

# The Influence of Environmental, Social, and Governance (ESG) and Leverage on Efficiency and Profitability in the Automotive Sector Listed on the NYSE: A SEM-PLS Approach

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## Keywords:

ESG;  
 leverage;  
 profitability;  
 automotive sector;  
 SEM-PLS.

## Abstract

Here is the proofread passage with corrections applied and technical terms italicised where appropriate, with paragraph form retained:

The global automotive industry faces increasing pressure to integrate Environmental, Social, and Governance (ESG) principles while maintaining financial performance; yet the relationship between ESG, leverage, efficiency, and profitability remains inconclusive. This study aims to examine the influence of ESG scores (Environmental, Social, and Governance) and leverage on the efficiency and profitability of automotive companies listed on the New York Stock Exchange (NYSE), with efficiency as a mediating variable. Using a quantitative approach, secondary data from 27 automotive companies (representing 44% of the population) were collected from Yahoo Finance up to Q2 2025 and analysed using Structural Equation Modelling–Partial Least Squares (SEM-PLS). The analysis results indicate that the Environmental score (X1) has a positive and significant effect on Profitability ( $p = 0.015$ ), while Leverage (X4) has a negative and significant effect on Profitability ( $p = 0.014$ ). However, the Social and Governance variables show no significant influence on either Efficiency or Profitability. Furthermore, Efficiency does not mediate the relationship between ESG scores and Profitability, confirming a no-mediation (direct only) model. The  $R^2$  value for Profitability (0.619) indicates that the model explains 61.9% of the variance in profitability performance. These findings suggest that improving environmental initiatives and reducing financial leverage are key factors in enhancing profitability within the automotive sector. Future research may extend this model to other industries or regions to assess the generalisability of ESG–financial performance linkages.

## INTRODUCTION

The global automotive industry is one of the strategic sectors that plays an important role in supporting world economic growth. The sector not only creates jobs and drives technological innovation, but also contributes greatly to global carbon emissions and energy consumption.



Figure 1. Comparison Line Chart of Automotive Sector Performance Vs S&P 500 of the Last 5 Years

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Over the past five years, the automotive sector has faced increasing pressure to transform towards sustainable business practices; yet despite these pressures, the US automotive sector has performed very well, as illustrated in Figure 1. Stock valuations in the automotive sector have been rising and have consistently outperformed the S&P 500. The push towards electric vehicles, the demand for emissions reductions, and growing social awareness and governance accountability have made sustainability a fundamental component of corporate strategy for automotive companies worldwide (Cao et al., 2021; Günther et al., 2015; Hossain et al., 2022; Lukin et al., 2022; Onat et al., 2022).

The global automotive industry is currently undergoing a major transformation driven by Environmental, Social, and Governance (ESG) pressures, as well as structural shifts towards more sustainable business models. In the United States, the automotive sector listed on the New York Stock Exchange (NYSE) serves as an important indicator of real economic dynamics owing to its interconnectedness with global supply chains, manufacturing technology, and energy consumption. However, behind its record of innovation and growth, the industry faces serious challenges related to operational efficiency and long-term profitability (Arisena et al., 2024; Gerlich, 2023; Hickman & Silva, 2018; Nagy, 2025; Zopounidis & Lemonakis, 2024).

The central challenge facing automotive companies lies in balancing the implementation of ESG principles with the financial imperative to maintain profitability. Investor and regulatory demands for environmentally responsible operations require substantial investment in electric vehicle research and development, energy efficiency, and production waste management (Ahuchogu et al., 2024; Hachem, 2022; Ning & Shen, 2024). At the same time, social factors such as labour welfare, occupational health and safety, and industrial relations are critical issues that affect a company's image and reputation. Governance, meanwhile, is a key determinant of success in risk management, transparency, and managerial accountability (Efunniyi et al., 2024; Manginte, 2024).

ESG implementation, however, often comes into tension with a company's leverage constraints and capital structure. Large automotive companies such as Ford Motor Company, General Motors (GM), and Stellantis must balance the need for external financing against the risks associated with high levels of debt. Excessive leverage ratios can constrain a company's capacity to invest in production efficiency, thereby negatively affecting financial ratios such as total asset turnover and accounts payable turnover. This condition reflects a reciprocal relationship between financing decisions, corporate social responsibility, and operational performance.

