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Budgeting and Forecasting Challenges for EV Startups in a Capital-Intensive Market

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ABSTRACT

This conceptual paper examines into the intricate budgeting and forecasting challenges confronting Electric Vehicle (EV) startups as they navigate a capital-intensive market characterized by rapid innovation and systemic uncertainty. The path to commercialization is filled with financial perils, includes high upfront costs associated with EV manufacturing, the expense of battery components, which constitutes a significant portion of the bill of materials and directly impacts pricing strategies and margin projections. Adding to this issue are demand uncertainty and market volatility; startups must forecast sales in a nascent market where consumer adoption depends on number of factors, which are largely beyond their control. Simultaneously, their financial models must account for severe supply-side constraints, including critical mineral scarcity for batteries and recurring semiconductor shortages, which create unpredictable production bottlenecks and volatile input costs that can devastate a carefully planned budget. The external ecosystem presents another layer of complexity, as massive infrastructure gaps in public charging networks necessitate co-investment and strategic partnerships, demanding innovative business model innovation to share risks and costs. Perhaps the most formidable forecasting variable is the pervasive influence of government. Startups must build flexible financial scenarios that can adapt to the sudden introduction, alteration, or expiration of purchase incentives, tax credits, and emissions regulations, which can instantly alter the competitive landscape and value proposition. Consequently, this paper contends that traditional financial planning is insufficient. Achieving viability requires EV startups to develop dynamic, multi-faceted forecasting models that integrate real-time risk assessments from the supply chain, policy arena, and consumer markets.

Keywords: Budgeting, Forecasting, EV startups Challenges, Capital Intensive

PURPOSE

This scholarly article adopts a qualitative, conceptual review approach to investigate the budgeting, forecasting and resource planning challenges confronted by Electric Vehicle (EV) start-ups in a capital-intensive industry. The overall aim of this study was to source, classify and critically evaluate the complex influences from the economic, technological, social and regulatory context, which affected the basis for financial planning and market predictions of start-up companies in the electromobility industry.

METHODOLOGY

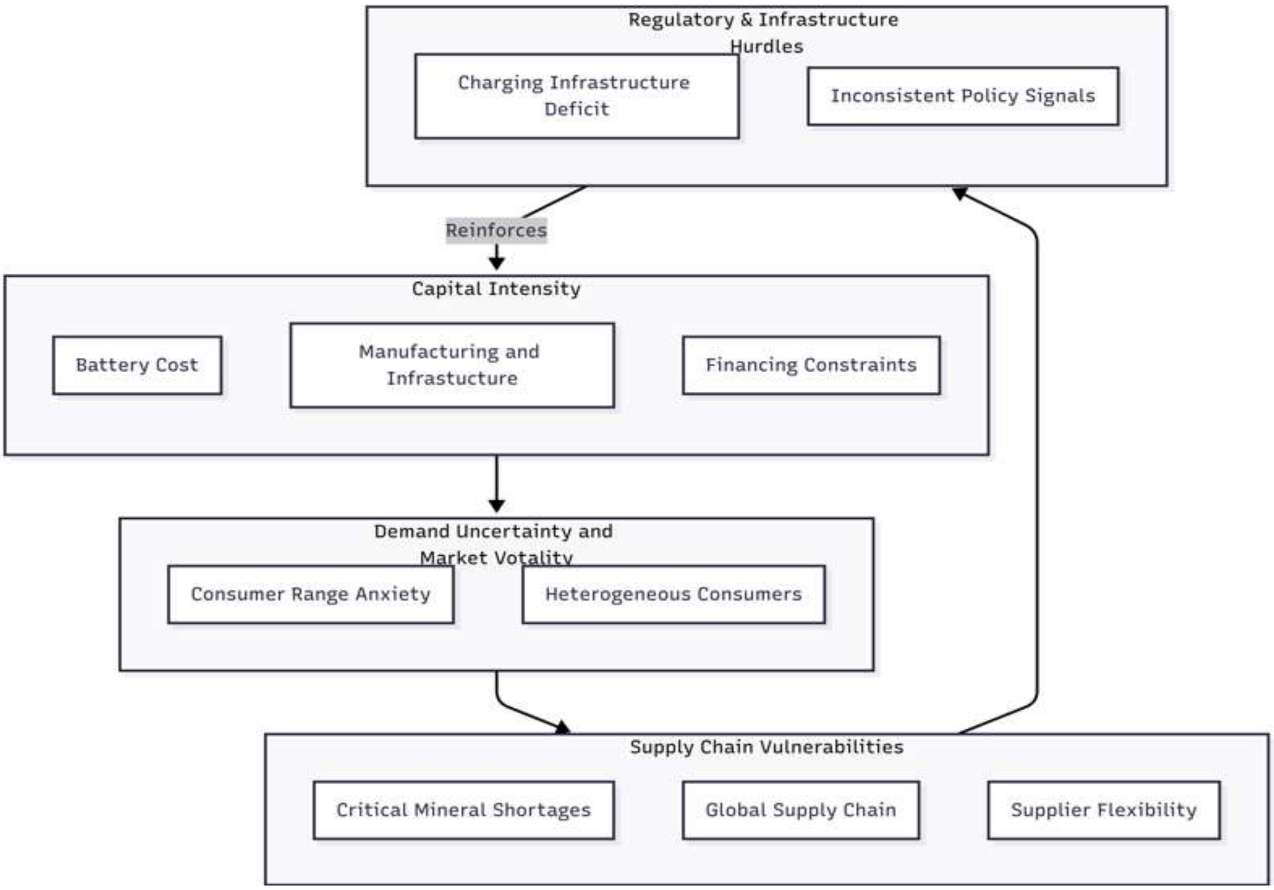
This study uses an intellectual, qualitative approach with a content analysis of publications between 2007 and 2025. The aim was to synthesise the multi-dimensional dynamism of economic, technological, social and regulatory factors on financial planning within the EV start-up context. The review focused on peer-reviewed publications and industry reports about specific topics: EV manufacturing as capital intensive, with high battery costs; challenges of funding and business models for startup, demand uncertainty and adoption barriers. In addition, include the vulnerabilities in the supply chain focused on critical minerals, semiconductors and government policies and incentives. The selected sources underwent thematic analysis to identify main arguments and empirical evidence. Key take aways were the large % of vehicle cost that is in batteries, the valley-of-death in funding, how hard it is to predict consumer demand and the impact of supply disruptions to

