Novelty Journals

ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 12, Issue 3, pp: (31-38), Month: September - December 2025, Available at: www.noveltyjournals.com

INNOVATION IN THE EV INDUSTRY: CASE STUDY OF TESLA 2019 – 2025

Nguyen Huynh Trong Hieu[1], Pham Tran My Duyen[2]

[1,2] Ho Chi Minh City University of Foreign Languages - Information Technology

DOI: https://doi.org/10.5281/zenodo.17588714

Published Date: 12-November-2025

Abstract: **This study investigates Tesla's strategic application of technological innovation within the electric vehicle (EV) industry, focusing on the U.S. market between 2019 and 2025. As global demand for sustainability and smart mobility accelerates, Tesla exemplifies how firms can integrate technology, data, and vertical integration to gain lasting competitive advantage. Using secondary data from company reports, industry analyses, and academic literature, the study explores Tesla's product, service, marketing, and R&D strategies as interconnected pillars of innovation. Findings reveal that Tesla's innovation approach which anchored in autonomy, digitalization, and renewable energy has revolutionized the EV industry. Continuous software improvements, over-the-air (OTA) updates, and AI-driven safety features have enabled superior performance and customer engagement. However, challenges such as inconsistent quality control, overreliance on Elon Musk's leadership, and limited service scalability persist. The study concludes that Tesla's innovation strategy demonstrates a dynamic balance between technological experimentation and strategic discipline. Future growth depends on strengthening production quality, diversifying communication channels, and enhancing AI-enabled customer support. Tesla's experience offers both theoretical and practical insights into how technology innovation can redefine competition in the global automotive industry.**

Keywords: **Tesla, technological innovation, electric vehicle, vertical integration, strategy, competitive advantage.**

1. INTRODUCTION

1.1 Rationale

The automotive industry is experiencing an unprecedented technological transformation driven by sustainability imperatives and digital disruption. Tesla, Inc. has become a defining force in this evolution. Since its founding in 2003, Tesla has pioneered innovations that merge artificial intelligence, renewable energy, and automation to revolutionize transportation.

Between 2019 and 2025, Tesla's revenue grew from $24.6 billion to over $96 billion, driven by its vertically integrated ecosystem that combines vehicle manufacturing, battery development, and clean energy production. Tesla's approach transcends the traditional automaker model: it operates as a technology company focused on accelerating the global shift toward sustainable mobility.

This research explores how Tesla's innovation strategy - through continuous technological development and strategic integration - has enabled it to maintain leadership in a rapidly evolving, competitive environment.

1.2 Aims and Objectives

The purpose of this study is to examine Tesla's technology innovation strategies and assess how they contribute to its competitive advantage in the U.S. market. The specific objectives are:

1. To analyze Tesla's innovations in product, service, marketing, and R&D.
2. To identify key factors and challenges influencing Tesla's innovation performance.

3. To evaluate how these strategies align with theoretical frameworks of innovation and sustainability.
4. To provide recommendations to strengthen Tesla's long-term innovation capacity.

1.3 Scope

The study focuses on Tesla's innovation activities in the United States from 2019 to 2025, covering developments in EV technology, software, energy solutions, and service models. Secondary data including academic papers, reports, and articles form the empirical basis of the analysis.

1.4 Significance

This study is significant because it illustrates how technology-driven firms can align innovation with strategic sustainability. Tesla demonstrates that competitive advantage can emerge not only from product excellence but from systemic integration—connecting design, AI, energy, and user experience. The findings benefit both scholars and practitioners aiming to understand how technological innovation can create enduring strategic impact.

1.5 Structure

The paper is structured into five chapters: introduction, literature review, methodology, findings and discussion, and conclusions and recommendations. This layout ensures logical progression from theoretical background to applied strategic insights.

2. LITERATURE REVIEW

2.1 Company Overview

Founded in 2003, Tesla, Inc. is an American company that designs, manufactures, and markets electric vehicles (EVs), energy storage systems, and renewable energy solutions. Headquartered in Austin, Texas, Tesla has evolved from a niche EV startup into a global leader in sustainable mobility and clean energy technologies (Tesla, 2023a). Under the leadership of Elon Musk, the company's long-term mission is to *accelerate the world's transition to sustainable energy* by delivering affordable, intelligent, and zero-emission transportation options (Musk, 2023; Mangram, 2023).

