Digital Transformation and Strategic Evolution of Mercedes-Benz: A Case Study on Innovation, Challenges, and Global Competitiveness

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Abstract. Recently, digital transformation has established itself as a primary impetus behind the evolution and competitive edge of companies. With the ongoing development of innovations such as autonomous driving, connected vehicles, and big data, automotive manufacturers are now confronted with the crucial task of using digital technologies to remain highly competitive. This paper takes the globally leading luxury automotive brand, Mercedes-Benz, as an example. Through case analysis and SWOT analysis, this paper identifies the digital strategic deployment of Mercedes-Benz in terms of digital platforms, intelligent manufacturing, and user services. The results indicate that the, success of Mercedes-Benz lies in its integration of digital technology R&D customer-centric innovation, the support of policies from various countries. However, challenges such as insufficient patent reserves and limited market expansion constrain the development of Mercedes-Benz. Therefore, this paper suggests that Mercedes-Benz should increase investment in core technologies and formulate localized strategies for key markets such as China. These findings provide a reference for automotive firms seeking to enhance sustainable growth and competitiveness through digital transformation.

Keywords: Mercedes-Benz, Digital transformation, Automotive.

1 Introduction

Digital transformation (DT) signifies innovation and transformation within enterprises driven by digital technologies, not only optimizing processes but also reshaping business models, organizational structures, value propositions, and even creating entirely new services and business models. It represents a profound and systemic change [1]. Currently, many governments, international organizations, and industry associations are formulating long-term strategies related to DT, aiming to achieve a series of objectives such as enhancing business added value and constructing digital infrastructure through policy initiatives, while enterprises also leverage disruptive technologies to strengthen market competitiveness [2]. Digital technologies not only reduce the costs of business activities—for example, cloud computing provides enterprises with low-

© The Author(s) 2026
A. J. Moshayedi (ed.), *Proceedings of the 2025 International Conference on Hybrid Commerce, Human Capital, and Economic Dynamics (ICHCH 2025)*, Advances in Economics, Business and Management Research 374,
https://doi.org/10.2991/978-2-38476-585-0_42

cost IT resources, lowering the threshold for IT investment and operational costs—but also improve user experience and enterprise productivity, such as mobile applications enabling digital connectivity between enterprises and customers or employees, thereby enhancing enterprise productivity and business responsiveness [3]. Against this backdrop, automotive enterprises are also profoundly affected. Following the continuous creation of new technologies, the traditional value creation mechanisms and ecosystem of the automotive industry are being fundamentally transformed, breaking the status quo previously dominated by original equipment manufacturers [4].

In 2024, Mercedes-Benz achieved the highest brand value in the global automotive industry, surpassing Tesla by $1.2 billion [5]. During its DT process, Mercedes-Benz not only leads the industry in terms of product intelligence but also actively deploys innovative initiatives across multiple areas including production, management, and services, exerting a strong demonstrative effect on the entire industry [6]. Therefore, this paper selects Mercedes-Benz as a case study to analyze its DT pathways and outcomes. Through case study analysis, this paper will discuss the main challenges faced by Mercedes-Benz during the DT process, summarize successful experiences, and propose corresponding countermeasures and recommendations. The purpose of these analyses is to inform the future advancement of automotive enterprises.

2 The Introduction, Development, Current Situation and Main Problems of Mercedes-Benz

2.1 Overview

In 1926, Mercedes-Benz established Germany, head office located in Stuttgart, not only sells automobiles globally but has also established manufacturing plants in more than 20 countries [7]. Its business scope covers three major areas: cars, vans, and mobility, with product offerings including sedans, SUVs, sports cars, and new energy vehicles (Mercedes-Benz USA) [6]. Moreover, Mercedes-Benz currently remains focused on building its brand around user experience [6]. The company is also guided by ethical objectives such as human rights, safety and sustainability [6]. Currently, Mercedes-Benz is prioritizing the extensive development of electric vehicles (EVs) in its strategy. [7].

2.2 Development History

Considering that comprehensive electrification is the primary strategic focus of Mercedes-Benz at present, according to Bloomberg NEF statistics, the electric vehicle market experienced a significant surge in both sales volume and charging infrastructure across multiple dimensions for the first time in 2021 [8]. For this reason, the paper analyzes post-2021 market data for Mercedes-Benz, aiming to explore both the Mercedes-Benz's financial performance and the periodical results of its electrification strategy in the evolving market landscape.

