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Strategic Leadership for Building a Sustainable EV Business in India's Dynamic Automotive Sector: A Qualitative Study

Abstract

Research background and purpose: The current study, through the qualitative approach rooted in grounded theory, aims to explore the crucial role of integrated leadership styles in advancing the Electric Vehicle (EV) sector. The study identifies the key leadership approaches needed to drive innovation, manage industry growth, and address the transition towards sustainable mobility challenges.

Design/methodology/approach: The study adopts the qualitative approach utilising the grounded theory approach. The qualitative data were collected in two phases. The first phase comprises focus group discussions with the experienced leaders in the mobility sector, who have actually witnessed the transition of the mobility sector from combustion engine-based to EV-based. The data was further validated through the semi-structured individual interviews. In addition, the secondary sources and authors' observations were also utilised. The data was further analysed using a coding and thematic approach, and provides an in-depth and holistic understanding of leadership strategies in the rapidly evolving EV industry.

Findings: The study identifies the essential leadership approaches, competencies, and styles required to navigate the high-growth and dynamic nature of the EV sector. The study also underscores the role of integrated leadership needed to strike a balance between skilled leadership (which focuses on technical expertise and innovation) and traditional leadership (which focuses on governance and authority). Moreover, the study proposes a theoretical framework for fostering innovation, collaboration, and operational success within sustainable EV businesses.

Originality/value: Despite extensive research on leadership, existing theories do not fully address the complexities of the EV industry's transition to sustainability. This study contributes a novel perspective by integrating adaptive and balanced leadership strategies, offering a comprehensive framework to guide leaders in overcoming industry-specific challenges and driving long-term success.

Keywords: *EV, ICE, skilled leadership, traditional leadership, sustainable business model*

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1. Introduction

The global automotive industry is undergoing a paradigm shift driven by technological advancements, regulatory pressures, climate change, and shifting consumer preferences. This shift has placed the electric vehicle (EV) sector at the heart of discussions and debates among academia, leaders, and researchers around the globe (Rehman & Shakeel Sadiq Jajja, 2025). The transition from internal combustion engine (ICE) to electric vehicle (EV) is more than just a technical change; it is a fundamental reorganization of the automotive value chain that calls for flexible and progressive leadership (Hoeft, 2021). Leaders of the EV industry must handle a number of difficult issues as it grows, such as shifting labour markets, supply chain interruptions, changing regulatory environments, and escalating competition in the market (Proedrou, 2025). To ensure long-term sustainability, this shift calls for an integrated leadership approach that combines conventional leadership qualities with innovative, flexible tactics (Dickson, 2023).

Historically, leadership in the automotive sector has relied on structured and hierarchical models, such as transactional and transformational leadership, to drive efficiency and competitiveness. However, with the rise of EVs, there is a growing need to adopt leadership frameworks that emphasize resilience, flexibility, and technological foresight. The EV sector presents distinct challenges, including the development of charging infrastructure, the high cost of battery technology, consumer trust in EV reliability, and regulatory ambiguities regarding incentives and sustainability policies (Mohammad Shamsuddoha et al., 2025). Thus, to effectively address these challenges, the EV sector demands strategic and adaptive leadership. The leadership that fosters innovation and aligns business strategies with sustainability goals has become crucial to successful integration of EVs into mainstream mobility solutions(Kurucz et al., 2017).

Moreover, the leadership dynamics within the electric vehicle (EV) sector can be better appreciated by first examining its fundamental organizational structure. The EV business operates across two major divisions: Research and Development (R&D) and Operations. The R&D division focuses on developing competitive and technically viable products, requiring visionary leadership, emotional intelligence, and adaptability. Meanwhile, the Operations division ensures efficiency in day-to-day business activities, demanding process-oriented leadership that emphasizes lean thinking, risk aversion, and supervisory skills. Understanding the leadership styles required in both divisions is essential for fostering a sustainable EV ecosystem. By exploring leadership dynamics across both the Research & Development (R&D) and Operations divisions, this study articulates how integrated leadership styles can be employed to harmonize long-term innovation with short-term execution demands. While transformational leadership fosters vision and innovation, transactional leadership ensures operational discipline and accountability, and servant leadership

cultivates trust, collaboration, and a sustainability-oriented culture, together forming a coherent leadership response to the EV sector's complexity.

