



The Price of Misconduct: Volkswagen’s Financial Health and Responsible Business Practices

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Abstract

This study examines the financial and reputational impacts of the 2015 Volkswagen emissions scandal using Agency Theory and Stakeholder Theory. Agency Theory explains how conflicts between shareholders and management lead to unethical behavior and financial instability, as seen at Volkswagen. Stakeholder Theory emphasizes the importance of managing stakeholder interests to rebuild trust and ensure long-term stability. Through a longitudinal analysis of Volkswagen’s financial metrics —profitability, liquidity, and solvency—from 2010 to 2023, this research captures the pronounced decline in financial health during the scandal and the subsequent recovery, driven by strategic investments in sustainability and ethical business practices. The findings reveal that Volkswagen’s governance shortcomings precipitated severe operational and financial challenges. At the same time, its recovery efforts, grounded in stakeholder engagement and sustainability initiatives, contributed markedly to regaining market confidence and improving financial performance. This integrative theoretical approach underscores the imperative of robust corporate governance and comprehensive stakeholder management in mitigating the adverse effects of corporate misconduct. The study offers valuable insights for organizations confronting similar crises, emphasizing that embedding sustainability and ethical practices within recovery strategies is crucial for rebuilding stakeholder trust and ensuring long-term financial resilience. The study proposes the Sustainability-Driven Financial Recovery (SDFR) framework, offering a testable model that integrates Agency and Stakeholder Theories to explain how sustainability initiatives drive post-scandal financial and reputational recovery.

1 Introduction

The emissions scandal, involving global car-maker Volkswagen, which revealed that it had installed ‘defeat devices’ in approximately 11 million cars that were sold worldwide, first unfolded in 2015 (Gruszczyński, 2018). The engine maker Volkswagen admitted to fitting its diesel cars with cheating software that was discovered by the US Environmental

Protection Agency (Vanderkolk, 2017). These devices maintained compliance with legislation during test bench use in the laboratory, whereas in-reality emissions reached levels up to 40x the legal maximum for nitrogen oxides (NO_x), which is associated with severe respiratory diseases and pollution (Birtwell, 2016). That means, instead of 0.04 g/mi, these vehicles were producing around 1.0–1.6 g/mi of NO_x (Leach, 2015). The financial consequence of the scandal was indeed huge. Within days of the EPA's announcement, Volkswagen's share price fell by a third, erasing \$18 billion in market capitalization (Merenda & Irwin, 2018). Over the following two weeks, amid low investor confidence, share prices fell by 40% (Etzioni, 2021).

Its consumers, Volkswagen's suppliers, and the rest of the auto industry also felt the impact of the scandal. The first tier of direct material suppliers to VW experienced a mean stock price decline of 2.69 percent in the week after the scandal. Still, this impact was not consistent across regions. European sellers were the most affected, with a mean stock price response of -5.52 percent (Jacobs & Singhal, 2020). Reputation Loss and Future Consequences: In addition to bearing the financial cost of the scandal, Volkswagen undermined one of its core strengths – being a maker of “clean diesel” vehicles (Hale, 2016). Rowena set the scene for discussions of ethical responsibilities in large corporations, following the failures in corporate governance exposed by the scandal. Due to the failure, Volkswagen lost customers' trust and had to go through a long process of regaining it through a combination of investments in sustainable technologies and research into the creation of electric automobiles (Zhou, 2016). The company has since vowed to go green, aiming to eliminate carbon emissions from its operations by 2050 and to double down on electric vehicle production (Jellinghaus, 2021; Karner, 2021). However, critics say that some of the costs of this scandal, such as financial costs and reputational damage, are still felt today, leading them to conclude that unethical corporate behavior remains costly (Jung & Sharon, 2019). This research fills this gap by showing the company's recovery approach, analyzing the general implications for the practical application of RBPs, and examining how Volkswagen's profitability, liquidity, and solvency changed after the scandal, how stakeholders regained trust, and how the company recovered under sustainability standards. By developing and applying the Sustainability-Driven Financial Recovery (SDFR) framework (Figure 3), this study provides theoretical advancement and practical insights into how embedding sustainability in post-crisis strategies can restore stakeholder trust and secure long-term financial resilience. Drawing on the identified research gap and theoretical foundations, this study proposes the following explicit research hypotheses to

guide the empirical analysis: H1: The 2015 emissions scandal significantly deteriorated Volkswagen's financial health, reflected in declines in profitability (e.g., gross and operating margins), liquidity (e.g., current ratio), and solvency (e.g., increased debt-to-equity ratio) relative to the pre-scandal period (2010–2014). H2: Post-scandal sustainability initiatives and responsible business practices contributed to Volkswagen's financial recovery, leading to gradual improvements in profitability, liquidity, and solvency from 2016 to 2023. H3: The integration of sustainability strategies mitigated agency conflicts and rebuilt stakeholder trust, resulting in long-term financial resilience rather than higher leverage. Collectively, these hypotheses offer a focused lens for exploring the interplay between corporate misconduct, ethical reforms, and financial performance within the SDFR framework.

2 Literature Review

Volkswagen's engineers put their company's profits above everything else out of greed. Their actions created major issues for the company, both financially and reputationally, when they were found to be using software manipulation to pass emissions tests (Juoperi, 2017). It was a grave scandal with significant implications for public health. One study by MIT and Harvard estimated that, in the United States, approximately 60 premature deaths would occur due to excess emissions (Chu, 2017). In Europe, the number is about 1,200 (Chu, 2017). His work addresses such gaps by integrating financial analysis with performance and sustainability frameworks to explore issues of corporate recovery and corporate ethical responsibility.

