

Electric Vehicle Battery Supply Strategy Considering Brand Spillover Effect

Zhonghua Ma

 <https://orcid.org/0000-0003-2884-5497>

Shanghai Maritime University, China

Yan Mengyao

 <https://orcid.org/0009-0007-6673-6263>

Shanghai Maritime University, China

ABSTRACT

Electric vehicle manufacturers ensure power battery supply through either direct sourcing or technology cooperation. This paper examines the battery supply strategy of an entrant manufacturer(m2), in a two-tier supply chain that includes a battery supplier (s), an incumbent manufacturer (m1), and the aforementioned entrant. It investigates these strategies under the influence of the brand spillover effect. It reveals that when m1 opts for direct battery procurement, if m2 boasts higher after-sales service standards, adopting a technology cooperation strategy becomes more advantageous. A sweet spot exists wherein, given m2's brand power and after-sales service level fall within a certain range, all supply chain participants can achieve mutual benefits. In scenarios where m1 depends on technology cooperation for its battery supply, it is advisable for m2 to mirror this approach by also engaging in technology cooperation.

KEYWORDS

Brand Spillover Effect, Technology Cooperation, Direct Sourcing, After-Sales Service Level

INTRODUCTION

The electric vehicle market continues to attract a diverse array of players, from traditional electric vehicle manufacturers (EVMs) to newcomers, driven by the growing demand for sustainable transportation solutions (Fang et al., 2024). Traditional EVMs, such as Mercedes-Benz, have established advantages in after-sales service and sales channels, facilitating smoother market penetration (Jin & Guo, 2018; Jin & Wu, 2021). Mercedes-Benz's 2023 financial report indicates that pure electric vehicles constituted 12% of total sales, marking a 61% increase from 2022 figures and reaching 240,600 units sold (Mercedes-Benz Group, 2023).

Brand power plays an important role in product marketing (Song et al., 2022). Entrant EVMs, such as Seres-Huawei and Xiaomi, face initial resource constraints, but leverage strong brand identity to gain market traction. The launch of the AITO M5 by Seres-Huawei in March 2022 set a new benchmark for rapid sales achievement, surpassing 10,000 units in a single model (Ke, 2023). Xiaomi's SU7, introduced in March 2024, outperformed Huawei's model in sales volume (Science and Technology Geek, 2024). These examples underscore the pivotal roles of brand power in market entry and growth. These factors significantly impact sales of emerging brands.

DOI: 10.4018/IJISSCM.360784

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Power batteries stand as the heart of electric vehicles, and their procurement strategy is a critical concern for all EVMs (Cui, 2011; Fan et al., 2022). There are two main battery supply models: direct sourcing and technology cooperation. Emerging manufacturers often lack the technological expertise for in-house battery production, leading them to rely on direct sourcing from specialized suppliers (Fan et al., 2022). This approach reduces research and development (R&D) expenditures and streamlines operations, as seen in the partnerships between Contemporary Amperex Technology Co., Limited (CATL) and EVMs, such as Ford, Huawei, NIO, and IDEAL. Additionally, Tesla models S and X rely on battery supply from LG Energy Solution (Yiche Encyclopedia, 2024). In direct sourcing, the battery supply becomes more convenient. EVMs reduce expenses related to R&D and operational costs. However, battery production technology faces constraints. As companies encounter supplier monopolies and potential weaknesses in the supply chain, their acquisition costs increase (Chen et al., 2023).

In technology-intensive sectors, technology cooperation is a prevalent strategy (Zhou et al., 2021). New entrants in the electric vehicle sector face barriers to entry, supply chain uncertainties, and market risks. By engaging in technology cooperation with battery suppliers, these manufacturers can license technology, thereby mitigating risks and ensuring supply stability (Yan et al., 2023). Tesla exemplifies this approach by licensing its battery technology to peers such as Panasonic, Toyota, GM, and Volkswagen, thus enhancing its market presence and fostering collaborative networks (MOTO, 2020). Similarly, Wide Temp's technology licensing to Xinke New Materials in 2022 facilitated the production of innovative aluminum-based battery cells and PACK products, expanding market applications (Luo, 2022). Technology cooperation mitigates battery supply risks and lowers procurement expenses for producers. Nevertheless, the production line setup at battery manufacturing plants consumes considerable time. Manufacturers must demonstrate strong management capabilities while facing elevated operational costs.

Enterprises with established brand reputations tend to enjoy higher consumer loyalty (Long et al., 2019). When both renowned and emerging manufacturers source batteries from the same supplier, the latter can leverage this association to boost product visibility and attract potential buyers (Liu, Z. et al., 2023). Brand reputation of famous brand manufacturers spills over to competitors because they acquire products from a common supplier. We refer to such a phenomenon as brand spillover (Wu et al., 2021). Analogous to how Chery Automobile Co. Ltd. promoted its Flag Cloud model by highlighting the use of a BMW engine, or how Netease Yanxuan and MINISO capitalized on their shared suppliers with global brands, emerging EVMs can benefit from the brand spillover effect (Yiche, 2023). Xiaomi's electric vehicles share battery components with BYD Company Limited, yet consumers may prefer BYD's offerings owing to brand perception. This scenario raises intriguing questions: Is the brand spillover effect always advantageous for new entrants? How does it shape their battery procurement strategy?

Building our research for this study upon empirical observations and existing literature, we explore the optimal battery procurement strategy for entrant manufacturers, considering the brand spillover effect. Factors such as brand power and after-sales service level significantly influence decision-making, yet their collective impact on battery procurement choices and profitability remains underexplored. Our investigation focuses on the strategic landscape for entrant manufacturers in a competitive market, accounting for these critical elements.

We propose the following questions:

- What are the implications of direct sourcing versus technology cooperation for entrant manufacturers? What are the optimal battery supply decisions and expected profits under each scenario? What are the primary outcomes?
- Does the brand spillover effect universally benefit entrant manufacturers in battery procurement? How does it affect their supply strategy?

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