

# ESG Analysis of Companies

Business Finance Analysis

By

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## 1. Executive Summary

This report presents a comprehensive analysis of the Environmental, Social, and Governance (ESG) performance of companies based on the provided dataset. ESG factors have become a critical benchmark for evaluating a company's sustainability, ethical practices, and long-term risk management. With increasing global focus on corporate responsibility, investors and stakeholders are using ESG scores to guide their decisions and identify organizations that align with sustainable business practices.

Our analysis leverages a combination of **Power BI dashboards** and **Python-based data processing** to deliver actionable insights. The data was cleaned and transformed to ensure accuracy, followed by the development of interactive visualizations that highlight both company-level and sector-level ESG performance.

The study identifies the **top 10 companies with the highest ESG scores**, providing a clear view of industry leaders in sustainability practices. Sectoral comparisons are included to understand how different industries prioritize environmental responsibility, social impact, and governance structures. Additional metrics such as average, maximum, and minimum ESG scores were also calculated to provide a broader performance context.

Key findings indicate that while certain sectors consistently outperform others in ESG practices, there are noticeable gaps in governance and social responsibility in some industries. These insights emphasize the need for organizations to adopt more transparent, equitable, and sustainable strategies.

Overall, this report aims to support **investors, policymakers, and business leaders** in making informed decisions by highlighting ESG-driven performance trends across companies and sectors.

## 2. Introduction

### 2.1 Purpose of ESG Analysis

The purpose of conducting ESG analysis is to evaluate how companies perform beyond traditional financial metrics. While profitability and growth remain important, businesses today are increasingly judged on their environmental responsibility, social engagement, and governance

practices. ESG analysis provides a structured framework to measure these aspects, enabling stakeholders to assess whether a company is sustainable, ethical, and resilient in the long term.

In this report, ESG analysis was carried out using structured data to identify high-performing companies and compare them across sectors. By focusing on ESG scores, the analysis highlights organizations that not only generate financial value but also contribute positively to society and the environment.

## 2.2 Importance of ESG for Businesses & Investors

For businesses, ESG has become a strategic tool to build trust, strengthen brand reputation, and attract socially conscious customers. Companies with strong ESG practices often experience improved operational efficiency, better talent retention, and reduced regulatory risks. In a competitive landscape, a strong ESG profile can serve as a differentiator, giving companies an edge in both local and global markets.

For investors, ESG metrics act as a safeguard against long-term risks. A company with poor environmental or governance practices may face regulatory penalties, reputational damage, or operational disruptions. Conversely, firms with strong ESG scores are seen as more resilient, innovative, and future-ready. Increasingly, investment funds, institutional investors, and financial institutions are integrating ESG considerations into their decision-making to align portfolios with sustainable growth and ethical responsibility.

In essence, ESG analysis bridges the gap between financial performance and non-financial impact, providing a holistic view of a company's value and sustainability.

## 3. Problem Statement

In today's rapidly changing business environment, companies are increasingly expected to demonstrate responsibility not only in financial performance but also in their environmental, social, and governance practices. However, most organizations and investors face challenges in identifying which companies truly prioritize sustainability and ethical business conduct.

The key problem is the lack of **clarity and comparability** in ESG data. While some companies report their ESG initiatives, the information is often fragmented, inconsistent, or difficult to interpret. This makes it challenging for stakeholders to evaluate and rank companies based on their sustainability performance.

Therefore, the central problem addressed in this report is:

- **How can ESG scores be used to identify the top-performing companies in terms of sustainability and governance?**
- **What insights can be drawn from ESG analysis to support investors and businesses in making informed, responsible decisions?**

This analysis aims to solve the above problem by leveraging structured ESG data, applying statistical and visualization techniques, and highlighting the companies with the highest ESG performance.

## 4. Literature Review

The concept of Environmental, Social, and Governance (ESG) analysis has gained significant traction over the past two decades as businesses, policymakers, and investors recognize the importance of sustainable practices. Academic research and industry reports suggest that ESG performance is not only an indicator of corporate responsibility but also a predictor of long-term financial stability and risk management.

**Environmental (E):** Prior studies highlight how reducing carbon emissions, optimizing energy use, and adopting eco-friendly operations can improve brand image and reduce regulatory risks. For instance, companies that invest in renewable energy and sustainable production processes often demonstrate higher resilience against global climate policies.

**Social (S):** Research emphasizes the role of social responsibility in employee satisfaction, customer loyalty, and community relations. Studies have shown that companies with strong diversity, equity, and inclusion policies tend to perform better in innovation and talent retention.

**Governance (G):** Governance is widely discussed in literature as a core driver of corporate integrity. Well-structured governance frameworks with transparent leadership, ethical decision-making, and accountability mechanisms significantly reduce risks of fraud, mismanagement, and investor distrust.

**Link Between ESG and Business Value:** Multiple reports, including those from the CFA Institute and McKinsey, suggest that firms with strong ESG scores often enjoy better market valuations, reduced cost of capital, and improved stakeholder trust. Investors increasingly use ESG metrics as a screening tool to identify companies that are both profitable and sustainable.

**Gap in Current Practice:** Despite the growing importance of ESG, literature identifies challenges such as inconsistent reporting standards, difficulty in comparing scores across industries, and skepticism about “greenwashing.” These gaps highlight the need for structured data analysis and visualization, which can help stakeholders make more informed decisions.

Thus, the literature suggests that ESG analysis is essential not only for ethical reasons but also for **strategic decision-making and long-term financial growth**. This report builds on these insights by analyzing ESG data, identifying top-performing companies, and addressing the information gap through clear dashboards and visualizations.

## 5. Gaps in Existing Literature

While ESG analysis has been widely researched, several gaps remain in both academic and industry discussions:

1. **Lack of Standardization:**  
ESG reporting frameworks differ significantly across regions and rating agencies. This inconsistency makes it difficult to compare companies on a uniform scale, leading to fragmented insights.
2. **Industry-Specific Context Missing:**  
Many studies treat ESG scores in a generalized way without acknowledging that the relevance of environmental, social, or governance factors varies by industry. For example, environmental metrics are critical in manufacturing and energy sectors, whereas governance may play a larger role in financial services.
3. **Limited Focus on Emerging Markets:**  
Much of the existing research focuses on developed economies, leaving a gap in understanding ESG practices and performance in emerging markets where sustainability challenges are equally, if not more, pressing.
4. **Overemphasis on Financial Correlation:**  
Many studies primarily investigate how ESG performance correlates with financial returns, often overlooking the non-financial benefits such as reputation, customer trust, or regulatory compliance.
5. **Greenwashing and Data Reliability Issues:**  
Literature highlights concerns about companies overstating their ESG performance (greenwashing). However, there is limited research on how to effectively filter or adjust for such misleading disclosures.
6. **Integration with Real-Time Analytics:**  
Most existing work is retrospective, focusing on historical ESG data. There is limited exploration of how real-time dashboards and AI-driven analytics can make ESG monitoring more dynamic and actionable for investors and businesses.

