Developing the Brand Promise–Ecosystem Readiness Gap and Modeling Attributional Damage to Brand Trust: A simulation-validated scale-development study for electric mobility in emerging markets

Ayushman Arun[1*], Tanmoy Kumar Banerjee[2] , Pratima Ekka[3]

[1*]Ph.D. Scholar, Department of Management, Birla Institute of Technology, Mesra, Ranchi, India
E-mail: arunayushman@gmail.com
[2]Assistant Professors, Department of Management, Birla Institute of Technology, Mesra, Ranchi, India, tanmoykumar@rediffmail.com
[3]Assistant Professors, Department of Management, Birla Institute of Technology, Mesra, Ranchi, India, pratima@bitmesra.ac.in

Abstract
Research on electric vehicles (EVs) often centres on adoption and product performance as the critical points of value creation. But ownership outcomes depend on an ecosystem of public charging, power reliability, service reach, digital connectivity, dealer capability and policy implementation. This article introduces the brand promise-ecosystem readiness gap (BPEG), which is the perceived difference between a brand's ownership promise and the readiness of complementary systems necessary to deliver on that promise. We draw from expectation-disconfirmation, attribution theory, service-dominant logic and brand-trust research to propose a model in which BPEG affects brand attribution, trust, satisfaction, loyalty and word of mouth. Since the dataset available is synthetic, the study is explicitly framed as a construct and model validation based on simulation, not as evidence about a sampled population. A theory-calibrated data set of 420 cases was divided into exploratory (n = 180) and confirmatory (n = 240) analyses. Reliability was adequate for the six proposed BPEG domains (α =.847–.888). Parallel analysis suggested a single dominant factor instead of six freely emerging factors; the domains are thus interpreted as theory-specified formative facets, embedded in one overall gap perception. The incremental and residual indices showed good confirmatory fit (CFI =.987; TLI =.986; RMSEA =.017), but the GFI/NFI were.831. Structural estimates showed that BPEG increased brand attribution (β =.621) and negative word of mouth (β =.752) and decreased trust (β = −.594) and satisfaction (β = −.545). Adding brand attribution further reduced trust (β = −.322) but did not explain satisfaction or negative word of mouth on its own. Trust and satisfaction were important joint predictors of loyalty and positive word of mouth. The model explained 38.8%–74.8% of endogenous variance and yielded positive Q^2 values. This study provides a boundary-spanning construct for ecosystem-dependent brands, clarifies the conditions under which infrastructure failure becomes a brand damage, and offers a pre-registered-ready measurement architecture for field replication in non-metro India. Its substantive claims are tentative until it is tested on real owners and longitudinal data.

Keywords: electric vehicles; brand trust; ecosystem readiness; attribution theory; satisfaction; word of mouth; emerging markets; structural equation modelling; simulation validation

1. Introduction

An electric vehicle is bought as a product but lived as a system. The manufacturer may engineer range, charging speed, software and cabin quality, but reliable mobility still requires the cooperation of actors the owner may never have selected. Charging-point operators, distribution utilities, app platforms, dealers, roadside-assistance providers, financiers and public agencies all have a part to play. This interdependence makes EV ownership a theoretically interesting case of ecosystem-dependent consumption. If the vehicle performs as promised, but the surrounding system does not, this is an attribution problem for the consumer. Is the inconvenience the result of an external infrastructure failure, a dealer failure, or evidence that the focal brand made a promise it could not responsibly deliver?

Recent EV scholarship confirms that post-adoption experience cannot be reduced to the vehicle specifications. Satisfaction and continuance depend on pragmatic performance and idealistic value (Cruz-Jesus et al., 2023), while repurchase intentions represent cumulative ownership assessments rather than purchase motives (Hasan et al., 2021). Charging availability and charging experience remain salient determinants of user satisfaction (Lin & Yang, 2024). Explainable-AI evidence from China shows that objective and subjective vehicle attributes influence satisfaction (Liang et al., 2024). Indian evidence also identifies infrastructure, cost, performance and institutional conditions as interlinked barriers and motivators (Goel et al., 2021; Yadav et al., 2024). These studies demonstrate the importance of the ecosystem but

do not fully explain how a shortfall in the ecosystem migrates psychologically into the brand relationship.