CAPEX budgets. The examination also aired innovative business models such as battery leasing and the crucial influence of subsidies. This process allowed a summary of the results aggregating them in a bigger picture portraying the budgeting and forecasting condition among EV startups. The conversation is framed in terms of direct financial implications, market volatility and the need for collective risk-sharing enterprise models as well as how external forces, such as supply chain resilience. This methodology gives the paper strength in which the findings are systematically grounded within current works, allowing for a sophisticate interpretation of financial planning challenges in this high-risk sector.

Conceptual Contribution: The "Vicious Cycle of Financial Risk" for Electric Vehicle (EV)

The bottleneck to mass EV adoption is not any single technological or economic challenge, but rather an interactively reinforcing system of financial risk produced by the dynamic interactions of Capital Intensity, Demand Uncertainty, Supply Chain Vulnerabilities and Regulatory & Infrastructure Hurdles. This framework suggests that all these elements create a negative dynamic that strangles investment, increases costs and delays market entry.

Diagram 1: The "Vicious Cycle of Financial Risk" for Electric Vehicle (EV)



The process starts with the underlying obstacles that contribute to a volatile market environment.

Regulatory & Infrastructure Challenges: The problem gets worse because entrepreneurs have to plan for development cycles that often take many years to complete but the key external variables are still in motion. A Charging Infrastructure Deficit is a concrete form of consumer resistance, while Inconsistent Policy Signals has made long-range market sizing a speculative endeavour. That a start-up could forecast sales without knowing the future regulatory and infrastructural landscape would be like creating a financial plan on shifting sands.

Drivers of Demand Uncertainty and Market Volatility: The immediate result of these barriers is an inability to create a predictable demand curve. Consumer Range Anxiety and Heterogeneous Consumers splinter the accessible market. The result is not only a small, but inherently volatile and difficult to model market, with revenue forecasts being extremely unreliable.

The Rise of Capital Intensity: The Price of Uncertainty

This is where the budgeting process becomes difficult. The Demand Uncertainty generated by the cycle provokes capital Intensity, perversely reinforcing it while poking a hole in every start-up's financial plan.

Cost of Capital: In a risky and unpredictable market, investors and lenders want to see a higher return on their investment given the increased volatility. This in turn raises the cost of capital for start-ups, which intensifies Financing Constraints. Fundraising budgeting is harder, and predictions need to include more equity dilution or costlier debt.

The Scale Conundrum: Accurate predictions are crucial in the selling of Uber-sized manufacturing and infrastructure needed for economies of scale that lower per unit battery Cost. But without a credible outlook such capital spending is rendered too risky. Start-ups are thus caught in a vicious cycle: they cannot budget for scale without forecasts of demand, and secure the cost structure that would stimulate such demand without making the capital investment first.

The Multiplying Factor: Supply Chain Risks

The ripple effect is also being felt for operational budgeting. High Capital Intensity and uncertain demand outlook mean start-ups can't afford the commitment of long-term purchases from suppliers. This exacerbates Critical Mineral Shortages, while reducing Supplier Flexibility, as suppliers are not going to reserve capacity for an unpredictable customer. As a result, start-ups are subjected to both higher and more volatile input costs, making COGS forecasts and production budgets even more uncertain.

INTRODUCTION

World life-style becomes increasingly electric. The mankind rush to electric driving will have direct and immediate shape on our lifestyle. But for start-ups looking to get into this market, the way forward is lined with an especially difficult financial environment. The paper discusses the unique budgeting and forecasting challenges facing EV startups in a capital-heavy industry with systemic volatility. These obstacles relate to four areas: cost structures and funding, market/demand volatility, supply chain disruption, and a changing regulatory system that present shortcomings for traditional financial planning models.

EV upstarts face extreme capital intensity and accordingly struggle against ever-greater hurdles to raising capital. The high cost of entry to the market especially due to EVs is a deterrent for those who may otherwise have entered into this sector in addition, the potential impact on margin predictions is being stunted by the high initial focus price at which costs associated with batteries can amount to as much as one third of an entire vehicle (König et al., 2021). The "Valley of Death" is a daunting funding gap that many startups encounter: the capital runs out before scaling revenue materializes. Making accurate forecasts of cash inflows, therefore, becomes essential albeit difficult to undertake-stakeholder appetite being aired by risk perception and extended return horizons (Faizal et al., 2019; Alshahapy et al., 2025). Second, the fact that dealers are not interested in selling or emphasizing EVs because of lower profit margins makes sales and distribution channel integration forecasting challenging (Sierra Club, 2019).