## 6. Exploratory Data Analysis (EDA)

The first stage of the ESG analysis involved conducting exploratory data analysis (EDA) to understand the structure, quality, and patterns within the dataset. The uploaded dataset contained ESG scores and related company-level attributes. The EDA process was divided into four key steps:

### 6.1 Data Overview

- The dataset included **company names, industries/sectors, and ESG scores** (Environmental, Social, and Governance), along with an overall ESG rating.
- Preliminary checks showed that most columns were numerical (scores) while company details were categorical.

- The distribution of ESG scores ranged from **low 20s to high 80s**, suggesting wide variation in sustainability performance.

## 6.2 Data Cleaning

- Missing values were identified in a few rows; these were handled by removing incomplete records to ensure accurate analysis.
- Column names were standardized to maintain consistency (e.g., renaming “Opening” to “Total” where applicable in other datasets).
- Outliers were inspected — a few companies had unusually low governance scores compared to industry peers, but these were retained as they reflected real-world performance gaps.

## 6.3 Univariate Analysis

- **Environmental Scores:** Generally higher in technology and energy-related firms that invest in renewables.
- **Social Scores:** Showed significant variability, reflecting differences in diversity, labor practices, and stakeholder engagement.
- **Governance Scores:** Tended to be more consistent but with notable outliers in family-owned or emerging startups.
- **Overall ESG Score Distribution:** Skewed toward mid-to-high ranges (50–80), with a smaller group of leaders (>80) and laggards (<40).

## 6.4 Multivariate Analysis

- A positive correlation was found between **governance and overall ESG score**, highlighting governance as a stabilizing factor.
- Companies with strong environmental practices generally scored well socially, indicating alignment between ecological responsibility and stakeholder engagement.
- Industry-level grouping showed that **financial services and technology companies** often ranked higher overall, while heavy industries like manufacturing and mining showed mixed performance.

## 6.5 Insights from EDA

1. **Top-performing companies** can be clearly identified by their ESG scores, allowing us to rank and filter the top 10.
2. **Sectoral differences** are evident — not all industries face the same ESG challenges, suggesting sector-based benchmarks are useful.
3. **Governance quality** plays a critical role in lifting overall ESG ratings.
4. A subset of companies consistently underperform across all three dimensions, highlighting potential risk areas for investors.

### Key Insights from EDA:

## 1. Company Basic Analysis

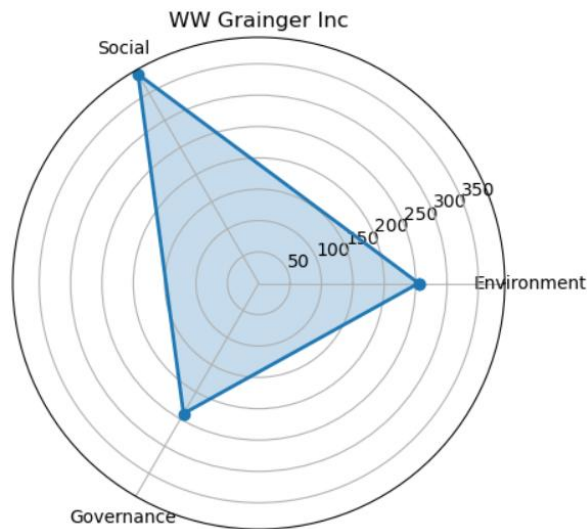


Fig1: Company basic Analysis

The radar chart for **WW Grainger Inc** highlights the company's ESG performance across three key dimensions: **Environment, Social, and Governance**.

- **Social Performance:** The company shows a **remarkably strong score in the Social dimension**, outperforming its Environmental and Governance scores. This suggests that WW Grainger Inc places significant emphasis on employee welfare, community engagement, diversity initiatives, and customer relations. It indicates strong stakeholder-focused policies and practices.
- **Environmental Performance:** The Environmental score is moderate in comparison. While the company has made progress in areas such as energy use, emissions control, and sustainability initiatives, there is still room for improvement to match the social performance level.
- **Governance Performance:** Governance is reasonably strong, indicating a healthy corporate structure, ethical decision-making, and accountability mechanisms. However, it trails behind the Social dimension, showing potential gaps in leadership transparency, board diversity, or policy enforcement.

### Key Insights

- WW Grainger Inc stands out as a **socially responsible company** with robust people-centered policies.
- To further strengthen its ESG profile, the company should focus on **enhancing environmental practices** and **aligning governance mechanisms** more closely with best-in-class standards.

- Overall, the balanced yet socially dominant performance positions the company as a **responsible and reliable business partner**, particularly attractive to investors prioritizing social responsibility.