With respect to efficiency (Y1), many automotive companies face challenges in optimising asset utilisation. In a capital-intensive industry such as automotive manufacturing, efficiency is measured through indicators including total asset turnover, accounts payable turnover, and net income margin. Declining efficiency may reflect idle capacity, resource wastage, or an underperforming supply chain. Data from NYSE-listed automotive companies show significant variation across these indicators, pointing to differences in operational strategies and cost structures between companies.

Profitability (Y2), as measured through Return on Equity (ROE), Return on Assets (ROA), and net income margin, has also exhibited considerable fluctuation due to raw material

cost pressures, interest rate movements, and shifting consumer preferences towards electric vehicles (EVs). Companies such as Tesla, despite being innovation leaders, experience high profitability volatility owing to the burden of substantial research investment and stock price dynamics. Conventional manufacturers such as GM and Ford, meanwhile, must adapt to technological change while sustaining profit margins in an increasingly competitive market.

Empirically, the relationship between ESG and the financial performance of automotive companies remains a subject of debate. Several studies indicate that ESG implementation can improve long-term efficiency by reducing operational and reputational risks. In the short term, however, ESG commitments often entail additional costs that may suppress profitability. It is therefore important to analyse the extent to which the Environmental, Social, Governance, and Leverage dimensions simultaneously affect the two primary outcome variables — Efficiency (Y1) and Profitability (Y2) — using the Structural Equation Modelling–Partial Least Squares (SEM-PLS) approach.

The SEM-PLS approach enables the simultaneous measurement of relationships between constructs, yielding a more comprehensive understanding of the mechanisms through which ESG and Leverage influence company performance. This approach is particularly relevant because it is well-suited to analyses based on relatively limited samples, such as the NYSE automotive sector, and provides robust estimates of latent causal relationships.

Preliminary analysis of the data revealed variation in the distribution of composite scores for Y1 (Efficiency) and Y2 (Profitability). The graph below illustrates the spread of composite values across the automotive companies in the study sample. The wide distribution reflects significant differences in efficiency and profitability performance, most likely attributable to divergent ESG strategies and leverage policies across companies.

These preliminary observations support the assumption that not all companies are able to simultaneously strike a balance between sustainability commitments and financial objectives. This study therefore aims to identify which variables exert the greatest influence on efficiency and profitability, and to provide strategic recommendations for management in pursuit of sustainable and optimal long-term performance. Given the strong performance of the automotive sector noted above, this study seeks to analyse which variables affect efficiency and profitability — both of which are closely associated with increases in stock prices (Sukmawati et al., 2016).

Specifically, this study aims to analyse the effect of the Environmental Score on the Efficiency and Profitability of automotive companies listed on the NYSE; to examine the effect of the Social Score on Efficiency and Profitability in the NYSE automotive sector; to analyse how the Governance Score affects the Efficiency and Profitability of automotive companies; to test the influence of Leverage on the Efficiency and Profitability of companies in the automotive sector; to determine the role of Efficiency as a mediating variable between the Environmental, Social, and Governance (ESG) scores, Leverage, and Profitability; and to identify the most dominant variables influencing profitability in the automotive sector based on the SEM-PLS approach.

Theoretically, this research is expected to make an empirical contribution to the development of Stakeholder Theory and Sustainability Performance Theory by assessing the influence of ESG factors on companies' financial performance — particularly profitability — through the mediating role of operational efficiency. This study also strengthens the literature

on the application of the SEM-PLS method in analysing the multidimensional relationships between non-financial factors, such as ESG, and corporate financial performance.

In practical terms, the results of this study are expected to provide strategic recommendations for investors and financial managers in the NYSE-listed automotive sector, encouraging greater attention to ESG considerations and leverage structures in efforts to improve company efficiency and profitability. This research may also serve as a reference for regulators and capital market analysts seeking to understand the impact of ESG implementation on company performance in the global automotive industry. Furthermore, the findings are intended to serve as an academic reference for future researchers interested in developing similar models in other industrial sectors or different capital markets, such as the Indonesia Stock Exchange (IDX) or the London Stock Exchange (LSE).

