

Comparative Analysis of Operational Advantages and Disadvantages Between Conventional Internal Combustion Engine Vehicles and Electric Vehicles based on Tesla

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Abstract: The automotive industry is undergoing a transformative phase driven by concerns over environmental sustainability, energy efficiency, and technological advancements. In this context, the shift from conventional internal combustion engine vehicles to electric vehicles (EVs) has emerged as a focal point. This paper conducts a comparative analysis of operational pros and cons between conventional internal combustion engine vehicles and electric vehicles, using Tesla as a case study. This paper undertakes a comprehensive comparative analysis of financial and operational aspects among leading automotive companies: Tesla, Volkswagen, and Toyota. This comparative exploration highlights the transformative potential of the new energy vehicle sector.

Keywords: Automotive Industry, Financial Performance, Operational Efficiency, Electric Vehicles.

1. Introduction

1.1. Background

In today's society, the increasing awareness of environmental conservation and the growing prominence of energy-related issues have led to significant transformations and challenges in the automotive industry. As a pivotal domain in both economic and technological development, the evolution of the automotive sector bears profound implications for sustainable growth and economic advancement. This paper centers on Tesla as a primary exemplar to explore the comparative advantages and disadvantages of conventional gasoline-powered vehicles and electric vehicles (represented by Tesla). It also undertakes a corporate perspective to analyze their effects on business decisions, market competition, sustainability strategies, and capital structures.

Tesla, as a frontrunner in the electric vehicle sector, has gradually attained a crucial foothold in the global market owing to its innovative technology and advanced electric car offerings. Through a juxtaposition of Tesla and traditional internal combustion engine vehicles, this paper delves into the factors underpinning Tesla's achievements and its distinctive strengths. Of particular note, the focus lies on Tesla's capital structure, delving into its unique financing strategies and the consequent impact on corporate operations.

By employing Tesla as a primary case study, this paper furnishes a profound comprehension of the realm of new energy vehicles, elucidating how electric vehicles, characterized by their environmentally friendly and low-emission nature, wield significant influence over corporate strategic decision-making, market dynamics, and sustainability strategies. Through a comprehensive study of Tesla, we can enhance our grasp of the current landscape and potential future trends within the new energy vehicle industry, thereby offering valuable insights and recommendations for the future trajectory of the automotive sector.

1.2. Related research

Numerous studies have offered profound insights into Tesla and its operational and managerial strategies within the electric vehicle (EV) industry. Chen and Perez explored the Electric Vehicle (EV) industry in its early product life cycle phase. Incumbent and emerging EV companies aim to introduce innovation in products and business models, with Tesla Motors standing out for disruptive solutions. The study reviewed business model approaches and categorized EV ecosystem innovation.

Tesla's strategy includes gradual market entry, addressing range anxiety via superchargers and high-capacity batteries, extensive IT integration, and vertical integration in battery and recharging. Valuable insights for established automakers are distilled from Tesla's methods [1]. Hardman et al. examined a market entry strategy for Fuel Cell Vehicles (FCVs) based on disruptive innovation precedents. While prior research briefly explored Tesla's Battery Electric Vehicle (BEV) entry, this study deeply investigates Tesla's high-end encroachment approach with disruptive technology. This historical case illustrates potential for valuable disruptive tech in entrenched markets. The study aids FCV and BEV marketing insights. Tesla's unique BEV strategy is highlighted, distinct from competitors. The paper contrasts this with historical cases like Daimler's innovations in flagship models. Authors argue against mass-market FCV introduction and stress BEVs' disruptive nature via Three Point Disruptive Technology Criteria [2]. Mangram analyzes Tesla's strategic marketing plan, comparing it to traditional auto industry practices. Using qualitative research and case studies, the study highlights Tesla's 'new technology' marketing approach, similar to Apple's success. It explores Tesla's potential in the growing electric vehicle market and suggests focusing on brand building, cost optimization, and innovative sales strategies. The study concludes that Tesla's unique marketing strategy positions it for success, akin to Apple's transformation in the computer industry [3]. Musonera and Cagle evaluated the industry and recommended sustainable strategies aligned with Tesla's mission through Michael Porter's Five Forces analysis. The shifting market and cultural acceptance of electric vehicles amplify the allure of Tesla's innovative design, cementing its competitive edge [4]. Akakpo, Gyasi, Oduro and Akpabot elucidates Tesla's management strategies, organizational policies, and forward-thinking approaches in formulating a practical blueprint for future mass production of affordable electric vehicles (EVs). In light of escalating global automotive uncertainties, evolving technology, and concerning carbon emissions surge, a departure from conventional practices to an innovative, executable solution became imperative. Faced with these challenges, Tesla devised an ambitious plan centered around advanced battery technology. This strategic approach positions Tesla to achieve large-scale, economical EV production devoid of emissions, noise, or pollution – revolutionizing the industry [5]. Mangram delves into Tesla Motors' pioneering role as the first automaker to manufacture and sell long-range, highway-capable electric vehicles in serial production, a pivotal contribution to the burgeoning global electric vehicle industry. This case study analysis suggests that the company can effectively address its challenges by adopting a strategic Market-Based Management framework and an integrated internal-markets strategy. This study holds importance for scholars and practitioners, offering a novel application of a proven management framework to a transformative and evolutionary enterprise [6].