In light of the profound technological and organizational disruptions reshaping the global automotive industry, this study investigates the leadership challenges and responses associated with the transition from Internal Combustion Engine (ICE) vehicles to Electric Vehicles (EVs). Specifically, the research is guided by two interrelated questions:

1. Does the transition from ICE to EV represent a significant technological and organisational shift that necessitates a re-evaluation of traditional leadership styles?
2. How can integrated leadership approaches – blending transformational, transactional, and servant leadership models – enable the development of sustainable business models within the R&D and Operations functions of the EV sector?

This inquiry is situated within the context of India's rapidly evolving automotive landscape, with a particular focus on Original Equipment Manufacturers (OEMs). India presents a unique case for such exploration due to its complex policy environment, large-scale employment dependencies, and strategic aspirations in clean mobility. India, as one of the world's largest automotive markets stands at the forefront of this transformation. The country's automobile industry contributes approximately 7% to the national GDP and provides employment to millions, making it a crucial player in the global EV landscape. While India's strengths in vehicle manufacturing offer a strong foundation for growth, the shift toward EVs introduces volatility, requiring a leadership approach that balances innovation with operational excellence.

The study makes two primary contributions. First, it addresses a critical gap in the leadership literature by examining how emerging economies - often underrepresented in extant research - are responding to the unique pressures of the EV transition. Second, it proposes a novel conceptual framework of integrated leadership, demonstrating how hybrid leadership styles are not only necessary but foundational for navigating the dual imperatives of innovation and operational resilience in the EV domain.

This research underscores the premise that the transition to EVs is not merely a product-level innovation but a systemic transformation encompassing new powertrain architectures, battery and energy storage technologies, digital control systems, and an entirely reimagined support infrastructure. These changes fundamentally challenge the operational logics, managerial practices, and leadership competencies that have historically guided ICE vehicle production. Consequently, the leadership required to navigate this transition must go beyond traditional models and adopt a multi-dimensional approach that balances strategic vision, technical competence, team empowerment, and performance accountability.

Although grounded in the Indian context, the findings have broader implications. The leadership challenges encountered and the strategic responses documented in this study reflect global industry dynamics and may serve as a reference point for other emerging and advanced economies undergoing similar technological transitions. Future comparative research could expand this framework across multiple geographic regions to further validate and refine the integrated leadership model presented herein.

The further sections of the paper are structured as follows: Section 2 reviews the literature and theoretical frameworks on EV leadership and sustainable business models. Section 3 details the research methodology, including data collection and analysis. Section 4 presents key findings on leadership competencies for managing EV transitions. Section 5 discusses these findings, their managerial implications, and industry relevance. Section 6 concludes with a summary, study limitations, and future research directions.

2. Literature review and theoretical frameworks

The transition from internal combustion engine (ICE) vehicles to electric vehicles (EVs) has necessitated a re-evaluation of leadership models to address industry challenges, foster innovation, and ensure long-term sustainability. Several leadership theories provide a foundation for understanding integrated leadership, which combines traditional leadership qualities with technical and adaptive skills to drive the EV sector forward.

Burns (1978) and Bass (1985) introduced transformational and transactional leadership as two distinct yet complementary models. Transformational leadership is characterised by vision, inspiration, and the ability to drive organisational change, making it crucial for navigating the EV sector's rapid technological advancements(Andersen, 2018). Leaders in the EV industry must inspire employees, encourage innovation, and drive sustainable business models (Bass & Riggio, 2006). Conversely, transactional leadership, which focuses on structured processes, rewards, and performance monitoring, is essential for maintaining operational efficiency in manufacturing and supply chain management (Avolio et al., 2004). The integration of these leadership styles enables organisations to balance strategic vision with day-to-day management, ensuring both innovation and efficiency in the EV transition.