In sum, this research aims to make both empirical and theoretical contributions to the understanding of how ESG and leverage dimensions interact to influence the efficiency and profitability of automotive companies in the global market. The results of the SEM-PLS analysis will provide an overview of the direct and indirect influence pathways between variables, thereby forming a basis for strategic decision-making oriented towards sustainability and long-term financial performance.

## **METHOD**

This study uses a quantitative approach with the Structural Equation Modeling method based on Partial Least Squares (SEM-PLS). This approach is used to analyze the causal relationship between latent variables involving multiple indicators. SEM-PLS was chosen because it has the ability to analyze models with non-normal distributed data, small to medium sample sizes, and is able to estimate measurement models (outer models) and structural models (inner models) simultaneously.

The population in this study is all automotive sector companies listed on the New York Stock Exchange (NYSE) until the Q2 2025 period. The sampling technique used secondary data taken from the Yahoo finance dataset, with the following criteria: (1) companies that have complete financial statements during the observation period, and (2) companies that have Environmental, Social, and Governance (ESG) score data. Based on these criteria, a number of automotive companies such as Tesla Inc., Ford Motor Co., General Motors, and several other companies that meet the research criteria were obtained. The sample taken from this study was 27 data from a total of 62 automotive companies listed on the NYSE with a stock price valuation above 5 USD, so the sample was taken around 44%

The data used in this study is secondary data obtained from Yahoo Finance. The data collected includes Quartal's financial statements, financial ratios, and publicly available ESG (Environmental, Social, and Governance) scores.

The variables in this study consist of independent variables (Environmental, Social, Governance, and Leverage), intervening variables (Efficiency), and dependent variables (Profitability). The operational definitions, dimensions, and indicators of each variable are described in the following table.

**Table 1. Operational Definitions and Indicators of Research Variables**

<b>Variabel</b>	<b>Dimensions</b>	<b>Indicator</b>	<b>Source</b>	<b>Measurement</b>
<b>Environment (X1)</b>	Environmental Performance	X1.1: Environmental score	Yahoo Finance	Formative
<b>Social (X2)</b>	Social Responsibility	X2.1: Social Score	Yahoo Finance	Formative
<b>Government (X3)</b>	Governance Structure	X3.1: Governance Score	Yahoo Finance	Formative
<b>Leverage (X4)</b>	Capital Structure	X4.1: Debt to Equity Ratio	Yahoo Finance	Formative
<b>Efficiency (Y1)</b>	Operational Efficiency	Y1.1: Account Payable Turnover Y1.2: Total asset Turnover	Yahoo Finance	Formative
<b>Profitability (Y2)</b>	Financial Performance	Y2.1: Return on Assets (ROA) Y2.2: Net Income Margin (NIM) Y2.3: Return on Equity (ROE)	Yahoo Finance	Formative

Source: Author's compilation based on Yahoo Finance data structure and operationalization of variables adapted from prior literature on ESG and financial performance (e.g., Alareeni & Hamdan, 2020; Zhou & Wang, 2022; Hair et al., 2021), 2025

The analysis technique used in this study is Structural Equation Modeling (SEM) based on Partial Least Squares (PLS) with the help of the latest version of SmartPLS software. PLS-SEM is a variant-based approach used to estimate structural models with several latent constructs measured through observed indicators.

The stages of analysis using PLS-SEM include:

1. Measurement Model Analysis (Outer Model)
  - a. The validity test was converged through the value of loading factor ( $>0.60$ ) & Average Variance Extracted (AVE) ( $>0.50$ ).
  - b. The construct reliability test used Composite Reliability (CR) ( $>0.70$ ) and Cronbach's Alpha ( $>0.70$ ).
  - c. Discriminant validity test using Heterotrait-monotrait ratio (HTMT) - Matrix.
2. Anlisa Model Struktural (Inner Model)
  - a. Measure the strength of the relationship between constructs through path coefficient and t-statistic values using bootstrapping.
  - b. The R-square ( $R^2$ ) test to assess the proportion of the variance of the dependent variables described by the independent variables.
  - c. Test the Effect Size ( $f^2$ ) to assess the influence of each variable.
  - d. Q-square ( $Q^2$ ) test to measure the predictive relevance of the model.
3. Mediation Test (Indirect Effect)