2.1 Financial Impact of Corporate Scandals

Corporate scandals have significant implications for a company's financial well-being and, in most cases, have grave repercussions. Profits can be reduced with fines, legal penalties, and customer loss of confidence (Agrawal & Cooper, 2017). Scandals are also likely to increase debt levels and jeopardize long-term stability, as companies in distress often have elevated debt-to-equity ratios (Bonini & Boraschi, 2010). Agency Theory sheds light on how corporate scandals affect the bottom line. It implies that unethical judgments leading to financial wrongdoing and eventual financial instability can result from conflicts of interest between shareholders (principals) and management (agents) (Al-Faryan, 2024). Multiple empirical studies demonstrate that scandals lead to major failures in financial metrics. Volkswagen's emissions scandal triggered an instant 46% decline in stock prices,

wiping out billions of euros in market capitalization (Aduku, 2023). Studies by Jacobs & Singhal (2020) have demonstrated that Volkswagen's suppliers and competitors experienced declining shareholder value and rising business risk after the emissions scandal.

Contrary to popular belief, the financial repercussions of scandals spread throughout the entire industry during acute phases (Jacobs & Singhal, 2020). Scandals disrupt operations, harming a business's financial stability. The Volkswagen scandal triggered extensive product recalls, requiring significant re-engineering work, which led the company to experience severe declines in cash flow indicators (Barth et al., 2022). The events show that ethical misconduct damages both organizations' financial reporting and their capacity to operate effectively and sustain themselves in the future. Analysis shows that corporations dealing with scandal-related disclosure experience market capitalization reductions averaging 8.45% from their first week of announcement through lasting effects over multiple years (Barth et al., 2022). Certain businesses can overcome critical times through detailed strategic financial forecasts. During its scandal, Volkswagen reallocated funds toward sustainable ventures that strengthened financial performance and customer trust, while also bolstering stakeholder confidence. The successful implementation of debt restructuring, paired with effective investor communication, became essential for managing long-term financial losses (Jung & Sharon, 2019).

2.2 Comparative Analysis of Corporate Scandals Across Industries

Corporate scandals in other sectors draw important lessons for the field, highlighting systemic inadequacies in governance and accountability that yield findings comparable to those of the Volkswagen case and its so-called Dieseldate. According to Soltani (2014), the scandals at Enron, WorldCom, Parmalat, and Satyam did not occur in a vacuum; rather, they resulted from the same factors: a lack of internal controls, management's greed, collusion with auditors, and regulatory leniency. These failures highlight the universality of agency problems, where managers are driven by short-term interests rather than long-term viability, leading to the destruction of stakeholder confidence in the company and firm value. These scandals indicate that corporate misconduct is not industry-specific but cuts across the finance, energy, and manufacturing sectors, and that, after each outbreak, it is typically followed by regulatory reform.

The analysis by DeCesare (2018) extends the comparison to legal and cultural boundaries as she discusses Olympus in Japan and Bear Stearns in the US. Although Japan's governance system is stakeholder-based and the US's is shareholder-based, the strengths and weaknesses of governance structures were evident in both scandals: too much control within organizations in the case of Olympus, and too much risk-taking in the case of Bear Stearns. Interestingly, both examples implemented reforms that moved them closer to these systems, resulting in hybrid governance with stricter monitoring and clearer responsibilities.

Applied to Volkswagen, the emissions scandal indicates a trend of failures in governance and perverse management incentives that are observed much more widely on a global scale, as in the cases of Olympus and Enron. It demonstrates that poor controls and cultural blind spots are the cause of misconduct, and that only more than monetary fixes are needed to recover, rather than the system changing, becoming more transparent, and being responsible to stakeholders.

2.3 Sustainability, Responsible Business Practices, and Corporate Recovery

Corporate scandals tend to cause disastrous financial and reputational losses, shake stakeholder confidence and jeopardize the long-term survival. The Volkswagen emissions scandal is an example, as the confession of cheating resulted in an 8.45 percent loss in equity market valuation and reputational costs five times higher (Barth et al., 2022). In such settings, sustainability and corporate responsibility are of utmost importance for recovery. It is evident that companies that support the Sustainable Development Goals (SDGs) are less prone to scandals, and when scandals do occur, their impact is less dramatic (Vasileva et al., 2024). Equally, the embrace of Corporate Social Responsibility (CSR) strategies promotes stakeholder trust and resilience. Nevertheless, ESG ratings are weak, as they tend to drop sharply following scandals (Utz, 2019). The stakeholder theory view is that CSR and sustainability initiatives are used to address the interests of clients, employees, and the community, thereby facilitating long-term recovery (Gromis di Trana et al., 2022).

Structures such as ESG standards support corporate resiliency by balancing the different facets of social, environmental, and financial responsibilities (Gromis di Trana et al., 2022). ESG standards support corporate resiliency by balancing the social, environmental, and financial obligations (Marchese et al., 2018). Implementing sustainable practices strengthens ties with stakeholders, especially clients, staff, and investors, and that

is particularly crucial in the crisis recovery stage (DesJardine et al., 2019). By drawing on the Resource-Based View, sustainable practices have been treated as strategic assets (or resources that provide resilience and a competitive edge). They are built into a firm's core capabilities (Felsberger et al., 2022). The empirical evidence supports the view that companies that incorporate sustainability and resilience into their strategies can maintain operational consistency and financial robustness even during external shocks, as demonstrated by Volkswagen (Florez-Jimenez et al., 2024). Sustainability strategies allow for flexibility and the firm's sustainable survival in rapidly changing industries, both in environmental and social terms (Kantabutra & Ketprapakorn, 2024). In the case of Volkswagen, sustainability frameworks were both an ethical imperative and a structural requirement for coordinating operational rebuilding and protocols to restore its image. These practices have mitigated business risks, ensured business sustainability, and facilitated the shift towards clean technologies as part of recovery (Corrales-Estrada et al., 2021).