This omission matters for theory and for practice. Brands are promising seamless ownership, reliable range, convenient charging, smart connectivity and worry-free service. Such claims stretch the perceived scope of responsibility of the brand. Attribution theory proposes that consumers attribute responsibility by interpreting causality, controllability and stability (Folkes, 1984). If charging is part of the branded solution, consumers may still blame a manufacturer even if it does not physically own the charging stations. Conversely, clear boundaries and effective recovery may protect trust even when external systems fail. The key unit is therefore not infrastructure readiness per se, but its difference from the ownership promise attached to a brand.

We label this disconnect the brand promise–ecosystem readiness gap (BPEG). BPEG is the difference between what a brand promises in terms of ownership, either explicitly or implicitly, and the consumer's perception of the readiness of complementary systems to realise that promise. The construct varies from charging access, power reliability, service-network availability, battery-support assurance, digital connectivity to market/policy enablement. It differs from perceived risk, which is prospective uncertainty, from dissatisfaction, which is a global evaluation, and from service quality, which usually evaluates a focal provider. BPEG is relational and boundary-spanning: it is only a promise, and can be made outside the legal control of the firm.

This article provides four things. First, it moves the theoretical lens from isolated product performance to promise–ecosystem alignment, extending customer-journey and service-ecosystem thinking (Lemon & Verhoef, 2016; Vargo & Lusch, 2016). Second, it links expectation-disconfirmation to attribution, offering an explanation for why similar ecosystem failures may cause different levels of brand damage. Third, it differentiates between positive and negative advocacy to show why gap perceptions can directly generate negative word of mouth even if brand attribution offers little incremental explanation. Fourth, it offers a transparent simulation-validation workflow for a new measure and structural model, including its failures and limitations. The central empirical pattern is promising, but the article does not make population inference because no real respondents produced the observations analysed.

The research question is: how does a perceived gap between an EV brand promise and ecosystem readiness translate into brand trust, satisfaction, loyalty and word of mouth? The rest of the article describes the construct and hypotheses, reports on the simulation-based measurement and structural assessment, interprets the results with caution, and specifies a field-validation agenda appropriate for non-metro emerging-market contexts.

Conceptual Background and Hypotheses

Ecosystem-dependent consumption and the BPEG construct

In service-dominant logic, value is not fully embedded in an exchange object but rather is co-created by integrating resources (Vargo & Lusch, 2016). This proposition becomes tangible in EV ownership. The value of a technically capable vehicle is limited if its owner cannot find compatible chargers, get reliable electricity, get timely service, use networked features, or get credible battery support. Customer experience is also cumulative and journey-based: pre-purchase communication sets expectations that are tested repeatedly over use, charging, maintenance, software updates, and recovery episodes (Lemon & Verhoef, 2016). Therefore, the brand promise is evaluated through a networked consumption journey.

BPEG is considered a higher-order composite consisting of six non-interchangeable domains. Charging-access gaps are defined as gaps in density, availability, compatibility or uptime. Power-reliability gaps include outages, voltage instability, and poor local supply. Gaps in service availability include distance, delay in appointment, technician competence, and parts availability. Battery support gaps include uncertainty around warranty, assessment of degradation, replacement and roadside contingencies. The digital connectivity gaps are the reliability of apps, the dependence of networks, the support of software and services related to data. Market support gaps comprise of financing, insurance, resale, information and policy implementation. High covariance among domains does not make them conceptually interchangeable. Dropping a domain would come at the cost of construct content. The logic permits a formative higher-order specification even if the item blocks within each domain are reflective (Diamantopoulos & Winklhofer, 2001; Jarvis et al., 2003).

Expectation-disconfirmation theory suggests that evaluations are influenced by a comparison of expected and experienced performance (Oliver, 1980). BPEG develops this comparison for ecosystem-based ownership. And it's not just about low readiness. A thin network can be defensible if a brand accurately communicates limitations. Nor is it just a question of high expectation: where partnerships and infrastructure deliver, ambitious claims can be credible. Mismatch is the condition with psychological consequences. Since the

promise is brand-linked, a larger mismatch should reduce trust and satisfaction even if the immediate cause is outside the firm.

Attribution as the bridge from ecosystem failure to brand damage

Attribution theory describes how consumers attribute responsibility for negative outcomes. Product-failure research indicates that complaint and repurchase responses are determined by causal locus, stability and controllability (Folkes 1984). Causal ownership is ambiguous when considering an ecosystem. Customers may blame the brand, the dealer, the government, the charging operator, or their own planning. Brand attribution is most likely to occur when three cues converge: the brand makes encompassing claims, it selects or endorses partners, and it has more knowledge than the buyer. A gap thus creates a cognitive pressure to find a responsible actor.

