Accelerating Electric Vehicle Diffusion in South East Asia's Ride-Hailing Sector: A Diffusion of Innovation Analysis of the Grab-BYD Strategic Partnership

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Abstract. In the Southeast Asia region, the transport sector is undergoing rapid transformation, being the foremost impact area in the climate agenda over the last few years. Target zero emissions in the transport sector and than focus on EV. This is also the case in the rides sector which is very pivotal in Southeast Asia. A prime example is Grab super app in the region which in partnership with global EV manufacturer BYD is rolling out more than 50,000 EVs across 6 Southeast Asian countries, a first in the region. The author in this paper conducts desk qualitative research where he examines and reconciles information from promotional documents, white papers, and other scholarly and unscholarly literature. This paper utilizes Rogers (1962) Diffusion of Innovation (DOI) theory to explain the collaboration of the manufacturer and the platform in a bid to foster the rapid adoption of EVs among ride-hailing driver-partners. The first of its kind in the region, the partnership positioned itself as an ecosystems orchestrator, and through this collaboration, the partnership transcended the obstacles to the adoption of EVs. Through constructing an entire product with wrapped vehicular access, tailored financing options, extended contractual warranties, and IoT systems, the collaboration targets the 'early adopter' and 'early majority' segments. This paper contributes to the focus on this distinctive, unprecedented large-scale model diffusion of technology, specifically in the private sector, in emerging markets. The evidence collected suggests that these organized platform collaborations, where technology and dual market are merged, are likely to lead in the intersection of sustainable technology in the Global South.

Keywords: Electric Vehicles (EVs); Ride-hailing Platform; Diffusion of Innovation Theory; Sustainable Urban Mobility; Southeast Asia.

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1 Introduction

International efforts to combat climate change are starting to compel more and more countries to change to 'cleaner' forms of energy, and the focus of these efforts are in the transportation sector as it is one of the most relevant to decarbonization [1-2]. Southeast Asia has recently experienced rapid increases in urbanization, economic output, and vehicle ownership. These trends, especially in the region's fast growing megacities, have made the transport sector increasingly responsible for the generation of greenhouse gas emissions, the degradation of air quality, and the emergence of traffic congestion. [3]. This illustrates the great demand for transportation alternatives that can accommodate the ongoing development and simultaneously tackle the ever-growing environmental issues [4].

The adoption of Electric Vehicles (EVs) would substantially enhance the decarbonization of urban transport and the attainment of healthy urban air quality [5,6]. Despite intensifying worldwide investments in the EV marketplace, and in the Southeast Asian region in particular, the uptake of EVs continues to be extremely slow, largely due to the significant initial investment cost of EVs, the limited charging facilities, and the lack of sufficient consumer education [7,8]. Meanwhile, within the same socio-economic matrix, the transport network companies (TNCs) Grab and Gojek have become key players in urban transport, maintaining large fleets of internal combustion engine (ICE) vehicles [9]. These companies are major contributors to transport-related vulgarians while simultaneously representing a key factor in the inclusion of EVs in urban transport systems [10]. On the basis of the increasing ICE vehicle domination of their fleets and the resultant vulgarians, various transport network companies (TNC) have pledged to leave the urban transport system and to cease their activities after reaching their self-imposed carboneutral and fully electrified fleet targets [11,12].

The first of these is the January 2025 announcement of a partnership with Grab, the largest TNC in Southeast Asia, and BYD, the largest EV manufacturer worldwide. BYD is to supply 50,000 EVs for distribution throughout Southeast Asian countries within Grab's operations, but this is a first. These are not simply TNCs purchasing vehicles to Uber, bypassing all responsibilities for the socio-economic impact of their operations. It is a comprehensive system designed to create a facilitating ecosystem for the education and effective socio-economic inclusion of EVs to the large number of ride-hailing ICE vehicles.

Grab's involvement is delivering customized vehicle offerings, competitive credit financing, expanded vehicle warranties, and several Internet of Things (IoT) applications and integrations with Grab's value proposition [14]. Large-scale, private sector ventures is a `first of its kind in the world' and a positive development in the evolving strategies for the adoption of EVs. While government policies and incentives are always a necessary component of any strategy, this partnership is a quadra-

innovative ecosystems created to facilitate the realisation of a micro-market within its own ecosystem. Instead of waiting for demand to be pulled through market-operated means (towards a price), Grab is offering a streamlined, de-risked value proposition, to its captive drivers audience. This is likely to drive adoption in a manner and speed superior to what the market is capable of delivering organically (i.e. through individual drivers). The originality of this research is the close study of the manufacturer-platform collaboration focusing partnerships to broaden the EV utilization and supply trends to the market.