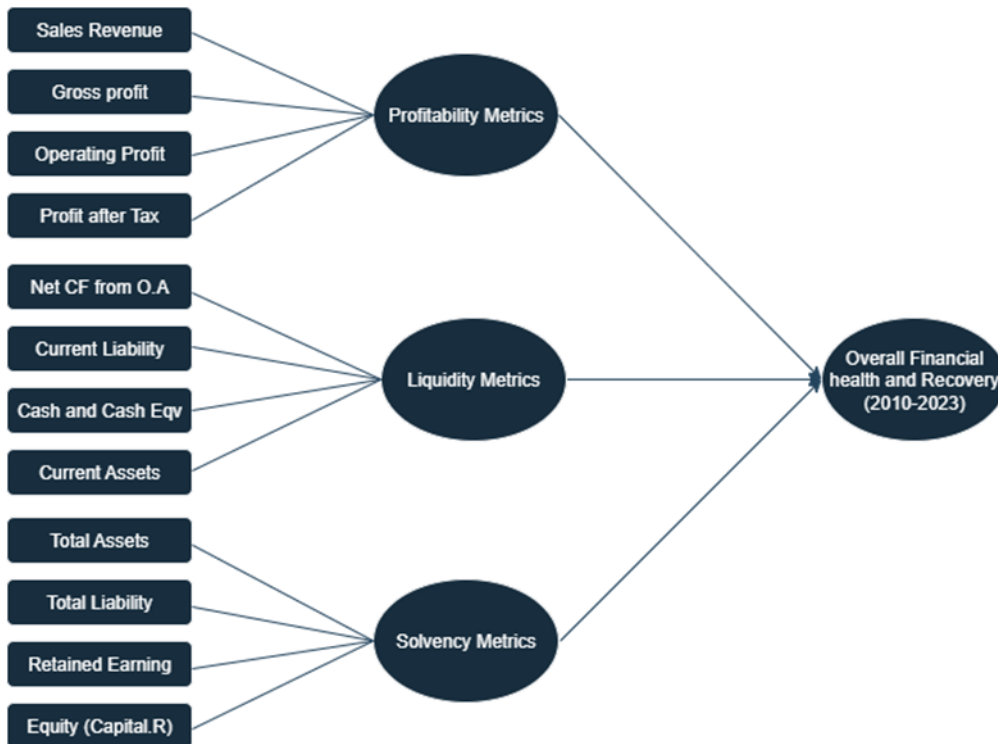
In line with this, Volkswagen also introduced major sustainability initiatives following the Dieselgate, committing itself to €73 billion in investments in electric mobility and hybrids, aiming to achieve around 70 all-electric models by 2030 (Mommssen, 2020). It also stated the objective of becoming climate-neutral by 2050, in line with international environmental targets, and to restore lost trust (Gebler et al., 2024). The literature indicates that an effective recovery involves integrating sustainability to protect the ability to absorb shocks and strengthen stakeholder trust in the long term (Manzaneque-Lizano et al., 2019). The case of Volkswagen shows that the concepts of sustainability and responsible action are no longer on the margins but have become vital strategic drivers of corporate resilience, recovery, and credibility in the wake of corporate scandals.

2.4 Broader Effects on the Automotive Ecosystem

The emissions scandal has financial repercussions that went beyond Volkswagen. The wider effects were demonstrated by the higher average decline of 7.60% seen by European automakers (Astvansh & Jindal, 2022). In addition to financial indicators, the scandal was also far-reaching in the automotive supply chain. Supply chain consolidation processes across the VW supply chain led to severe price instability, revealing structural vulnerabilities (Jacobs & Singhal, 2020). (Zhang et al., 2021) reported that the scandal shifted demand for diesel vehicles, demonstrating the role of misconduct in disrupting the entire stakeholder network. The destruction of the environment accelerated the European

transition to electric vehicles, and the VW scandal led to structural changes and sustainability initiatives that transformed the industry (Measso, 2022). According to Barth et al. (2022), the financial blowback from VW affected automotive bonds and stocks, making the industry more vulnerable. The scandal brought to light the industry's inherent weaknesses and sparked a rapid shift towards improved sustainability and governance.

Figure 1



2.5 Lessons from Financial and Operational Recovery

VW developed strategic communication efforts that transformed public perception, fostered a spirit of cooperation, and reestablished the belief in responsible behavior. The company reduced further damage to its reputation through positive public statements issued in its aftermath (Painter & Martins, 2017). There is evidence that effective media practices not only contribute to narrative recovery but also hold organizations to account, implying that companies ought to remain transparent to external supervisors (Bayçu & KILINÇ, 2017). The integration of operational restructuring is a major key to understanding when

developing recovery strategies is critical to the research. Operational recovery goes beyond correction to establish new productive services that reshape business valuation schemes (Pjatakova & Nilsson, 2019). Holweg and Oliver show that operational resilience is critical in automotive manufacturing because crises cause greater financial damage through supply chain disruptions and production interruptions (Holweg & Oliver, 2015). Financial stability functions as an important aspect for businesses undergoing recovery. Through their financial assessment of Volkswagen Máté and Péter document the company's approach to controlling operational expenses while funding initiatives for future growth, including electric vehicle development (Máté & Péter, 2022). The Volkswagen situation illustrates how financial, operational, and reputational metrics work together, as discussed earlier. By integrating sustainable strategies alongside financial planning, operational restructuring, and transparent communication, Volkswagen stabilized its business while laying the foundation for recovery. Business recovery strategies should combine multiple perspectives to manage immediate emergencies while creating enduring value, according to lessons from this study.

2.6 Synthesis of Literature and Research Gap

The reviewed literature, while rich in isolated analyses of corporate scandals' financial consequences (e.g., Agrawal & Cooper, 2017; Barth et al., 2022), comparative governance failures across industries (Soltani, 2014; DeCesare, 2018), and the potential role of sustainability in post-crisis recovery (Gromis di Trana et al., 2022; Florez-Jimenez et al., 2024), remains fragmented and mainly descriptive. Critically, most studies focus on short-term market reactions, reputational costs, or immediate operational disruptions, with limited longitudinal examination of how financial metrics, such as profitability, liquidity, and solvency, evolve over a complete crisis-to-recovery cycle. Moreover, although sustainability and responsible business practices are increasingly linked to resilience, few works argue for integrating Agency Theory, which explains governance failures, and Stakeholder Theory, which emphasizes trust rebuilding, to demonstrate how strategic sustainability investments drive measurable financial recovery in a real-world scandal context.

