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Electric Vehicle Safety from a Service-Dominant Logic Perspective: A Literature Review

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Abstract

This study aims to analyze electric vehicle (EV) safety as a component of value creation from the perspective of Service-Dominant Logic (SDL) using a literature review approach. In the context of a rapidly evolving and competitive EV industry, safety is no longer viewed solely as a technical attribute but as a critical element in shaping customer trust, satisfaction, and long-term loyalty. Accordingly, safety is positioned as an integral part of the value proposition offered to customers. The study was conducted between August and October 2025 through a systematic review of academic journals, industry reports, and relevant publications on electric vehicles and service management. The analysis employs descriptive and comparative techniques to synthesize prior research and identify key patterns. The findings reveal that EV safety is the result of a value co-creation process involving multiple actors—manufacturers, service providers, and users—within a service ecosystem. Key determinants include user knowledge and behavior, the reliability of charging infrastructure, the effectiveness of after-sales services, and the quality of digital interaction systems. These elements collectively shape customer perceptions of safety and overall value. The study further highlights that safety plays a strategic role in reducing perceived risk and strengthening customer confidence, particularly in emerging markets where adoption is still evolving. From a managerial perspective, the findings emphasize the importance of integrating safety into service-based strategies through customer education, infrastructure development, and continuous service engagement. In conclusion, managing safety as a co-created value rather than merely a technical feature enables firms to enhance customer experience and achieve sustainable competitive advantage in the EV market.

Keywords:

Service-Dominant Logic; Electric Vehicles; Safety; Customer Value; Service Ecosystem

INTRODUCTION

The electric vehicle (EV) industry has experienced significant growth in recent years, driven by the increasing demand for energy efficiency, carbon emission reduction, and the global transition toward sustainable mobility. According to the International Energy Agency, global EV sales surpassed 14 million units in 2023, representing an increase of approximately 35% compared to the previous year, with continued growth projected over the next decade. This rapid expansion reflects not only technological advancements but also shifts in market behavior and evolving customer expectations toward environmentally friendly and innovative products.

In Indonesia, the adoption of electric vehicles is also showing a positive trend, supported by government policies and growing public awareness of sustainability issues. Data from the Ministry of Energy and Mineral Resources indicates an increase in EV usage, although the adoption rate remains relatively early compared to developed countries. From a consumer perspective, the decision to adopt EVs is influenced not only by price and efficiency but also by perceived ease of use, availability of charging infrastructure, and perceived safety (Wang et al., 2021; Liu et al., 2022). This suggests that psychological factors and service experiences play a critical role in shaping consumer behavior in emerging markets such as Indonesia (Saefullah et al., 2025).

Alongside these developments, business models in the EV industry are shifting from product-based approaches toward service-based orientations. Companies no longer focus solely on selling vehicles as physical products but increasingly offer integrated service ecosystems, including charging solutions, digital applications, vehicle monitoring systems, and after-sales services (Baines et al., 2017; Kohtamäki et al., 2019). For instance, Tesla has developed a comprehensive service ecosystem through its Supercharger network and over-the-air software updates, while BYD integrates vehicles with battery and energy service solutions. This transformation highlights the importance of customer experience and service quality as key drivers of competitive advantage.

In the Indonesian context, electric vehicle safety has become an increasingly critical issue as the number of new users continues to grow, many of whom are still adapting to this emerging technology (Tafsiruddin et al., 2024). Safety concerns extend beyond technical aspects such as battery performance and electrical systems to include user understanding, reliability of charging infrastructure, and the quality of after-sales services. Perceived safety directly influences customer trust and adoption decisions (Hardman et al., 2018). Therefore, safety can be conceptualized as a component of customer perceived value within a service context.

This perspective aligns with the principles of Service-Dominant Logic (SDL), which emphasize that value is not created solely by firms but co-created through interactions among multiple actors within a service ecosystem (Vargo & Lusch, 2008; 2016). From this viewpoint, EV safety can be understood as an outcome of value co-creation involving manufacturers, service providers, and users, collectively shaping the overall experience and perceived value.

Despite its importance, existing research on electric vehicles predominantly focuses on technical and engineering aspects, while studies that examine safety from a service and value creation perspective—particularly in emerging markets like Indonesia—remain limited (Wang et al., 2021; Li et al., 2020). This gap highlights the need for a more comprehensive analysis that integrates safety within a broader service-oriented and managerial framework.

Accordingly, this study aims to analyze electric vehicle safety as part of value creation from a Service-Dominant Logic perspective through a literature review approach. The rapid development of electric vehicles (EVs) has not only transformed technological paradigms but also reshaped how customers perceive safety, risk, and value. In the context of EV adoption, safety is no longer viewed solely as a technical attribute embedded within the product; rather, it is increasingly interpreted as part of the overall service experience perceived by customers. This shift is particularly relevant in emerging markets, where users are still in the early stages of adapting to new mobility technologies. Empirical studies indicate that perceived safety significantly influences customer trust and adoption decisions. When users perceive EVs as safe, their willingness to adopt increases; conversely, high perceived risk becomes a major barrier to acceptance. Moreover, safety concerns are closely linked to the readiness of supporting ecosystems, including charging infrastructure, after-sales service, and user education. Inadequate infrastructure or limited user knowledge can amplify perceived risks and reduce the overall value experienced by customers.

