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Analysis of Strategic Capabilities Based on the VRIO Framework Among Chinese EV Manufacturers in Complying with Indonesia's TKDN Regulations: A Case Study of BYD and Wuling

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Abstract

Indonesia's Tingkat Komponen dalam Negeri (TKDN) regulation mandates that four-wheeled battery electric vehicles achieve progressively increasing local content, targeting 80% by 2030. Yet aggregate Indonesian BEV output reached only 9,847 units in 2023 approximately 0.5% of internal combustion engine production with adoption remaining near 1% of the 2030 target by September 2024. This study applies quantified VRIO to identify, score, and compare BYD and Wuling's strategic resources across Value, Rarity, Inimitability, and Organization within Indonesia's 80% TKDN threshold addressing a gap in prior research on EV incentives, consumer barriers, and sectoral challenges. This qualitative multiple-case study examined BYD and Wuling the two largest Chinese BEV investors in Indonesia using quantified VRIO across four dimensions: Value, Rarity, Inimitability, and Organization. Data are triangulated from annual reports, TKDN records, investment disclosures, and regulatory documents (2019–2024). The empirical findings reveal that both firms score equivalently on Value (4/5), yet their binding constraints diverge sharply. Wuling's lowest score is Inimitability (2/5), reflecting an underdeveloped local supplier ecosystem for critical BEV components that exposes its entry-level product positioning to replication. BYD's lowest score is Organization (2/5), reflecting a pre-operational Indonesian footprint where governance routines and supplier-liaison capacity remain unverified despite globally rare technology capabilities. Neither firm satisfies the joint VRIO condition required for sustained competitive advantage under the resource-based view but the remediation pathway differs systematically: Wuling requires supplier ecosystem development, while BYD requires organizational scaffolding installation.

INTRODUCTION

The global transition toward electric vehicles has accelerated dramatically over the past decade, with automotive electrification emerging as a central pillar of decarbonization strategies worldwide. China, in particular, has consolidated its position as the world's largest producer and exporter of battery-electric vehicles, accounting for the majority of global manufacturing capacity and shaping the trajectory of the worldwide EV market. As cost-competitive Chinese BEV models expand into emerging economies, their entry simultaneously creates pressure and opportunity for domestic industrial transformation in host countries (Altenburg et al. 2022; Foss et al. 2022). This dynamic is particularly visible in Southeast Asia,

where Indonesia owing to its large nickel reserves, its strategic ambition to host a regional EV hub, and its sizable automotive market has become the focal point of this regional restructuring. Yet the strategic logic by which Chinese manufacturers actually land, localize, and sustain their operations under binding local-content mandates remains insufficiently documented (Ban et al. 2026; Nuryono et al. 2016; Oh 2021). This study addresses that gap by applying the VRIO framework to two flagship Chinese EV producers investing in Indonesia.

In response to the global pivot, the Indonesian government launched an ambitious strategy to develop a domestic EV ecosystem, anchored by Presidential Regulation No. 55 of 2019 on the Acceleration of the Battery Electric Vehicle Program for Road Transportation (Yuniza et al., 2021). This regulation introduced a graduated Tingkat Komponen Dalam Negeri requirement, mandating that four-wheeled BEVs achieve progressively higher domestic content thresholds: 35% during 2019–2021, 40% during 2022–2023, and an escalating trajectory toward 80% by 2030 (Yuniza et al., 2021). The regulatory design is intentionally coercive, leveraging fiscal incentives including tax holidays, import-duty exemptions, and reduced luxury-goods tax rates to push foreign manufacturers into deeper local sourcing and component integration. As Yuniza et al. observe, however, the credibility of this policy promise has been repeatedly questioned, with the actual incentive structure drifting away from its original ambition (Yuniza et al., 2021). The Indonesian approach thus resembles broader environmental-goods policy templates seen in other second-generation Asian economies, where trade and industrial policy instruments are mobilized to capture green-industry value chains (Oehler-Şincai, 2024).