Complicating the cost problem further, there is extreme uncertainty in demand, which complicates sales forecasting dramatically. For example, startups have to act in a market still in an embryonic stage with consumers being triggered by external influences such as energy prices and range anxiety that never seems to go away (Egbue & Long, 2012; Melliger et al., 2018). Green needs of the end users along with which, low willingness to pay a high price premium cost led to revenue uncertainty (Bhattacharyya et al., n.d.). The lack of charging infrastructure installation, specifically in urban and multi-family environments, is further limiting but introduces equity concerns that can influence market size projections as well (Ge et al., 2021; Kumar & Alok, 2020).

On the supply side, prediction becomes increasingly difficult because of vulnerabilities. Global supply chain disruptions, as result of critical mineral (lithium, cobalt and nickel) or semiconductor shortages generate unpredictable production bottlenecks and highly volatile input costs that are destroying well planned budgets (Alshahapy et al., 2025; Shelar, 2024). Inadequate development of the battery recycle (including second life applications) infrastructure Bond polarity weakens supply chain, and reduces capability to project long-term cost sustainability models (Shelar, 2024). These circumstances require startups to rely on flexible financial scenarios that are able to respond to unexpected price shocks and lack of materials.

The effect of government policy is probably the most difficult prediction variable. Market conditions including the value proposition and competitive landscape can change overnight with the introduction, modification or expiration of purchase incentives, tax credits and emissions regulations (Shelar, 2024). Market creation is also dependent on state investment such as dependence necessitates startups to build adaptive and multi-layered financial models that factor in real-time policy risk assessments.

The confluence of these challenges: high capital intensity, demand volatility, supply chains vulnerability, infrastructure deficit and regulatory uncertainty present an existential financial planning crisis for EV startups. In this paper, we argue that viability relies on a move from static budgeting to create agile scenario-based forecast models. That's not only for the better, but also a necessity to attract investment and profit over the long term in a space as high risks and stakes as electric mobility.

FINDINGS: LITERATURE REVIEW

High capital Intensity

High Electric Vehicle and Battery Component Prices

There are economic hurdles attached to the shift from internal combustion automobiles to EV vehicles, and particularly so for EV startups, who must compete in a very capital-heavy field. These are concerns that weigh heavily on the consumer pricing strategy, on manufacturing investment, and in the financial modeling of the infrastructure we need to build. One key restraining factor to penetrating the market more widely, and hence to predicting correctly the revenue flows from start-ups, is that "electric vehicles are more expensive to buy than internal combustion engine vehicles (ICEVs)" (Faizal et al., 2019, p. 8; Egbue and Long, 2012; Adepetu and Keshav, 2017). This price mismatch leaves an implementation paradox scale to reduce cost/unit necessitates massive up-front manufacturing capital, high end prices means a small TAP (Total Addressable Market). This is compounded for low-income and vulnerable communities where the rich readily access big lines of credit (Alshahapy et al., 2025), which complicates the demand estimation even more. Accordingly, research suggests that even modest capex cuts to EV retail prices can significantly enhance product competitiveness (see, Faizal et al., 2019; Adepetu et al., 2017), which illustrates a key role for government policy and innovative finance mechanisms to ensure price points are met. But for startups, understanding and projecting the timing and magnitude of these external factors' impact on production costs and consumer demand becomes a key and highly challenging element of financial planning.

The Battery Cost Conundrum

The expensive cost of battery constituents is one of the main reasons for the high purchase price of EVs (Duffner et al., 2020; Berckmans et al., 2017; Alshahapy et al., 2025). The batteries may contribute up to 40-30 % for the cost and value chain of the entire vehicle (Faizal et al., 2019). Though battery costs have decreased dramatically—from 800 €/kWh in 2011 to a projected 280 €/kWh by 2020—economic mass-scale production is still an elusive goal. This is mainly related to the material composition and the demanding process to get high-performance batteries as well as production process variations limiting performances and increasing costs of production (Duffner et al., 2020; Berckmans et al., 2017; Asif and Singh, 2007). Hence, battery cost reduction is considered as, more important than improving EV due to mass market penetration without the need of government subsidies, and this cost is anticipated to continue to reflect EV prices above ICEV prices in coming years (Faizal etal.,2019).

For an EV startup, that reliance creates profound forecasting uncertainty. The single largest line item in their budget, and one that can spike wildly due to supply chain disruptions, is the cost of the raw materials that go into making batteries. This volatility makes it almost impossible to establish consistent pricing, good margins, or a reliable 5-year financial return for investors which greatly adds even more risk of financial return.

Manufacturing and Infrastructure Investment Challenges

There are major uncertainties associated with costs of investment up front, and the profitability of operations in the future for both the Original Equipment Manufacturers (OEMs), as well as the public charging infrastructure (Dechant et al., 2025; Kley et al., 2011), as it attempts to compete in an EV -era. For the OEMs, EV systems are new, they require a significant financial commitment with a potentially enormous return. This is especially difficult for startups, as they are already having a hard time to ensure sufficient returns from over-dimensioned, mostly manually operated assembly systems which is hardly feasible for them to purchase (Dechant et al., 2025).

By redesigning and rearranging their current Internal Combustion Engine Vehicle (ICEV) production infrastructure, existing OEMs significantly reduced this risk as opposed to starting from scratch with new lines for dedicated EV production. This approach saves existing investments but creates a less efficient manufacturing process not tailored for electric drive trains (Niemann & Eckermann, 2018; Faizal et al., 2019). This requires convincing investors to fund large, high-risk projects long before any sales income is generated.