The absence of a unified, quantitative perspective on a business's financial history following a fraud is a sorely needed gap. The paper fills that gap by presenting a quantitative longitudinal assessment of the gap between 2010 and 2023, grounded in Agency and Stakeholder Theories. It shows the need to integrate sustainability into the

recovery plan, which will lead to long-term financial sustainability and restore lost stakeholder confidence. It provides some theoretical understanding and practical recommendations for companies facing a similar crisis.

3 Methodology

3.1 Research Design

The study used a quantitative research approach to examine the financial impact of the Volkswagen emissions scandal over a specific time frame. It examines major financial indicators, such as profitability, liquidity, and solvency, to determine how these areas have changed. Data-driven assessment of the financial health of Volkswagen before and after the crisis, provided via statistical and financial analysis methods, including descriptive and correlational analyses performed using STATA software.

3.2 Data Collection

This study uses yearly reports covering income statements, balance sheets, and cash flow metrics from 2010 to 2023 to assess Volkswagen's financial performance. The three phases or "parts" of the timeline include pre-scandal (2010-2014), the scandal (2015), and post-scandal (2016-2023). Each part will enable a look at the entire trajectory of the business from its stable period to an unpredictable period until it becomes stable again in the future. Reviewing each phase will allow a financial examination of the major financial metrics of profitability, liquidity, and solvency. To evaluate profitability in this review, we will use the DuPont Analysis Model and Agency Theory; these are two of the most effective tools for evaluating Return on Equity (ROE) and Return on Assets (ROA), two indicators of the success or failure of any business (Sayed et al., 2017; Zelgalve et al., 2014). To check short-term financial flexibility, liquidity is measured using current and quick ratios. These ratios are based on liquidity preference theory and financial distress theory (Lucic, 2014). The Debt-to-Equity Ratio is a measure of underlying financial health and debt management. It is used to evaluate solvency. It is based on Pecking Order Theory and the Modigliani–Miller Theorem. (Naomi, 2023; Sharma). All things considered, this period provides sufficient data for reliable trend and correlation analysis and for a thorough assessment of Volkswagen's financial stability and recovery following the emissions scandal.

3.3 Variables and Metrics

Profitability Metrics offered by Volkswagen include Sales Revenue, Gross Profit, Operating Profit, and Profit after Tax, which are among the factors that portray a business's financial position and operational efficiency. These indicators can serve as a good proxy for estimating the short-term impact of the fines and penalties imposed by the emissions scandal, as well as the scandal's effect on revenue generation and profitability. The Liquidity Metrics contain Net Cash Flow Operating Activities, Current Liabilities, Cash and Cash Equivalents, and Current Assets. These variables provide information on the short-term funds available to Aleksandrov to address short-term obligations within Volkswagen during the period when the crisis occurred, reflecting the cash available to fund the company's expenses. Furthermore, they provide insight into critical internal factors, such as inventory and receivables, that affect liquidity in the short term. Volkswagen Solvency Metrics, such as Total Assets, Total Liabilities, Retained Earnings, and Equity (Capital Reserves), provide insight into the company's financial stability and long-term prospects. They emphasize the implications of the scandal for the individual shareholder's equity and the firm's ability to match its debtors and assets over the long term.

3.4 Theoretical Framework

This paper uses Agency Theory and Stakeholder Theory to discuss in depth Volkswagen's financial performance and the path to recovery after the massive scandal over its emissions outrages. Agency Theory provides a robust basis for understanding how the interests of the principals (shareholders) and the actions of the agents (management) can lead to unethical decision-making and corporate malpractice, resulting in financial and reputational losses (Al-Faryan, 2024). Such a theoretical perspective is useful for examining the governance failures that led to the scandal and their subsequent negative effects on Volkswagen's profitability, liquidity, and solvency. Similarly, Stakeholder Theory shifts the analysis to the interests and needs of a highly diverse range of stakeholders, namely customers, employees, suppliers, and the community as a whole (Stoelhorst & Vishwanathan, 2024). This approach helps explain why Volkswagen has engaged in strategic efforts to restore trust within its stakeholder community, especially through massive investments in sustainability and ethical corporate conduct. The synthesis of two theoretical frameworks used in this study will provide a broader perspective on how the manifestation of governance weaknesses, third-party intervention, and sustainability

initiatives interact to stimulate financial recovery and strengthen Volkswagen's long-term sustainability.

Incorporating Agency Theory and Stakeholder Theory, the current study proposes the Sustainability-Led Financial Recovery (SDFR) Framework to provide an explanatory framework for understanding post-scandal corporate recovery. The framework asserts that governance failures and agency conflicts lead to corporate scandals that cause an immediate decline in financial performance, thereby encouraging companies to adopt sustainability-based interventions (such as ESG integration, carbon-neutral commitments, and increased stakeholder engagement). These measures aim to restore financial stability, maintain a strong foundation of trust in the organization, and reduce conflict among stakeholder groups. Additionally, these steps promote self-reorganization and change management through equity-based approaches.