Tesla's vertically integrated business model is a defining characteristic of its competitive strategy. Unlike traditional automakers that rely heavily on suppliers and dealerships, Tesla controls multiple stages of its value chain, ranging from vehicle design, component manufacturing, and software development to sales, after-service, and charging infrastructure (Lambert, 2024; Munster, 2024). This integration enables superior cost control, consistent quality management, and rapid innovation cycles, allowing Tesla to introduce cutting-edge technologies such as Autopilot, Full Self-Driving (FSD), and Over-the-Air (OTA) software updates. Moreover, the company's expansion into energy generation and storage—through products like the Powerwall, Powerpack, and Solar Roof—positions Tesla as a holistic clean energy provider rather than merely an automotive manufacturer (Statista, 2024).

Through this combination of technological innovation, strategic integration, and sustainability focus, Tesla exemplifies the convergence of automotive engineering, digital technology, and environmental stewardship, reshaping global perceptions of mobility and energy consumption (Christensen, 2016; Kotler & Keller, 2023).

2.2 Market Development (2019 – 2025)

Between 2019 and 2024, Tesla's market share in the U.S. electric vehicle (EV) sector declined sharply from 74.5% to 36.5% as legacy automakers and new entrants intensified competition (Statista, 2025; Cox Automotive, 2024). Companies such as Volkswagen, BMW, Hyundai, and Ford significantly expanded their EV portfolios, leveraging existing production capacity and dealership networks to capture a growing share of the mid- and premium-price segments (Reuters, 2024). This shift reflects the natural market diffusion process of EV adoption, where early monopolistic advantages give way to broader industry participation once technology and infrastructure mature (Christensen, 2016).

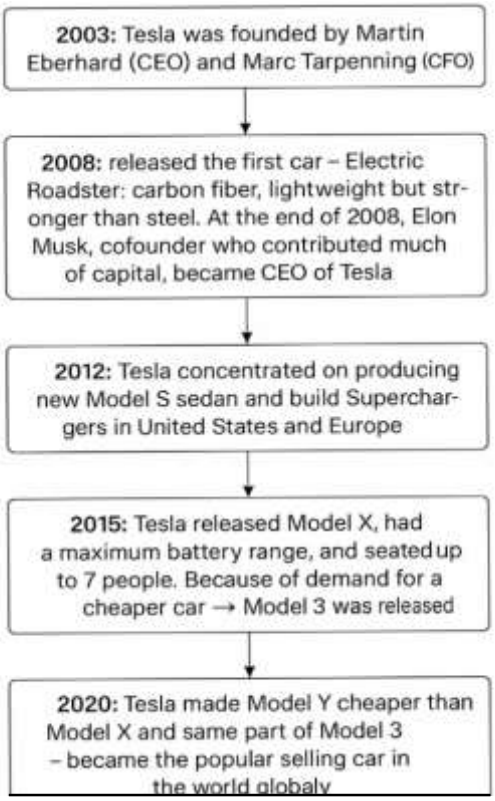
Despite this market share erosion, Tesla's overall revenue and brand equity continued to rise, driven by high-volume production, cost efficiencies, and product differentiation (Tesla, 2023a; Bloomberg, 2024). The company's global output surged following the expansion of Gigafactories in Shanghai, Berlin, and Austin, enabling economies of scale and greater localization of supply chains. Moreover, Tesla maintained premium pricing power through advanced software capabilities such as Full Self-Driving (FSD) and Over-the-Air (OTA) updates which reinforced its image as a technology innovator rather than a conventional automaker (Munster, 2024).