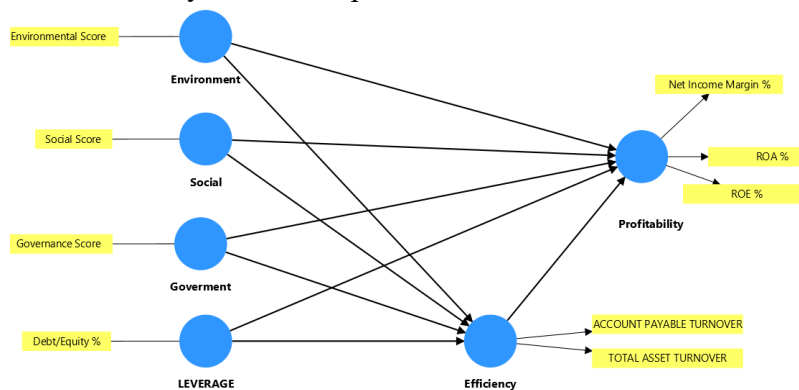
To find out whether the Efficiency variable (Y1) acts as a mediating variable between ESG and leverage on Profitability (Y2), an indirect influence test was conducted using the bootstrapping method with a significance level of 5% ( $<0.05$ ). Where the mediation category is divided into:

**Table 2. Types of Mediation and Relationship Conditions**

Types of Mediation	Description	Relationship Conditions (Path)
Full Mediation	The effect of X on Y is entirely through M (there is no direct influence from X to Y).	The lines $X \rightarrow Y$ are <b>insignificant</b> , but $X \rightarrow M$ and $M \rightarrow Y$ are <b>significant</b> .
Partial Mediation	The effect of X on Y is partly through M and partly direct.	The $X \rightarrow Y$ lines <b>remain significant</b> , although $X \rightarrow M$ and $M \rightarrow Y$ are also <b>significant</b> .
No Mediation (Direct Only)	There is no role of mediation at all.	$X \rightarrow Y$ are <b>significant</b> , but the path through M is <b>not significant</b> .
Indirect Only (Full Mediation)	The X to Y effect is only through M.	$X \rightarrow Y$ is <b>insignificant</b> , but the indirect path $X \rightarrow M \rightarrow Y$ is <b>significant</b> .
No Effect at All	There is no significant relationship between any of the pathways.	All paths are <b>insignificant</b> .

Source: Adapted from Hair et al. (2021) and Nitzl et al. (2016).

The conceptual model of this study illustrates the relationship between ESG (Environmental, Social, Governance) variables and Leverage on Efficiency and Profitability in automotive companies on NYSE. Efficiency is hypothesized to be the mediating variable between ESG and Profitability. The conceptual model is illustrated as follows:



**Figure 2. Conceptual Models Using SEM-PLS**

Source: Author's conceptual framework developed for this study (2025)

## RESULTS AND DISCUSSION

### Analisa Outer Model (PLS SEM Algorithm)

#### 1. Convergent Validity (Loading factor >0.6)

The convergent validity of the measurement model with the indicator reflective model is assessed based on the correlation between the item score and the construct score calculated with PLS. The reflective size is said to be high if it correlates more than 0.6 with the construction to be measured. Data is dropped if the loading factor < 0.6.

**Tabel 3. Outer loading (Loading factors)**

	Efficiency	Environment	Government	Leverage	Profitability	Social
Account Payable Turnover	0.786					
Debt/Equity %				1.000		
Environmental Score		1.000				
Governance Score			1.000			
Net Income Margin %					0.775	
LONG %					0.971	
ROE %					0,906	
Social Score						1,000
Total Asset Turnover	0,775					

Source: SmartPLS algorithm output, 2025

## 2. Discriminant validity

The discriminant validity of the measurement model with reflective indicators is assessed based on the cross loading of the measurement with the construct by comparing the loading value in the intended construct must be greater with other constructs. All latent variables show the largest construct of each indicator compared to the other constructs of the indicator.