4 Data Analysis and Discussion

4.1 Descriptive Analysis:

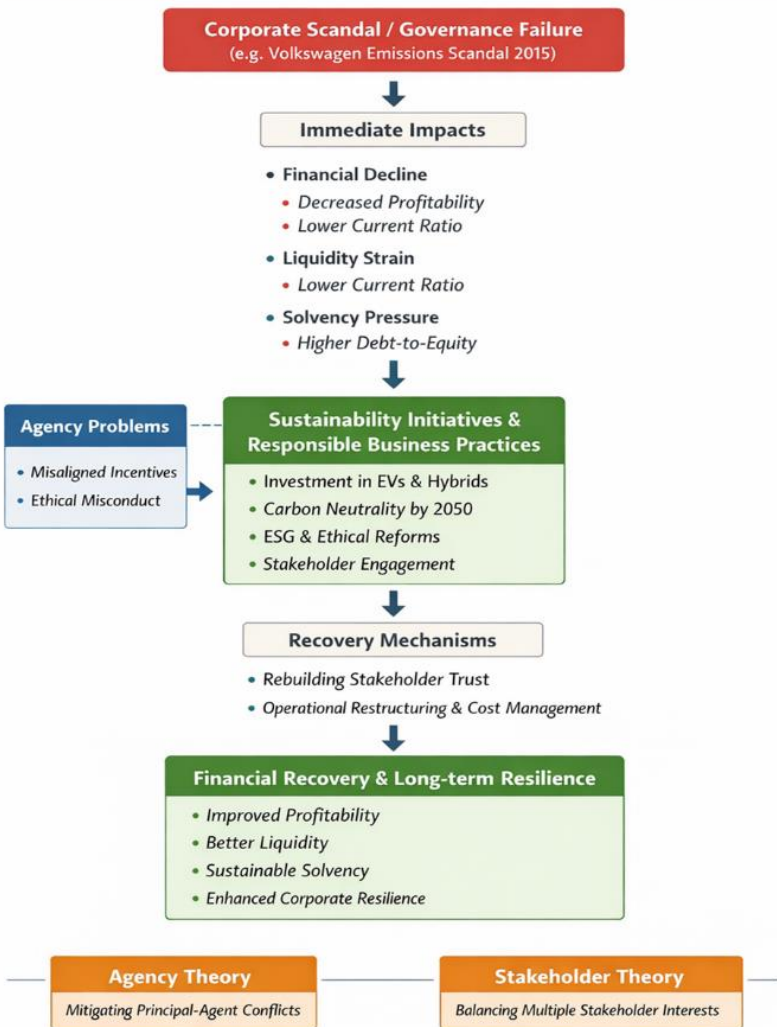
The descriptive analysis covers key financial factors such as sales revenue, operating profit, and total liabilities to offer a clearer understanding of Volkswagen's financial performance. It provides insights into the company's financial stability and recovery by showing trends, changes, and how data is distributed. This is done by calculating measures such as the mean, median, standard deviation, and skewness.

Even though the 2015 emissions scandal caught the company by surprise, the descriptive statistics show that Volkswagen remained financially strong from 2010 to 2023. The level of Sales revenue was also stable, with a mean and median of \$222 million and \$220 million, respectively, and with moderate variability (SD \$48.2m), indicating that the company has strong market positioning. Gross profit was also consistent (mean \$40.6m; SD \$10.2m) as a direct result of their cost management, even in crisis years. The results showing greater variation were operating profit (mean \$13.8m; SD \$5.08m) and profit after tax (mean \$12.8m; SD \$4.6m), as they reflected the momentary impact in 2015 and the subsequent recovery. The least consistent variable was cash flow from operating activities (mean 16.2m; SD 9.4m), which had positive skew (1.15) and positive kurtosis (3.37) since the values were strongest in some recovery years. Current liabilities averaged 148m, with total liabilities (363m) and total assets (413m) in balance, reflecting judicious control of liabilities and assets following the scandal. The levels of retained earnings (mean: 86.4m)

and equity (\$13.5m) remained constant, with some peaks driven by a reinvestment strategy. To sum it up, all considerations indicate that profitability and cash flow were most affected; nevertheless, Volkswagen's liquidity and solvency measures indicate the ability to absorb shocks and gradually recover financial strength.

Figure 2 *The Sustainability-Driven Financial Recovery (SDFR) Framework*

Sustainability-Driven Financial Recovery (SDFR) Framework



Note: illustrating the process through which Volkswagen transformed the 2015 emissions scandal into long-term financial resilience via sustainability-oriented strategies.

Table 1 Descriptive Analysis

| Variable | Mean | Median | St. Dev | Variance | Skewness | Kurtosis |
|---|----------|----------|----------|----------|-----------|----------|
| Sales Revenue | 2.22E+08 | 2.20E+08 | 4.82E+07 | 2.33E+15 | 9.14E-02 | 3.24E+00 |
| Gross Profit | 4.06E+07 | 4.00E+07 | 1.02E+07 | 1.04E+14 | 9.80E-02 | 2.79E+00 |
| Operating Profit | 1.38E+07 | 1.27E+07 | 5.08E+06 | 2.58E+13 | 4.75E-01 | 2.17E+00 |
| Profit After Tax | 1.28E+07 | 1.22E+07 | 4.61E+06 | 2.13E+13 | 2.31E-01 | 2.42E+00 |
| Net Cash Flow from Operating Activities | 1.62E+07 | 1.26E+07 | 9.49E+06 | 9.00E+13 | 1.16E+00 | 3.38E+00 |
| Current Liabilities | 1.48E+08 | 1.62E+08 | 3.63E+07 | 1.32E+15 | -4.77E-01 | 2.31E+00 |
| Cash & Cash Equivalents | 2.45E+07 | 1.98E+07 | 8.95E+06 | 8.02E+13 | 1.04E+00 | 2.66E+00 |
| Current Asset | 1.61E+08 | 1.58E+08 | 4.62E+07 | 2.13E+15 | 8.48E-02 | 1.97E+00 |
| Total Assets | 4.13E+08 | 4.16E+08 | 1.18E+08 | 1.39E+16 | -1.67E-01 | 2.12E+00 |
| Total Liabilities | 3.03E+08 | 3.15E+08 | 7.97E+07 | 6.36E+15 | -4.53E-01 | 2.07E+00 |
| Retained Earnings | 8.64E+07 | 7.69E+07 | 3.13E+07 | 9.78E+14 | 5.58E-01 | 2.55E+00 |
| Equity (Capital Reserve) | 1.35E+07 | 1.46E+07 | 1.97E+06 | 3.90E+12 | -1.41E+00 | 3.33E+00 |

Even though the 2015 emissions scandal caught the company by surprise, the descriptive statistics show that Volkswagen remained financially strong from 2010 to 2023. The level of Sales revenue was also stable, with a mean and median of \$222 million and \$220 million, respectively, and with moderate variability (SD \$48.2m), indicating that the company has strong market positioning. Gross profit was also consistent (mean \$40.6m; SD \$10.2m) as a direct result of their cost management even in crisis years. The results that showed more variation were operating profit (mean \$13.8m; SD \$5.08m) and profit after tax (mean \$12.8m; SD \$4.6m) as they reflected the momentary impact in 2015 and the subsequent recovery. The least consistent variable was cash flow from operating activities (mean 16.2m; SD 9.4m), which had positive skew (1.15) and positive kurtosis (3.37) since the values were strongest in some recovery years. Current liabilities averaged 148m, with total liabilities (363m) and total assets (413m) in balance, reflecting judicious control of liabilities and assets following the scandal. The levels of retained earnings (mean: 86.4m) and equity (\$13.5m) remained constant, with some peaks driven by a reinvestment strategy. To sum it up, all considerations indicate that profitability and cash flow were most affected; nevertheless, Volkswagen's liquidity and solvency measures indicate the ability to absorb shocks and gradually recover financial strength.