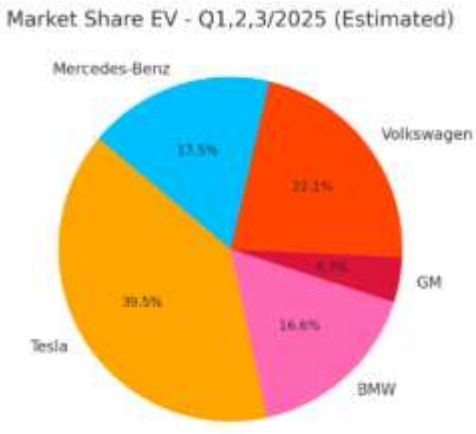
Novelty Journals

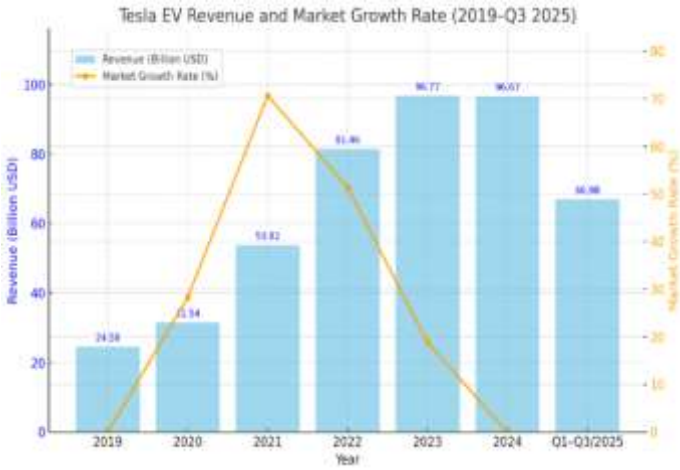
ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 12, Issue 3, pp: (31-38), Month: September - December 2025, Available at: www.noveltyjournals.com

Figure 1. Tesla's Market Share and Revenue Growth 2019–2025 ***(Source: Author, 2025)***







This paradox: declining market share amid increasing revenue highlights Tesla's successful strategic pivot from volume dominance to value-driven growth. The company's sustained profitability indicates that its innovation-led model can offset competitive pressure by deepening customer loyalty and expanding into adjacent sectors such as energy storage and grid services.

2.3 Theoretical Foundations

The concept of technological innovation builds on Schumpeter's (1942) theory of "creative destruction," where innovation continuously reshapes market structures. The *Oslo Manual* (1997) expands this notion, classifying innovation into product, process, marketing, and organizational types. Tesla exemplifies this multi-dimensional approach, integrating both technological and service-based innovation.

Verbano and Crema (2016) argue that technology innovation strategy connects knowledge assets with innovation outcomes - a framework highly relevant to Tesla's model, where R&D, AI, and vertical integration converge to enhance competitiveness.

2.4 Technology Innovation Components

Tesla's innovation strategy can be categorized into four pillars:

- **Product Innovation:** Tesla continuously enhances vehicle design, performance, and energy efficiency through OTA updates and AI integration.
- **Service Innovation:** The company emphasizes customer-centric digital platforms, mobile service networks, and direct-to-consumer sales.
- **Marketing Innovation:** Tesla rejects traditional advertising in favor of digital engagement, user communities, and social media advocacy.
- **R&D Innovation:** Internal and external collaborations drive battery technology, AI development, and manufacturing automation.

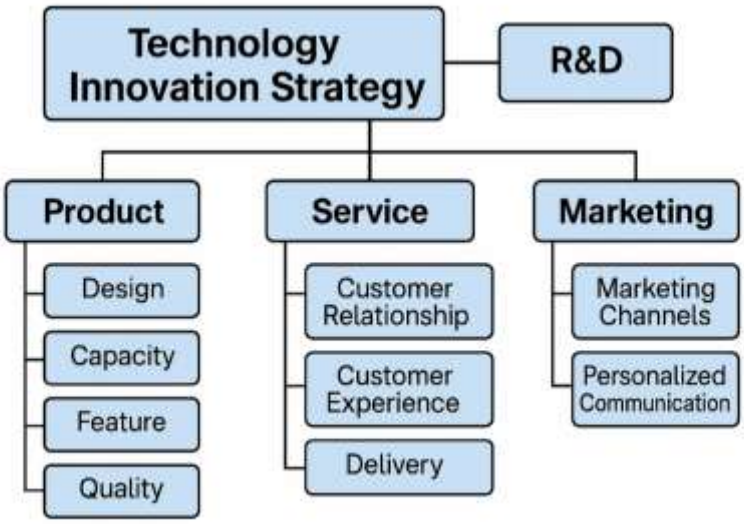


Figure 2. Tesla's Technology Innovation Framework (Source: Author, 2025)