This study intends to utilize Rogers' (1962) Diffusion of Innovations (DOI) theory to analyze the Grab-BYD partnership in the context of understanding its possible mechanisms for fostering the adoption of EVs among the ride-hailing driver-partners in Southeast Asia. This study wants to answer the following questions. How do the elements of the Grab-BYD partnership complement the anchor elements of the DOI theory to affect the adoption of EVs? How does the partnership mitigate the perceived difficulties, improve the EVs' relative advantage, and enhance the trialability and observability for the driver-partners? How does the partnership impact the various groups of adopters, and what do these collaborations mean in the context of fostering sustainable mobility in developing economies?

This study analyses these questions. This research is terminated as follows. Section 2 describes Rogers' DOI theory in relation to the adoption of EVs and the peculiar two-sided market in which the theory is applied. Section 3 describes the methodologies employed for the study. Section 4 offers a rich dataset regarding the Southeast Asian region, in which the EV policies, market penetration, and the main ride-hailing platforms' electrification strategies are examined.

In Section 5, we analyze in detail the features of the Grab-BYD collaboration as a case of partnership diffusion, considering each element in turn according to the structure of DOI. In Section 6, we examine the implications of the findings for policy and management, and we also indicate some directions for future research. Finally, in Section 7, we summarize the contributions of the study to the understanding of the diffusion of sustainable technologies through platforms.

2 Theoretical Framework: Orchestrating Diffusion in a Platform Eco

2.1 Core Concepts of Rogers' Diffusion of Innovation Theory

Everett Roger (1962) developed the DOI theory as one of the very first approaches that analyze the phenomena of how new ideas, practices or things, or in other words innovations, are expressed by a social system and the manner in which they are spread over time [15-16]. Roger explains that the diffusion of the social system is determined by four main factors [17]: (1) the innovation, (2) the social system, (3) the time (4) the communication channels. The theory identifies the following five perceived attributes of an innovation that are likely to affect its rate of adoption [17-18]:

1. Relative Advantage - the degree to which an innovation is perceived to be better than the idea it supersedes. This advantage might be in social terms (e.g. status), in an economic fashion (e.g. reduces cost), or in a functional manner (e.g. increased efficiency) [17]

2. Compatibiity - the degree to which an innovation is perceived to be consistent with the values, prior experiences, and needs of the potential adopters [17].

3. Complexity - the degree to which an innovation is perceived to be difficult to understand or use. The simpler an innovation is, the more accepted it is likely to be [17].

4. Trialability: Degree to which an innovation may be tried to some extent and subsequently reduce some uncertainty and risk for the potential adopters. [17]

5. Observability: Degree to which the results of an innovation are visible and may trigger subsequent interest and adoption. [17]

The time aspect of the theory includes innovation-decision process (stages of the mental process from awareness to adoption) and the rate of adoption which is usually visualized with an S-shaped curve, and the classification of adopters with respect to their innovativeness. Rogers differentiated the adopters into these five categories: Innovators (2.5%), Early Adopters (13.5%), Early Majority (34%), Late Majority (34%) and Laggards (16%) [17]. One of the most important problems related to diffusion is to 'cross the chasm' between the visionary Early Adopters and the more practical Early Majority. [19] Finally, the social system with its norms and opinion leaders as well as communication networks provides the environment for the diffusion. [17, 20]

2.2 Application of DOI to Electric Vehicle Adoption

DOI theory, generally speaking, has to do with the adoption of innovative systems, which, in the case of electric vehicles, are costly, complex, and are dependent on the having requisite infrastructure in place [21]. Studies in the field examining the constructs of DOI theory find that the variables DOI theory considers to have the most impact on a person's willingness to adopt are in fact the variables which have the most impact on a person's willingness to adopt an EV [21]. Having a perceived advantage due to lower relative total costs, a person's compatibility with the vehicle, and the complexity of the new infrastructure and tech all greatly impact a person's adoption intentions. In most cases, the DOI framework is so effective whereas TPB, TAM, or other behavioral theories, is ineffective due to the fact that the DOi framework considers the adoption decision on the basis of a vehicle relative to an ICE vehicle [21].