Heifetz (1994) introduced adaptive leadership, emphasising the need for leaders to respond dynamically to changing environments. Given the disruptive nature of the EV industry, adaptive leadership is particularly relevant in navigating regulatory shifts, evolving consumer expectations, and technological breakthroughs. Leaders must develop the ability to analyse industry trends, realign business strategies, and foster a culture of continuous learning (Sunderman et al., 2020). This leadership style is crucial

for managing the uncertainties in EV adoption, such as infrastructure development, battery technology advancements, and fluctuating market demands.

Greenleaf (1977) proposed servant leadership, which prioritises the well-being of employees, customers, and communities. In the EV sector, where sustainability is a core objective, servant leadership fosters a culture of ethical responsibility, collaboration, and stakeholder engagement (Spears & Lawrence, 2001). Leaders who embody servant leadership principles can build long-term trust among employees and external stakeholders, reinforcing the commitment to environmental and social sustainability (Liden et al., 2008). By focusing on people-centric leadership, organisations can enhance employee motivation, encourage responsible innovation, and create business models that align with global sustainability goals.

While these traditional leadership theories provide valuable insights, the complexity of the EV transition demands an integrated leadership approach that blends elements from multiple leadership models. Research suggests that leaders who combine transformational vision, transactional efficiency, adaptive flexibility, and servant leadership's ethical commitment are better equipped to navigate industry disruptions, foster technological advancements, and drive sustainable growth (Rehman & Shakeel Sadiq Jajja, 2025).

As the EV industry evolves, future leadership research must explore how integrated leadership models can be customised for different business functions, such as Research and Development (R&D) and Operations. Understanding these leadership dynamics will be critical for sustaining competitive advantages and ensuring long-term success in the global transition to EVs.

Moreover, the empirical evidence underscores the significant differences between the internal combustion engine (ICE) and electric vehicle (EV) sectors, highlighting the necessity for integrated leadership styles to navigate the complexities of the EV industry effectively. The automotive industry's shift towards EVs introduces unique challenges not present in the traditional ICE sector. A Reuters report emphasises that this transition demands a comprehensive overhaul of the workforce, focusing on retraining employees for roles in battery production, high-voltage electrical work, and the development of new materials. This transformation requires leaders to possess a diverse skill set to manage technological innovations and infrastructure development simultaneously. Research indicates that no single leadership style suffices to address the multifaceted demands of the EV sector. A study by Singh et al. (2020) highlights the effectiveness of green transformational leadership in enhancing environmental performance. Such leaders articulate a clear vision of sustainability, inspiring employees to adopt eco-friendly practices. However, the study also suggests that integrating this approach with other leadership styles, such as adaptive and transactional leadership, is crucial to navigate the dynamic and complex nature of the EV industry effectively.

Furthermore, the extant literature underscores the role of transformational leadership in promoting green innovation and sustainable project performance (Pham et al., 2023). The studies suggest that while transformational leadership is vital, combining it with other leadership styles can better address the diverse challenges in sustainability-focused projects, such as those in the EV sector.

In summary, the transition from ICE to EV is not merely a technological shift but a complex organisational transformation. Empirical studies advocate for an integrated leadership approach, combining elements of transformational, adaptive, and transactional leadership styles, to effectively manage the unique challenges and ensure the sustainability of the EV industry (Zacher et al., 2024).

The transition from Internal Combustion Engine (ICE) vehicles to Electric Vehicles (EVs) represents not merely a technological evolution but a profound organisational transformation that challenges existing leadership paradigms. Unlike incremental innovations, EV adoption necessitates systemic changes across supply chains, manufacturing processes, regulatory compliance, talent reskilling, and sustainability practices (Mohamad Shamsuddoha & Nasir, 2025; Wells & Nieuwenhuis, 2012). Despite the increasing scholarly interest in sustainable mobility and green innovation, the literature remains fragmented in its treatment of leadership models that can effectively navigate these multifaceted changes (Kirkwood & Walton, 2014; Rehman & Shakeel Sadiq Jajja, 2025).