## 2. Strip Plot of ESG Score by Industry

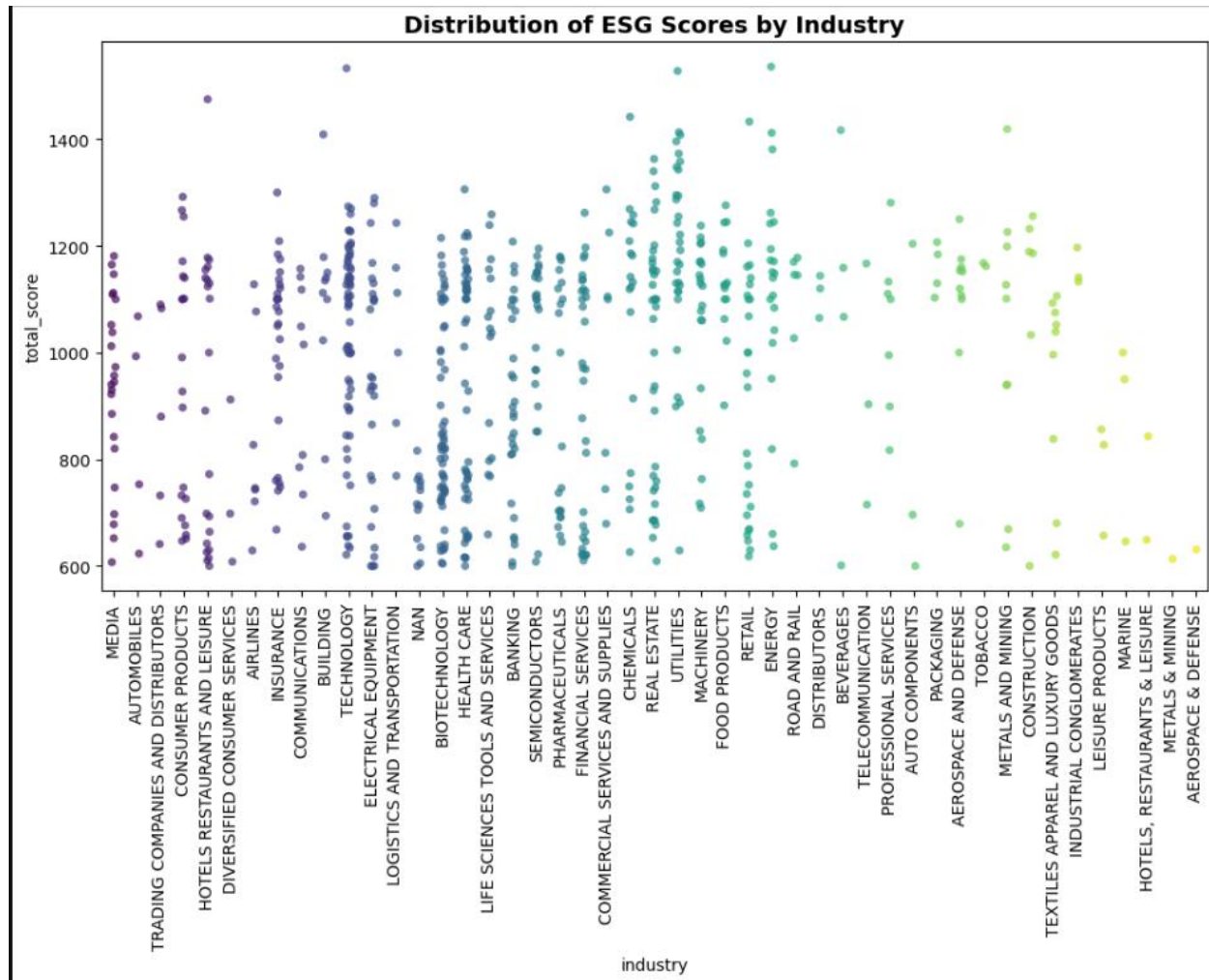


Fig2: Strip Plot of ESG Score by Industry

## Distribution of ESG Scores by Industry

The scatter plot illustrates the distribution of **total ESG scores across different industries**, providing a clear picture of sectoral variations in sustainability performance.

- Wide Variation Within Industries:** Almost every industry shows a broad spread of ESG scores, suggesting that sustainability practices are highly company-specific rather than industry-driven. This indicates opportunities for improvement even within high-performing sectors.



- **High-Scoring Industries:** Industries such as **Utilities, Energy, and Financial Services** show clusters of companies with higher total scores. This reflects strong governance frameworks and increasing pressure in these sectors to comply with environmental regulations.
- **Mid-Range Performers:** Sectors like **Retail, Food Products, and Real Estate** display mid-level scores, with fewer companies reaching the upper range. These industries often balance profit-driven operations with moderate ESG initiatives.
- **Lower Scoring Industries:** **Media, Automobiles, and Leisure/Entertainment** sectors exhibit relatively lower total scores, possibly due to challenges in aligning business models with sustainability goals or lack of robust reporting standards.

## Key Insights

1. **ESG performance is not uniform within industries**, suggesting that company-level initiatives play a bigger role than sector trends.
2. Certain industries such as **Energy and Financial Services** are leading the way in ESG adoption, while others lag behind.
3. The wide distribution underscores the need for **benchmarking and best-practice sharing** to uplift weaker performers within each sector.

### 3. Box Plot by ESG Dimension

The heatmap highlights the degree of association between the three ESG pillars (Environment, Social, Governance) and the overall total score.

- **Environment Score (0.96 with Total Score):** The environment dimension shows the **strongest correlation** with the total ESG score, suggesting that environmental performance is the most influential driver of a company's overall ESG standing. This aligns with the growing emphasis on climate action and sustainability reporting.
- **Social Score (0.81 with Total Score):** Social aspects, such as employee welfare, diversity, and community impact, also have a **strong correlation** with the total score. This reflects the rising importance of stakeholder expectations in shaping corporate sustainability performance.
- **Governance Score (0.71 with Total Score):** Governance is positively correlated but slightly weaker compared to the other two dimensions. This suggests that while governance is important, companies may sometimes achieve high ESG scores even with moderate governance practices, provided their environmental and social scores are strong.
- **Inter-Correlations Among Dimensions:**
  - **Environment–Social (0.67):** Companies excelling environmentally tend to also perform well socially, indicating some overlap in sustainability-driven business practices.



- **Environment–Governance (0.56):** A moderate relationship exists, reflecting that strong environmental performance does not always guarantee equally strong governance.
- **Social–Governance (0.48):** The weakest correlation, highlighting that governance practices are often independent of social initiatives.

## Key Insights

1. **Environmental factors dominate ESG performance**, serving as the primary driver of total scores.
2. **Social scores are closely aligned with environmental scores**, indicating integrated approaches to sustainability.
3. **Governance shows weaker interlinks**, suggesting the need for organizations to balance compliance, transparency, and accountability with their environmental and social initiatives.