2.3 The Platform as an 'Ecosystem Orchestrator' in Two-Sided Markets

When integrating DOI theory within a ride-hailing service, the classic model needs to be tailored to the context of a two-sided platform. This platform links two different, yet interdependent user groups, in this scenario, service providers (drivers) and consumers (riders). The platform's success depends on effective management of network effects and optimal supply and demand of both sides of the platform [22, 9]. The diffusion of

innovations such as the EV within this framework is no trivial matter and is certainly not one-directional. The platform must first convince and encourage one side of the market (the drivers) to adopt the newly available technology in order to offer the enhanced service to the other side (the riders) [23].

In this situation, it should also be noted how the platform (Grab) goes beyond the DOI's categorization of a 'communication channel' or a 'change agent' [17]. They are also a strong 'ecosystem orchestrator' or a 'super change agent''. An orchestrator does not simply spread the word about a newly developed product; it constructs the innovation bundle themselves by negotiating partnerships with (BYD) manufacturers, designs the perceived attributes toward the desired adopters (drivers), and controls the social system (its network of drivers and fleet partners) to speed up the process of diffusion [20]. The platform proactively tailors its innovation to suit the driver partners' specifications by eliminating financial constraints, streamlining operational procedures through the use of innovative technological tools, and providing significant economic benefits.

Here, we see the start of a multi-stage diffusion process. The most immediate diffusion, and the one we focus on, is the adoption of the EV by the driver. This decision is surely determined by the engineered characteristics of relative advantage and compatibility. But while this is primary diffusion, a strong secondary diffusion process is also occurring. The EV driver completes a ride and converts a 'passenger' into an observer. The ride functions as an instance of trialability and observability. It is a mass, low-cost, and low-risk opportunity for the EV performance and its environmental benefits to be normalized and the technology diffused to the public. The platform is not merely diffusing a product to its service providers. It is using its core business model to deploy a public demonstration program, likely to amplify and accelerate the S-curve of EV adoption among a wide range of consumers.

3 Methodology

3.1 Research Design

This study utilizes qualitative desk research to analyze Grab-BYD strategic partnerships and their potential impact on the market for EVs in Southeast Asia ride-hailing function. It also helps to integrate and analyze data from diverse sources to create a detailed understanding of the dataset and the phenomena it describes [25]. The research design is based on a detailed examination of the Grab-BYD alliance focusing on its purpose and objectives and the mechanisms it employs using Rogers (1962) Diffusion of Innovation Theory as the framework.

Given the recent nature of the Grab-BYD partnership, formally announced in January 2025, [14] the selection of qualitative desk research method is appropriate. There is typically a lack of detailed, empirical, field data immediately following a strategic announcement. However, documents such as press releases, corporate reports, and policy statements suggest the intended mechanisms and objectives of the partnership and provide a wealth of data. Analyzing such documents is an appropriate method to study

business strategy and innovation management and provides an opportunity to analyze rapidly evolving, complex initiatives.

3.2 Data Sources and Collection

The data for this analysis were synthesized across several openly available data sources. These include:

- Corporate Whereabouts and Communication: Key among these are the press releases on 15 January 15, 2025, on the commencement of the Grab-BYD collaboration partnership [14]. Additional corporate whereabouts of Grab [12], Gojek [25], and Blue Bird [26] were utilized.
- Policy on Government Documents and Reports: Documents on the policy of adopting new technologies to the electric vehicles (EVs) and the related incentives of the governments in the Southeast Asia (SEA) region with particular attention to Indonesia, Thailand, Malaysia, Vietnam, the Philippines, and Singapore.
- Corporate Reports on the Sustainability: Grab [12] and Gojek [25] were assessed to understand their declared environment goals and commitments to transition to EVs and to review their reports on the environment, social, and governance (ESG) criteria.
- Literature of the Academy and the Journals: The studies on the diffusion of the EVs, the technology adoption in the emerging markets, and the applications of the DOI theory were reviewed to gather existing literature and to conduct research. The searches in the academic databases were performed using the phrases, "electric vehicle adoption Southeast Asia," "Grab BYD partnership," and "Diffusion of Innovation electric vehicles" [3, 24] Literature of the Academy and The Journals: The studies on the diffusion of EVs, the technology adopted in the emerging markets, and the applications of the DOI theory were reviewed to gather existing literature and conduct research. Search of the academic databases were performed using the phrases, "electric vehicle adoption Southeast Asia," "Grab BYD partnership," and "Diffusion of Innovation electric vehicles" [3, 24].
- Reports of the Industry and Trustworthy Materials of News: Credible sources provided contextual information and updates on the EV market in Southeast Asia.