From a theoretical standpoint, this phenomenon aligns with the Service-Dominant Logic (SDL), which emphasizes that value is co-created through interactions among multiple actors within a service ecosystem. Under SDL, firms are not the sole creators of value but act as facilitators, enabling value creation through collaboration with customers and other stakeholders. Core concepts such as value co-creation and service ecosystems highlight that value emerges from dynamic interactions rather than being embedded in products alone. This perspective is increasingly relevant in modern industries characterized by digitalization and servitization, where manufacturing firms expand their offerings to include integrated services. In the EV industry, companies are not only producing vehicles but also delivering comprehensive solutions that include charging systems, digital platforms, maintenance services, and continuous updates.

Consequently, safety becomes part of this integrated service offering, shaped by both product performance and service interactions.

In this context, safety can be conceptualized as a dimension of customer perceived value. Traditional service quality models, such as SERVQUAL, emphasize reliability and assurance as key determinants of customer satisfaction. Applied to EVs, safety contributes to building trust, which in turn influences satisfaction and long-term loyalty. Therefore, safety should not be treated merely as an operational or engineering concern but as a strategic element in value creation and competitive differentiation. Within the SDL framework, safety is understood as an outcome of value co-creation processes involving manufacturers, service providers, infrastructure systems, and users. This perspective provides a more holistic understanding of safety, positioning it as an experiential and relational construct rather than a purely technical one.

Despite the growing body of literature on EVs, significant gaps remain. Most existing studies focus predominantly on technical aspects such as battery performance, energy efficiency, and infrastructure development. Research addressing safety also tends to be confined to engineering perspectives, such as system failures or component reliability, without adequately considering customer perceptions and service dimensions. Furthermore, studies on EV adoption behavior primarily emphasize economic and environmental factors—such as price incentives and environmental awareness—while overlooking safety as a critical component of perceived value. This limitation is particularly evident in developing markets, where psychological factors, including risk perception and trust, play a crucial role in shaping consumer decisions.

Additionally, the application of Service-Dominant Logic in the context of EV safety remains relatively underexplored. Existing research often treats safety as an inherent product attribute rather than as a co-created value emerging from interactions within a service ecosystem. As a result, there is a lack of integrative frameworks that connect safety, service interactions, and value creation in a comprehensive manner. This gap highlights the need for a conceptual approach that positions safety within the broader context of service systems and customer experience.

Based on these gaps, this study proposes a novel perspective by integrating EV safety into the framework of Service-Dominant Logic. The primary contribution of this research is threefold. First, from a theoretical perspective, it extends SDL by conceptualizing safety as a co-created value rather than a purely technical attribute. This shift provides a new lens for understanding how value is generated in technology-intensive industries. Second, from a conceptual standpoint, the study develops a holistic framework that positions safety as an outcome of interactions within a service ecosystem involving multiple stakeholders. This framework bridges the gap between technical and service-oriented perspectives. Third, from a managerial perspective, the study offers practical

implications for industry practitioners by emphasizing the importance of managing safety as part of the overall customer value strategy. Firms are encouraged to strengthen after-sales services, enhance user education, and develop integrated service ecosystems to improve safety perceptions.

Ultimately, this research underscores that safety can serve as a critical source of competitive advantage in the EV market. By effectively integrating safety into service systems, firms can enhance customer trust, reduce perceived risk, and foster long-term customer relationships. In increasingly competitive and technology-driven markets, the ability to manage safety as a co-created value will be essential for achieving sustainable growth and market differentiation.

METHODS

This study adopts a qualitative approach using a literature review method to analyze electric vehicle (EV) safety from the perspective of Service-Dominant Logic (SDL). This approach is considered appropriate as the study aims to examine, synthesize, and critically integrate various theoretical frameworks, concepts, and prior empirical findings related to EV safety, service systems, and customer value creation.

The research was conducted over a three-month period, from August to October 2025. During this period, the study was systematically organized into several stages, including literature identification, selection, analysis, and synthesis. The initial phase (August 2025) focused on collecting relevant literature and mapping key themes. The second phase (September 2025) involved in-depth analysis, categorization, and comparison of the selected studies. The final phase (October 2025) emphasized conceptual synthesis and the development of an integrated analytical framework based on SDL

The data sources in this study consist of secondary data derived from academic journal articles, industry reports, and publications from institutions related to electric vehicles and service management. The selection of literature was based on several criteria: relevance to the research topic, credibility of the source, and recency of publication. Priority was given to studies published within the last 5–10 years to ensure the timeliness and relevance of insights.

Data collection was conducted through systematic searches of academic databases such as Google Scholar and other reputable sources using keywords including “electric vehicles,” “safety,” “service,” and “customer value.” The collected literature was then screened and refined to ensure alignment with the research objectives.