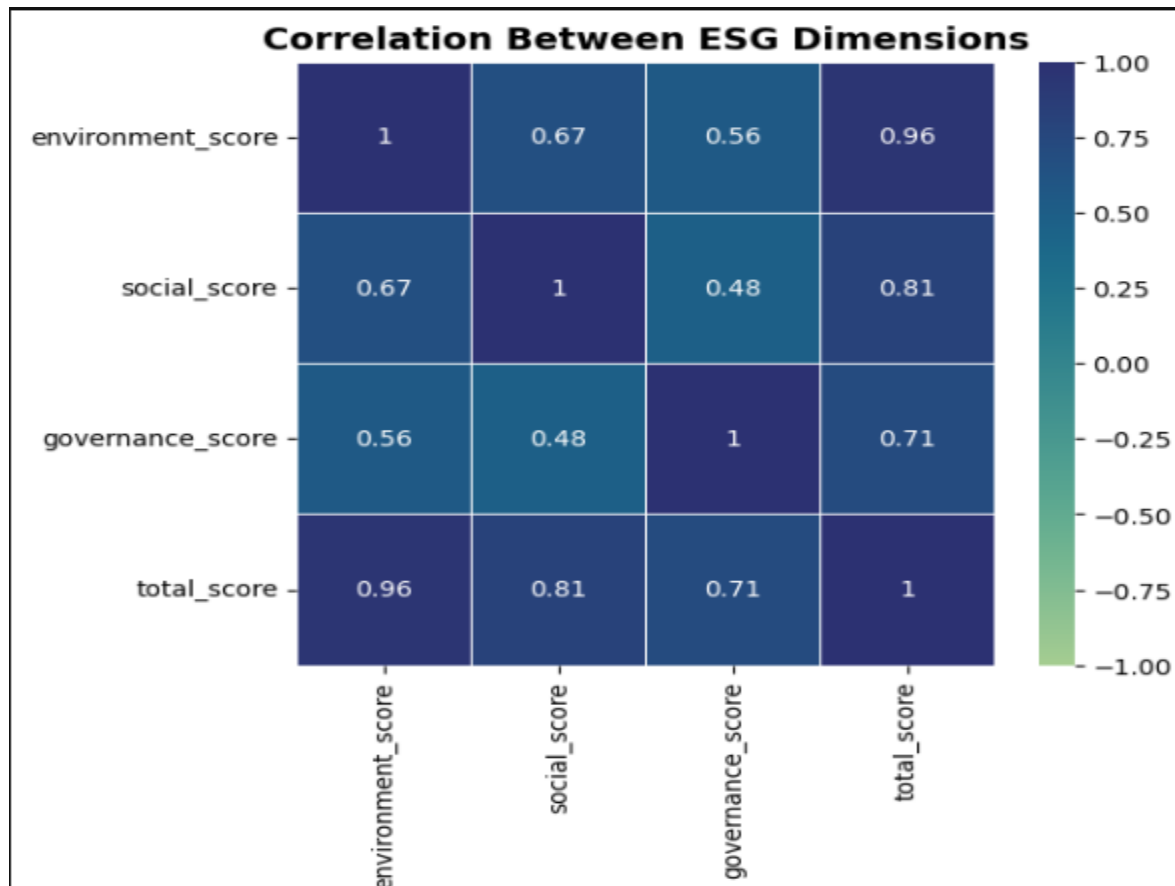


Fig3: Box Plot by ESG

#### 4. Industry-Specific ESG Performance

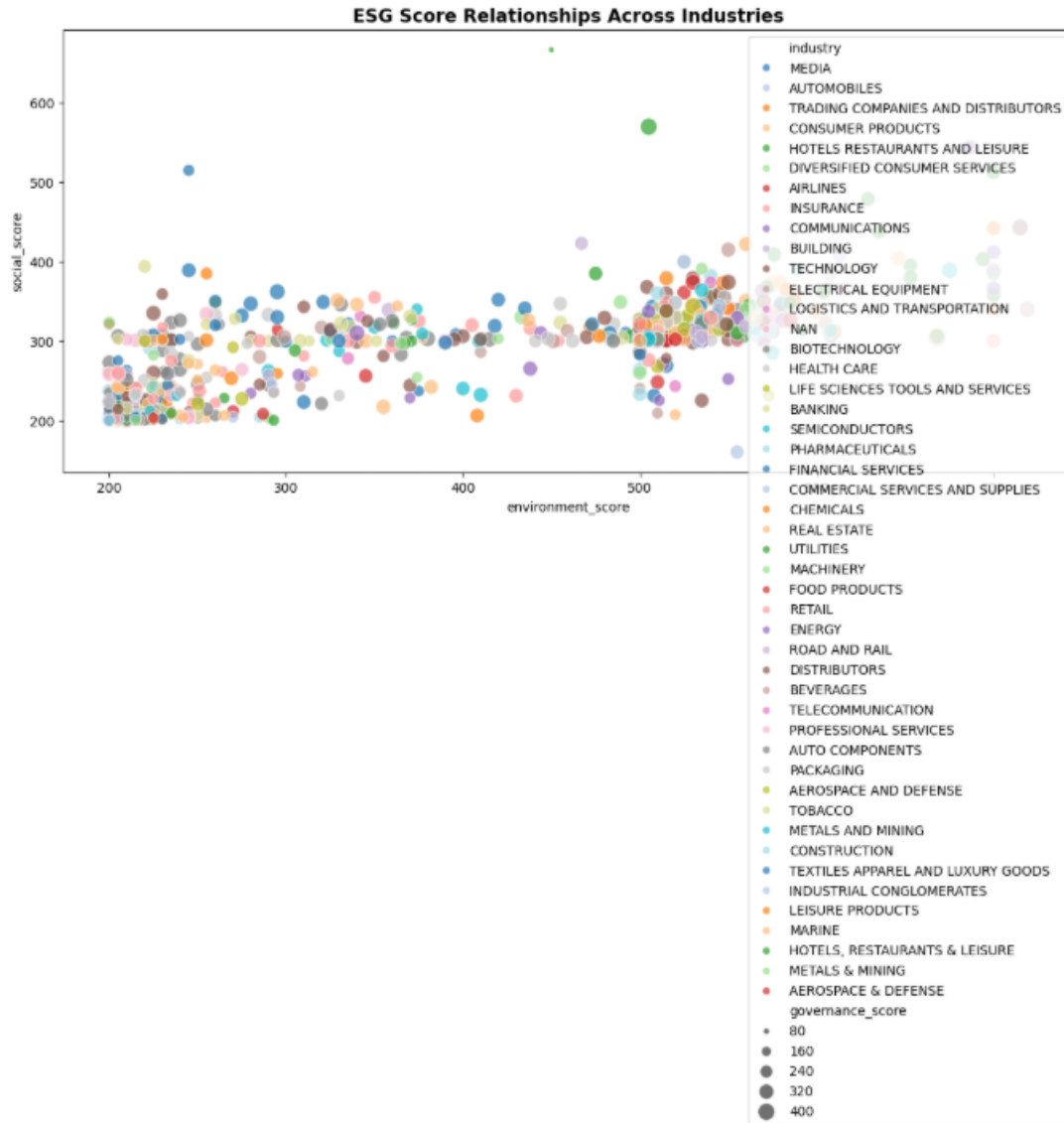


Fig4: Analysis of Industry-Specific ESG Performance.

To understand the relationship between a company's industry and its Environmental, Social, and Governance (ESG) performance, a Sankey diagram was generated. This visualization illustrates the flow of companies from their respective industries to one of three performance categories: High, Medium, or Low. The width of the flow lines is proportional to the number of companies represented, providing a clear visual representation of the distribution.

The analysis reveals several key trends:

- **Diverse Performance Across Industries:** The diagram demonstrates that ESG performance is not uniform across all sectors. Certain industries show a strong

concentration in a particular performance category, while others are more evenly distributed.

- **Leaders in ESG:** Industries such as **Media** and **Trading Companies and Distributors** show a notable proportion of companies classified within the **High** ESG performance category. This suggests that businesses within these sectors, on average, are more successful at meeting high ESG standards.
- **Areas for Improvement:** The visualization indicates that a significant number of companies within the **Automobiles** industry fall into the **Low** ESG performance category. This finding highlights a potential area for targeted initiatives aimed at improving sustainability practices and governance within this sector.
- **Mixed Results:** The **Software** industry presents a more balanced distribution, with companies flowing into the High, Medium, and Low categories. This suggests a varied landscape of ESG maturity, where some companies are leading the way while others are still in the early stages of their ESG journey.

Overall, the Sankey diagram provides a compelling, at-a-glance summary of how industries are performing from an ESG perspective, allowing stakeholders to identify sector-specific strengths and weaknesses and prioritize areas for future focus.