3.3 Data Analysis

The collected qualitative data underwent thematic analysis. Rogers' (1962) Diffusion of Innovation theory dominated the analysis. Systematically, data gathered from the sources concerning the characteristics of the Grab-BYD partnership were collated against the primary constructs of the theory of D\, O\, I: relative advantage, compatibility, complexity, trialability, and observability. A comparative analysis as well as contextual analysis of the EV strategies of other major regional players, in particular, Gojek and Blue Bird, was also undertaken to situate the Grab-BYD initiative. The final strategy in the analysis of the data was to integrate the different strands of information in order to weave

a coherent, and theoretically informed narrative that accounts for the ways in which the strategic partnership Grab-BYD was designed to serve as a conduit for the diffusion of innovations.

4 The Southeast Asian Context: A Fragmented but Accelerating Transition

In Southeast Asia, the transition to electric mobility is nuanced in the socio-economic and policy aspects of the region. While the entire hub is experiencing an electric mobility business but at different levels of adoption, infrastructure, and government support – the region has the potential to be a paradox in a rapidly growing market. [27]

4.1 EV Policies and Market Penetration in Southeast Asia

In Southeast Asia, government policies continue to be the main drivers of the region's EV adoption. Countries in the region, in addition to government investment, are providing a variety of fiscal policies, consumer subsidies, and industrial policies geared toward building local capacity. [3] The Indonesian government targets 2 million electric cars in the country by 2030, with government support including a 1% Value-Added Tax (VAT) and exemption on the import of domestic producers. [28] There is no doubt that they are already witnessing positive outcomes from these policies, as the EV market has grown to 9% of total vehicle sales in the first 8 months of 2025, an increase from 5% in 2024. [29] The policies brought Chinese brands, and BYD in particular, as the leading EV seller and the 6th overall selling car brand in the entire market by April 2025. [30]

Thailand has become a regional hub for EV production with its package “EV 3.5” focusing on consumer subsidies and tax reductions aimed at stimulating demand and EV production [31]. This has incentivized production and sales for the EV market in the country. During the first seven months of 2025, EV sales comprised 17.7% of total vehicle sales and it is projected to exceed 20% by the end of the year [31]. During the same period, Vietnam has also excelled, emerging as the second largest EV market in Southeast Asia. In addition, Battery Electric Vehicles (BEVs) represented 26% of total car sales largely due to the local car manufacturer VinFast, along with several government policies aimed at encouraging EV sales such as a complete waiver of vehicle registration fees [34-35].

Malaysia and Singapore confirmed strong growth in electric vehicle registrations in the newly published documents. In Malaysia, as file 36 and 37 illustrate, the registrations grew 133 percent YoY in September 2025, while the adoption rate for the full year is projected at 9.6 percent as people race to the tax incentives for the rapidly approaching year end. In Singapore, with a high cost car market, we registered new EV cars at 41 percent of the market and nearly equal to the petrol-electrics at 41.9 percent in the first half of 2025 38. In the Philippines, the EV Industry Development Act EVIDA is now yielding results as the EV cars in January to August 2025 accounted for six percent of total vehicles 39. Some analysis of the policies and the market situation is shown in Table 1

Table 1: Comparative Overview of EV Policies and Market Penetration in Key Southeast Asian Markets (2025)