Furthermore, beyond the exploration of the company's operational and managerial strategies, scholars have also extensively examined facets of Tesla's corporate finance, including its capital structure and market valuation. Strauss and Smith examines how corporate communication, specifically Tesla's tweets about a new product, and media framing impact share prices. Employing a multi-method approach, the research analyzes market events, financial news, and Elon Musk's tweets. Findings suggest market reactions are driven by events and expectations, with financial news relying on Musk's attention-grabbing tweets for sustained engagement. Remarkably, Twitter accounts of firms like Tesla serve as valuable information sources for day traders and shareholders, fostering profitable trades. The study highlights the need for prudent social media communication, considering market regulations and potential effects on company valuations [7]. Song delves into the practicality of value investing, a robust valuation technique aiding investor decisions rooted in real business conditions across various periods. It underscores the success of this method, particularly in share acquisitions and provision of reliable information for shareholders and boards. The essay's focal point is a quantitative analysis of Tesla Ltd., notably during the Covid-19 period. Utilizing financial statements and stock prices, it conducts multiple valuations. Given the innovative nature of the research, limited existing studies are available. The essay furnishes a comprehensive overview of Tesla Inc.'s financial ratios in 2019 and 2020, followed by an in-depth analysis estimating share prices and enterprise value. A comparison of estimated and actual values determines potential discrepancies.

Ultimately, the essay assesses the accuracy of Tesla Inc.'s key figures and concludes with informed recommendations for future research directions [8]. Pan delves into Tesla's capital structure, delving deep into its response to the COVID-19 pandemic and the global surge in costs. Employing the Discounted Cash Flow (DCF) model, a widely employed capital pricing technique, it estimates Tesla's present enterprise value to be approximately \$900 billion. A comparison with public valuation reveals the potential risk of overvaluation. Despite certain limitations, the DCF model remains pragmatic for evaluating distinguished corporations. Notwithstanding the ongoing influence of the pandemic, the electric vehicle domain, exemplified by Tesla, still holds substantial untapped growth potential [9]. Gilson and Abbott delve into the equity market valuation of Tesla Motors. The case thoroughly examines the valuation perspectives put forth by two analysts - one bullish and the other bearish on the stock by evaluating these analysts' arguments and analytical methodologies, and subsequently discussing the implications of their disparate stock valuations on the company's financing strategy [10].

1.3. Objective

Taking the literature review into account, this paper aims to extensively examine Tesla's operational strategies in the electric vehicle domain, with a particular focus on comparing its financial performance with traditional automotive manufacturers. Chapter 2 will delve into analyzing the financial comparisons between Tesla and established automakers like Volkswagen and Toyota, exploring the nuances in their capital structures and related aspects. Chapter 3 will further delve into Tesla's operational strategies and its distinctive achievements in the electric vehicle market. Drawing insights from these chapters will provide a comprehensive understanding of Tesla's influence and standing in terms of business strategy and finance.

2. Financial Comparison

As a frontrunner in the domain of EV, Tesla markedly surpasses the conventional automotive entities Volkswagen and Toyota in terms of its financial standing, thereby exemplifying the preeminence and latent prospects inherent in the EV sector.

In terms of profitability, Tesla significantly outperforms Volkswagen (VW) and Toyota. Its net profit margin, gross profit margin, and return on equity are all substantially higher than those of the latter two companies. This signifies Tesla's robust competitiveness in product sales and cost management, while also reflecting its effective product pricing strategy and brand premium effect. VW and Toyota, as traditional automotive manufacturers, exhibit relatively lower profitability primarily due to the impact of market competition and industry dynamics, as shown in Figure 1. In 2022, Tesla achieved a revenue of \$81.462 billion, marking a year-on-year increase of 51%. The Volkswagen Group reported an official total revenue growth of 11.6% to €279.2 billion (approximately \$303.3 billion). Toyota's revenue reached ¥37.1542 trillion (approximately \$254.1 billion), representing a year-on-year growth of 18.4%.