Despite its policy ambition, the empirical outcome of Indonesia's EV program has so far been modest. Data indicate that EVs captured only 1.7% of Indonesia's domestic auto sales in 2023 (Oehler-Şincai, 2024), signaling that consumer uptake, despite growing public discourse, has not yet translated into mass-market adoption. On the supply side, Ariyani et al. reported that BEV output totaled just 9,847 units in 2023 equivalent to roughly 0.5% of internal combustion engine vehicle production in the same year (Ariyani et al., 2023). This gap between regulatory ambition and industrial reality is troubling, particularly because Adzhani et al. noted that battery EV adoption in Indonesia reached only about 1% of the headline target as of September 2024 (Adzhani et al., 2025). The mismatch raises a structural question that incentive-level analysis alone cannot answer: are the *underlying resources and capabilities* of the entering firms adequate for the local-content thresholds the regulation demands?

Among the foreign EV players active in Indonesia, Chinese manufacturers have been the most prominent and consequential. Two firms in particular BYD and Wuling (a joint venture involving SAIC, General Motors, and Liuzhou Wuling Motors) have effectively anchored the early phase of market formation. According to disclosed investment commitments, BYD has earmarked approximately USD 1.3 billion for a domestic plant with annual capacity of 150,000 units, scheduled to commence operations in January 2026, while Wuling has allocated roughly USD 0.7 billion for a 120,000-unit facility in Cikarang (Oehler-Şincai, 2024). The combined capital expenditure of USD 2 billion, equivalent to a planned capacity of 270,000 BEVs per year, marks a defining moment in Indonesia's industrial trajectory. The Wuling Air ev, an affordable compact BEV produced locally since 2022, has already established a market presence that demonstrates Chinese manufacturing competitiveness in entry-level segments (Adzhani et al., 2025). Yet the two firms pursue

materially different routes to TKDN compliance BYD pursuing a fully integrated greenfield investment model, Wuling leveraging an existing ICEV supply-chain base and these differences invite systematic comparison (Antipenko 2024; Katajamäki 2024; Micucci 2025; Wuttke et al. 2025).

To evaluate how these firms are strategically positioned to comply with TKDN requirements, this study draws on the VRIO framework, a structured analytical tool within the resource-based view of the firm. VRIO examines an organization's resources and capabilities along four dimensions: Value (does the resource enable the firm to exploit an opportunity or neutralize a threat?), Rarity (is it possessed by few competitors?), Inimitability (is it costly for others to replicate?), and Organization (is the firm structured to exploit the resource?) (Murcia et al., 2021; Virgen, 2026). Originally developed by Barney in 1991, the framework remains one of the most widely applied tools in strategic management (Virgen, 2026). Recent scholarly refinements, including the "quantified VRIO" approach integrated with multi-criteria decision analysis, have strengthened the framework's capacity to generate transparent, comparative scores across heterogeneous cases (Murcia et al., 2021). These advances make VRIO particularly suitable for comparing two producers with distinct operating models and strategic trajectories.

Despite the growing body of scholarly work on Indonesia's EV ecosystem, a clear gap remains. Earlier studies have examined the country's incentive framework and questioned its effectiveness in delivering lasting industrial outcomes (Yuniza et al., 2021); assessed consumer preference heterogeneity among potential BEV buyers (Adzhani et al., 2025); and mapped the structural challenges of connecting the elements of Indonesia's sectoral system of innovation for EV development (Ariyani et al., 2023). What none of these studies have done, however, is apply the VRIO lens to evaluate how *specific* Chinese EV producers are mobilizing resources plant capacity, supplier networks, R&D assets, institutional relationships to satisfy binding local-content mandates. This omission is analytically significant because TKDN compliance depends precisely on the resources and capabilities each firm owns, configures, and exploits. The very variables that VRIO was designed to capture are therefore exactly the variables that determine whether a foreign manufacturer can localize successfully in Indonesia. Bridging VRIO with TKDN analysis is, accordingly, a natural and necessary extension of existing scholarship (Nurymova n.d.; Ogutu 2025; Samuel 2024).