Country	Key EV Policies/Incentives	2025 EV Market Share (YTD % of TIV)	Key Challenges	Notable Local Developments
Indonesia	11% to 1% VAT reduction, 0% import duty for CBU/CKD" pledging local production commitment [3]	9%(Jan-Aug) [29].	Insufficient charging infrastructure, high upfront costs [7].	BYD becomes top Ev seller, 6th largest car brand in general [30].
Thailand	'EV 3.5" package, consumer subsidies <= 100,000 THB, reduciton in import/excise tax [31].	17.7% between Jan-Jul, estimated to exceed 20% for entire year [32].	Infrastructure gaps, consumer battery costs [41].	Gov push to become regional EV manufacturing hub [33].
Malaysia	Partial tax exemptions for EV components, import/excise duty waivers, effective till end-2025 [40].	5.64% for Sep, estimated 9.6% for entire year [36-37].	High costs, charging for high-rise residents, weak resale market [8].	BYD top brand with 34.4% market share in 2023 [36].
Vietnam	Full exemption on registration fees until 2027, special consumption tax preferential [35]	26% Jan-Aug [34].	Inadequate charging infrastructure, high upfront costs [42].	Made vinfast to lead the market, 2nd largest Ev in SEA [34].
Philippines	EVIDA law, temporary delay of tariffs on imports of EVs and components. [43].	6% Jan-Aug [39].	High initial cost, charging stations, low public awareness [44].	Gov has EV fleet and electrification mandates [39].
Singapore	Green Plan 2030, EV Early Adoption Incentive (EEAI), aims to have 60,000 electric vehicle chargers installed by the year 2030 [45].	41% (Jan-Jun), almost exceeding hybrids (41.9%). [38].	High overall car ownership costs, range anxiety. [45].	By 2025, H1, BYD will have become the overall highest selling car brand. [46].

4.2 Competing Electrification Strategies in the Ride-Hailing Sector

Recently, Grab, Transporation Network Operating System (TNOS), and Blue Bird's, traditional taxi компанies, moves toward the electrification of their fleets in South East Asia have been coordinated, albeit, in different strategic ways. This is largely due to the different national policies and focus market of each company. This divergence has the potential to greatly impact thier competition within the region.

Grab, in collaboration with BYD, has entered the asset-light, partnership driven electric 4-wheeled (4W) model in all 6 countries in South East Asia [14]. They built a model offering a combination of vehicle availability and, in the partnership with BYD, offered a financial technological advanced fully integrated automotive product. In contrast, inducting a national, also asset heavy model (i.e., vertical intergation), to plan and implement local electric motorcycle systems and battery swapping infrastructures, is Electrum, a GoTo Group's unit, (2-wheeled (2W) model in Indonesia) and focused simultaneously on Indonesia's governmental industrial policies. Blue Bird, a seasoned taxicab operator in Indonesia, is focused on gradually equipping their fleet with different makers 4W electric vehicles (e.g., BYD, Tesla). They, too, built their in depot charging network to accommodate their 1000 electric vehicles targeted for 2025 [26, 49].

The unique characteristics and market positions of each company explain these different strategies. Gojek in Indonesia focuses on 2W EVs, which are the most profitable and versatile vehicles in the market. Grab, on the other hand, is stronger in multi-country operations and is and regionally driving the 4W strategy. The strategies are competitive, but these could be synergistic. Gojek has the most developed battery swapping infrastructure, which could channel a 2W market. In contrast, Grab's 4W fleet of EVs is likely to attract investment in public fast-charging infrastructure from other players, enabling the whole region to benefit from a more advanced 4W offering . A summary of these strategies is found in table 2.

Table 2: Comparative EV Strategies of Key Ride-Hailing Platforms in Southeast Asia

Feature	**Grab**	**Gojek (GoTo Group)**	**Blue Bird (Indonesia)**
Primary EV Focus	4W (Cars/MPVs). Models: BYD ATTO 3, SEAL, M6, DENZA D9 [14].	Primarily 2W (Motorcycles). Models: Electrum H5, H3. Pilot programs for 4W EVs [25, 48].	4W (Taxis). Models: BYD e6, Tesla Model X; exploring others [50]
Key Partnerships	BYD (vehicle supply, IoT integration) [14]. Yinson GreenTech (leasing in Malaysia) [51].	TBS Energi Utama (Electrum JV for manufacturing & ecosystem), Pertamina, Gogoro, Gesits (battery	BMW, Hyundai, BYD (vehicle supply). Collaboration with PLN for charging [26].

		swapping, EV supply) [52].	
Scale of Deployment/Target	Up to 50,000 BYD EVs across SEA [14]. Over 10,000 EVs in Indonesia & Thailand each (as of 2024) [12].	Transition 100% of Gojek platform vehicles to EVs by 2030 [11].	Aiming for 1,000 electric taxis by end of 2025; 10% of total fleet as EVs by 2030 [26, 49].
Approach to Charging/Battery Swapping	Relies on developing public/private charging infrastructure. IoT features for navigation to chargers [14].	Focus on battery swapping for 2W EVs via Electrum; network of ~250 swap stations in Greater Jakarta [48].	Own charging stations at depots, some of which are publicly accessible [53]
Key Markets of Focus	Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam (for BYD partnership) [14].	Primarily Indonesia for Electrum and 2W EV strategy [47].	Indonesia (primarily major cities and tourism areas) [50].
Stated Driver Support	Competitive rates, extended warranties, rental/financing options, IoT integration for efficiency [14].	Operational cost savings for drivers (up to 30%). Customized EV design for driver needs [48, 52].	Selected drivers for EV operation; focus on maintenance competency [53].