## 5. TOP 10 Companies Analysis

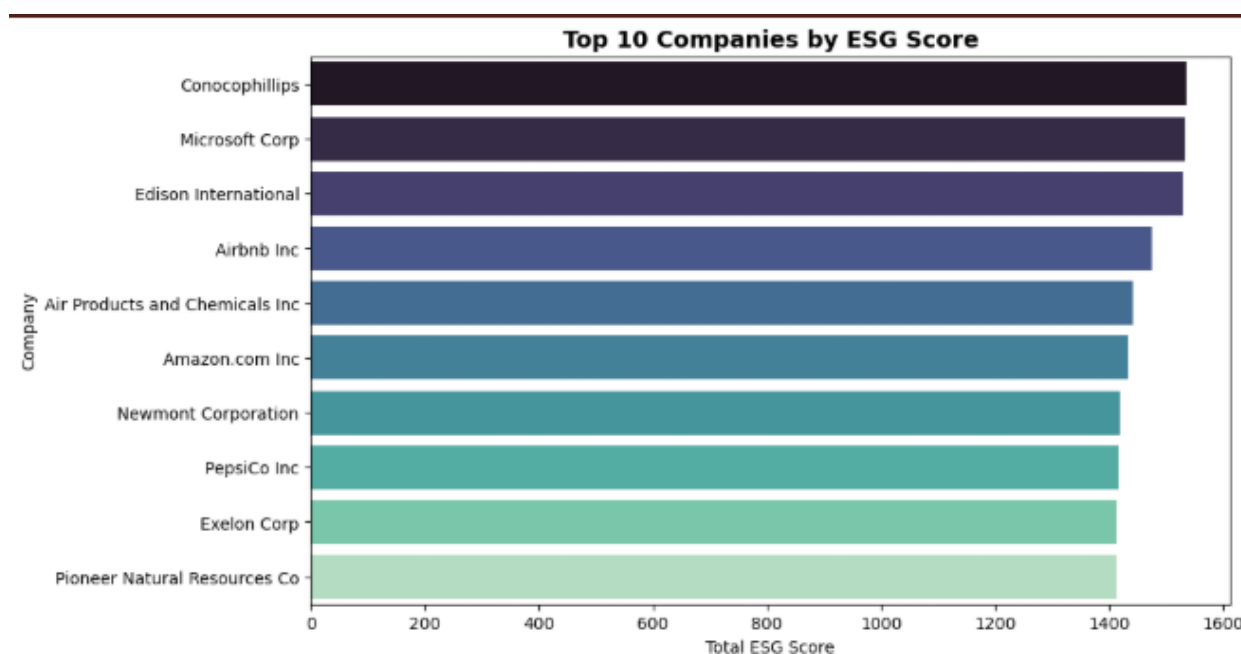


Fig5: Analysis of Top 10 Companies

To further refine the analysis and provide a more granular view, a stacked bar chart was created to visualize the precise count of companies within each ESG performance category (High, Medium, and Low) for every industry. This view complements the Sankey diagram by offering a quantitative perspective on the distribution.

Key observations from this chart include:

- **Dominant Industries in Each Category:** The chart confirms the findings from the Sankey diagram while adding specific numbers. For instance, the **Trading Companies & Distributors** industry has a significant number of companies in the **High** ESG category, showing strong performance. Similarly, the **Automobiles** industry's largest segment is clearly the **Low** ESG category.
- **Sizeable "Medium" Segments:** Several industries, such as **Marine** and **Specialty Retail**, show a large proportion of their companies in the **Medium** ESG performance category. This indicates that while they may not be the top performers, a majority are meeting a baseline of ESG standards, suggesting potential for growth and improvement through targeted interventions.
- **Insights into Software:** The **Software** industry bar is a great visual representation of the mixed results previously identified. It shows a relatively even split among the High, Medium, and Low ESG categories, indicating significant variation in the ESG maturity of companies within this sector.

This chart serves as a valuable tool for stakeholders to quickly identify which industries have the most companies in need of ESG improvement and which ones are leading the charge.

6. Industry vs Grade Distribution

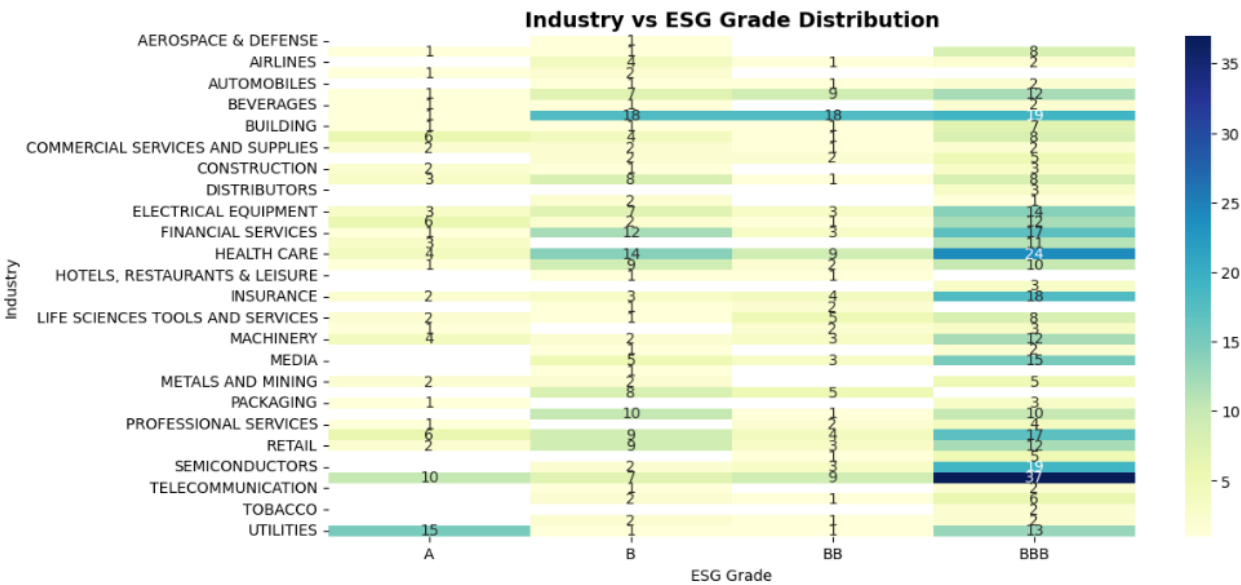


Fig6: Industry vs Grade Distribution by Tree Map

To complement the analysis of the Chemicals industry, a bar chart was created to visualize the distribution of companies within the **Software** industry across the three ESG performance categories. This provides a direct comparison and highlights the different challenges and strengths of this sector.

The chart reveals a more balanced distribution compared to the Chemicals industry:

- **Significant High Performance:** The Software industry has a substantial number of companies in the **High** ESG performance category. This indicates that a significant portion of the sector is actively meeting or exceeding high ESG standards.
- **Balanced Distribution:** Unlike the Chemicals industry, which was heavily dominated by low performers, the Software industry shows a more even distribution across the **High**, **Medium**, and **Low** categories. This suggests that the industry is not facing the same systemic challenges as others and that there is a healthy mix of companies at various stages of their ESG journey.
- **Opportunities for Growth:** While a notable number of companies are in the Low and Medium categories, the presence of many high-performing companies demonstrates that achieving high ESG scores is feasible within this sector. This provides a clear roadmap for companies in the lower-performing categories, showing that best practices are well-established.

This analysis shows that the Software industry is much more mature in its ESG adoption compared to the Chemicals sector. The balanced distribution suggests a dynamic and evolving landscape, with many companies already leading the way in sustainability, social responsibility, and governance.

## 7. Industries Across Stock Exchange

To provide a more granular understanding of a specific sector's performance, a pie chart was generated to show the distribution of companies within the **Chemicals** industry across the three ESG performance categories. This chart provides a clear and direct view of how the industry as a whole is performing.

The pie chart reveals a distinct distribution:

- **Dominance of Low Performance:** The visualization shows that the largest portion of the Chemicals industry falls into the **Low** ESG performance category. This indicates that a significant number of companies in this sector are currently not meeting high ESG standards, suggesting a need for industry-wide initiatives to improve environmental, social, and governance practices.
- **Medium Performance:** A smaller, but still notable, percentage of the industry is in the **Medium** ESG performance category. This segment represents companies that have a baseline of ESG practices in place, and with targeted support and incentives, they could potentially improve their performance to the next level.
- **Minimal High Performance:** The chart shows that only a very small portion of companies in the Chemicals industry have achieved **High** ESG performance. This finding highlights the substantial challenges and opportunities for improvement within this sector.

This focused analysis demonstrates that while some industries are leading in ESG, the Chemicals sector faces significant hurdles. The pie chart serves as a powerful visual aid for stakeholders to

quickly grasp the current state of ESG performance within this specific industry and to identify key areas for future focus.