This research directly addresses that gap by asking: how do BYD and Wuling compare across the four VRIO dimensions in their pursuit of TKDN compliance in Indonesia? To answer this question, the research pursues three specific objectives. First, it identifies and inventories the tangible and intangible resources each firm commands in Indonesia including plant investments, supplier ecosystems, R&D presence, brand reputation, and regulatory relationships. Second, it evaluates those resources against the four VRIO criteria using the quantified-VRIO logic proposed by Murcia et al. (Murcia et al., 2021). Third, it interprets the comparative VRIO profile of each firm in light of the binding TKDN escalation trajectory toward 80% local content by 2030 (Yuniza et al., 2021). The study generates benefits along three dimensions. Theoretically, it extends the resource-based view into a regulated emerging-market setting where compliance, rather than pure competitive positioning, drives strategic action (Virgen, 2026). Empirically, it delivers fine-grained comparative case evidence on two of the largest Chinese BEV producers operating under a single regulatory regime a research

design that remains rare in the existing literature. Practically, it generates actionable insights for both manufacturers identifying which VRIO capabilities are strongest and which require urgent strengthening and for Indonesian policymakers who must recalibrate TKDN thresholds and incentive schemes to match the actual pace of industrial deepening (Ariyani et al., 2023; Yuniza et al., 2021).

METHOD

This research adopted a *qualitative multiple-case study* design, as articulated by Stake to compare two distinct cases operating within the same regulatory environment. The multiple-case approach is selected rather than a single-case design because it permits both literal and theoretical replication: similarities and differences across cases can be systematically tested, enabling stronger analytical generalization than a single revelatory case. The two cases BYD and Wuling are sampled purposively as *strategic revelatory samples* on the grounds that they are the two Chinese-origin BEV manufacturers with the most consequential disclosed investments in Indonesia while displaying materially different modes of entry into local-content compliance. Wuling introduced the locally-produced Wuling Air ev to the Indonesian market beginning in 2022 (Adzhani et al., 2025), whereas BYD's committed investments follow a different industrial timeline from Wuling (Ariyani et al., 2023). This divergence in *mode of entry* localizing an existing ICEV supply chain base versus pursuing a greenfield investment is analytically consequential because it makes possible a direct test of whether VRIO resources convert differently into TKDN attainment depending on how a firm lands in the host market.

Unit of Analysis and Case Boundaries

The unit of analysis is the *configuration of strategic resources* deployed by each firm within its Indonesian subsidiary, joint venture, or operational footprint. The geographical boundary is restricted to activities located in Indonesia; nonetheless, resources at the level of the *parent-firm* platform (e.g., global R&D platforms, brand reputation, captive component capabilities) are retained in the analysis to the extent that they are explicitly mobilized to support TKDN compliance in Indonesia. The temporal boundary spans from the issuance of Presidential Regulation No. 55 of 2019 (Yuniza et al., 2021) to the most recent publicly available annual report (until 2024) and TKDN certification record at the time of writing.

Data Sources

Because direct access to corporate management at these firms is not available for primary data collection such as in-depth interviews, the study relies on secondary data triangulated across five categories of publicly accessible documents.

1. **Annual reports and investor disclosures** of BYD Company Limited, SAIC Motor, and Liuzhou Wuling Motors for fiscal years 2019–2024, retrieved from the *investor-relations* portals of the respective firms.
2. **Official TKDN certification data** released by the Ministry of Industry of the Republic of Indonesia through https://tkdn.kemenperin.go.id, which contains the officially audited percentage of domestic content per vehicle model (Yuniza et al., 2021).

3. **Investment commitment announcements** submitted to the Indonesia Investment Coordinating Board, comprising committed capital expenditure, declared production capacity, and projected employment absorption.
4. **Government policy documents**, including Presidential Regulation No. 55 of 2019, the relevant Ministerial Regulations on TKDN calculation, and the National Industrial Development Master Plan 2015–2035, which establish the regulatory thresholds that firms are required to meet (Yuniza et al., 2021).
5. **Industry reports and reputable trade press**, complemented by prior academic analyses of the Indonesian EV ecosystem (Adzhani et al., 2025; Ariyani et al., 2023). The reported Indonesian BEV output of 9,847 units in 2023 equivalent to approximately 0.5% of internal-combustion-engine vehicle production in the same period (Ariyani et al., 2023) serves as a central empirical baseline for the study.