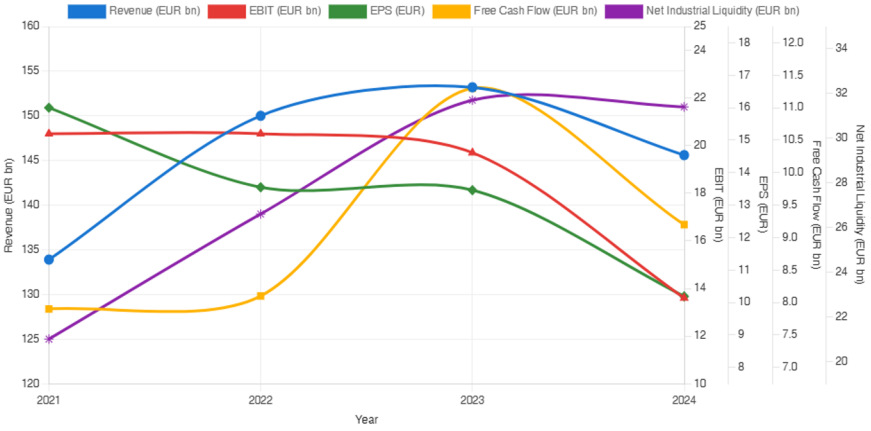

Fig. 1. Mercedes-Benz Group Key Financials (2021-2024) [9, 10]

As shown in figure 1, firstly, starting with € 133.9 billion in 2021, revenue reach to € 153.2 billion in 2023, before declining to € 145.6 billion in 2024. reflecting a downward trend after peaking in 2023. Secondly, EBIT remained stable at € 20.5 billion in 2021 and 2022, then dropped to € 19.7 billion in 2023 and further to € 13.6 billion in 2024, indicating a notable decrease in operational profitability in the most recent year. Thirdly, earnings per share reached its highest value of € 16.00 in 2021, then declined to € 13.55 in 2022, € 13.46 in 2023, and € 10.19 in 2024. Fourthly, free cash flow from industrial operations fluctuated, rising from € 7.9 billion and peaking at € 11.3 billion in 2023, then fails to € 9.2 billion in the next year. Finally, net industrial liquidity increased steadily from € 21.0 billion to € 31.7 billion before 2024, and slightly fail to € 31.4 billion. In summary, while the Mercedes-Benz Group maintained strong liquidity and cash flow in recent years, both revenue and profitability indicators faced downward pressure in 2024.

3 Mercedes-Benz’s Current Strategies for Digital Transformation

3.1 Mercedes-Benz's Digital Strategy Plan

All three core business segments currently operated by Mercedes-Benz regard DT as a strategic priority, aiming to drive business innovation and enhance customer experience through data and intelligent technologies. The core strategy of Cars and Vans includes establishing emotional bonds with customers by integrating technology, digitalization, lifestyle, and culture, thereby creating and leading a comprehensive digital brand experience in the automotive sector. Data and artificial intelligence are leveraged to improve profitability, enhance communication efficiency with customers, provide personalized

services and experiences, and achieve integrated omni-channel sales [6]. The core strategy for Mobility includes establishing comprehensive digital platforms and infrastructure to enhance customer experience, encouraging user engagement in digital experiences, simplifying management processes for both customers and the company, and maintaining sustainable development [6]. These core strategies not only embed digital technologies into corporate operations, product manufacturing, and innovation, but also create entirely new business models and services, generating new value through digital technologies. At the same time, Digital Trust is regarded as a basic strategy, with a strong emphasis on data security and user privacy protection, managing customer data in a transparent and compliant manner, and demonstrating its technological values in the digital era [6].

3.2 Digital Transformation for Users Ends

Mercedes-Benz develops new technologies centered on customer satisfaction, such as intelligent connected vehicles, with the goal of becoming the number one brand in user satisfaction within the premium automobile market [6]. The company utilizes anonymized customer data to offer more personalized products and services, places great importance on customer trust, and ensures data transparency, security, and customer choice. Customers are empowered to control their own data via the app, and Mercedes-Benz has established stringent AI and data usage principles to safeguard privacy and security [6]. Mercedes-Benz invests significant resources in providing mobility services, such as investing in Blacklane to offer consumers more comprehensive and digitalized mobility solutions, and enables simple online shopping processes through digitalization [6]. The Mercedes me platform offers consumers services such as remote vehicle status inquiry, vehicle control, and navigation. These customer experience-centered digital initiatives are reorganizing and redefining the way users interact with their vehicles, actively communicating the company’s values to consumers, and ensuring that every Mercedes-Benz owner can conveniently enjoy a smarter and safer automotive lifestyle.