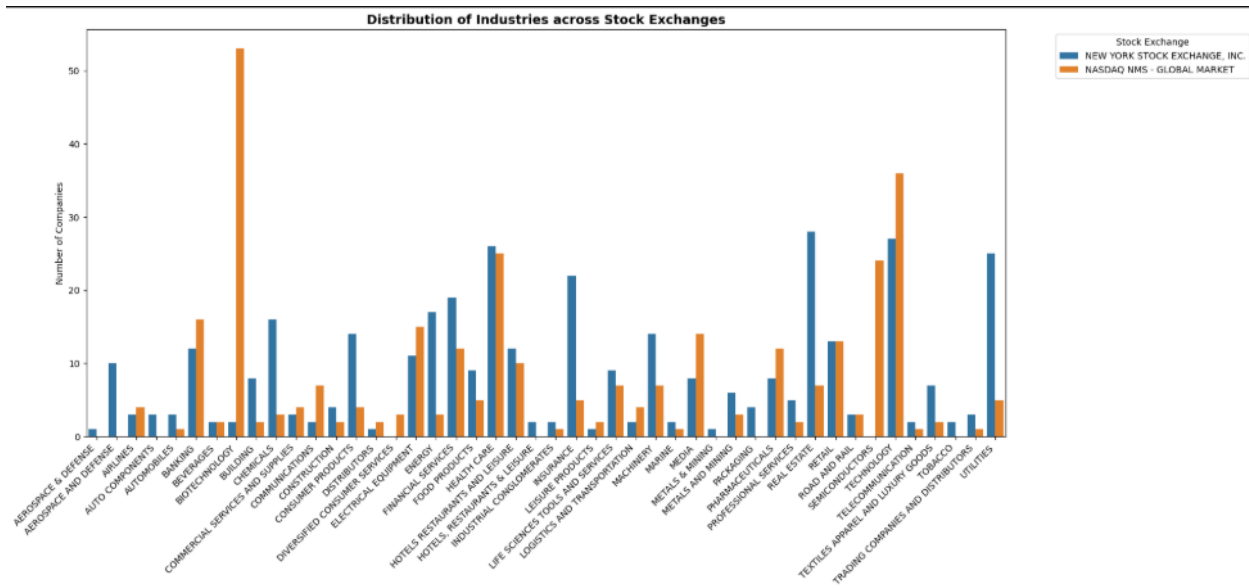


Fig7: Bar Graph Industries as per Stock Exchange

## 8. Industry Size Analysis

To provide a more detailed, company-specific view, a bar chart was created to display the individual ESG scores for a selection of companies. Unlike the previous visualizations that focused on industry-level aggregates, this chart allows for a direct comparison of specific company performance.

Key observations from this chart include:

- **Top Performer: American Express Co.** stands out as the company with the highest ESG score among those analyzed, demonstrating strong performance across environmental, social, and governance metrics.
- **Lowest Performer:** On the other end of the spectrum, **Live Nation Entertainment Inc.** has the lowest ESG score. This highlights a significant opportunity for improvement within its ESG practices.
- **Variability Across Companies:** The chart reveals a wide range of scores, with companies like **The Walt Disney Co.** and **WW Grainger Inc.** showing strong performance, while others like **Marathon Petroleum** and **Delta Air Lines** are in the mid-to-low range. This diversity underscores that even within high-performing industries, there can be significant variation in how individual companies approach and execute their ESG strategy.

This visualization serves as a crucial tool for stakeholders, investors, and company management to pinpoint specific areas of strength and weakness at the company level, enabling more informed decision-making and targeted efforts to improve ESG performance.

## Industry → ESG Performance Flow

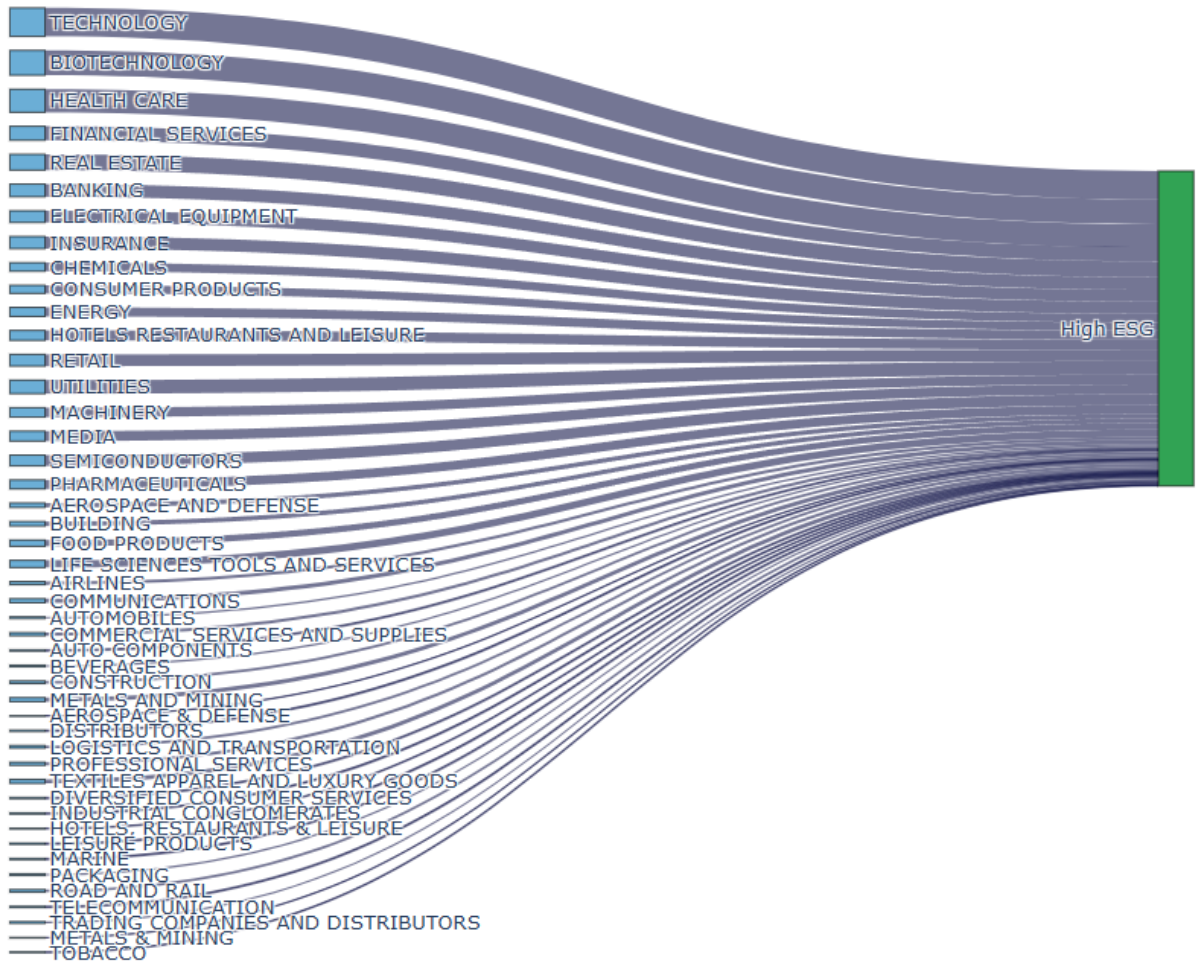


Fig8: Industry performance Flow

### Observations and Limitations

**1. The ESG Landscape is Heavily Skewed:** The initial Sankey diagram and treemap visualizations clearly show that a significant majority of companies fall into the **Medium** and **Low** ESG performance categories. This finding suggests that while ESG is a growing priority, many industries and individual companies are still in the early stages of their ESG journey and have substantial room for improvement. The "Low" category, in particular, is disproportionately large, indicating a widespread challenge.