2.5 Comparative Studies

BMW Case: Kukkamalla et al. (2021) emphasize BMW's innovation through connected-car services and digital ecosystems that enhance user experience and post-purchase engagement. BMW relies on partnerships with technology suppliers for data analytics and connectivity. In contrast, Tesla maintains full vertical integration, developing hardware and software internally to accelerate innovation cycles. Its Over-the-Air (OTA) updates enable real-time product improvement, reinforcing Tesla's agility and control over the customer experience (Lambert, 2024; Munster, 2024).

Battery Innovation: Lezama (2016) highlights Tesla's early adoption of lithium-ion battery architecture, which improved efficiency and reduced environmental impact. Large-scale Gigafactory production supports cost efficiency through economies of scale (Tesla, 2023a). More recently, Tesla's initiatives in battery recycling and sustainable material sourcing strengthen its long-term cost leadership while aligning with global decarbonization goals (Lutsey & Nicholas, 2023).

Self-Driving Vehicles: Maradin et al. (2018) identify Tesla as a pioneer in autonomous mobility, integrating AI directly into vehicle design. Through the Dojo supercomputer and Full Self-Driving (FSD) Beta, Tesla continuously refines driving algorithms using real-world data (Tesla, 2023b; Munster, 2024). Although regulatory approval remains a challenge, Tesla's rapid progress in AI-powered systems demonstrates its leadership in shaping the next stage of smart transportation.

International Journal of Novel Research in Marketing Management and Economics
Vol. 12, Issue 3, pp: (31-38), Month: September - December 2025, Available at: www.noveltyjournals.com

3. METHODOLOGY

3.1 Research Design

This study employs a qualitative secondary research design to investigate Tesla's innovation strategies over the period 2019–2025. The qualitative approach is appropriate for exploring patterns, meanings, and trends embedded in textual and documentary evidence rather than quantifiable metrics. By drawing from multiple secondary data sources, the research aims to provide a holistic and interpretive understanding of how Tesla's innovation practices have evolved in product development, service models, marketing approaches, and research and development (R&D) investments. The longitudinal scope—spanning six years—enables the identification of both continuity and change in Tesla's strategic trajectory, thereby offering insights into the company's sustained competitive advantage and adaptive responses to technological and market dynamics.

3.2 Data Collection

The data were collected from credible and authoritative secondary sources. Primary sources of information included Tesla's official annual and sustainability reports, press releases, and investor presentations, which offer direct insight into corporate strategies and performance indicators. Supplementary data were obtained from peer-reviewed academic journals, industry reports, and market analyses published in databases such as Google Scholar, ScienceDirect, and Statista, as well as from reputable business and technology repositories (e.g., Bloomberg, Forbes, and Fortune). The selection of materials was guided by three main criteria: credibility, relevance, and recency. Only sources published between 2019 and 2025 were considered to ensure the analysis reflects contemporary developments. Collectively, these sources provided a reliable foundation for evaluating Tesla's innovation practices within the broader context of the global electric vehicle and clean energy industries.

3.3 Data Analysis

The analytical process involved thematic categorization and synthesis of the collected data. Thematic analysis was chosen for its strength in identifying, organizing, and interpreting patterns within qualitative materials. Data were first grouped under four principal domains—product innovation, service innovation, marketing innovation, and R&D innovation—to reflect the multidimensional nature of Tesla's strategic initiatives. Within each domain, key themes and subthemes were extracted through iterative comparison and cross-source triangulation, allowing the researcher to discern both convergent and divergent insights. Analytical emphasis was placed on identifying strategic priorities, innovation outcomes, and their temporal progression from 2019 to 2025. To enhance interpretability, visualization tools such as trend charts and comparative tables were utilized to illustrate Tesla's innovation performance and strategic evolution across the studied period.