3.3 Digital Transformation within Enterprises

In the production process, Mercedes-Benz has established the MO360 system as the core, building an intelligent system that covers the entire value chain from procurement and production to equipment maintenance, thus empowering automotive manufacturing through digital technology. Through collaboration with Microsoft, it has established the MO360 digital platform, which is based on Microsoft Azure and supports real-time data analytics to help teams resolve supply chain bottlenecks more efficiently, optimize resource allocation, and prioritize the production of low-emission and premium models [11]. In addition, Mercedes extensively implements automation software and system to reduce costs and improve efficiency. For example, by automating routine computer tasks that were previously performed manually, the software significantly cuts the overall processing time—from approximately 230 hours down to about 26 hours—resulting in labor savings equivalent to about five employees [12]. The Beijing Benz engine plant

operates highly automated and intelligent production lines, with an automation rate as high as 98%. Right from the planning and design stages, the factory incorporated smart and flexible manufacturing concepts, merging the principles of Germany's Industry 4.0 with the advancements of China's manufacturing upgrade. This approach has resulted in a digital factory centered on intelligent production, smart logistics, and advanced quality management [13].

4 SWOT Analysis

4.1 Strengths

In addition to the aforementioned high brand value, Mercedes-Benz also possesses industry-leading technological R&D capabilities, integrating AI into the MB.OS operating system to optimize the consumer driving experience. Furthermore, Mercedes-Benz has obtained autonomous driving policy support in both Germany and Beijing, reflecting the strong reputation of its technology [6]. At the same time, they have a highly developed production and sales network. The company operates 20 factories across eight countries, which provides Mercedes-Benz with a comprehensive production network and global technological collaboration capabilities [7]. With 262 subsidiaries deployed worldwide, combined with digital platforms such as Mercedes me, Mercedes-Benz is able to offer consumers convenient sales, after-sales, and digital services [14].

4.2 Weaknesses

Firstly, although Mercedes-Benz spend much in the R&D of new technologies overall, its number of patents is still insufficient compared to other major automotive companies. The number of its publicly available and valid patent titles after 2020 (282 items) accounts for only 2.49% among the top five global automotive companies in 2022 [15]. Although a low patent count does not necessarily indicate a lack of innovation capability, compared to companies with a larger number of patents, patent barriers, blockades, and litigations may place Mercedes-Benz in a disadvantaged competitive position [16].

Secondly, Mercedes-Benz lacks competitiveness in market expansion. Since 2021, the overall automotive market has shown an upward trend, the number (in million) of units reaching 83.64 in 2021, slightly declining to 82.99 in 2022. By 2023, sales rebounded significantly to 92.85 and continued to grow to 95.31 in 2024 [17]. In this context of automotive market recovery, Mercedes-Benz's performance has been less than satisfactory, with sales remaining around 2.4 million units from 2021 to 2024 [9, 10]. Especially during the period from 2022 to 2024, when global automotive industry sales surged, Mercedes-Benz's sales increased from approximately 2.45 million to about 2.5 million, then declined back to around 2.4 million [9, 10]. This trend is also reflected in several indicators such as revenue and EBIT. Among them, the company's core strategic layout in electric vehicles faced even greater setbacks, with only 185,000 pure electric vehicles sold in 2024, representing a decline of about 23% [10].

4.3 Opportunities

Governments around the world are vigorously promoting clean transportation solutions. For example, European governments are targeting carbon neutrality through the European Green Deal [18]. The New Energy Vehicle Pilot City initiative provides incentives and subsidies for new energy technologies in China, China also designated the industry of vehicle those do not use traditional energy sources as a national strategic sector [19,20]. Under the stimulus of these policies, enterprises are actively engaged in the development of new technologies, and numerous advancements have not only reduced EV prices but also improved driving range. For instance, from 2010 to 2021, battery pack costs fell by 90%, enhancing consumer willingness to purchase EVs [21]. Research also demonstrates that those with greater financial resources show a greater paying willingness for the goods that friendly for environment with higher price, which aligns with the Mercedes-Benz's brand position that usually regarded as a symbol of high income [22].