Similar hurdles confront the build-out of public charging infrastructure. On the one hand, the economics are inherently challenging, with the investments being high and initial utilization relatively low, hence, not profitable (Zhang et al., 2018; Rahman et al., 2016). This missing proven and viable business model leads to reluctance to invest, which triggers an essential “chicken and egg” effect, ie, low numbers of charging stations prevent consumer acceptance, while low penetration of EVs would also undercut the business case for more infrastructure investment (Zhang et al., 2018; Zarazua de Rubens et al., 2020; Alshahapy et al., 2025).

For an EV startup, this infrastructure gap isn’t just a market barrier but a dollar-and-cents line item on any fledgling budget. In order to give a sense of confidence to consumer and alleviate “range anxiety,” startups need a large pile of money to spend on developing strategic partnerships with charging networks as they in option help subsidize the enabling infrastructure of one’s own vehicles in major markets. The high fixed cost figure is hardly negotiable, as it's critical to establish consumer trust, and even the smallest automakers are strapped for cash long before selling their first vehicle.

Financing Constraints for Startups

The high costs in capital needed, in the electromobility field hinder start-up financing (Vainio 2024Donada & Lepoutre 2016). A case for dynamic consolidator intentions the typical EV start-up has a diversified capital base and the venture debt funds are in constant need of high return investment in order to sign deals, but after all, will face a deadly “Valley of Death” where the first seed money has run out but the big volume of production scaling money is not yet available (Vainio, 2024; Sollazzo, 2024). This deficit is compounded by the inherent challenge of working in an unstable environment. The huge financial investment that scares away venture capitalists and other investors. It is the overwhelming demand coupled with policy uncertainty that makes traditional revenue forecast models irrelevant. A startup ready and able to demonstrate the value of a sophisticated, living breathing forecast model that indeed does include those risks is crucial in demonstrating its own value and raising the capital to scale. Financing strategy is varied by stage (i.e., bootstrap, angel investment, crowdfunding for early stage; venture capital, mid-term loan, public equity for growth stage) (Vainio, 2024and Sollazzo, 2024). On the other hand, regional differences have been observed while Europe positively accept of crowd-funding and public loans, Asia is funded by venture capital and in the US government grants or subsidies are used; taxation and VC invesment are treated (Vainio, 2024). Pessimism about low-performance, high-risk outcome of an investment might cause investors to be afraid of what in general is known as "risk capital" which is one of the biggest reasons for the bankruptcy of new companies in the area (Vainio 2024; Hoff 2012).

Total Cost of Ownership and Developing Business Models

Total Cost of Ownership (TCO) has significant impact on customer purchasing behaviour and the market share (Palmer, 2018; Liao, et al., 2019; Egbue & Long, 2012). Despite subsidies that can match the high cost of acquisition, electicity and maintenance savings over time sometimes do not justify the initial cost (Kęska et al., 2024; Haddadian et al., 2015). This creates an investment dilemma, forcing a choice between funding infrastructure early for long-term gains or delaying due to uncertain short-term returns (Salu, 2015; Vehmas, 2018). Consumer behaviour does not help, since prospective consumers tend to hold off their EV purchase, whereas it is easier for them to pay-as-you-go with the well-known refuel method used in ICVs (M & Montini, 2019). Ultimately, the demand-side is dominated by economic decisions, without collective measures of financial aid, only few electric vehicles appear to be cost-competitive to ICEVs for private buyers if short-term additional costs and insurance premiums are greater than long-term savings (Palmer et al., 2018; Kley et al., 2011).

Developments in TCO also have implications for fabrication technologies. Unlike three-wheel ICEVs, EVs create minimal after purchase income which discourages significant Battery Electric Vehicles (BEV) investment. Therefore, a common strategy among firms is to complement their BEV programs with PHEV offerings, thereby striking a balance between investing in radical innovation and ensuring short-to-medium-term market stability (Kley et al., 2011; Palmer et al., 2018). To overcome the issue of cost, the industry is testing alternative models such as battery leasing, combined package maintenance and direct online sales (Liao et al., 2019; Kley et al., 2011). These methods shift costs, limit consumer risk and lower financial barriers and provide a way for start up companies to trigger adoption in a capital-intensive unproven market.

Demand uncertainty and Market Votality

The march toward an EV future isn’t a straight story line, it’s a twisting filled with surprises and sharp corners. Wind up Consumer The market application demand change is large and the threshold of consumer psychology is deep, which has brought great challenges to manufacturers and decision makers. The unpredictability is being driven on the wheels of doubt and indeed one very large obstacle to the development of strategies around estimates of the up take rate of the EV is the wide range by which its predicted figure swing from strategic analyses; from a very low potential 3% of total market share by 2025 to an alarmingly large 24% (Dechant & Möhring,2023.). This vast distance underscores the difficulty in predicting how consumers en masse will behave. Car manufacturers are moving through murky waters, not knowing how to adjust capacity, how to crown factories anew, and how to negotiate long term procurement contracts of materials like batteries, requiring complex dynamic models, able to analyze the complex relations hidden in global production processes (Dechant & Möhring,2023).

The expansion of these markets does not appear to be regulated by a hard rule which might be exerted by the other more developed European markets and techniques for a predictable growth only, e.g. through a time varying grey Bernoulli modelling which have not yet been successful. The reality, however, is that it seems that the past may not match the future given the fluid nature of the vehicle market dynamics, slash-and-burn paths through technologies, ambiguous policy action, and changing household travel behaviour. This volatility worsens the fundamental barriers to EV deployment; a market that is usually unfriendly to EVs when compared to the current ICE vehicle standard, implied technical deficiencies, and persistent social barriers (Shbool et al., 2023; Ogbue et al., 2012). So, the uncertainty is not an accidental state of the EV marketplace for the present time, indeed in some senses it is the very nature of the frontier, and that frontier is something that needs to be recognised and carefully negotiated.

