide application and pruning practices.

Using the following mathematical model,



The prototype aims to balance ecological and economic objectives, reducing baseline CO2 emissions by an estimated 27.87% over a 10-year period.

A graph of a farm emission dashboard

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While transitioning to organic practices involves risks—such as yield reductions and financial challenges—our approach integrates pilot testing, enhanced data collection, and financial support to mitigate these barriers. This innovative solution underscores the role of business analytics in driving sustainable agriculture.

6 Conclusion

In this project, we have analyzed Nespresso’s most pressing sustainability challenge: reducing its carbon footprint, particularly Scope 3 emissions originating from coffee farming and related activities. By focusing on increasing the share of organic coffee in its supply chain, Nespresso can tackle emissions stemming from synthetic fertilizer use, land-use changes, and conventional farming practices. This approach aligns with its commitment to achieving net-zero emissions by 2050 and enhances its position as a sustainability leader in the coffee industry.

To assess progress, we developed measurable Key Performance Indicators (KPIs), such as tracking the share of organic coffee sourced and reductions in fertilizer-based emissions. Enhanced transparency and detailed sustainability reporting will be crucial in ensuring credibility and engaging stakeholders. Benchmarking against peers like Starbucks and Lavazza highlights Nespresso’s potential to lead in organic sourcing and emissions reductions, setting a new standard in the premium coffee market.

By implementing these strategies, Nespresso has the opportunity not only to reduce its environmental impact but also to build a more resilient and sustainable supply chain that benefits both the company and its stakeholders. This holistic approach ensures that Nespresso remains competitive in an increasingly sustainability-conscious global market while contributing to broader environmental goals.

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