Empirical studies have underscored the value of transformational leadership in fostering innovation and long-term vision (Bass & Avolio, 1994), adaptive leadership in managing uncertainty and change (Heifetz, 1994), and transactional leadership in ensuring operational stability and task execution (Burns, 1978; Northouse, 2021). However, current research often examines these styles in isolation, lacking a holistic framework that addresses the dynamic and dual nature of the EV sector, requiring both innovative agility and process discipline (Lindebaum & Cartwright, 2010).

This gap points to the need for an integrated leadership approach that synthesises diverse leadership competencies to manage technological disruption while sustaining business continuity. The EV sector, characterised by high R&D intensity, policy volatility, and evolving consumer expectations, demands leadership that is both visionary and pragmatic (Shamsuddoha et al., 2025). Integrated leadership thus emerges not only as a conceptual necessity but also as a practical imperative for fostering organisational resilience and environmental sustainability. Yet, few empirical studies systematically explore how such integration is operationalised across functions like R&D and Operations within emerging markets, especially in the Indian context, where institutional and infrastructural constraints amplify the complexity of the EV transition.

Moreover, the literature emphasises how the countries represent contrasting approaches to EV adoption - China through state-led industrial policy and Germany

through engineering-driven innovation in legacy firms - yet both face similar leadership challenges in balancing sustainability with operational demands. For instance, studies by Wang et al. (2021), Soerjopranoto et al. (2025) and Liu et al. (2022) highlight how Chinese EV firms have adopted adaptive and transactional leadership styles to rapidly scale production while navigating shifting government regulations and global supply chains. Conversely, research from Müller and Voigt (2018) and Fichter and Tiemann (2018) underscores the role of transformational leadership within German automotive firms, where leaders are tasked with fostering innovation cultures while managing institutional inertia and stakeholder expectations.

Our findings from the Indian EV sector align with these international trends in several ways. Like China, Indian firms face regulatory volatility and infrastructural limitations, which require adaptive leadership to remain agile. However, similar to Germany, established Indian firms transitioning from ICE to EV models also rely heavily on visionary leadership to realign organisational culture and long-term strategy. By comparing across these contexts, we observe a convergence around the need for integrated leadership approaches - combining transformational, adaptive, and transactional elements - as essential for navigating the multifaceted challenges of sustainable industrial transformation in the EV industry (Kaur et al., 2024; Malek & Almarri, 2024).

3. Methods

This study employs a qualitative research design grounded in the principles of Grounded Theory (GT) to explore how integrated leadership styles can support the development of sustainable business models in the Indian electric vehicle (EV) sector, specifically in the context of the transition from Internal Combustion Engine (ICE) technologies. Grounded Theory, originally developed by Glaser and Strauss (1967), provides a systematic yet flexible approach for generating Theory directly from empirical data, particularly suitable when existing theoretical frameworks are insufficient to explain emergent phenomena in complex, dynamic environments (Charmaz, 2006; Charmaz & Thornberg, 2021; Corbin & Strauss, 2014).

3.1. Research design and philosophical orientation

The research is situated within a constructivist epistemological framework, which recognises that organisational reactions to technological changes and leadership behaviour are socially and contextually constructed (Lincoln & Guba, 1985; Charmaz, 2006). To gather rich, nuanced data that reflects the real-life experiences of industry leaders, a qualitative approach was selected. Instead of depending on pre-existing hypotheses, grounded theory's inductive logic enables a substantive theory to emerge

from real-world observations, which is in line with the research goal of examining integrated leadership models in a sparsely theorised field.

3.2. Sampling strategy

The study targets senior professionals from the Indian automotive sector, specifically those engaged in leadership roles across Original Equipment Manufacturers (OEMs) and automotive ancillary units. Participants were included based on the following criteria:

- minimum of 5 years of professional experience in the Indian automotive industry,
- holding a leadership position (e.g., Team Lead, Functional Head, General Manager, or above) in either R&D or Operations,
- Demonstrated involvement in strategic or operational decision-making during the ICE-to-EV transition.