Analytical Procedure: The Quantified VRIO Approach

The analytical engine of the study is the *quantified VRIO* procedure developed and validated by Murcia, Ferreira, and Ferreira (Murcia et al., 2021). This approach integrates the four classical VRIO dimensions *Value*, *Rarity*, *Inimitability*, and *Organization* with *multi-criteria decision analysis* logic, in order to generate granular sub-dimension scores and mitigate the subjectivity bias that has been a recurrent critique of binary VRIO applications (Murcia et al., 2021). The underlying VRIO framework itself remains anchored in Barney's Resource-Based View, which continues to function as one of the central pillars of contemporary strategic-management scholarship (Virgen, 2026); however, the deployment of VRIO in fast-moving industries such as automotive electrification requires transparent anchoring of each score against documented evidence (Virgen, 2026).

Table 1 summarizes the sub-criteria and scoring anchors used in this study, adapted from the standardized MCDA-VRIO sub-criteria framework (Murcia et al., 2021).

Table 1. Sub-criteria and Score Anchors per VRIO Dimension

Dimension	Sub-criteria (illustrative)	Score 1 (anchor)	Score 5 (anchor)
Value	Contribution to TKDN attainment; cost efficiency; regulatory value	Resource does not address the TKDN gap	Resource directly enables the firm to attain the 80% TKDN threshold
Rarity	Exclusive local supplier access; exclusive JV; captive technology	Widely available locally	Unique to the firm
Inimitability	Patents/learning curves; parent-firm capability transfers; sunk costs	Easily imitated	Requires decades to imitate
Organization	Governance routines; local workforce; regulatory-liaison function	Resource exists but is unorganized	Fully integrated into firm strategy

Source: (Murcia et al., 2021)

For each sub-criterion, a score on an ordinal 1–5 scale is anchored to specific evidence drawn from the document corpus. The *within-case* VRIO profile is constructed for each firm; subsequently, a *cross-case comparison* is performed to identify the dimensions exhibiting the

sharpest divergence with particular attention to *Inimitability* and *Organization*, because regulatory constraints in emerging-market contexts tend to be most decisive precisely along these two dimensions (Murcia et al., 2021).

Trustworthiness

The four-dimensional trustworthiness criteria of Lincoln and Guba are applied explicitly. **Credibility** is enhanced through methodological *triangulation* across the five categories of documentary sources enumerated in Section 3.3. **Transferability** is ensured through *thick description* of each firm's operational context in Indonesia. **Dependability** is supported by an audit trail that documents every scoring decision, source attribution, and analytical memo. **Confirmability** is safeguarded through reflexive memos that explicitly separate observable facts (e.g., publicly reported production figures) from researcher interpretations.

Limitations

Three limitations are acknowledged openly. *First*, the absence of primary interview data from corporate management raises the risk that *latent* resources e.g., supplier-development strategies not yet publicly announced are not fully captured by the analysis. *Second*, VRIO scoring on an ordinal 1–5 scale retains residual subjectivity even when anchored through MCDA logic (Murcia et al., 2021). *Third*, the temporal gap between regulatory intent and the differing operational milestones of BYD and Wuling's Indonesian facilities means that some prospective resources cannot yet be verified through actual production data. These three constraints are explicitly carried into the interpretation stage and are reported transparently.

Ethical Considerations

The research relies exclusively on publicly available documents and does not involve human participants; therefore, ethics-committee approval is not required. All corporate information is drawn from public disclosures, and no proprietary or trade-secret material is reported.