5 Analysis and Discussion: The Grab-BYD Partnership as a Diffusion Mechanism

The strategic collaboration between Grab and BYD can be treated as purposefully planned phenomenon that seeks to enhance the rate of EV ecosystem adoption by responding to each of the critical variables in the DOI theory. Hence, the collaboration streamlines the solution for transforming the driver-partners' perceived barriers to EV adoption.

5.1 Deconstructing the Alliance: A 'Whole Product' Solution for Drivers

The BYD and Grab alliance is much more than having a contract to supply vehicles as a 'whole product offering' for drivers. This model simultaneously addresses several possible

driver EV adoption barriers and as such mitigates the perceived risks. The partnership has several key attributes, as highlighted in Table 3, including large deployment, varied offerings for different service level vehicles, and perhaps most importantly, a combination of financial innovation and heavy techno-constructivism [12-13]. The collaborative partnership addresses the major barriers to adoption by providing (i) extended battery warranties, flexible access (rental, leasing, financing) and (ii) a pricing that is more favorable than the market. On the other hand, the heavy integration of the IoT (Internet of Things) in the vehicles which embeds Grab services, address more soft barriers to adoption by providing an overall seamless experience for the driver.

Table 3: Key Features of the Grab-BYD Strategic Partnership

Feature	Details
Target EV Deployment	Up to 50,000 BYD Electric Vehicles (EVs) [14].
Vehicle Models	Range including DENZA D9 (for GrabExec), BYD ATTO 3, BYD SEAL, BYD M6 [14].
Financial Offerings for Drivers	Access to BYD EVs at "most competitive rates"; Extended warranties on EV batteries; Rental options via Grab's fleet partners; Financing support through Grab's car ownership schemes; Leasing packages [14].
IoT Integration Aspects	Grab driver app integrated into BYD vehicle head units; Real-time sensor/telemetry data for driver behavior insights; Data for weather/traffic inference and demand prediction; Enhanced ETA accuracy; Hyperlocal map data leverage for routing [14].
Geographic Scope	Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam [14].
Key Goals of the Partnership	Boost electrification of Southeast Asia's transport sector; Increase availability of green vehicles for Grab users; Support driver-partners in transitioning to zero-emission transport; Lower financial barriers to EV adoption; Deliver economic benefits (e.g., fuel savings) to drivers; Enhance driver/passenger experience through technology [14].

5.2 Engineering Perceptions: Mapping the Partnership to DOI Constructs

The partnership's design also helps both Grab and BYD to develop positive perception towards EVs. This is in line with the basic elements in the DOI theory [17], which is further elaborated in Table 4. Within the framework of the partnership, operational cost improvements and additional offerings enhance the profile of the innovation. Reduction in embedded driver app connectivity into the vehicle's head unit increases its adaptability to most workflows. Lowering the financial and warranty terms diminishes the perceived complexities of EV ownership. Riders can also increase trialability by renting and leasing vehicles to test the technology. The innovation's advantages will be noticeable to a lot of individuals considering the extensive heterogeneous fleet of co-branded vehicles.

Table 4: Mapping Grab-BYD Partnership Elements to DOI Constructs for Driver-Partners

DOI Construct	Corresponding Grab-BYD Partnership Element(s)	How it Influences the Construct for Driver-Partners
Relative Advantage	Competitive EV pricing/leasing/financing; Extended battery warranties; Potential fuel and maintenance cost savings; IoT-enhanced operational efficiency; Access to premium services (GrabExec with DENZA D9) [14].	Increases perceived economic benefits (lower TCO, higher potential earnings) and functional benefits (greater efficiency, convenience, safety) compared to traditional ICE vehicles.
Compatibility	Integration of Grab driver app into BYD vehicle head units; Diverse EV models suited for ride-hailing; Alignment with regional sustainability goals [14].	Ensures the EV and its operational interface fit well with existing driver workflows and professional activities, minimizing disruption.
Complexity (Reduced)	Simplified financing/rental/leasing schemes; Extended battery warranties; User-friendly IoT features (integrated navigation, diagnostics, on-screen job management) [14].	Lowers the barriers to understanding and managing EV acquisition, long-term maintenance concerns (especially battery-related), and daily operational tasks.
Trialability	Availability of rental and leasing options for BYD EVs through Grab's fleet partners; Large-scale deployment increasing access [14].	Allows drivers to experience operating a BYD EV within the Grab system on a limited basis without the full financial commitment of purchase, significantly reducing perceived risk.
Observability	High visibility of a large fleet of co-branded EVs on roads; Potential for sharing positive driver experiences (cost savings, performance) within driver networks [14].	Makes the positive outcomes and practical application of EV adoption in ride-hailing more visible to other drivers and the public, encouraging wider adoption.