4.2 Correlation Analysis:

The correlation matrix shows that Volkswagen’s financial variables exhibit strong interdependence. Sales Revenue (S.R.) has a near-perfect correlation with Gross Profit (0.994), Current Liabilities (0.955), Current Assets (0.951), and Total Assets (0.959); hence, revenue growth went hand in hand with asset growth and liability commitments. Operating Profit (OP) is also strongly correlated with Gross Profit (0.837) and Retained Earnings (0.843), indicating that operational efficiency drives profit retention. Profit After Tax (PAT) also shows lower values and a moderate relationship with OP, suggesting that externalities, such as fines and taxes, had an effect after the scandal. There is a strong connection between Liquidity estimators: Cash & Cash Equivalents, Current Assets, Net Cash Flow (NCF), and Retained Earnings, demonstrating how recovery measures helped manage liquidity. Measures of Asset show a strong correlation, with near-perfect relationships between Current Assets and the Asset base and between Total Liabilities and the Asset base, indicating an optimal relationship between asset expansion and debt financing. Retained Earnings were strongly correlated with Sales Revenue, Gross Profit, and Operating Profit, thus indicating that long-term reserves were directly related to profitability. There are moderate negative relations between equity (CR) and profitability, indicating that shareholder reserves were less sensitive to operational performance and were dragged down by financial punishment following the financial scandal. In general, the analysis demonstrated that Volkswagen’s financial structure is highly interdependent, with revenue, profitability, assets, and liabilities moving in the same direction. However, equity and profit after taxes were most volatile during the scandal period.

Table 2 Correlation Coefficients

| Variables | S.R | G.P | OP | P.A.T | N.C.F | C.L | C & C.E | C.A | T.A | T.L | R.E | CR |
|--------------------------|-------|-------|-------|--------|-------|-------|---------|-------|-------|-------|------|----|
| Sales Revenue | 1 | | | | | | | | | | | |
| Gross Profit | 0.994 | 1 | | | | | | | | | | |
| Operating Profit | 0.842 | 0.837 | 1 | | | | | | | | | |
| Profit After Tax | 0.37 | 0.369 | 0.617 | 1 | | | | | | | | |
| Net Cashflow from O.A | 0.531 | 0.49 | 0.611 | 0.154 | 1 | | | | | | | |
| Current Liabilities | 0.955 | 0.952 | 0.7 | 0.151 | 0.524 | 1 | | | | | | |
| Cash & Cash Equivalents | 0.767 | 0.724 | 0.702 | 0.261 | 0.816 | 0.744 | 1 | | | | | |
| Current Asset | 0.951 | 0.938 | 0.781 | 0.239 | 0.662 | 0.973 | 0.83 | 1 | | | | |
| Total Assets | 0.959 | 0.947 | 0.774 | 0.249 | 0.674 | 0.975 | 0.823 | 0.994 | 1 | | | |
| Total Liabilities | 0.925 | 0.92 | 0.697 | 0.182 | 0.628 | 0.976 | 0.771 | 0.979 | 0.986 | 1 | | |
| Retained Earnings | 0.964 | 0.942 | 0.843 | 0.328 | 0.669 | 0.935 | 0.827 | 0.973 | 0.97 | 0.938 | 1 | |
| Equity (Capital Reserve) | 0.794 | 0.797 | 0.487 | -0.054 | 0.448 | 0.867 | 0.524 | 0.796 | 0.841 | 0.873 | 0.75 | 1 |

4.3 Integrated Financial Performance and Trend Analysis

Key ratios like debt-to-equity ratio, current ratio, and profit margin percentage (operating and gross profit margin) will be computed to assess profitability, solvency, and liquidity aspects of a period under research. Important indicators will be propped across years, the rally year, and the recovery year to provide insight into recovery trends and patterns.