**Table 4. Discriminant Validity using the Heterotrait-monotrait ratio (HTMT) - Matrix**

	Efficiency	Environment	Government	Leverage	Profitability	Social
Efficiency						
Environment	0.238					
Government	0.616	0.158				
Leverage	0.417	0.068	0.377			
Profitability	0.324	0.563	0.035	0.471		
Social	0.083	0.120	0.117	0.262	0.460	

Source: SmartPLS algorithm output, 2025

## 3. Average Variance Extracted (AVE), Expected AVE value >0.5 – Convergent Test

The AVE measure can also be used to measure the realism of latent variable component score and the results are more conservative than composite reliability (CR). If the indicator is standardized, the AVE value will be equal to the average value of block communalities. It aims to measure the degree of variance of a construct component collected from the indicator by adjusting to the error rate.

### a. All variables show a value of > 0.5 (table 3.)

An AVE value of at least 0.5 indicates a good measure of convergence validity. This means that latent variables can explain the average of more than half of the variants of the indicators. The AVE value is obtained from the sum of the squares of the loading factor divided by the error.

**b. Reality Test**

1) Composite reliability ( $\rho_a > 0.7$  dan  $\rho_b > 0.7$ )

The reality test is reinforced with composite reality, the expected value is  $> 0.7$  for all constructs. Data that has a  $CR > 0.7$  has high realism. There is a composite Reliability value of the efficiency variable  $< 0.7$ , stating that the data is less reliable (less reliable)

2) Cronbach's Alpha

The realism test is reinforced with Cronbach's alpha, the expected value  $> 0.7$  for all constructs. It is a test of the consistency level of the dataset in a single latent variable There is a value of Cronbach's alpha efficiency variable  $< 0.7$ , stating that the data is inconsistent

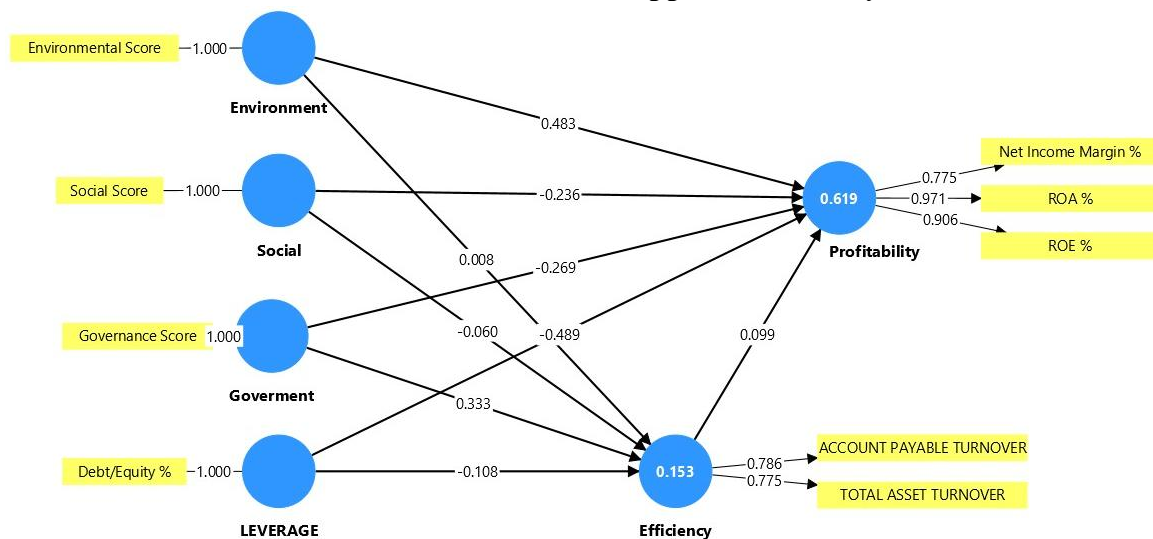
Below is the table data for Cronbach's alpha, CR, and AVE:

**Tabel 5. Construct Reliability & Validity**

	Cronbach's alpha	Composite reliability ( $\rho_a$ )	Composite reliability ( $\rho_c$ )	Average variance extracted (AVE)
Efficiency	0.358	0.358	0.757	0.609
Profitability	0.870	0.948	0.917	0.788

Source: SmartPLS algorithm output, 2025

In the outer model test using the PLS-SEM Algorithm, the validity test value of all indicators was found  $> 0.6$ . so that **no data was dropped** in this study



**Figure 3. Outer Model SEM-PLS**

Source: SmartPLS algorithm visualization, 2025

**Analyzes Inner Model**

**1. R-square on the Endogenous construct.**

The R-Square value is the coefficient of determination in endogenous constructs. In assessing a model with PLS it starts by looking at the R-square for each dependent latent variable. The R-square values are 0.75 (strong), 0.5 (moderate), and 0.25 (weak).

**Table 6. R-Square**

	R-square	R-square adjusted
Efficiency	0.153	-0.001
Profitability	0.619	0.528

Source: SmartPLS algorithm output, 2025

## 2. Path Coefficient

It is the value of the path coefficient or the magnitude of the relationship/influence of the latent construct. It is done by bootstrapping procedure. Where p-values < 0.05 is the variable is influential and significant. (Hair, J. F., 2021).

**Table 7. Path Coefficient using Bootstrapping**

	Original sample (O)	Sample mean (M)	Std deviation (STDEV)	T statistics ( O/STDEV )	p values
Efficiency -> Profitability	0.099	0.122	0.176	0.560	0.576
Environment -> Efficiency	0.008	-0.006	0.222	0.037	0.970
Environment -> Profitability	0.483	0.479	0.199	2.423	<b>0.015</b>
Government -> Efficiency	0.333	0.346	0.261	1.276	0.202
Government -> Profitability	-0.269	-0.314	0.203	1.327	0.185
Leverage -> Efficiency	-0.108	-0.073	0.272	0.399	0.690
Leverage -> Profitability	-0.489	-0.528	0.200	2.448	<b>0.014</b>
Social -> Efficiency	-0.060	-0.093	0.300	0.199	0.842
Social -> Profitability	-0.236	-0.171	0.268	0.882	0.378

Source: SmartPLS bootstrapping output, 2025

## 3. Effect size (F Square)

Fsquare Done to find out the goodness of the model. Whether the predictor of the latent variable has a weak, medium, or large influence on the structural level, where: 0.02 (small); 0.15 (moderate); 0.35 (Large). Exogenous latent variables have a small, moderate, and desirable influence on the structural level (Cohen, 1998)

**Table 8. F-square**

	f-square
Efficiency -> Profitability	0.022
Environment -> Efficiency	0.000
Environment -> Profitability	0.584
Government -> Efficiency	0.102
Government -> Profitability	0.134
Leverage -> Efficiency	0.011
Leverage -> Profitability	0.472
Social -> Efficiency	0.004
Social -> Profitability	0.125