BPEG should improve focal-brand attribution as the perceived discrepancy is anchored to the brand's promise. The argument does not mean that every external failure is objectively the manufacturer's fault. This suggests a consumer inference: a brand that sells an integrated mobility solution may be held accountable for anticipating dependencies, qualifying claims, designing redundancies, and coordinating recovery. Accordingly,

H2a. BPEG is positively correlated with the attribution of ecosystem-related problems to the focal brand.

Brand trust is the confidence that a brand is dependable and that it is willing to act in the customer's interests. Trust translates cumulative brand performance into loyalty and market results (Chaudhuri & Holbrook, 2001). Directly, the promise–readiness gap damages the reliability dimension: the brand image is no longer consistent with actual ownership. The perceived gap can also be a sign of opportunism or incompetence. So:

H1. BPEG is negatively related to brand trust.

Attribution compounds this damage. An inconvenience becomes diagnostic of brand competence or integrity when consumers find the cause in the brand's sphere. Stable and controllable attributions should be particularly corrosive, since future recurrence seems likely and preventable (Folkes, 1984). So:

H2b. Ecosystem-related problems attributed to the focal brand are negatively associated with brand trust.

Satisfaction, trust, and relationship outcomes

Satisfaction is a cumulative assessment of ownership experience. BPEG forces negative disconfirmation again and again, so more effort, more time, more uncertainty, more psychological cost. EV research links pragmatic ownership performance to satisfaction and continuance (Cruz-Jesus et al., 2023). Satisfaction with charging infrastructure is dependent on both provision and user practice (Lin & Yang, 2024). We therefore expect a negative direct relation. Brand attribution may provide a second path: If the focal firm is blamed, the same event should weigh more heavily in the overall evaluation.

H3a. Satisfaction is negatively associated with BPEG.

H3b. Focal-brand attribution is negatively related to satisfaction.

Trust is a relational lens, too. A trusted brand has the benefit of the doubt, reduces perceived vulnerability and inspires confidence that problems will be solved. Second, trust should have a positive effect on satisfaction beyond the direct effect of BPEG.

H4. Brand trust is positively related to satisfaction.

Loyalty is an attitude to maintain the relationship in spite of alternatives and repurchase and recommendation are behavioural expressions. Classic loyalty theory separates true loyalty from inertia and highlights the role of conviction (Oliver, 1999). That conviction is underpinned by trust; satisfaction, by reinforcing experience. So both should be an independent contribution.

H5a Brand trust has a positive relationship with loyalty. H5b. Satisfaction is positively related to loyalty.

Positive word of mouth indicates approval and shifts perceived risk to the recommender. Such advocacy is defensible when trust exists, while satisfaction gives the owner a positive story to tell. Hence:

H6a. Word of mouth has a positive relationship with brand trust.

H6b. Satisfaction has a positive relationship with positive word of mouth.

Negative word of mouth is not simply the opposite of positive advocacy. Severe gap provides socially useful warnings in the form of strandedness, search costs, failed charging and service delay stories. Even if the owner claims there are external causes, such episodes can be shared. Therefore, BPEG should be strongly directly related to negative word of mouth. Focal-brand attribution may produce an additional effect, adding anger and blame.

H7a. BPEG has a positive impact on negative word-of-mouth.

H7b. There is a positive relationship between focal-brand attribution and negative word of mouth.

Lastly, attribution is expected to transmit part of BPEG's effect through trust. A gap increases brand blame, brand blame decreases trust, and decreased trust lessens satisfaction, loyalty and positive advocacy. These sequential mechanisms are

important because they distinguish operational inconvenience from relational damage. We assess indirect effects without assuming mediation to be complete.

Method

Research design and epistemic status

The study is a model development and validation exercise based on a simulation. The analysed file includes 420 synthetic response profiles which were generated to be logically consistent with the proposed questionnaire and structural theory. There was no participant recruitment, field administration or interaction with human subjects. As a consequence estimates describe the behaviour of the specified measurement and structural architecture under a plausible data generating process. The estimates do not estimate prevalence, causal effects or population parameters among Indian EV owners. The disclosure is central to the contribution: simulation can reveal identification problems, weak measures and recoverability before costly fieldwork, but cannot substitute field evidence.