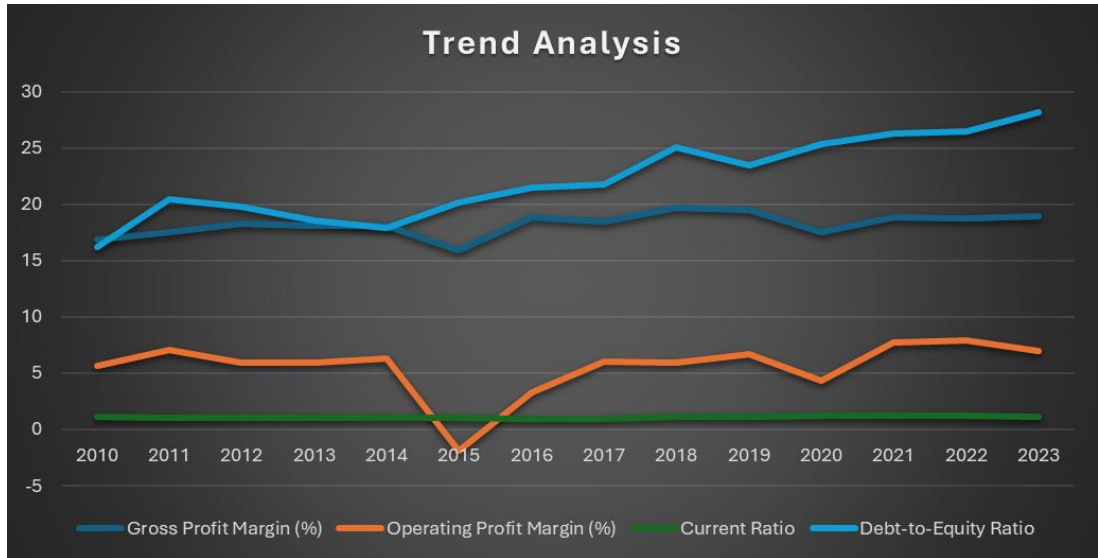
Table 3 Financial Ratios

| Year | Gross Profit Margin (%) | Operating Profit Margin (%) | Current Ratio | Debt-to-Equity Ratio |
|------|-------------------------|-----------------------------|---------------|----------------------|
| 2010 | 16.90167488 | 5.628374384 | 1.117503251 | 16.15708771 |
| 2011 | 17.55085134 | 7.073686589 | 1.045350644 | 20.39586236 |
| 2012 | 18.24513691 | 5.967530985 | 1.071404204 | 19.76905031 |
| 2013 | 18.07042389 | 5.924154979 | 1.030069547 | 18.50979618 |
| 2014 | 18.0402849 | 6.271424197 | 1.0030297 | 17.85851122 |
| 2015 | 15.89886165 | -1.907713369 | 0.979109564 | 20.18170572 |
| 2016 | 18.86940953 | 3.269249357 | 0.970901995 | 21.51845234 |
| 2017 | 18.44183768 | 5.990064244 | 0.901963214 | 21.77314274 |
| 2018 | 19.65240472 | 5.902081416 | 1.09297063 | 25.04439557 |
| 2019 | 19.45200925 | 6.713322144 | 1.116063774 | 23.42203285 |
| 2020 | 17.47411209 | 4.340823029 | 1.178550269 | 25.31310563 |
| 2021 | 18.88129496 | 7.70383693 | 1.218707609 | 26.28376057 |
| 2022 | 18.70059129 | 7.922952876 | 1.226769482 | 26.50566971 |
| 2023 | 18.93423192 | 7.0050018 | 1.164032369 | 28.20603395 |

The trend analysis of Volkswagen's financial ratios provides detailed information about the company's financial picture before, during, and after the scandal, in line with the study's objectives. The Gross Profit Margin (%), which indicates the level of operating efficiency, did not change significantly before the scandal and rose slightly (16.90% in 2010 to 18.04% in 2014). Nevertheless, the margin decreased to 15.89% (2015) in the year of the scandal, indicating a decline in revenue and an increase in expenses, likely due to reputational losses and court battles. In the post-scandal period, the margin improved gradually to a peak of 19.65% (2018) and subsequently plateaued at 18.9% (2023), illustrating the newfound focus on cost management and recovery. The Operating Profit Margin (%) better reflects the operational disruption associated with the scandal. Before the scandal, it ranged from 5.62 percent (2010) to 7.07 percent (2011), indicating consistent operational success. The margin has, however, slipped to -1.90% (2015) following high legal fines and operational inefficiencies, as well as a loss of sales due to the crisis. Recovery has been achieved since 2016, and margins began to increase every year,

reaching 7.92% (2022). This is an indication of Volkswagen's capacity to manage costs and recover operational efficiency even under adverse conditions. The Current Ratio is a liquidity ratio that measures a company's ability to settle short-term liabilities. It was 1.11 (2010) and deteriorated to 0.97 (2015), indicating financial difficulties during the scandal, as short-term liabilities increased relative to current assets. But after 2017, the ratio continued to improve, reaching 1.22 in 2022, indicating improved liquidity management and financial solidity during the recovery stage. The Debt-to-Equity Ratio, a significant solvency factor, indicates Volkswagen's over-reliance on debt financing. The pre-scandal amount was not very high, but it rose in the post-scandal period to 20.18 (2015), reflecting the fiscal drain from fines and healing expenses. The identified pattern became visible following the scandal, as the corresponding ratio reached a peak of 28.20 in 2023, demonstrating Volkswagen's ability to sustain its recovery plan. This measure, according to my analysis, is an indicator of better access to capital but also of increased threats of financial instability. The gross and operating profit margins demonstrate how the scandal affected profitability and how the company finally stabilized at a new level.

The Current Ratio illustrates the liquidity issues both amid the scandal and subsequently through the management transitions. The debt-to-equity ratio shows that Volkswagen managed financial and expansion risks through its capital structure, enabling it to recover and grow in the long term. The analysis illustrates the financial strength and flexibility of the company's strategies, which proved crucial in getting through the emissions scandal. The ratio reached a record high in 2023 at 28.20. Thus, it is evident that, after the scandal, Volkswagen has the capacity to implement its recovery plan and renew its sustainable goals. This shows that there is better access to capital but more financial risk. The ratios of total debt to equity and return on equity for Volkswagen show that it is crisis-hit but returning to health. The Gross and Operating Profit Margins once again tell the story of how the scandal impacted profitability and of how the company recovered to some extent. The Current Ratio continues to reveal liquidity problems throughout the scandal and the management changes. The Debt-to-Equity Ratio again shows that Volkswagen used its capital structure as a strategic tool to help the company recover and grow long-term, as well as manage risks. The tone of this discussion clearly demonstrates why the company had the financial strength and strategic approach to cope with the emissions scandal.

Figure 3 Trend Analysis

4.4 Findings

The results offer compelling evidence in favor of the suggested theories. The significant drops in important ratios in 2015 support H1, whereas the long-term recovery patterns following 2016—fueled by sustainable investments and stakeholder-focused reforms support H2 and H3. The analysis reveals the significant impact the scandal had on Volkswagen's finances, as profitability and liquidity deteriorated in the initial stages. Nevertheless, it also shows how the company has been recovering, as there are positive trends in the growth of profitability (Gross Profit Margin and Operating Profit Margin) and liquidity (Current Ratio), and the trend of improvement has been gradual, showing the effect of the impact of the scandal on finances and the subsequent recovery process. The impact of the emissions scandal on Volkswagen's financial performance was immediate and substantial, as Gross Profit Margin reduced to 6.27 percent and Operating Profit margin declined by 11.97 percent in 2015 compared to 2014. These falls are associated with the operational burden of heightened penalties, legal expenses, and reputational damage, which have adversely impacted revenue collection. Despite this, Volkswagen showed a clear trend of recovery in the years after the scandal. Effective cost management, targeted investing, and reforms with sustainability integration enabled the company to stabilize its Gross Profit Margin at about 18.9 percent by 2023 and to grow its Operating Profit Margin

to 7.92 percent in 2022. Liquidity ratios have indicated significant hardship in the scandal, highlighting the ability to handle short-term commitments during unstable financial situations. The financial implications of the emissions scandal were greatly felt on the short-term liquidity of Volkswagen, as the Current Ratio indicated that the value of the ratio decreased over the years between 2010 and 2015, which reported a decrease of 1.11 to 0.97, implying that Volkswagen is unable to cope with short-term liabilities efficiently, as the ratio measures the ability to meet short-term debt obligations.