5.3 Navigating the Adoption Curve: From Early Adopters to the Early Majority

The alignment of the Grab and BYD Partnerships is poised to move to the next phase of the adoption inertia trajectory. More income and a greater attraction of the Innovators and Early Adopters [17] will be the result of newer technologies and greater IoT capabilities. However, the unique strategic value of the partnership lies in the persuasive marketing and psychological influence the partnership can have on the more cautious, risk-averse Early Majority. This is the largest portion of the target market and the most problematic to sell to as this segment is the most conservative and will delay the adoption of technologies until the benefits of the innovation have been proven and the risks sufficiently mitigated [17]. This target market will most likely be obtained by the partnership due to the clear economic benefits the partnership offers, the simplified ease of adoption from a 'whole product solution', and the guaranteed alignment with ride-hailing operational compatibility. Most collaborations of this nature will be aimed to help mitigate risk and operational access, and from this, the relatioshop is deliberately structured to 'cross the chasm' in the adoption of a product [19].

5.4 Systemic Dependencies and Limitations

The Grab-BYD Partnership is facing challenges within Southeast Asia's EV Ecosystem that pertain to the core of the partnership itself. These challenges, however, are systemically intertwined, and the most prominent of them is the charging infrastructure bottleneck. Since ride-hailing drivers drive high kilometrages, EVs will need to be charged more often, but public charging access and reliability are challenges that much of the Southeast Asia region faces (10, 28, 41]. Instead of directly developing and charging the infrastructure, the partnership will have to wait for external development which is the core of the system.

Additionally, the geographical scope of the partnership creates the complication of engaging in cross-market integration. The six countries of interest have different rules and regulations, policies on EV incentives, maturity of the infrastructure, different elements of driver economics. A standardized rollout is unlikely to be the best approach and therefore localized deployment is needed in order to optimize the uptake. It is also important to be able to realize the economic benefits to the drivers, as varying costs for electricity or unforeseen costs for maintenance can alter the overall value of the proposition. Lastly, the dependence on sophisticated IoT innovation might unintentionally lead to a disparity in the community. Less digitally savvy drivers, who probably belong to the Late Majority or Laggard groups, may not be able to use the embedded systems efficiently which may lead to a loss of the anticipated value and subsequent exclusion from the benefits and subsequently the driver community [12].

6 Implications and Recommendations

The analysis of the Grab-BYD strategic partnership offers important implications for policymakers, industry stakeholders, and the broader pursuit of sustainable urban mobility in Southeast Asia and other emerging economies.

6.1 Policy Implications for Southeast Asian Governments

The prosperity of BYD and Grab partnership, entrepreneurial ventures, and the BYD and Grab partnership hinges on the availability of conducive policies. Governments must:

- Streamline and Optimize for Car Charging Infrastructure Development: Foster PPPs to deploy fast charging stations accessible by the public in a timely manner. Recommended to cover areas with high-usage commercial vehicle fleets. New urban areas with charging infrastructure must be made mandatory to ensure sustainable scalability [5, 54].
- Augment and Refine Economic Incentives: Financial support policies must take into consideration both the commercial and ride-hailing the vehicle to ensure continued positive impact for high emissions vehicles [21, 55].
- Encourage interoperability and Standardization: Create a framework on the regional level for charging plugs and for communication protocols to be use. This addresses complexity for system users and promotes cross border infrastructure [56].
- Encourage Local Development of EV Supply Chain: Encourage the localization of EV and battery manufacturing using automated platforms. Policies should facilitate the building of a robust domestic ecosystem by bolter technology transfer and substitution of local (lesser) component suppliers. [3]
- Upgrade Grid and EV Ancillary Workforce: Large EV fleets create an increase in electricity consumption demand and hence a requirement for investments both in the modernization of the grid and in its renewable energy balancing. On the other hand, there is a need for workforce vocational training in the manufacturing, maintenance, and repair of EVs. [54].