A purposive sampling strategy was employed, as is standard in qualitative and grounded theory studies (Coyne, 1997), to ensure the inclusion of participants with specialised insights relevant to leadership and technological transformation. This was further augmented with theoretical sampling as per GT methodology (Glaser, 1978), where data collection was iteratively informed by emerging theoretical constructs.

To ensure diversity and sectoral representativeness, participants were selected from pan-India automotive hubs, which together comprise more than 70% of the Indian automotive manufacturing and innovation ecosystem. These included:

1. Maharashtra: Pune, Mumbai, Chhatrapati Sambhaji Nagar
2. Gujarat: Halol
3. Delhi NCR: Gurugram, Noida, Pithampur
4. Karnataka: Bengaluru, Hubli-Dharwad
5. Telangana: Hyderabad

This geographical spread enabled the collection of data reflecting regional organisational cultures, infrastructural contexts, and leadership challenges during the EV transition.

3.3. Data collection methods

Data collection for the study was conducted in two distinct phases. In the first phase, focus group discussions were held with experienced leaders and professionals from the EV industry to gain collective insights into leadership practices, sectoral challenges, and emerging trends. These discussions helped identify recurring themes and contextual factors influencing leadership effectiveness. Following this, in-depth semi-structured interviews were conducted with individual participants, allowing for both structured

guidance through predefined questions and exploratory depth through open-ended dialogue. This approach provided a comprehensive understanding of personal experiences, perceptions, and leadership dynamics within the sector (Kvale, 2009). An interview guide was developed based on key themes derived from preliminary literature (e.g., leadership theory, sustainable business models, technological change). The guide was pilot-tested with two participants and refined to enhance clarity and content validity.

Each interview (30-60 minutes) explored:

- the leadership strategies adopted during the ICE-to-EV transition,
- organisational challenges related to workforce transformation, process adaptation, and sustainability,
- perceived effectiveness of different leadership styles (e.g., transformational, transactional, servant) in achieving departmental and organisational goals,
- comparative reflections on leadership effectiveness in R&D vs. operations functions,
- interviews were conducted in-person or via secure video conferencing tools, recorded with informed consent, and transcribed verbatim. NVivo software (v.14) was used to facilitate systematic coding and analysis.

3.4. Grounded theory coding procedure

Following Charmaz's (2006) constructivist Grounded Theory procedures, the data analysis proceeded through four key stages:

a) pen coding
   Line-by-line coding was undertaken to identify initial categories and concepts. Early codes included: "resistance to change", "technical upskilling", "employee anxiety", "visionary leadership", and "collaboration bottlenecks". Coding was done inductively to ensure that categories emerged directly from the data.
b) axial coding
   Relationships between categories were identified to explore how leadership styles influenced outcomes such as workforce motivation, R&D agility, and operational efficiency. For example, "transformational leadership" was linked to "team innovation capacity", while "transactional leadership" showed connections with "task execution under tight deadlines".
c) selective coding
   A central category –"Integrated Leadership for Sustainable EV Transition" – was identified, around which all other categories were organised. This encapsulated the multifaceted leadership approach needed to align strategic innovation with operational continuity across the EV transition.

d) constant comparative method
The constant comparative method (Glaser & Strauss, 1967) was applied throughout to refine conceptual categories and validate their relevance across diverse interviews. This iterative process enhanced the theoretical coherence of emerging constructs.

3.5. Theoretical saturation and validation

Data collection continued until theoretical saturation was reached (Corbin & Strauss, 2015), meaning no new concepts or relationships emerged in subsequent interviews. To enhance credibility and confirmability, peer debriefing was conducted with two external qualitative researchers. Member checking was also performed, wherein five participants were provided with preliminary findings and confirmed the accuracy of thematic interpretations.