Psychological Barriers: Recital Anxiety and Technology Resistance

Beyond the numbers and projections, the most important fight for electric vehicle (EV) market share is psychological. The biggest challenge of all is consumer acceptance and it is grounded in human nature. The most prevalent psychological barrier is range anxiety ,the recurring fear of the battery running out of charge before reaching a charger, thus leaving the driver unable to continue to their destination (Pevec, Olaverri-Monreal, Schramm, & Emberger, 2019). It is a tough psychological barrier which real-world sufficiency of range for commuting you will not get over. The only real solution is a plentiful, accessible, and unwaveringly reliable public charging infrastructure, especially the rapid charging options that approximate the near-instant refuelling of a gas station. Without that infrastructure, consumer trust is still a major roadblock. For a start-up, this commercial distrust of consumers is an essential forecasting issue since the theoretical market (demand) is significantly larger than the actual market (opportunity).IF business models cannot cater for this "reservation factor" until a dense charging infrastructure is indeed in place.

National efforts, such as the US Bipartisan Infrastructure Law targeting 500,000 chargers by 2030, are critical federal policies to prepare the public for long range travel, and embrace refueling of EVs (The White House, 2021). Although not yet commercially available, there are also emerging technologies, such as dynamic inductive charging (charging from equipped roads) or mobile systems, designed to counter this embedded terror (Spencer & Nissen, 2024).

Range anxiety is only a small piece of a larger resistance to new technology. Adopting new technologies is never easy (Sopinka et al., 2014), and the EV has to overcome more than 100 years of market lock-in and a culture with a deeply rooted attachment to the ICE and ICE-related lifestyle (Ogbue et al., 2012; Kley et al., 2011). History is everything in this case: Though early EVs were praised as clean and functional cars, their historic bugbears (range and cost) remain burnt in the public consciousness to create a kind of "concept drift," in which perceptions are trailing modern reality by some margin. The transformation of EVs from a 100-year-old technology only suitable for driving to a car to one that can offer certain levels of mobility has to go through a strong push from automakers, governments, and energy producers, so as to make people believe that it is a mature and superior technology that is already affordable today (Wen, Leite, Almeida & Ferreira, 2017). This is not just a fight of machines but a fight of optics and muscle memory.

Price-Environment Paradox and Heterogeneous Consumers

A key paradox in the EV market is consumers' desire for sustainability alongside reluctance to pay higher prices. Although most of the consumers claim that they support sustainability, however, economic constraints still are the major barrier toward EV penetration in the market, due to the high vehicle purchase price caused by the expensive battery packs (Faizal, et Panthagani, 2017). These batteries account for a third of the total cost of a vehicle (König et al., 2021). Despite the fact that an EV can have a lower running cost than a comparable fossil fuel solution, many consumers think in the short time horizon which leads to the high initial purchase price having a significantly negative impact on the purchase of an EV compared to a fossil alternative (Graham-Rowe et al., 2012; Kęska et al. 2024). A startup must budget not just for production but also for significant investments in marketing and consumer education to justify their price premium. Quantifying the ROI accrued from such 'soft' costs is a key pain point in the financial planning of early startups.

A dilemma to this economic paradox is a most diversified consumer behaviour. Preferences are not uniform and closely related to reflected complex of socioeconomic influences (Wen et al., 2017; Shbool et al. 2023). Early adopters, who have dominated initial market growth, comprise a niche: typically high-income, highly educated individuals with any home access to charging who are technology or green oriented (Axsen et al., 2016). The broader mass market, by contrast, is more varied, and sometimes irrational. The heterogeneity also makes a one-size-fits-all approach inappropriate, so tailored marketing strategies and extensive educational campaigns are required to raise awareness, debunk myths, and explain the long-term payoff of EV adoption, namely, the total cost of ownership (McLeay et al., 2018; Sierra Club, 2019).

Supply-Chain Vulnerabilities: The Production Dilemma

The greatest threat to an EV startup's financial planning is not a fatal lack of investor interest. It is the existential vulnerability of the global supply chain. These disturbances convert deterministic budget expectations into uncertainty, which can severely threaten production plans and cost estimates (Alshahapy et al., 2025; Shelar, 2024).

Demand-side challenges are bad, and it gets worse when it comes to the supply side. Manufacturing of EVs at large scale is very susceptible to complex supply-chain disruptions and lack of raw materials such as lithium and cobalt. The problems will thus increase production costs and pose high access costs to the market for new entrants and small suppliers (Alshahapy et al., 2025). This exposure, driven by globalization, coupled with increased demand, has reinforced the necessity of a more robust supply chain, with enhanced coordination, flexibility, and increased investment in securing the raw materials (Niemann et al., 2018). The article is evidence of how the road to electromobility is challenged up and down the value chain.

Unlike big, established vehicle makers, which can exploit relationships with multi-decade suppliers to get better deals, startups have little in the way of assets in this fragmented space to negotiate. That means they are very much exposed to being at the mercy of volatile prices, and they are not in a position to negotiate the flexible supply terms that would enable them to tailor the price to their uncertain load shape, so they are really struggling to plan their financials.