Source: SmartPLS bootstrapping output, 2025

## 4. Prediction Relevance (Q-square) atau Stone Geisser's

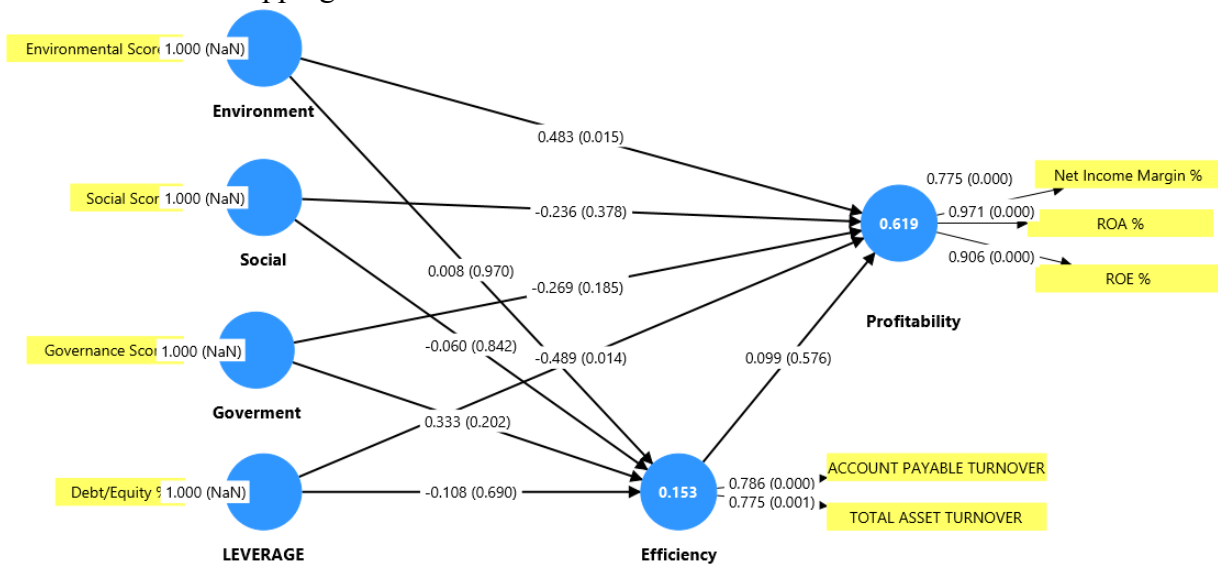
This test is performed for endogenous constructs with reflective indicators. The Q-square value has the same meaning as the coefficient determination (R-square) in regression analysis, where the higher the Q-square, the better the model or the better fit the data.

$Q^2 = 1 - (1 - R^2_1) (1 - R^2_2) \dots (1 - R^2_n) \rightarrow$  The R value can be seen in **table 4**

$Q^2 = 1 - (1 - 0.153) (1 - 0.619)$

$Q^2 = 0.677$

After the inner model test using bootstrapping was produced 2 values that are significant to Y1, including X1 = environment (p-values = 0.015) and X4 = leverage (p-values = 0.0140). [See Table 5]. The following is a visualization of the inner model of the SEM PLS model after bootstrapping:



**Figure 4. SEM-PLS Modeling Using Bootstrapping - Outer Weight / (p-values)**

Source: SmartPLS bootstrapping visualization, 2025

So that the modeling equation can be written as follows:

**a. Efficiency Model (Y1)**

$$Y1 = b1 X1 + b2 X2 + b3 X3 + b4 X4$$

$$Y1 = (0.008) X_{environment} + (-0.060) X_{social} + (0.333) X_{government} + (-0.108) X_{leverage}$$

**b. Profitability Model (Y2)**

$$Y2 = b5 X1 + b6 X2 + b7 X3 + b8 X4 + b9 Y1$$

$$Y2 = (0.483) X_{environment} + (-0.236) X_{social} + (-0.269) X_{government} + (-0.489) X_{leverage} + (0.153) X_{efficiency}$$

**Mediation Test (Indirect Effect)**

The latent variable Efficiency (Y1), which acts as a mediating variable between ESG and Profitability, shows no significant effect; therefore, the nature of this model is classified as No Mediation (Direct Only).

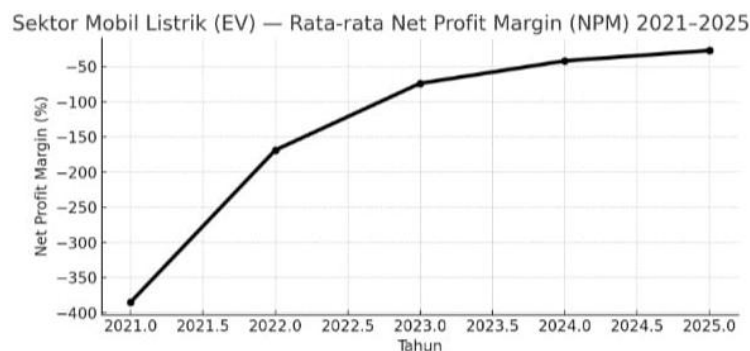
Based on the results of the research analysis, the Environmental Score has a positive effect on Efficiency, though this effect is not statistically significant. The Social Score shows a negative effect on Efficiency, while the Governance Score has a positive effect on Efficiency; neither is statistically significant. Similarly, the Leverage variable shows a negative influence on Efficiency, also without a statistically significant degree.