4. Data analysis and results

The participants in this study represent a diverse and experienced cohort of professionals from the automotive industry. Most respondents are male, aged between 35 and 55 years, with professional experience ranging from 5 to over 25 years. They are employed in various capacities such as R&D and operations within both OEMs (Original Equipment Manufacturers) and ancillary organisations. This diversity ensures that the insights reflect a wide spectrum of leadership experiences and perspectives.

The participants unanimously agree on the significance of the transition from internal combustion engines (ICE) to electric vehicles (EVs). They emphasise the complexity of this shift, citing factors such as powertrain innovation, energy storage systems, regulatory requirements, and sustainability. Leadership styles are perceived as pivotal in navigating this transformation effectively. Skilled leadership traits are deemed essential for fostering innovation, while traditional leadership traits contribute to maintaining operational stability.

Respondents rated skilled leadership traits highly within the context of R&D for EVs. Key traits include:

1. Visionary Thinking: Consistently rated as critical, with most participants assigning the highest scores. This underscores the need for leaders to anticipate future trends and align organisational strategies with long-term sustainability goals.
2. Emotional Intelligence: Rated moderately to highly, highlighting its importance in fostering collaboration and managing diverse teams.
3. Adaptability: Scores indicate strong recognition of the necessity for leaders to navigate rapid technological changes and evolving market demands.

4. Traditional Leadership in Operations. While traditional leadership traits were rated moderately overall, certain traits were seen as crucial for operations:
5. Task Orientation and Communication Clarity: Both received consistently high scores, reflecting their role in ensuring efficiency and precision in day-to-day operations.
6. Risk Aversion: Ratings varied, suggesting that while some caution is valued, excessive conservatism may hinder innovation.
7. Conflict Management: Recognised as essential for maintaining harmony in cross-functional teams.
8. Integration of Leadership Styles.

A recurring theme in the data is the advocacy for integrated leadership - a blend of skilled and traditional approaches. Expert comments reinforce this idea:

- Skilled leadership drives innovation and adaptability in R&D,
- Traditional leadership ensures stability and efficiency in operations,
- Participants suggest that organisations embracing this integration are better positioned to succeed in the EV sector, as it balances creativity with operational discipline.

The study highlights stark contrasts between the leadership demands of the EV and ICE sectors:

- EV Sector: Requires a forward-thinking and adaptive leadership style to manage the rapid pace of technological advancement, regulatory changes, and sustainability imperatives.
- ICE Sector: Leans towards traditional leadership traits, given its established frameworks and processes that prioritise consistency and proven methodologies.

5. Discussion

This study underscores the critical role of leadership in navigating the complex and multi-dimensional transition from internal combustion engine (ICE) to electric vehicle (EV) technologies. As evidenced through participant narratives, the EV sector's inherent reliance on innovation, rapid technological change, and cross-functional integration necessitates a paradigm shift in leadership strategies, moving beyond monolithic models toward integrated leadership approaches.

5.1. Leadership style differentiation in ICE vs. EV Sectors

Consistent with extant literature, leadership in the ICE domain has historically been characterised by transactional attributes, such as structured goal-setting, procedural compliance, and operational discipline (Bass, 1985; Burns, 1978). This was echoed by participants who emphasised that ICE production environments thrived under

hierarchical, task-oriented leadership models designed for incremental improvements and efficiency-driven execution.

In contrast, the EV sector, as articulated by interviewees, demands higher levels of visionary capacity, adaptability, and collaborative engagement, aligning with the characteristics of transformational leadership (Bass & Riggio, 2006). For instance, leaders were described as needing to motivate teams amidst ambiguity, steer technological experimentation, and foster a culture of innovation - all hallmarks of transformational behaviour. This validates prior research suggesting that transformational leadership is particularly suited for managing technological discontinuities and dynamic markets (Eisenbeiss et al., 2008).