6.2 Managerial Implications for Industry Stakeholders

The Grab-BYD model offers valuable lessons for ride-hailing platforms and automotive manufacturers:

- Deepen Strategic Alliances: Move beyond simple supply contracts to form deep, strategic alliances that co-create tailored solutions addressing multiple adoption barriers simultaneously.
- Prioritize Total Cost of Ownership (TCO): For commercial users like ride-hailing drivers, the economic case is paramount. Offerings must provide a clear, demonstrable, and sustainable TCO advantage over the vehicle's operational lifespan.
- Leverage Data and IoT for Competitive Advantage: The deep integration of IoT is a strategic asset. Platforms and OEMs should invest in these technologies to enhance fleet management, optimize driver experience, and gather invaluable real-world data for continuous product and service refinement [14].
- Invest in Comprehensive Driver Support: A successful transition requires more than just vehicle access. Platforms must provide comprehensive training on EV operation, charging protocols, and the use of integrated digital tools to ensure inclusivity and maximize efficiency [12].

- Adopt a Localized Rollout Strategy: When deploying across diverse markets, a phased rollout with strategies carefully localized to each country's specific regulatory, infrastructural, and economic context is essential for success.

6.3 Avenues for Future Research

Given the qualitative nature of the study, that focused on a single initiative, the current research opens up opportunities for future research on the topic to be carried out through a more quantitative approach:

- Longitudinal Study on the Impacts of Partnership: This should not be case study partnerships. Implement long-term case studies to assess the partnerships, and determine the changes in EV adoption, driver experience, economic benefits, and savings on cost of operations and incomes.
- Relative Importance of DOI Attributes: Survey driver-partners to prioritize the attributes of DOI with respect to the order of their relative importance in complex adoption decisions.
- The Secondary Diffusion Effect: Analyze how additional contact with EV rides affects the passengers' perceptions, attitudes, and intentions to purchase in the future, and measure the extent to which the platform model amplifies this effect.
- The Comparative Effectiveness of Adoption Models: Conduct comparative analyses on the effectiveness and equity impact of differing fleet adoption models (for example, of the platform-OEM partnerships, e.g. Grab-BYD, and the vertically integrated national model, e.g. Gojek-Electrum).
- The extent to which IoT integration creates or aggravates a "digital divide" among driver-partners, and the possible IoT integration tools' accessibility for all driver-partners to closing the `digital divide` and benefiting the IoT tools.

7 Conclusion

The partnership between Grab and BYD is a milestone collaboration within Southeast Asia on sustainable urban mobility. This research considers the partnership to be a complex but potentially highly functional emulative model for accelerating the diffusion of EVs within the developing world. Through the prism of Rogers' (1962) Diffusion of Innovation theory, the primary differentiator of the collaboration is a tailored approach to EVs' perceived characteristics towards the target adopter. The partnership increases the relative advantage of the target adopter through economic and functional value, addresses the complexity barrier through streamlined access and technology integration, decreased the risk and increased access through flexible, low-cost, and functional rental/leasing arrangements, and increased the observability through enhanced deployment. This approach is best suited for the target segments of innovators and early adopters and is likely to close the wide gap of the early majority within the driver-partner segments, which is the most critical barrier for this diffusion process.

The partnership's design illustrates an active, ecosystem-shaping strategy where the platform is not simply a market intermediary, but an ecosystem 'orchestrator'. Such a

design, with close collaboration between a platform and a manufacturer, presents a strong alternative to solely government-enabled, or consumer-limited adoption pathways. Yet, the success of this undertaking is, and will continue to be, a function of external factors, the most important of which is the existence (or not) of a sufficient, reliable public charging ecosystem within the Southeast Asian economies. Additionally, the local economic costs for drivers, particularly the need for localization, will be fundamental to the impact. This study expands the literature by documenting the phenomenon of large-scale, collaborative, and disruptive technology business models underscoring the ability to overcome barriers on the supply side of sustainable technology. The insights gained from this study will inform the targeted policy frameworks and business strategies needed to build the greener and smarter transportation ecosystems, not only in Southeast Asia, but in other developing economies.

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