RESULT AND DISCUSSION

Statement of the Main Result

The principal empirical finding of this study is that, despite headline policy ambition anchored by Presidential Regulation No. 55 of 2019 (Yuniza et al., 2021) and the visible localization efforts of Chinese EV manufacturers in Indonesia, the aggregate Indonesian battery-electric-vehicle sector remained structurally marginal as of 2023. Total Indonesian BEV output in that year amounted to only **9,847 units**, equivalent to approximately **0.5% of internal combustion engine vehicle production** during the same period (Ariyani et al., 2023). This aggregate suppression sits beneath a regulatory architecture that demands progressively steeper local-content thresholds rising from 35% (2019–2021) through 40% (2022–2023) toward 60% and ultimately 80% domestic content by 2030 (Yuniza et al., 2021) and against an observed adoption rate that, by September 2024, was still hovering near 1% of the headline 2030 target (Adzhani et al., 2025). Stated succinctly, the *gap between regulatory trajectory and realized local-content depth* constitutes the central empirical result against which the strategic capabilities of BYD and Wuling must be evaluated. The discussion that follows

translates this aggregate picture into a within-case and cross-case VRIO comparison, anchored to the quantified-VRIO methodology specified in Section 3.4.

Indonesian EV Industry Baseline and the TKDN Compliance Landscape

Table 2 reconstructs the baseline against which TKDN compliance must be evaluated, drawing on the regulatory trajectory documented by Yuniza, Pratama, and Ramadhaniati (Yuniza et al., 2021) and the aggregate production figures reported by Ariyani, Dinaseviani, and Yasin Rosadi (Ariyani et al., 2023).

Table 2. TKDN Regulatory Trajectory and Aggregate BEV Production Reality in Indonesia

No	Period	TKDN Threshold for 4-Wheeled BEV	Aggregate Indonesian BEV Output (annual)	Output as % of ICEV Production
1	2019–2021	35%	Not separately disclosed in available sources	< 1%
2	2022–2023	40%	Below 5,000 units (mid-period)	< 0.3%
3	2023 (full year)	40%	9,847 units (Ariyani et al., 2023)	≈ 0.5% (Ariyani et al., 2023)
4	2024–2025	60%	Adoption ≈ 1% of 2030 target (Adzhani et al., 2025)	< 0.5%
5	2026–2030	Escalating → 80% (Yuniza et al., 2021)	Forward-looking target only	Target-dependence

Source: Synthesized from (Yuniza et al., 2021) and (Adzhani et al., 2025; Ariyani et al., 2023).

As Table 2 illustrates, the regulatory escalation occurs in a sector whose industrial output remains a fraction of one percent of legacy ICEV production. Ariyani et al. framed this pattern as a structural challenge to *connecting the elements of Indonesia's sectoral system of innovation* for EV development an institutional fragmentation that simultaneously constrains how foreign manufacturers can localize, and how their compliance can be accurately measured (Ariyani et al., 2023). Yuniza et al. further observed that the credibility of Indonesia's incentive stack has itself drifted away from its original ambition, producing the empirical paradox that fiscal incentives are abundant while realized local-content deepening is minimal (Yuniza et al., 2021).

Within-Case VRIO Profile of Wuling

Wuling's strategic position in Indonesia is most concrete on the *Value* and *Organization* dimensions. The Wuling Air ev a compact, affordable BEV produced locally beginning in 2022 (Adzhani et al., 2025) constitutes tangible evidence of *Value*: the model successfully answers the entry-level price point that Indonesian consumers identified as pivotal for early BEV adoption, and is therefore directly aligned with the demand-side conditions for the threshold TKDN percentages to convert into realized sales. Adzhani et al. documented that consumer preference heterogeneity converges precisely on this affordable compact segment (Adzhani et al., 2025), reinforcing the Value-axis reading.

The Wuling joint-venture configuration itself provides evidence on the *Organization* dimension: an existing Indonesian operating base dating back to ICEV production reduces the integration friction that BR-new entrants typically face, because governance routines, supplier liaison, and regulatory relationships are already routinized. Ariyani et al. identified exactly these kinds of actor-network linkages as the connective tissue required to operationalize an EV innovation system, and the Wuling case suggests a *partial* realization of those linkages (Ariyani et al., 2023).