Rare Minerals and Semiconductor Shortages

For EV startups, effective budgeting and forecasting are severely restricted by critical shortages of minerals and semiconductors, which escalate costs and disrupt production (Alshahapy et al., 2025). The core components of EVs such batteries and motors depend heavily on scarce minerals like lithium, cobalt, and nickel (Shelar, 2024; Alshahapy et al., 2025). This creates a fundamental planning challenge, as a typical battery-electric vehicle requires six times the mineral input of a conventional car (Shelar, 2024). Consequently, raw materials constitute 50-70% of total battery cost, a key driver of financial volatility.This is clearly shown by the price of an average EV battery pack, which increase from $3,381 in 2020 to $8,255 by 2022, making the bill of materials a moving target and accurate forecasting extremely difficult (Shelar, 2024; Alshahapy et al., 2025).

This mineral scarcity is compounded by high supply chain risk. The geographical concentration of these resources in a few countries creates vulnerability to geopolitical conflict and trade disputes, jeopardizing long-term financial models (Shelar, 2024; Alshahapy et al., 2025). This instability is worsened by the added complexity and cost of ensuring ethical sourcing, such as eliminating child labor from cobalt supply chains (Shelar, 2024).

A parallel dilemma exists with the global semiconductor shortage. Modern EVs need twice as many chips as internal combustion engine vehicles, increasing their exposure to supply disruptions (Alshahapy et al., 2025). The semiconductor supply chain is also highly centralized, creating a single point of failure. Stresses like the COVID-19 pandemic and US-China trade tensions have caused production slowdowns and inflated costs, making reliable financial estimates a major strategic challenge for startups (Alshahapy et al., 2025). Therefore, establishing resilient and diversified supply chains is not just an operational goal but a critical requirement for credible financial planning.

Reliance on Global Supply Chains

In addition, the budgeting and forecasting procedures of EV startups are being seriously challenged by risks tied to those global supply chains. EV production processes are still to a large degree reliant upon globalised and outsourced supply networks of which many still carry forward from the long-standing internal combustion engine (ICE) industry Just-In-Time (JIT) techniques (Shelar, 2024; Alshahapy et al., 2025). This JIT relationship is a major risk in sensitive battery subsystems as it can immediately stop production in case of any disruption (Shelar, 2024). This risk is exacerbated by the underinvestment in specific EV manufacturing lines. EV manufacturing is in many cases based on more manual and expensive assembly than for mature ICE platforms, leading to challenges for the more efficient manufacturing of costly components on a large scale and limiting the possibility to predict cost (Dechant et al., 2025). The global disruptions have also brought these vulnerabilities to light, and the recent COVID-19 pandemic has resulted in extremely large material supply chain disruptions and inflationary escalation costs, leading startup financial projections to become less optimistic. (Shelar, 2024; Wen et al., 2019).

This becomes a serious threat for large number of firms specially startup firms due to the lack of investment in inventory, shortage in local manufacturing capacity and overly reliance on the imported goods (Shelar, 2024). Thus, ensuring supply chain resilience is not only a matter of supply chain logistics but also financial survival. Expert also suggest preventive strategies such as shortening value chain, diversifying supply base and a re-shoring certain key components which will help preventing such risks which can lead to a more predictable foundation for financial planning (Shelar, 2024).

Supplier Structures and Flexibility

The reshaping of the supply chain in the emerging electric vehicle industry exposes startups to specific, difficult to manage risks which are critical for financial planning and for contracts' flexibility (Niemann et al., 2018). One big change is the proliferation of new, typically smaller suppliers specialising in EV technology but inexperienced in the exacting requirements of the automotive industry. This, in many scenarios, has defied the traditional power relationship between seller and buyer (Niemann et al., 2018). This fragmented and inexperienced supplier network, along with the complex nature of projecting a dynamic EV electricity load and demand, poses considerable challenges for startups when developing their financial models around accurate demand planning and supplier sourcing (Niemann et al., 2018). Therefore, the optimal interaction of production system, procurement and suppliers which is necessary for controlling costs, often fails (Niemann et al., 2018). To address this, OEMs and other firm are required to modify their processes to involve these new partners into their process, improving transparency and including them from the 'edges' to the 'centre' of the supply chain (Shelar, 2024). Although such strategies as the "early locking in of raw materials" and "building the flexibility to contracts," are essential to harnessing volatile price pressures (Shelar, 2024), new suppliers themselves may be immature to offer such flexibility, leading to a contractual stalemate (Niemann et al., 2018). Thus, accurate forecasting of EV stock and sales is not only an essential operation goal, but also a fundamental basis for the sustainable development of the industry, effective policy-making, and dependable long-term financial forecasting for startups in this field (Zhou et al., 2023).

Infrastructure Deficit and Range Anxiety

The early stage of charging infrastructure also creates an elemental budgeting and forecasting conundrum for EV startups in a capital-intensive industry. Fundamentally, there is a huge lack of charging points in general broken in several different units. The preferred, convenient way to charge is at private resident's home which currently is the most common scenario. However, large percentage of the population cannot rely on this provision, including renters and workers in multi-unit buildings (Alshahapy et al., 2025; Faizal et al., 2019). A strong public network is a must for these kinds of customers who are buying into EV ownership.

This deficit of public charging serves as the bottleneck in addressing the range anxiety that is the persistent apprehension of not finding a charging station while draining a battery, and is the main psychological deterrent in consumer adoption (Faizal et al., 2019; Bhattacharyya et al., 2020). It's not just the maximum range of an automobile it's where and how often it can be recharged the perceived freedom of movement there. The problem gets worse in countries with limited infrastructure in place leading to huge "charging deserts" which act as barriers to market development (Bhattacharyya et al., 2020).