With respect to Profitability, the Environmental Score has a positive and significant effect, with a p-value of 0.015, indicating that the environmental dimension of ESG practices can enhance the profitability of automotive companies listed on the NYSE. The Social Score has a negative but insignificant effect on Profitability, and the Governance Score shows a positive effect that is likewise not statistically significant. The Leverage variable was found to

have a negative and significant effect on Profitability, with a p-value of 0.014, indicating that higher levels of debt tend to reduce company profitability. The Efficiency variable has a positive effect on Profitability, although this effect is not statistically significant. Furthermore, the latent variable Efficiency (Y1), in its role as a mediating variable between ESG and Profitability, is confirmed to be insignificant, thereby establishing this research model as No Mediation (Direct Only).

Companies that achieve high environmental scores generally demonstrate the implementation of energy efficiency measures, emissions reduction programmes, sound waste management practices, and a transition towards more environmentally responsible business models. These advantages translate into operational cost savings — such as reduced energy and waste management expenditures — lower exposure to environmental fines or litigation, and strengthened reputation and stakeholder trust among customers and investors alike. The application of sound environmental practices can thus serve as a source of competitive advantage and contribute to higher profitability. These findings are consistent with the results of Zhou and Wang (2022), Zhang and Zhu (2023), and Alareeni and Hamdan (2020), all of whom found that strong environmental performance can enhance profitability through cost efficiency, improved reputation, and more effective environmental risk management.

The positive effect of the Environmental Score on Profitability is further supported by empirical evidence from the automotive sector. Several companies with high environmental scores — including Tesla, Rivian, Lucid, Fisker, and Nikola — have recorded consistently improving profitability over the past five years, as illustrated in the chart below.



**Figure 5. 2021-2025 NPM average graph of Tesla, Rivian, Lucid, Fisker, and Nikola companies**

Source: Yahoo Finance data, processed by author, 2025

## CONCLUSION

Overall, the results of this study confirm that the environmental aspect makes a significant contribution to improving company profitability, while leverage is a factor that exerts a negative and significant effect on financial performance. Company management is therefore advised to strengthen its sustainability strategy in the environmental domain and to maintain a sound financial structure in order to improve profitability performance in a sustainable manner. With respect to the Efficiency variable, which acts as a mediating variable between ESG and Profitability, the results confirm that it is insignificant, establishing a no-mediation model. This means that the relationship between ESG and Profitability is direct, without the mediating role of Efficiency.

Based on the findings of this study, the following recommendations are proposed for NYSE-listed automotive companies. First, financial structures should be managed prudently, with particular attention to minimising leverage levels. Companies are advised to reduce their debt burden through timely instalment payments, avoidance of excessive borrowing, and optimal utilisation of internal capital in order to sustain profitability stability. Second, sustainability performance in the environmental domain should be strengthened — for example, through energy efficiency initiatives, waste management improvements, environmentally responsible innovation, and the adoption of green technology. These efforts have been shown to enhance company profitability and competitiveness in the global market. Third, companies should focus on improving profitability directly rather than prioritising the maximisation of operational efficiency through ratios such as accounts payable turnover and total asset turnover, given that the study's findings show Efficiency does not play a significant mediating role. Corporate strategies should therefore be oriented towards financial performance improvements that have a direct impact on net profit.

For investors and capital market analysts, the findings of this study may be considered in investment decision-making, particularly by taking into account a company's environmental performance and leverage level as important indicators in assessing long-term profitability. Regulators and policymakers are encouraged to promote transparency and the standardisation of ESG reporting in the automotive sector, so that sustainability data can be objectively measured and compared across companies. Finally, future research is recommended to extend coverage to other industry sectors and to incorporate moderating variables — such as company size or degree of business digitalisation — in order to develop a more comprehensive understanding of the relationship between ESG and financial performance.

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