The data analysis employed descriptive and comparative techniques. This involved identifying patterns, similarities, and differences across previous studies, as well as examining how safety is conceptualized within both technical and service-oriented perspectives. The analytical process followed structured stages, including data reduction, data display, and conclusion drawing.

Key concepts—such as safety, customer perceived value, and service ecosystems—were integrated within the SDL framework to generate a more comprehensive understanding.

Through this approach, the study aims to produce a robust conceptual synthesis that explains EV safety not merely as a technical attribute, but as a co-created value within a service ecosystem, thereby offering a broader perspective for both academic research and managerial practice.

RESULT AND DISCUSSION

The findings of this study indicate that electric vehicle (EV) safety cannot be understood solely as a technical attribute but must be viewed as a multidimensional construct shaped by interactions within a service ecosystem. First, the literature consistently shows that safety is strongly influenced by user behavior and knowledge. Proper understanding of charging procedures, battery management, and vehicle operation significantly contributes to reducing perceived and actual risks. Conversely, limited user literacy increases the likelihood of misuse, which negatively affects safety outcomes. This highlights that safety is partially co-produced by users through their interaction with the technology.

Second, the study reveals that safety is closely tied to the availability and reliability of supporting service systems. Elements such as charging infrastructure, digital monitoring systems, and after-sales services play a critical role in shaping safety perceptions. Inadequate infrastructure or inconsistent service quality often leads to user anxiety, commonly referred to as "range anxiety" or safety uncertainty, which reduces overall customer value.

Third, safety is found to be a key determinant of customer trust and perceived value. Studies indicate that when users perceive EV systems as safe and well-supported, their confidence in the technology increases, leading to higher satisfaction and stronger adoption intentions. In this sense, safety functions not only as a protective mechanism but also as a value-enhancing factor that influences long-term customer relationships.

The findings reinforce the perspective of Service-Dominant Logic (SDL), particularly the concept of value co-creation. Safety in EV usage emerges as a co-created outcome involving manufacturers, service providers, and users. This aligns with recent studies (e.g., Wang et al., 2021; Liu et al., 2022) which emphasize that user behavior and perceived risk significantly influence EV adoption. However, this study extends prior research by framing safety not merely as a perception factor but as an interactive process shaped through continuous engagement within the service system.

Furthermore, the role of the service ecosystem is evident in determining safety outcomes. Consistent with Hardman et al. (2018), infrastructure readiness and service support significantly affect user confidence. This study deepens that insight by positioning these elements as interconnected components within a broader ecosystem, where failure in one component—such as unreliable charging stations—can undermine the entire safety perception. This supports the SDL view proposed by Vargo and Lusch (2016), where value is generated through systemic interactions rather than isolated product features.

From a strategic perspective, the findings confirm that safety plays a crucial role in building customer trust, which is a key driver of satisfaction and loyalty. This is consistent with the service quality framework of Parasuraman et al. (1988), particularly the dimensions of reliability and assurance. However, this study contributes further by demonstrating that safety, when managed as part of a service-based value proposition, can serve as a source of competitive advantage. Unlike traditional views that treat safety as a compliance requirement, this research positions it as a strategic asset that enhances customer value and strengthens long-term relationships.

Overall, the integration of safety into the service ecosystem highlights the need for firms to move beyond product-centric strategies toward more holistic, service-oriented approaches. By facilitating user education, strengthening infrastructure, and ensuring continuous service interaction, companies can effectively co-create safety and, in turn, deliver superior customer value in the evolving EV market.

CONCLUSION

This study demonstrates that electric vehicle (EV) safety can no longer be viewed solely as a technical attribute, but rather as an integral component of value creation within the Service-Dominant Logic (SDL) perspective. The findings show that safety emerges from the interaction between users, technology, and supporting service systems. In this context, safety is co-created through user behavior, the reliability of infrastructure, and the quality of service interactions. Thus, EV safety is not only embedded in the product but is continuously shaped through the broader service ecosystem involving manufacturers, service providers, and customers. The study also reveals that perceived safety plays a strategic role in shaping customer trust and perceived value. Empirical insights indicate that users are more likely to adopt and continue using EVs when they feel confident about safety aspects supported by reliable infrastructure and responsive services. This is particularly relevant in emerging markets such as Indonesia, where adoption is still influenced by risk perception and the readiness of supporting systems. Therefore, firms must go beyond ensuring technical safety and actively manage safety as part of the overall customer value proposition. From a business perspective, safety represents a critical lever for competitive

advantage when integrated into service-oriented strategies. The findings highlight that companies can enhance customer value by strengthening after-sales services, improving user education, and ensuring the availability of reliable infrastructure. These elements collectively reduce perceived risk and enhance the overall user experience. In this regard, safety shifts from being a compliance requirement to a strategic asset that supports long-term customer relationships and market differentiation. Finally, this study opens avenues for future research to empirically examine the relationship between safety, customer value, and business performance. Further studies may develop quantitative models to measure how different elements of the service ecosystem contribute to safety perceptions and adoption outcomes. Such efforts would provide deeper insights into how EV companies can design more effective, value-driven strategies in an increasingly service-oriented mobility industry.

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