4.4 Threatens

Beginning in 2022, almost 60% of the world's newly registered electric vehicles have been in China. For the first time, the country's electric vehicle fleet represents more than half of the global total. Overall sales in China have far surpassed those of other countries, making it the primary source of incremental growth in the current electric vehicle sector [23]. However, with intensifying competition with China, the German government has gradually opposed automotive investment in China. Cooperation with China may also lead to the technological advancement of local enterprises, thereby increasing their competitiveness, and collaboration with controversial Chinese companies may provoke negative reactions from Western consumers [24]. In addition, research indicates that Chinese consumers have the highest preference for domestic and emerging brands, and for traditional Western automotive companies such as Mercedes-Benz, willingness to pay for the brand decreases by 62,000 Yuan [25].

5 Future Prospect

5.1 Measures and Suggestions Dealing With Risks

Firstly, in response to insufficient market expansion momentum and the delicate relationship with the Chinese market, this paper recommend that Mercedes-Benz further cultivate the high-potential electric vehicle market in China. For example, Mercedes-Benz's brand operations in China can be appropriately localized, with enhanced monitoring of sensitive topics and improved public sentiment response mechanisms. Communication with local Chinese teams should be strengthened to develop brand communication strategies that better align with the realities of the Chinese market. For instance, Mercedes-Benz's public support for LGBTQ+ groups in western culture demonstrates the brand's diversity and inclusiveness [6]. However, research indicates

that Chinese market preferences for EVs are related to self-expression, and within the Chinese socio-cultural context, LGBTQ+ topics may cause discomfort among some consumers [26]. Previously, Mercedes-Benz quoted the Dalai Lama, who is regarded as a separatist by China, "hurting the feelings of the Chinese people" [27].

5.2 New Technologies and the Prospects of Digital Innovation

In 2024, Mercedes-Benz's R&D expenditure for passenger vehicles reached €8.7 billion, with reduced spending on existing models and traditional powertrains, and the R&D expenditure mainly flows to the new electric architectures and the expansion of autonomous driving [6]. this paper recommend that Mercedes-Benz further support the development of own patents in the electric vehicle sector, continuously increasing independent innovation in core technologies such as electric drive, battery management, and intelligent energy consumption control. This will ensure that its 2030 all-electric plan will not be delayed or hindered by patent issues.

6 Conclusion

This paper takes Mercedes-Benz as a case study to analyze their DT strategic deployment, major achievements, and challenges. The findings indicate that Mercedes-Benz's DT strategy is reflected not only in product intelligence and production process optimization, but also extends comprehensively to the holistic promotion of enterprise production, the restructuring of business models, and service models. The company has continuously invested significant resources in digital platforms, intelligent manufacturing, and user services to drive innovation. By integrating advanced technologies with a customer-centric philosophy, Mercedes-Benz has enhanced its brand competitiveness and sustainable development potential. For instance, through the integration of AI and automation software to manage and optimize automobile manufacturing, Mercedes-Benz has redefined the way cars are made, significantly improving production efficiency and product quality. However, this paper also identifies that Mercedes-Benz is currently facing issues such as insufficient patent reserves and lackluster expansion in the non-traditional energy vehicle market. The emergence of these issues is influenced not only by the evolving global new energy policy environment and changing market landscape, but also closely related to the company's own investment in innovation and localization strategies. In response, this paper suggests that Mercedes-Benz should increase its R&D efforts in core technologies and patent accumulation, particularly maintaining continuous investment in electrification and intelligentization. Furthermore, it is recommended to formulate localized brand strategies and mechanisms for addressing sensitive topics in key markets such as China, in order to better seize development opportunities amid the global wave of non-traditional energy vehicles.

The significance of this case analysis lies in providing an industry-representative empirical reference for the DT of the automotive sector. It reveals the pathways and strategic choices of traditional manufacturing enterprises when responding to new tech-

nological revolutions and market changes, as well as highlighting the potential shortcomings faced during DT. These insights contribute to promoting sustainable development and enhancing global competitiveness for enterprises. However, this study focuses exclusively on Mercedes-Benz as a case example. The analysis and data are based primarily on information accessible to the public, and do not encompass all industry variables or include insights from company insiders. Future research could further expand to multi-case comparisons, incorporating more primary data to discover the effectiveness of DT under different corporate and market environments.

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