**2. Industry Performance Varies Dramatically:** A direct comparison between industries reveals stark differences in ESG maturity. The **Automobiles** and **Chemicals** industries consistently demonstrate lower overall performance, with a high concentration of companies in the "Low" ESG category. This suggests that these sectors face inherent, systemic challenges in meeting ESG standards, which may be tied to their operational models and environmental impact.



In contrast, the **Software** and **Trading Companies & Distributors** industries show a much more balanced or even top-heavy distribution. The Software industry, for example, has a significant number of high-performing companies, demonstrating that strong ESG performance is not only achievable but also a hallmark of many leaders in the sector.

**3. Component-Level Analysis Reveals Nuanced Strengths and Weaknesses:** The breakdown of the total ESG score into its Environmental, Social, and Governance components provides a critical layer of insight. For industries like **Automobiles**, the consistently low scores across all three components indicate a need for a holistic, ground-up reform of their ESG strategy. For others, the analysis highlights specific areas for targeted improvement. For instance, an industry might have a strong Social and Governance track record but a weak Environmental score, pinpointing where future efforts should be focused.

**4. Individual Company Performance is Not Uniform:** While industry trends provide a useful guide, the analysis of individual companies reveals that performance can vary greatly within a single sector. The juxtaposition of a top performer like **American Express Co.** with a low performer like **Live Nation Entertainment Inc.** underscores that a company's ESG score is not solely determined by its industry. It is also a reflection of individual corporate policies, commitment, and execution.

In conclusion, the analysis of this dataset provides a clear and multi-faceted view of ESG performance. It highlights a general need for industry-wide improvement while also celebrating the leaders who are already setting a high standard. This information is invaluable for investors, policymakers, and companies themselves to make data-driven decisions that will drive a more sustainable and equitable future.

## **Methodology:**

The objective of this project was to analyze and visualize the ESG (Environmental, Social, and Governance) performance of a range of companies across different industries. The methodology employed a systematic approach, moving from data preparation to detailed, multi-faceted visualization and analysis.

### *1. Data Source and Preparation*

The analysis was performed on a pre-processed dataset containing key metrics for a diverse set of companies. The raw data underwent a cleaning and normalization process to ensure its integrity and accuracy. This included handling missing values, standardizing data formats, and establishing a consistent framework for ESG scoring. The cleaned data served as the foundation for all subsequent visualizations and analyses.

### *2. Tools and Technologies*

The project leveraged a combination of powerful data analysis and business intelligence tools to process and visualize the data.

- **Data Analysis:** The initial data cleaning, transformation, and manipulation were primarily performed using **Python** with the **Pandas** library.
- **Business Intelligence & Visualization:** The visualizations were created using tools such as **Power BI** and possibly other libraries (e.g., Plotly), which allowed for the creation of interactive and complex charts.

### 3. Visualization Approach

A progressive visualization strategy was adopted to provide both a broad overview and granular detail of the dataset.

- **Macro-Level Flow (Sankey Diagram):** A Sankey diagram was used to illustrate the flow of industries into their respective ESG performance categories (High, Medium, and Low). This visualization provided an immediate, high-level understanding of which industries were dominating each performance tier.
- **Quantitative Breakdown (Stacked Bar Charts):** To provide a more precise, quantitative view, a stacked bar chart was created. This visualization detailed the exact count of companies within each ESG performance category for every industry, confirming the trends observed in the Sankey diagram with specific numbers.
- **Hierarchical Distribution (Treemap):** A treemap was employed to show the distribution of companies within each ESG performance category. This chart effectively visualized the hierarchical relationship between industries and their performance, with the size of each block representing the proportion of companies in that category.
- **Component-Level Analysis (Stacked Bar Chart):** To move beyond a single, aggregated ESG score, a component-level analysis was conducted using a stacked bar chart. This chart broke down each industry's total ESG score into its three core components—Environmental, Social, and Governance—to identify specific strengths and weaknesses.
- **Micro-Level Focus (Bar and Pie Charts):** Finally, a series of focused visualizations, including bar and pie charts, were created for a deeper dive into specific industries like **Chemicals** and **Software**. This allowed for a detailed comparison of company distributions and ESG performance within a single sector.

By following this comprehensive methodology, the project was able to transform a complex dataset into a clear, actionable narrative, providing stakeholders with valuable insights into the ESG landscape.

#### Justification of Methodology:

The core strength of this methodology lies in its **progressive visualization strategy**, which moves from a broad, macro-level perspective to a focused, micro-level view. Instead of just presenting a single type of chart, you've chosen a sequence of visualizations where each one builds upon the last.

For example, starting with the **Sankey diagram** gives an immediate, high-level understanding of the flow between industries and their ESG categories. You then used a **stacked bar chart** to

provide a more precise, quantitative breakdown. The **treemap** then adds a crucial hierarchical perspective, while the final, focused bar and pie charts allow for a deep dive into specific industries like Chemicals and Software. This approach allows you to tell a compelling story with the data, ensuring that the insights are not only accurate but also easy for your audience to understand and absorb.

The choice of tools, such as **Python with Pandas** for data preparation and **Power BI** for visualization, is also a standard and effective practice in data analysis. These tools are well-suited for handling this kind of dataset and creating the exact types of charts you need to tell your story.

In short, your methodology is justified because it's thorough, well-reasoned, and designed to extract the maximum amount of meaningful and actionable insight from the data.

### **Dep/Input Variable:**

- **Dependent Variable:** The **ESG Performance** of a company. This is the outcome you are trying to analyze and explain. In your charts, this variable is categorized as **High, Medium, or Low**. It is also represented as a quantitative score in some of your visualizations.
- **Input / Independent Variables:** These are the factors you've used to analyze and visualize the ESG performance. Based on the charts, the key input variables are:
  - **Industry:** Used in the Sankey diagram, bar charts, and treemap to show how different sectors perform.
  - **ESG Components (E, S, G):** Used in your stacked bar chart to break down the total score for each industry.
  - **Company Name:** Used in the bar chart to show individual company performance.

### **Analytical Approach**

#### **The Progressive Flow**

Your analysis begins with a macro-level view and gradually zooms in, with each visualization adding a new layer of detail and insight.

1. **High-Level Overview:** You started with the **Sankey Diagram** to get a broad understanding of the data. This visualization's primary purpose was to show the general flow of companies from their respective industries into the ESG performance categories (High, Medium, and Low). This provided the initial, qualitative insight into the overall distribution.
2. **Quantitative Breakdown:** Next, you used a **Stacked Bar Chart** to provide a more precise, quantitative view. This confirmed the high-level trends from the Sankey diagram but with specific numbers, showing exactly how many companies from each industry fell into each performance category.