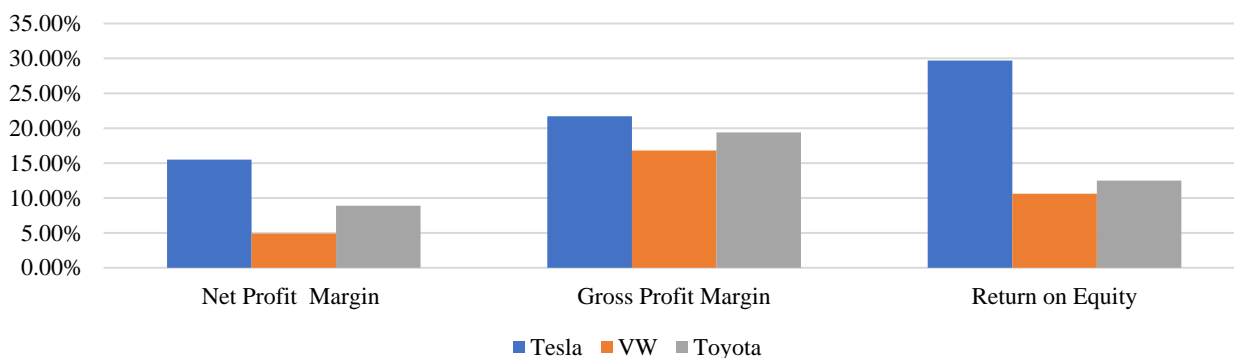


Fig. 1 Profitability Comparison

Regarding operational efficiency, Tesla also demonstrates a higher level of performance. Its inventory turnover ratio, accounts receivable turnover ratio, and total asset turnover ratio surpass those of VW and Toyota. This indicates Tesla's efficiency in inventory management, accounts receivable collection, and asset utilization, enabling rapid conversion of funds into cash flow. Conversely, VW and Toyota's operational capabilities are relatively lower, influenced primarily by their product structure and market demand.

In terms of solvency, the differences between Tesla, VW, and Toyota are marginal. Their asset-liability ratios hover around 150%, with current ratios and quick ratios both exceeding 1. This underscores that all three companies maintain reasonable levels of debt and possess sufficient liquid assets to meet short-term debt obligations. However, Tesla holds a slight advantage over VW and Toyota in liquidity, as evidenced by its higher current and quick ratios, indicating stronger short-term liquidity.

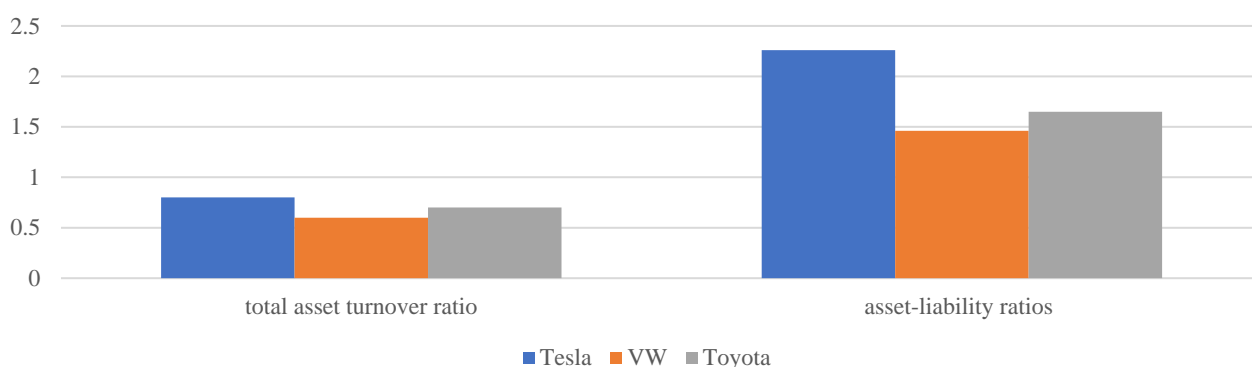


Fig. 2 Solvency Comparison

In the realm of corporate development capabilities, Tesla unquestionably stands out. Its growth rates in revenue and net profit significantly exceed those of VW and Toyota, and all are positive values. This highlights Tesla's achievement of rapid expansion in 2022, while also sustaining profitability elevation. In contrast, VW and Toyota faced setbacks due to the impact of the pandemic and market fluctuations, resulting in declines in both revenue and net profit. Furthermore, Tesla's proportion of research and development expenses is higher than that of VW and Toyota, signifying substantial investments in technological innovation and laying the groundwork for future advancement.