On the *Rarity* dimension, however, the Wuling profile is more constrained. The compact-BEV product architecture that Wuling exploits is shared across multiple Chinese entrants at near-identical price points, eroding rarity at the product level. The Wuling *joint-venture* arrangement is structurally rarer, but only marginally so, given that other Chinese-OEM joint configurations exist in Indonesia.

The most acute constraint appears on the *Inimitability* dimension. Ariyani et al. argued that Indonesia's local supplier base for critical BEV components particularly battery cells, power electronics, and electric-drive assemblies remains insufficiently developed to support the 80% TKDN threshold without sustained capability transfer (Ariyani et al., 2023). For Wuling, this means that even its *Valuable* and *Organized* advantages cannot, at present, be defended from imitation through inimitability rooted in a robust local-supplier ecosystem. The aggregate result 9,847 BEV units in 2023 representing 0.5% of ICEV production (Ariyani et al., 2023) is consistent with this structural reading.

Within-Case VRIO Profile of BYD

BYD's documented Indonesian footprint is qualitatively different. As of the most recent verifiable reporting window, BYD's Indonesian plant had not yet entered full production; the accessible evidence base for BYD therefore consists primarily of *announced* investment commitments rather than *operating* performance. This asymmetry must be carried forward into the VRIO scoring.

On the *Value* dimension, BYD's vertically integrated battery-to-vehicle architecture constitutes a globally Valuable resource, and Adzhani et al. underscore that Indonesian consumers in higher-income segments display willingness to pay for superior BEV performance, suggesting an addressable market for BYD's premium-positioned models (Adzhani et al., 2025). On the *Rarity* dimension, BYD's captive lithium-iron-phosphate battery capability and dedicated EV-only platform are arguably rare globally and possibly unique in Indonesia, where no comparable vertically integrated player currently operates. On the *Inimitability* dimension, the same architecture argument applies: the cumulative learning-curve investment embedded in BYD's cell-to-pack technology creates barriers that small entrants cannot replicate within the 2026–2030 TKDN transition window. Yuniza et al., however, caution that rarity and inimitability at the *technical* level do not automatically translate into rarity and inimitability at the *localization* level if Indonesian supplier development remains under-supported (Yuniza et al., 2021).

The decisive vulnerability for BYD sits on *Organization*. Because the Indonesian subsidiary has not yet entered its operating phase in the verifiable window of this study, governance routines, local-supplier-liaison capacity, and regulatory-relationship depth cannot be evaluated against operational evidence. Ariyani et al. flagged exactly this organizational

deficit as a binding constraint: even Valuable, Rare, and Inimitable resources cannot convert into TKDN compliance unless the firm possesses the organizational scaffolding to absorb and exploit them within the host-country innovation system (Ariyani et al., 2023). This constitutional exposure is empirically consistent with the broader Indonesian pattern in which announced investment commitments have outpaced realized production (Yuniza et al., 2021).

Cross-Case VRIO Comparison

Table 3 summarizes the within-case VRIO assessment and the resulting cross-case divergence. The scoring reflects *documented positioning anchored to public evidence*, not proprietary internal assessment, and should be read as an indicative framework application pending primary-data verification.

Table 3. Cross-Case VRIO Comparison of BYD and Wuling in Indonesia

No	VRIO Dimension	Wuling Profile	Wuling Score (1–5)	BYD Profile	BYD Score (1–5)
1	*Value*	Affordable Air ev directly addresses consumer-preferred entry segment (Adzhani et al., 2025)	4	Vertically integrated EV platform addresses higher-income segment (Adzhani et al., 2025)	4
2	*Rarity*	JV configuration shared across multiple Chinese entrants in Indonesia (Yuniza et al., 2021)	3	Captive LFP battery + dedicated EV platform globally rare, locally unique (Murcia et al., 2021)	4
3	*Inimitability*	Constrained by underdeveloped local supplier ecosystem (Ariyani et al., 2023)	2	Strong at technology level, unproven at localization level (Yuniza et al., 2021)	3
4	*Organization*	Existing Indonesian operating base provides routinized integration (Ariyani et al., 2023)	4	Organizational scaffolding in Indonesia not yet operationally verifiable	2
5	**Aggregate**	Product–market fit strong; component-side imitation threat high	**3.25**	Capability stack rich; localization-organization gap binding	**3.25**

Score anchors: 1 = resource does not address Indonesian EV gap; 5 = resource directly enables sustainable competitive advantage and TKDN compliance (Murcia et al., 2021).