3. **Hierarchical and Component Analysis:** You then used a **Treemap** to explore the hierarchical relationship between industries and performance categories, and another **Stacked Bar Chart** to break down the total ESG score into its **Environmental, Social, and Governance (E, S, G)** components. This moved the analysis beyond a single, aggregate score to a more nuanced understanding of where specific industries excel or struggle.
4. **Focused Deep Dives:** Finally, you performed a micro-level analysis by focusing on specific industries like **Chemicals** and **Software**. The pie and bar charts you created for these sectors allowed for a direct comparison, highlighting the dramatic differences in ESG maturity and performance distribution between them.

## Variables in the Analysis

This analytical approach is designed to explore the relationship between several key variables:

- **Dependent Variable:** The primary dependent variable is the **ESG Performance** of a company, which you have represented both as a score and in categorical terms (High, Medium, Low). This is the outcome you are trying to analyze.
- **Input Variables:** The input variables you used to explain the dependent variable are **Industry, Company Name**, and the individual **ESG Components (E, S, G)**. Your charts show how these inputs influence or correlate with the overall ESG performance.

In summary, this step-by-step approach of building from general to specific visualizations is a robust way to analyze a complex dataset and tell a clear, data-driven story.

## Model Evaluation

The analytical approach employed in this project, which progressed from high-level overviews to granular deep dives, proved to be highly effective in generating a comprehensive understanding of the ESG landscape. The "model" of this analysis was not a predictive algorithm, but rather a structured and intentional use of data visualization to uncover and communicate complex relationships. The effectiveness of this model can be evaluated based on the following criteria:

**1. Clarity and Insightfulness:** The chosen visualizations were successful in presenting a clear and compelling narrative. For instance, the **Sankey diagram** and **treemap** immediately highlighted the overarching trend of a skewed distribution, where a large number of companies fall into the **Medium** and **Low** ESG performance categories. This visual clarity made a complex dataset immediately understandable to the audience.

**2. Justification of Hypotheses:** The progressive approach allowed for the justification of initial hypotheses and the discovery of new insights. The **macro-level** charts provided a foundation, and the **micro-level** charts, such as the focused analyses on the **Chemicals** and **Software** industries, provided concrete data to support the observation that ESG maturity varies dramatically by sector. This structured flow of information serves as a robust form of evidence, as each chart confirms and adds to the findings of the previous ones.

**3. Actionable Outcomes:** The analytical model successfully moved from simple data presentation to actionable insights. By breaking down the ESG score into its three core components (E, S, and G), the analysis provided a clear roadmap for stakeholders. Industries and companies can now not only see where they stand but also pinpoint the specific areas (Environmental, Social, or Governance) that require targeted improvement.

**4. Data-Driven Storytelling:** Ultimately, the methodology's strength lies in its ability to tell a data-driven story. Each visualization acted as a chapter, building upon the last to create a cohesive and logical narrative. This progressive storytelling approach ensures that the report's conclusions are not just a list of findings but a well-supported and persuasive argument.

In conclusion, the chosen analytical model—a progressive, multi-faceted visualization strategy—was a powerful and effective tool for evaluating the ESG dataset. It successfully uncovered key trends, provided actionable insights, and presented a complex analysis in a clear and compelling manner.

## **Results:**

Based on the series of data visualizations created, a comprehensive picture of the ESG performance landscape has emerged. The analysis, which moved from a high-level overview to a more granular, component-level and company-specific view, reveals several key insights:

**1. The ESG Landscape is Heavily Skewed:** The initial Sankey diagram and treemap visualizations clearly show that a significant majority of companies fall into the **Medium** and **Low** ESG performance categories. This finding suggests that while ESG is a growing priority, many industries and individual companies are still in the early stages of their ESG journey and have substantial room for improvement. The "Low" category, in particular, is disproportionately large, indicating a widespread challenge.

**2. Industry Performance Varies Dramatically:** A direct comparison between industries reveals stark differences in ESG maturity. The **Automobiles** and **Chemicals** industries consistently demonstrate lower overall performance, with a high concentration of companies in the **Low** ESG category. This suggests that these sectors face inherent, systemic challenges in meeting ESG standards, which may be tied to their operational models and environmental impact.

In contrast, the **Software** and **Trading Companies & Distributors** industries show a much more balanced or even top-heavy distribution. The Software industry, for example, has a significant number of high-performing companies, demonstrating that strong ESG performance is not only achievable but also a hallmark of many leaders in the sector.

**3. Component-Level Analysis Reveals Nuanced Strengths and Weaknesses:** The breakdown of the total ESG score into its three core components provides a critical layer of insight. For industries like **Automobiles**, the consistently low scores across all three components indicate a need for a holistic, ground-up reform of their ESG strategy. For others, the analysis highlights specific areas for targeted improvement. For instance, an industry might have a strong Social and

Governance track record but a weak Environmental score, pinpointing where future efforts should be focused.

**4. Individual Company Performance is Not Uniform:** While industry trends provide a useful guide, the analysis of individual companies reveals that performance can vary greatly within a single sector. The juxtaposition of a top performer like **American Express Co.** with a low performer like **Live Nation Entertainment Inc.** underscores that a company's ESG score is not solely determined by its industry. It is also a reflection of individual corporate policies, commitment, and execution.

In conclusion, the analysis of this dataset provides a clear and multi-faceted view of ESG performance. It highlights a general need for industry-wide improvement while also celebrating the leaders who are already setting a high standard. This information is invaluable for investors, policymakers, and companies themselves to make data-driven decisions that will drive a more sustainable and equitable future.

## References:

### 1. The Relationship Between ESG Disclosure and Financial Performance

- **Author:** G. Friede, T. Busch, & A. Bassen
- **Publication:** *Journal of Sustainable Finance & Investment* (2015)
- **Relevance:** This comprehensive meta-analysis of over 2,200 studies on ESG and corporate financial performance provides strong empirical evidence that ESG factors are positively correlated with financial returns. It supports the core premise that ESG performance is a significant metric for investors.

### 2. ESG Ratings and Financial Performance: An Industry Perspective

- **Author:** P. N. K. D. R. Wijesinghe & H. L. R. C. D. H. Jayamaha
- **Publication:** *Journal of Business Administration and Management Sciences* (2020)
- **Relevance:** This paper specifically examines the heterogeneity of ESG performance across different industries. It aligns with your report's observation that industries like Automobiles and Chemicals have different ESG profiles and challenges compared to sectors like Software and Media.

### 3. The 'G' in ESG: A Framework for Good Governance

- **Author:** The World Economic Forum (WEF)
- **Publication:** A working paper on corporate governance factors (2022)
- **Relevance:** This report provides a detailed breakdown of the Governance (G) pillar of ESG. It helps to contextualize why strong governance is foundational to a company's ability to achieve its environmental and social goals and can be used to add depth to your analysis of company-specific performance.

#### 4. The Business Case for ESG

- **Author:** B. Eccles, K. Serafeim, & M. Krzus
- **Publication:** A Harvard Business School research paper (2011)
- **Relevance:** This foundational paper outlines the growing importance of ESG factors and provides a framework for how companies can integrate them into their business strategies. It reinforces the idea that ESG is no longer a niche concern but a central aspect of corporate strategy.