For an EV startup the infrastructure deficit, in other words, equates to a real budgetary planning obstacle. It presents a challenging strategic trade-off with significant budget implications: one would either have to focus marketing efforts toward geographically confined areas where charging conditions are better, hence capping the market size, or commit significant capital to establish partnerships and build a network of charging infrastructure. This latter way involves projecting that large sunk costs now will result in a great deal of usage later, enabling them to scale the business however much they must to "win." As such, not only do they need to budget for expensive production, but they also have to accurately predict demand and resource allocation for market development. This introduces a high level of overhead in an already very expensive industry.

The economic barrier: is a public charging business model feasible?

The immature charging infrastructure is a major issue for EV startups in budgeting and forecasting. It is not simply not having the chargers but it is also not having clear successful business models for public infrastructure. This economic uncertainty represents a fundamental bottleneck to investment, leading to a classical chicken-and-egg situation, as investors do not want to bet on chargers without EVs, whereas consumers do not buy EVs without a dense, regular (and reliable) network (Faizal et al., 2019). The cost of investment for rolling out public charge points, particularly DC fast chargers, is extremely high including hardware, civils, electricity upgrades, grid connection fees and day-to-day software management.

For startups that are forecasting a market ramp, it is very risky. The return on investment is similarly deflated by low utilization rates, a consequence of the immature EV market. As a result, there is a large proportion of public charges which have difficulties being financially feasible, as they do not even recoup their running costs (Faizal et al., 2019). Without a well-defined road to profitability, private investors and utilities are extremely unlikely to invest the billions necessary to roll-out a nation-wide charging infrastructure. This reduction in investment is not only curbing the growth needed for wide electric vehicle adoption but creating a circular problem that startups will have to factor into their financial models. Experts therefore advocate for demand-responsive planning and viable economic instruments, such as public-private partnerships (PPPs) or targeted subsidies, to de-risk investments and accelerate installation (Faizal et al., 2019).

Technological Limitations and Standardization Challenges

In addition to economic models, EV startups also need to allot resources to tackle the numerous physical and technological limitations of charging infrastructure. One of the main concern of consumers is the time-consuming of charging. Since the AC Level 2 chargers take six to eight hours for a full charge, this is considered to be impractical for most of the drivers hence there is an urgent need for deployment of DC fast charging stations to address range anxiety and that can able to deliver up to 80% of the charge in approximately 30 min (Faizal et al.2019).

However, the current scarcity of fast-chargers presents a major strategic and financial challenge. They are also expensive to install and operate given the power requirements, which typically necessitate significant investment to local electrical infrastructure. This heavy expenditure must be passed onto the consumers by charging higher fees and charging fee is added with suppress demand and market adoption prediction hazard (Faizal et al., 2019; Rahman et al., 2016).

A lack of industry-wide standards on connectors types means startups have to make tough decisions about how to allocate their tight budgets for compatibility. Furthermore, integration with potentially complimentary technologies, on-site renewable energy and energy storage systems (ESS), and smart grid management to ensure stability, would increase technical and economical complexity as well as making financial forecasting difficult at best (Faizal et al., 2019; Rahman et al., 2016).

Novel Business Models as a New Dawn

In order to bypass the high capital investment cost and consumer anxieties towards usage of electric vehicles (EVs), new business models are appearing that separate the purchase price of the vehicle and its battery from the act of using the vehicle on the road (Liao et al., 2019). These models are something startups in this era of capital-intensity must win at to be able to attain enough liquidity and leadership in the market.

The most common models are battery leases and car subscriptions. This method enable the battery which is the most expensive part being rented, the consumer is left with a much reduced initial purchase price. At the same time, the risk of battery decline and aging are transferred to leasing institution, who hold title to the asset (Ali et al., 2016; Liao et al., 2019; Alshahaby et al., 2025). These model successfully shift financial risk and market uncertainty from the consumer to vehicle and service suppliers amplifying the attractiveness of the EV.

It is a budgeting and forecasting tactic to new market entrance to service based models focusing on the customers. By providing flexible ownership and usage arrangements, such as ‘pay-per-mile’ pricing or packages that combine charging services and insurance, firms can reduce the consumer cash constraints and gain critical early market share (Donada and Lepoutre, 2016; Alshahapy et al., 2025). At the end of the day, promoting EV adoption needs an approach that takes into account infrastructure, technology, and finance innovation, to create an ecosystem that is sustainable.

Government Regulation, Subsidies and Policy Induction Uncertainty

Accelerating Electric Vehicle Adoption: The Key Role of Government

Government intervention plays a significant role in driving electric vehicle adoption. However, its unlikelihood complicates startups' forecasting. Subsidy, incentives, or regulation changes could instantly undermine a startup's financial forecast and value proposition. On a global scale, government initiatives could significantly expedite the EV switch. These directly affect the consumer acquisition rate and market commercialization. For example, the Chinese, Norwegian, and US governments primarily invest in the financial support and infrastructure necessary to overcome the barrier. Nonetheless, for startups, this implies that its strategic plans will be uncertain, as the governmental setting will heavily affect its long-term feasibility, which is impossible to predict, thus making robust financial modelling extremely complicated**.**

A Mix of Economic and Infrastructural Drivers

Economic instruments, such as subsidies and tax returns are effective means to scale up electric vehicle (EV) markets by reducing the user cost and increasing consumer's willingness of adoption (Sierzchula et al., 2014; Lévay et al., 2017; Li et al., 2017). For EV startups, such dependence on government support injects a lot of uncertainty into financial planning. Market-enhancing regulation can also constitute a significant risk, a sudden change in or the removal of an important incentive may mean that demand forecasts and value propositions made by startups are no longer valid, making the viability of a market disappear overnight (Power and Bruderer 2015). The design of incentives also matters, with upfront point-of-sale subsidies being more effective in stimulating immediate demand than post-purchase tax credits a standard that startups need to follow in their pricing.