3.4 Limitations

While secondary data analysis provides valuable access to a wide range of credible information, it also presents inherent limitations. The study lacks direct access to Tesla's internal decision-making processes, managerial perspectives, and proprietary data, which could have enriched contextual interpretation. Furthermore, reliance on publicly available reports may entail some degree of reporting bias or selective disclosure. To mitigate these constraints, the research applied triangulation across diverse data sources, ensuring that interpretations were corroborated by multiple independent references. Despite these limitations, the methodological rigor and systematic validation of data strengthen the reliability and validity of the study's findings.

4. FINDINGS AND DISCUSSION

4.1 Overview

Table 1 summarizes Tesla's innovation milestones between 2019 and 2025, organized into four strategic domains: product, service, marketing, and research and development (R&D). These milestones illustrate Tesla's transformation from a purely automotive manufacturer to a technology-driven ecosystem that integrates artificial intelligence (AI), clean energy, and software-based services (Lambert, 2024; Statista, 2025). The longitudinal analysis captures Tesla's adaptive capacity to maintain leadership through sustained technological advancement and vertical integration (Mangram, 2023).

Novelty Journals

ISSN 2394-7322

International Journal of Novel Research in Marketing Management and Economics
Vol. 12, Issue 3, pp: (31-38), Month: September - December 2025, Available at: www.noveltyjournals.com

Table 1. Tesla's Innovation Milestones (2019–2025)

Year	Product	Service	Marketing	R&D
2019	Model 3, Autopilot expansion	Direct sales	Brand collaborations	Partnership with Panasonic
2020	Model Y launch, OTA features	Touchless delivery	Social media focus	Lithium contracts, Dalhousie University collaboration
2021	Model S Plaid, AI-enabled design	Digital app integration	Online community	4680 battery development
2022	FSD Beta, Dojo AI project	Mobile service growth	Digital-first strategy	Advanced AI and manufacturing robotics
2025	HW4 system, improved comfort	Expanded service centers	Global influencer outreach	Pure Vision Autopilot

(Source: Author, 2025)

Overall, Tesla's innovation portfolio reflects a consistent pattern of cross-functional development, where product, service, and technological advances mutually reinforce strategic competitiveness (Vance, 2023).

4.2 Product Strategy

Tesla's product innovation strategy focuses on the integration of hardware excellence and software-driven adaptability. The introduction of Over-the-Air (OTA) updates transformed vehicle maintenance and user experience by enabling remote system upgrades and real-time feature deployment (Tesla, 2023a). This approach differentiates Tesla from traditional automakers who rely heavily on physical service networks (Boudette, 2021).

The evolution from Autopilot to Full Self-Driving (FSD) capability represents Tesla's core commitment to autonomous mobility (Lambert, 2023). Although these developments have attracted regulatory scrutiny over safety and labeling accuracy (National Highway Traffic Safety Administration [NHTSA], 2024), they demonstrate Tesla's first-mover advantage in embedding AI into vehicular systems. The continuous rollout of hardware version 4 (HW4) and improvements in real-time processing further position Tesla as a digital-first automaker, blurring the line between automotive engineering and consumer electronics (Munster, 2024).

4.3 Service Strategy

Tesla's service innovation lies in its direct-to-consumer (D2C) model, bypassing traditional dealerships and creating a unified customer experience (Tesla, 2023b). The company's mobile repair fleet and app-based service scheduling offer a high level of accessibility and personalization (Hawkins, 2022). During the COVID-19 pandemic, the introduction of "Touchless Delivery" set an industry benchmark for contactless vehicle transactions, reinforcing Tesla's agility and digital service readiness (Reuters, 2020).

However, as global demand surged, Tesla faced challenges related to service center congestion and long repair wait times (InsideEVs, 2023). These operational issues highlight a misalignment between rapid product expansion and service capacity growth. Despite such constraints, the service model continues to provide Tesla with valuable data loops that inform design improvements and enhance long-term customer retention (Statista, 2024).