Nevertheless, the post-2016 period was marked by the gradual improvement in the company's liquidity management, as its Current Ratio increased to 1.22 by 2022, indicating greater liquidity and stronger financial stability. Solvency indicators demonstrated that Volkswagen resorted to debt financing to ride out financial instability, as the Debt-to-Equity ratio grew by 20.18 in 2015, reaching a higher level of 28.20 in 2023, indicating the level of solvency risk the company sought to recover and sustain. Although the high Debt-to-Equity ratio supported the post-scandal investment and recovery of Volkswagen's profits, the overall leverage-profitable relationship is positive and should be approached with caution. The short-run benefits of debt-financed growth do not exclude long-term risks, such as higher borrowing costs, greater vulnerability to macroeconomic fluctuations, and possible undermining of financial stability, which underscore the importance of sound debt management. The case of Volkswagen demonstrates that, despite the fact that leverage might expedite sustainability shifts, overreliance can undermine long-term stability, underscoring the need to adopt a moderate stance in corporate recovery processes.

The Debt-to-Equity Ratio indicates worsening solvency due to Volkswagen's increased reliance on debt financing after the scandal, as reflected in the ratio's increase during the specific period. The dependence of these indicators is evidenced by the strong positive correlation between sales revenue and profitability indicators (e.g., 0.994 for sales revenue and gross profit margin). Liquidity was also negatively impacted, as liabilities increased during the scandal, as evidenced by decreases in the Current Ratio and Cash & Cash Equivalents. Sustainability initiatives, such as efforts to rebuild the company's image through strategic investments, proved crucial to stabilizing the company and its financial recovery.

The returns of investing in electric cars, neutral carbon projects, and more inclusive sustainability strategies are evidenced by profits and liquidity measures jumping after the scandals, not only ensuring the stability of operations but also regaining the confidence of stakeholders. The case of Volkswagen's revitalization demonstrates how a company can

be transformed by appropriate corporate governance reforms in a timely manner. Focusing on environmental responsibility and ethical behavior helped the company rebuild stakeholders' trust and avert long-term financial risks. As evident in the case, sound governance and sustainability are at the heart of organizations facing similar crises. The financial strength of Volkswagen can be seen in its capacity to reduce leverage on the path to recovery and in its ability to stabilize profitability, as the gross profit margin of Volkswagen stood at approximately 18.9 per cent in 2023. This discussion follows the timeline of Volkswagen's recovery, evaluates the financial effects of the scandal, and draws broader lessons: how corporate misconduct can destroy solvency, liquidity, and profitability, and how sustainability-based reform can restore stakeholder confidence and financial health.

Integrate and synchronize mechanisms, such as recovery strategies and sustainability visions, to restore the company's image and ensure long-term economic stability. Volkswagen was able to develop new long-term sustainability strategies, improve quality control, and make targeted investments to support its comeback. The company's turnaround demonstrates that true recovery and long-term success lie in the balance between financial well-being and genuine corporate responsibility. The case of Volkswagen indicates that only through good business ethics and honest reforms grounded in sustainability can financial recovery be increased, reputational risk be reduced, the organization be enhanced, and lasting value be generated.

4.5 Recommendations

Audits of companies such as Volkswagen should be regular, and, above all, stakeholders should be involved. In addition to long-term reliability, they can make crises more sustainable. Financial stability can be reinforced by investing more in carbon-neutral solutions for electric-car manufacturing and by implementing robust ESG policies. There are reputational risks when ethical conduct is absent within a company. Make it a habit by adhering to it, training employees, and promoting the appropriate corporate culture. Enhancing financial resilience is also possible through expanding revenue streams into smart car technology and renewable energy. Besides forecasting, borrowing, and liquidity, the companies also have to enhance risk management. Crisis management can be more visible and resources utilized more effectively with the use of technologies, including blockchain and AI. Finally, by observing the recovery and collaborating with the entire supply chain, one can still align with larger objectives and build better relations with

stakeholders. These measures are used to restore the confidence of the companies and enable them to compete in the massively regulated international market.

5 Conclusion

The Volkswagen negative-emissions scandal demonstrates that the company's misconduct can destroy its financial resources, and that going green can restore them. The issue struck very quickly and fiercely in 2015. Profit margins decreased, cash reserves were low, and the debt-to-equity ratio increased significantly. Bad ethics cost us a lot of money and reputation as demonstrated by the crisis. Volkswagen's response, though, offers some valuable lessons for a company caught in a storm such as this. By investing in electric vehicles, carbon-free initiatives, and enhanced sustainability, Volkswagen corrected its balance sheets and has regained customer confidence, investor confidence, and regulatory confidence. The Sustainability-Driven Financial Recovery (SDFR) plan provides a clear, testable framework for transforming a crisis into an opportunity to emerge more effectively. By 2023, the majority of Volkswagen's primary financial indicators had returned to pre-scandal levels and in some cases improved, demonstrating that a full recovery is possible. The greatest lesson is that turning around money is directly connected to doing the right thing and true sustainability. Harsh cost management, open governance, and bold new ideas were the way to cut. Next, Volkswagen and others will have to seize the opportunities of the digital transformation and cope with the increased costs of borrowing and severe competition in the EV market. Eventually, the Volkswagen case can be a good lesson for leaders who seek to balance responsibility and sound financial performance. In the contemporary world, which is highly regulated, the combination of profitability and purpose is not only a good ethic but a life-or-death requirement.

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