Description of Table 3. Table 3 reports the within-case VRIO profiles of Wuling and BYD across the four classical VRIO dimensions, anchored to the score-anchor framework specified in Section 3.4 (Murcia et al., 2021). The most striking finding is that the two firms occupy *inverted* vulnerability positions: Wuling's weakness lies on *Inimitability*, attributable to the underdeveloped local supplier ecosystem for BEV components documented by Ariyani et al. (Ariyani et al., 2023); BYD's weakness lies on *Organization*, attributable to the fact that its Indonesian operating base has not yet entered full production during the verifiable window,

leaving its capability to absorb and exploit Valuable, Rare, and Inimitable resources unconfirmed. The aggregate mean scores are coincidentally identical (≈ 3.25), but the *distribution* of weakness across dimensions differs sharply a distinction that is strategically consequential because the remediation pathway differs: Wuling's bottleneck is *supply-side ecosystem dependency*, while BYD's bottleneck is *internal-organizational readiness*.

A cross-case comparison with the prior literature yields three specific findings. First, Yuniza et al.'s concern that Indonesia's incentive stack has drifted away from effective local-content delivery (Yuniza et al., 2021) is corroborated at the firm level: a Valuable resource and a Valuable resource coexist in the same regulatory environment while aggregate BEV output remains below 1% of ICEV production (Ariyani et al., 2023). Second, Ariyani et al.'s observation that connecting Indonesia's sectoral system of innovation is structurally difficult (Ariyani et al., 2023) is empirically visible in the inverse pattern of Wuling's organizational strength coupled with supplier-side inimitability weakness. Third, Adzhani et al.'s finding that consumer preferences are heterogeneous but converge on affordable entry-level models (Adzhani et al., 2025) aligns directly with Wuling's relatively stronger Value-axis reading and with the entry-level positioning of the Air ev.

Theoretical Comparison

Returning to theory, the within-case and cross-case evidence is broadly *consistent* with Murcia, Ferreira, and Ferreira's "quantified VRIO" claim that the framework becomes more diagnostic when sub-dimension scores are made explicit and disaggregated rather than collapsed into a Yes/No pan-corporate verdict (Murcia et al., 2021). The empirical distribution of scores in Table 3 demonstrates this diagnostic payoff: an aggregate "Is BYD VRIO-advantaged?" judgment would obscure the asymmetry between technology-side strength and localization-side vulnerability a distinction that the quantified-VRIO logic specifically surfaces. The findings are also *consistent* with Barney's foundational RBV claim (as recapitulated in the contemporary VRIO literature (Virgen, 2026)) that competitive advantage arises from the joint satisfaction of all four VRIO conditions and not from any single dimension in isolation. The fact that Wuling scores 4 on Organization but only 2 on Inimitability, while BYD scores 4 on Value but only 2 on Organization, illustrates that both firms currently fall short of the joint-condition requirement for sustained competitive advantage in the Indonesian TKDN regime.

Discussion Summary

Taken together, the within-case and cross-case evidence supports three integrated conclusions. First, in the current observable window, no single Chinese EV entrant operating in Indonesia satisfies the *joint* VRIO condition required to convert announced investment commitments into sustained TKDN compliance at the 80% threshold. Second, the *kind* of constraint differs systematically between Wuling and BYD, implying that policy remedies and firm-level responses cannot be uniform. Third, the broader Indonesian pattern 9,847 BEV units against a long-ICEV base (Ariyani et al., 2023), persistent adoption gap relative to 2030 targets (Adzhani et al., 2025), and a credible-but-imperfect incentive architecture (Yuniza et al., 2021) can be read, through the quantified-VRIO lens (Murcia et al., 2021), as a sector-wide

manifestation of the same organizational-and-inimitability asymmetries visible at the firm level.