4.4 Marketing Strategy

Tesla has redefined automotive marketing by eliminating paid advertising and relying instead on organic communication and digital engagement (Kotler & Keller, 2023). The brand's narrative is amplified through Elon Musk's personal online presence, which generates continuous media coverage and public discourse (Business Insider, 2024). This approach reduces traditional marketing costs while fostering emotional engagement with the brand (Mangram, 2023).

Tesla's online community forums, referral programs, and mobile app communications enhance personalization and customer advocacy (Tesla, 2022). Nevertheless, overdependence on Musk's persona has been identified as a reputational risk factor, as controversies on social media occasionally affect investor confidence (The Guardian, 2024). By 2025, Tesla's global influencer collaborations signify a gradual effort to decentralize brand representation and create more institutional brand resilience beyond its CEO (Bloomberg, 2025).

4.5 R&D Strategy

Research and Development (R&D) form the technological backbone of Tesla's competitive positioning. Projects such as the 4680 battery cell and Dojo supercomputer represent milestones in scaling cost efficiency and deep learning capabilities (Tesla, 2023c). The 4680 cell's higher energy density and simplified production process mark significant progress in Tesla's vertical integration efforts (Lutsey & Nicholas, 2023).

Collaborations with Panasonic, Dalhousie University, and AI research institutions further diversify Tesla's innovation network (Chediak, 2023). These partnerships enable the company to access specialized expertise and accelerate experimentation cycles. However, the intensity of R&D expenditure reaching over $3.1 billion in 2024 (Statista, 2025) necessitates strict capital discipline to sustain profitability amid global competition. This tension between innovation speed and financial control remains a defining feature of Tesla's strategic management.

4.6 Discussion

The findings reveal that Tesla's innovation strategy is multi-dimensional and integrative, combining technological advancement with customer experience optimization. The vertical integration model not only enhances supply chain control but also enables Tesla to capture more value across production stages (Lambert, 2024). This structure supports faster feedback loops, agile production, and continuous improvement hallmarks of systemic innovation capability (Chakravarthy & Lorange, 2023).

Nevertheless, Tesla's aggressive growth trajectory introduces operational risks. Quality inconsistencies, service delivery delays, and the over-centralization of brand identity around Elon Musk present strategic vulnerabilities (Business Insider, 2024; The Guardian, 2024). Furthermore, the fast pace of innovation sometimes exceeds the capacity of regulatory frameworks to adapt, creating compliance and safety challenges (NHTSA, 2024).

Tesla thus exemplifies the dual nature of disruptive innovation as both a source of sustained advantage and a generator of organizational strain (Christensen, 2016). To maintain long-term leadership, Tesla must balance experimentation with execution, integrating operational scalability with visionary innovation. The company's evolution from a disruptor to an institutionalized global leader will depend on how effectively it manages this dynamic equilibrium in the maturing EV industry.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Tesla's innovation journey between 2019 and 2025 demonstrates how technological foresight and vertical integration can redefine an industry. The company's achievements in product performance, digital service, and AI-driven design illustrate its ability to blend technology with sustainability. However, maintaining market leadership now requires greater attention to quality assurance, service scalability, and risk diversification.

The study concludes that Tesla's innovation success lies in its integrated approach which combines R&D excellence, digital marketing, and customer experience. Nevertheless, innovation must evolve from being personality-driven to system-driven to ensure long-term resilience.

5.2 Recommendations

This research paper identifies Tesla's current challenges and proposes solutions focused on quality control, safety, and brand management. Present issues include inconsistent production quality, limited safety monitoring, and insufficient automation. The paper highlights the need for enhanced production monitoring, stronger preventive measures, and the integration of advanced vision systems to detect and correct errors in real time. In areas lacking full automation, increased manual inspection is necessary. Safety concerns have also arisen due to the removal of radar sensors, emphasizing the need to reassess the elimination of radar and cameras and strengthen real-time AI-based monitoring.