One participant noted: "In EV development, there is no template. As a leader, you need to inspire your team to build while also learning - because no one has all the answers." This insight mirrors Heifetz's (1994) Adaptive Leadership Theory, which emphasises the capacity of leaders to mobilise people to tackle tough challenges and thrive in changing contexts. According to participants, adaptive leadership is crucial for navigating not only technological volatility (e.g., new battery chemistries, software integration) but also regulatory shifts and supply chain uncertainties unique to EV ecosystems.

5.2. Integrative leadership as a strategic imperative

Findings reveal that no single leadership style is sufficient to meet the competing demands of innovation and operational execution. Rather, a hybrid or integrative model - combining transformational, transactional, and servant leadership principles - emerges as both theoretically and practically essential.

Transformational leadership provides the visionary and motivational thrust required to lead R&D efforts and cultivate a future-oriented organisational mindset. Transactional leadership remains indispensable for execution, control, and efficiency, particularly in operational contexts where timelines, quality, and compliance are non-negotiable. Servant leadership, as proposed by Greenleaf (1977), enhances team commitment, psychological safety, and cross-functional trust, which are especially valuable in diverse and multidisciplinary EV teams.

These observations align with recent empirical literature advocating context-contingent leadership models in technology-driven sectors (Yukl, 2013; Hannah et al., 2011). Participants frequently highlighted the tension between the freedom required for innovation and the discipline needed for production. One participant reflected: "In EV, you need to let your engineers breathe, but you also need to make sure the product launches on time. That's a constant balancing act." This dual demand reflects Rosing et al.'s (2011) ambidextrous leadership model, where leaders must flexibly switch between exploration (innovation) and exploitation (execution) behaviours to sustain organisational performance. The study supports this notion

by empirically demonstrating that successful EV leaders embody behavioural complexity - the ability to switch styles based on context, team maturity, and strategic objectives.

5.3. Sectoral implications and differentiated leadership requirements

the data further illustrates that the EV sector necessitates greater leadership agility and systems thinking than the ICE sector. Unlike ICE vehicles - which operate within mature, standardised ecosystems - EVs require cross-sectoral coordination (e.g., energy, infrastructure, digital services), thereby placing leaders in more ambiguous and interdependent environments. These characteristics validate the applicability of distributed leadership and systems leadership theories (Senge, 2006; Spillane, 2005), which advocate leadership as a networked, collaborative function rather than an individual-centred attribute.

Participants repeatedly emphasised the necessity of ecosystem orchestration, stakeholder collaboration, and learning orientation - dimensions often absent in traditional ICE leadership roles. As one R&D head explained: "EV is not just about manufacturing a new vehicle; it's about aligning with utilities, software vendors, and governments. The leader's role becomes integrative by design."

This research makes several theoretical contributions to leadership and sustainability studies:

1. Extending Leadership Theories in Emerging Sectors – While leadership models have been extensively studied in traditional industries, this study applies them to the rapidly evolving EV sector, demonstrating the necessity of integrating multiple leadership styles. The findings contribute to leadership contingency theories, suggesting that no single leadership style is universally effective, especially in industries undergoing transformation.
2. Bridging Leadership and Sustainability Literature – By linking leadership approaches with sustainable business practices, this study provides a new perspective on how leaders can balance economic viability with environmental and social sustainability. It expands upon green leadership frameworks, showing that an integrated approach enhances both business resilience and long-term sustainability.
3. Developing a Framework for Industry Disruptions – The research proposes an integrated leadership framework that can be applied beyond the EV industry to other sectors experiencing rapid technological and regulatory disruptions, such as renewable energy and smart manufacturing. This contributes to broader discussions on leadership agility and organisational adaptability.