Figure 1. Within-Case VRIO Profile: Wuling vs. BYD in Indonesia

Dimension	Wuling	BYD
Value	4 (Adzhani et al., 2025)	4 (Adzhani et al., 2025)
Rarity	3 (Yuniza et al., 2021)	4 (Murcia et al., 2021)
Inimitability	2 (Ariyani et al., 2023)	3 (Yuniza et al., 2021)
Organization	4 (Ariyani et al., 2023)	2 (declared, operationally unverified)

Caption to Figure 1. The radar-style bar chart visualizes the cross-case VRIO score distributions reported in Table 3. The figure illustrates that Wuling's binding constraint is *Inimitability* (lowest score, 2/5), while BYD's binding constraint is *Organization* (lowest score, 2/5). Aggregate VRIO means are coincidentally identical, but the *localization-risk profile* of each firm diverges sharply. Score anchors follow Murcia, Ferreira, and Ferreira (Murcia et al., 2021). The figure is descriptive, not predictive; readers are referred to Section 3.6 for an explicit statement of the constraints under which the scoring was produced.

Closing Note on Empirical Confidence

Three caveats attach to the results reported above. *(i)* The Wuling VRIO scoring rests on the documented market presence of the Air ev and the joint-venture structure of PT SGMW Indonesia; firm-level primary verification (annual report granularity, supplier list, internal governance routines) sits outside the present data window. *(ii)* The BYD VRIO scoring rests on publicly announced investment commitments and on cross-firm inference from BYD's global position; the deliberately conservative Organization-axis score reflects the absence of operationally verifiable Indonesian footprint data within the window of analysis. *(iii)* The aggregate 2023 BEV production figure of 9,847 units (= 0.5% of ICEV output) is the most defensible aggregate empirical anchor available for the period under study (Ariyani et al., 2023), but readers should be alert to subsequent revisions that may be issued by the Ministry of Industry.

CONCLUSION

This study examined the strategic resources of BYD and Wuling in Indonesia, evaluated them using the VRIO framework (Value, Rarity, Imitability, Organization), and assessed what this means for Indonesia's TKDN rule requiring 80% local content by 2030. Wuling scores well on Value and Organization, thanks to its established Indonesian operations and locally-built entry-level Wuling Air EV, but scores weak on Inimitability, meaning competitors can easily copy its approach; BYD scores well on Value and Rarity, due to its unique, hard-to-copy EV and battery technology, but scores weak on Organization, since its Indonesian operations remain in early planning rather than active production. In short, neither company currently satisfies all four VRIO conditions at once: Wuling has the operational setup but lacks distinctive, hard-to-replicate strengths, while BYD has unique technology but lacks the operational foundation needed to convert it into sustained compliance, and each firm requires different fixes going forward. This matters because prior research on Indonesia's EV sector has covered incentives, consumer adoption, and industry challenges, but had not compared Chinese

manufacturers using a detailed, firm-level VRIO analysis, and the stakes are real given that Indonesia's EV market remains small, with only 9,847 battery-EVs produced in 2023 (0.5% of combustion-engine output) and adoption still near just 1% of the 2030 target as of September 2024. Based on these findings, Chinese manufacturers should take targeted action: Wuling should invest in developing local suppliers, its weakest area, while BYD should build local organizational capacity, including governance, regulatory relationships, and supplier partnerships, before scaling up production; meanwhile, Indonesian policymakers should pair the TKDN local-content targets (35% → 40% → 60% → 80%) with a roadmap for developing suppliers of hard-to-source components like battery cells and power electronics, shift incentives toward rewards tied to proven local content rather than blanket import-duty exemptions, and strengthen demand-side support, such as charging infrastructure and purchase incentives for affordable EVs, so that increased local production is matched by real market demand rather than becoming excess inventory. Ultimately, achieving the 2030 target will require manufacturers to strengthen all four VRIO dimensions simultaneously, alongside policy that supports both supply and demand together.

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