Tesla's service infrastructure remains underdeveloped, causing long wait times and weak customer support. The company also faces communication inefficiencies, relying heavily on Elon Musk's persona rather than structured corporate channels. To address these, the paper recommends implementing a Comprehensive Quality Assurance Program (CQAP), upgrading

TeslaCare+ services, and establishing a Global Brand Communication Unit to improve reliability, customer satisfaction, and brand reputation.

For the future, Tesla should expand service centers across the U.S., deploy 24/7 AI chatbots for customer support, and enhance employee training in maintenance and delivery. Diversifying communication channels on major platforms (TikTok, Instagram, Facebook) will strengthen visibility and prevent fraud. Additionally, Tesla must scale production of the 4680 battery, improve efficiency, and expand energy storage development. Maximizing the use of Dojo supercomputers will optimize AI training for safer self-driving. Finally, building localized marketing teams will ensure stronger global brand alignment and sustainable market growth.

REFERENCES

[1] *Blocked*. (2025). Bullfincher.io. https://www.bullfincher.io/companies/tesla/revenue

[2] *Cars.com*. (2018). Cars.com. https://www.cars.com/research/tesla/

[3] Church, R. M. (2002). The Effective Use of Secondary Data. *Learning and Motivation*, *33*(1), 32–45. https://doi.org/10.1006/lmot.2001.1098

[4] Daim, T. U., Chan, L., Estep, J., & Springerlink (Online Service. (2018). *Infrastructure and Technology Management : Contributions from the Energy, Healthcare and Transportation Sectors*. Springer International Publishing.

[5] Edgerton, D. (2010). Innovation, Technology, or History: What is the Historiography of Technology About? *Technology and Culture*, *51*(3), 680–697. https://doi.org/10.1353/tech.2010.0007

[6] FerreiraJ. J. M., TeixeiraS. J., & Rammal, H. G. (2021). *Technological innovation and international competitiveness for business growth : challenges and opportunities*. Palgrave Macmillan.

[7] Geels, F. W. (2005). *Technological transitions and system innovations: a co-evolutionary and socio-technical analysis*. Edward Elgar.

[8] Greenacre, P., Gross, R., & Speirs, J. (2012). *Innovation Theory: A review of the literature ICEPT Working Paper*. https://www.imperial.ac.uk/media/imperial-college/research-centres-and-groups/icept/Innovation-review---ICEPT-working-paper-version-(16.05.12).pdf

[9] Han, J. (2021a). How Does Tesla Motors Achieve Competitive Advantage in the Global Automobile Industry? *Journal of Next-Generation Convergence Information Services Technology*, *10*(5), 573–582. https://doi.org/10.29056/jncist.2021.10.09

[10] Han, J. (2021b). How Does Tesla Motors Achieve Competitive Advantage in the Global Automobile Industry? *Journal of Next-Generation Convergence Information Services Technology*, *10*(5), 573–582. https://doi.org/10.29056/jncist.2021.10.09

[11] https://www.nativeassignmenthelp.co.uk.(2022). *NativeAssignmentHelp*. Nativeassignmenthelp.co.uk; Native Assignment Help. https://www.nativeassignmenthelp.co.uk/teslas-operations-management-driving-efficiency-through-technology-and-innovation-case-study-25210

[12] *ICMIP 2022: proceedings of 2022 7th International Conference on Multimedia and Image Processing: Virtual Conference, January 14-16, 2022*. (2022). The Association for Computing Machinery.

[13] Koen Frenken. (2006). *Innovation, Evolution and Complexity Theory*. Edward Elgar Publishing.

[14] Kukkamalla, P. K., Bikfalvi, A., & Arbussa, A. (2020). The new BMW: business model innovation transforms an automotive leader. *Journal of Business Strategy*, *42*(4). https://doi.org/10.1108/jbs-02-2020-0021

[15] Lezama, R., & J, J. (2016). *Architectural innovation in the automotive industry: Tesla and the renaissance of the battery electric vehicle*. Dspace.mit.edu. https://dspace.mit.edu/handle/1721.1/107365

[16] *Management of Technological Innovation in Developing and Developed Countries*. (2025). Google Book