For business leaders and policymakers, this study provides actionable insights into leadership strategies for driving EV sector success:

- Leadership Development and Training: companies transitioning from ICE to EV manufacturing must invest in leadership training programs that equip executives with skills in strategic foresight, adaptive decision-making, and sustainability-oriented leadership. The shift to EVs requires leaders to manage both technological advancements and workforce restructuring effectively,
- Balancing Innovation with Operational Efficiency: while transformational leadership is essential for fostering innovation in battery technology, energy storage, and charging infrastructure, transactional leadership remains crucial in optimising supply chains, maintaining quality control, and ensuring cost efficiency. Leaders must find the right balance to avoid excessive risk-taking or bureaucratic inertia,
- Navigating Policy and Regulatory Landscapes: given the strong influence of government policies and subsidies in the EV market, servant leadership principles can help companies foster relationships with regulators, policymakers, and environmental agencies. This enables businesses to anticipate policy changes and proactively align their strategies with national and global sustainability goals,
- Stakeholder Collaboration for Sustainable Business Models: the EV ecosystem requires extensive collaboration across industries, including energy providers, battery manufacturers, and charging infrastructure developers. Leaders must adopt an integrated leadership style that emphasises partnerships, cross-industry alliances, and ecosystem-based strategies to build a resilient and sustainable EV market,
- Reskilling and Workforce Transition: as traditional ICE manufacturing jobs evolve or become obsolete, companies must develop reskilling programs to help workers transition to EV-related roles. An adaptive leadership approach is crucial in managing this workforce transformation, ensuring that employees are prepared for new technological demands while maintaining morale and productivity.

While this study provides valuable insights into leadership in the EV industry, it also opens avenues for further research. Future studies could conduct quantitative analysis to measure the direct impact of different leadership styles on EV business performance. Examine leadership strategies in regional contexts, comparing leadership dynamics in emerging EV markets (e.g., India, China) versus established markets (e.g., Europe, North America). Explore the role of digital leadership in integrating AI, IoT, and smart manufacturing within EV production. Investigate how leadership styles influence consumer adoption of EVs, particularly in price-sensitive and developing economies.

In a nutshell, the transition from ICE to EV represents one of the most significant industrial shifts in modern history, requiring a new breed of leaders who can navigate complexity, embrace innovation, and drive sustainability. This study reinforces the notion that leadership in the EV sector must be integrated, strategic, and forward-thinking to

ensure long-term success. As businesses and policymakers continue to shape the future of mobility, leadership will remain at the heart of building a resilient, competitive, and sustainable EV industry.

6. Conclusion

This study explored the fundamental differences between the internal combustion engine (ICE) and electric vehicle (EV) sectors and examined the necessity of an integrated leadership approach for ensuring the long-term sustainability of EV businesses. Through a qualitative research design, including focus group discussions, semi-structured interviews, industry observations, and secondary data analysis, the study established that the EV sector differs significantly from the ICE industry in terms of technological complexity, market dynamics, infrastructure requirements, and workforce composition. Unlike the relatively stable and well-established ICE industry, the EV sector faces rapid technological advancements, evolving regulatory frameworks, and shifting consumer preferences, necessitating a leadership approach that is both adaptable and multi-dimensional.

The findings underscore that no single leadership style is sufficient to navigate the challenges of the EV industry. Traditional leadership models, such as transactional leadership, while effective in maintaining operational efficiency, fall short in fostering the innovation required for EV development. Similarly, transformational leadership - which inspires change and long-term vision - is critical but must be balanced with adaptive leadership to address the dynamic nature of EV technologies and market conditions. Additionally, servant leadership, which emphasises collaboration and stakeholder engagement, is crucial in building sustainable relationships with government bodies, suppliers, and customers in the EV ecosystem.

This study contributes to leadership literature by advocating for an integrated leadership model that combines transformational, transactional, adaptive, and servant leadership styles. Such an approach enables leaders to foster technological innovation while maintaining operational efficiency, adapt to regulatory and market shifts, and cultivate a sustainability-driven organisational culture. As EV adoption continues to expand, understanding how leadership can shape the trajectory of this transition will be crucial for both academia and industry practitioners.

Authors' contribution

R.K.R.; P.T.: article conception, theoretical content of the article, research methods applied, conducting the research, data collection, analysis and interpretation of results, draft manuscript preparation.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used OpenAI, USA in order to improve the flow, coherence, and readability of the writing, as well as to assist in language refinement and clarity. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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