In addition, government will play a key role to make public charging infrastructure investment, as an important and long-term intervention for reducing range anxiety and increasing the adoption (Cole et al., 2023; Wang, 2023). This policy terrain is not conducive to long-term stability for startups. Their financial life depends on the ability to forecast not just market rates, but also political decisions. Consequently, budgeting processes must incorporate sophisticated scenario analysis to model the impact of expiring, renewed, or newly introduced incentives on the achievement of financial and operational targets. There is also a second significant barrier to sustainable long run that stems from the need to develop financial models that are resilient to unexpected changes in government policy.

Limitations, Equity Issues and Policy Recommendations

At the same time, regulatory incentives are key for market activation, yet also heavily inconsistent in terms of sustainability and equity, making it hard for startups to play their cards when entering this volatile space. The top complaint is that these subsidies disproportionately help the well-heeled. Indeed, more than 90% of the U.S. federal EV tax credits are claimed by those in the top two income deciles because lower-income buyers do not have sufficient tax liability to employ the full non-refundable credit (Borenstein & Davis, 2016; Alshahapy et al., 2025). This backward logic also plays out in state programs such as California's Clean Vehicle Rebate Project. Moreover, marginalized groups frequently do not have access to those incentives as in most cases car dealerships are not willing to explain that there is support available and thus support a market where more affluent customers come (Alshahapy et al., 2025).

For small companies, though, those equity issues can mean direct market and forecasting challenges. A market that is relying on regressive incentives may struggle in achieving mass-market adoption, will limit TAM and make forecasted demand unreliable. In order to hedge against such risks, startups will have to design supple business models, like battery leases or car subscriptions, which reduce the initial investment and thus make their offering available also to people who cannot take advantage of tax credits (Liao et al., 2019; Donada & Lepoutre, 2016). As a result, although short-term subsidies continue to be an important (if not central) variable in financial models, perhaps the more durable and reliable growth strategy for startups is serving as advocates for and aligning with longter m equitable infrastructure investments that promote system-level health across the full portfolio, thereby making them less susceptible to volatile and regressive policies (Cole et al., 2023; Alshahapy et al., 2026).

Regulatory Frameworks and Government Leadership Are Critical factors.

Regulatory requirements are a key driver of demand for EVs, forcing car-makers to speed up the electric transition, Kristof Rottiers, head of Carmignac's environmental strategies team based in Paris said Tight regulations, EU tailpipe emission standards and future bans of ICE vehicle sales in regions with aggressive policies (i.e., Norway or California) stimulate implementation of electric drivetrains at industry level (Van Alshahapy et al., 2025; Shelhar, 2024). Supplementary instruments such as fossil fuel taxes also reduce ICE vehicle utilization (Faizal et al., 2019). Moreover, governmental R&D funding is pulling down costs of offered technologies and regulatory convergence (i.e., harmonizing charging solutions) is contributing to the overall stability of the market and its integration (Faizal et al, 2019; Shelhar, 2024).

However, predictability in regulation is still a major challenge for startups. Abrupt changes in policy or uneven enforcement can upset financial projections and operational planning. For example, a government's own procurement practices greatly shape how the market views it. As observed in India, delayed EV make out is due to the fact that government has not been utilizing EVs in its fleet which does not enhance customer confidence and have lead newbies having slow launch for their businesses (Bhattacharyya et al., 2020). This absence of visible leadership can stifle demand and increase market uncertainty.

For startups, navigating this landscape demands agile strategic planning. They have to model the regulatory dependencies in their financial models, while arguing for uniform and facilitating policies. Finally, a comprehensive government strategy including incentives, infrastructure, regulation and public procurement is necessary to de-risk investments and ensure a predictable environment for the adoption of EVs and the growth of startups.

CONCLUSION: FINDING

EV startups are facing a major financial planning crisis from electric mobility, with several important issues combining into one. The most dominant barrier concerns the high levels of capital intensity, due to the fact that battery costs amount to 30–40 % of total vehicle cost and entrepreneurs face a funding gap across the 'Valley of Death' from seed capital up to scalable production. (König et al., 2021). This situation is further compounded by significant demand volatility, as consumer purchasing behaviour is constrained by price sensitivity, range anxiety, and inadequate charging infrastructure, rendering sales forecasting highly uncertain. (Egbue & Long, 2012; Melliger et al., 2018). At the same time, the supply chain weaknesses create makes for enormous cost uncertainty. Electric vehicles require approximately six times more critical minerals than fossil-fuel vehicles, and the prices of key materials such as lithium remain dangerously volatile. At the same time, global chip shortages continue to disrupt production (Shelar, 2024). Inadequate charging infrastructure further limits mass-market adoption, making market-size forecasting increasingly difficult. Perhaps the greatest challenge is regulatory uncertainty. Government incentives, while essential, are highly unpredictable. Their sudden introduction or withdrawal can render a startup's business model unviable overnight. In addition, the absence of regulatory convergence across markets complicates planning for firms operating in multiple regions (Alshahapy et al., 2025; Faizal et al., 2019). For new EV entrants, this convergence of challenges undermines the relevance of traditional static budgeting. Instead, survival requires flexible financial planning capable of adapting to rapid changes.

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