In conclusion, we can derive the following conclusions: As a trailblazer in the electric vehicle sector, Tesla's financial standing surpasses that of traditional automakers VW and Toyota across various dimensions, particularly excelling in profitability and corporate development capabilities. This excellence underscores the high growth potential and profitability within the electric vehicle industry. VW and Toyota, emblematic of traditional automotive companies, exhibit comparatively weaker financial profiles mainly due to the constraints posed by market competition and the prevailing industry landscape.

3. Discussion

The findings presented in the preceding analysis shed light on several crucial dimensions of the financial performance and operational dynamics of three prominent automotive entities: Tesla, Volkswagen, and Toyota. The discourse pivots around four central facets: profitability, operational efficiency, solvency, and corporate developmental capability. These parameters serve as the bedrock for understanding the comparative standing of these entities within the contemporary automotive landscape.

3.1. Profitability

The observed disparities in profitability are particularly notable. Tesla's discernible competitive edge, underscored by its superior net profit margin, gross profit margin, and return on equity, underscores its prowess in both product commercialization and adept cost management. The strategic nexus of its product pricing approach and brand premium positioning has accentuated this advantage. In contrast, the relatively subdued profitability of Volkswagen and Toyota can be attributed to their legacy as conventional automotive incumbents. These entities appear to be grappling with the ongoing market competition and the transformative industry environment engendered by the rise of new energy vehicles.

3.2. Operational efficiency

Operational efficiency serves as a pivot upon which these entities' nimbleness rests. The results vividly demonstrate Tesla's operational excellence, manifest through its elevated inventory turnover, accounts receivable turnover, and total asset turnover ratios. The astute management of inventory, prompt accounts receivable retrieval, and efficient asset utilization underscore Tesla's adeptness at resource optimization. Conversely, Volkswagen and Toyota exhibit operational limitations, reflective of the influence of their prevailing product structures and market exigencies.

3.3. Debt-paying ability

The examination of solvency reveals a measure of parity among the trio. Their debt-to-asset ratios, encapsulating financial leverage, are relatively consistent, suggesting a comparable degree of indebtedness management. Notably, all three companies maintain current and quick ratios above unity, signifying their ability to satisfy short-term financial obligations. Tesla, however, maintains a marginal liquidity advantage, which hints at its enhanced capacity to navigate immediate fiscal commitments.

3.4. Developmental capability

The sphere of corporate developmental capability underscores Tesla's distinctive trajectory. Its accelerated revenue growth rate and net profit growth rate resonate with its role as an industry pioneer, while Volkswagen and Toyota have confronted challenges stemming from external disruptions, resulting in revenue and net profit contractions. Tesla's emphasis on research and development expenditure, superior to its peers, exemplifies its commitment to innovation and resilience to shape its future trajectory.

In summation, this discussion encapsulates the multi-faceted comparative analysis of Tesla, Volkswagen, and Toyota from the financial and operational vantage points. The empirical evidence underscores Tesla's preeminence as a leader in the new energy vehicle sector and accentuates the transformative potential this sector harbors. Furthermore, this comparative exploration elucidates the underlying mechanisms that contribute to the distinct positioning of these companies within the contemporary automotive paradigm.

4. Conclusion

This paper delves into an extensive examination of Tesla's operational strategies, mainly financial aspects within the electric vehicle sector. The research particularly emphasizes a comparative analysis of Tesla's financial performance against that of conventional automotive manufacturers. By conducting a comprehensive literature review, the study ascertains Tesla's strategic position in the realm of electric vehicles, juxtaposing it with established industry players. The analysis reveals that Tesla's unique approach to capital structure, leveraging innovation-driven strategies, has allowed it to establish a distinctive presence in the electric vehicle market. It becomes evident that Tesla's financial agility and risk-taking have enabled it to achieve substantial growth and market valuation, challenging the conventional norms of the automotive industry.

The research underscores the significance of innovation-driven operational strategies, such as those employed by Tesla, in fostering success and sustainability in the ever-changing landscape of the automotive industry. Drawing from the findings, it is recommended that traditional automakers explore avenues for strategic partnerships, investment in research and development, and the integration of cutting-edge technologies to maintain competitive relevance.

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