The next field study will focus on adult owners or primary users of battery-electric two- or four-wheelers in non-metro Indian cities who have owned the vehicle for long enough to have experienced the charging and service processes. The synthetic sample size of 420 was chosen to be greater than conventional power requirements for the most complex endogenous equations and to enable split-sample exploration and confirmation. The exploratory factor analysis (EFA) was conducted on the first 180 cases and the confirmatory factor analysis (CFA) on the other 240. The complete sample supported bootstrapping and structural estimation.

Measures

Multi-item Likert-type measures were used to assess all focal variables. The BPEG item pool included charging access (CH), power reliability (PW), service availability (SV), battery support (BT), digital connectivity (DG) and market or policy support (MK). Items were worded as perceived shortfalls relative to the focal brand's ownership promise, maintaining the discrepancy logic. Focal brand, external system, and dealer attribution were differentiated by attribution items. Downstream constructs were measured: brand trust, cumulative satisfaction, loyalty, positive word of mouth (PWOM) and negative word of mouth (NWOM). Additional diagnostic constructs, dissonance, perceived risk, and brand response, were retained for scale assessment but excluded from the parsimonious structural model.

Ultimately, content validity should be established through expert review, cognitive interviews, and owner pretests. Respondents are asked to indicate a focal EV brand and duration of ownership for field deployment, then rate all items for this same brand. The number of reverse-coded items should be limited. The terminology of the ecosystem already has a cognitive burden for the respondent. Post committee translation and de-centering, the Hindi and relevant regional language translations should be tested for measurement-invariance by language, vehicle type, and city tier.

Analytical procedure

The analysis was done using a two-step measurement and structural sequence (Anderson & Gerbing, 1988). Internal consistency was assessed using Cronbach's alpha. Sampling adequacy and factorability were evaluated using the Kaiser–Meyer–Olkin statistic and Bartlett's test. Parallel analysis was used to determine the empirically dominant number of factors, and a theory-constrained six-factor EFA was examined only as a diagnostic. CFA fit was assessed by χ^2, CFI, TLI, RMSEA, GFI, AGFI and NFI. The reliability and convergent validity were evaluated by composite reliability (CR) and average variance extracted (AVE). The heterotrait-monotrait criterion was incorporated in the output architecture for the preferred discriminant-validity diagnostic (Henseler et al., 2015). The formative higher-order BPEG composite was assessed for collinearity with the variance inflation factors (VIFs) and domain weights.

Structural paths were reported as standardised coefficients with bootstrap tests, effect sizes, R^2 and out-of-sample-oriented Q^2 statistics. Bootstrap confidence intervals were used to test indirect effects because the sampling distributions of indirect effects are not normal in most cases (Preacher & Hayes, 2008). Simulated responses cannot meaningfully diagnose common-method remedies; future field design should use psychological separation, neutral wording, marker variable or latent method sensitivity checks, and procedural controls recommended by Podsakoff et al. (2003). Reporting is based on the principle that fit, reliability, validity, and prediction are not interchangeable, but rather, are complementary.

Results

Reliability, factorability, and dimensionality

The six BPEG domain blocks exhibited good internal consistency, with α ranging from.847 for power reliability to.888 for charging access. The core outcomes were also reliable (trust α =.883; satisfaction α
=.917; loyalty α =.861; PWOM α =.889; NWOM α =.798). Focal-brand attribution was good for exploratory work (α =.771). The two-item dealer-attribution block was weak (α =.436) and was

dropped from the structural model. The EFA subsample was highly factorable (KMO =.969; Bartlett's χ^2 = 2,982.61, df = 210, p <.001).

Construct/domain	α	Mean	Interpretation
Charging-access gap (CH)	.888	4.155	Good
Power-reliability gap (PW)	.847	4.101	Good

Construct/domain	α	Mean	Interpretation
Service-availability gap (SV)	.884	4.192	Good
Battery-support gap (BT)	.852	4.022	Good
Digital-connectivity gap (DG)	.869	3.961	Good
Market-support gap (MK)	.881	3.961	Good
Focal-brand attribution	.771	3.933	Acceptable
Dealer attribution	.436	—	Weak; excluded
Brand trust	.883	—	Good
Satisfaction	.917	—	Excellent
Loyalty	.861	—	Good
Positive WOM	.889	—	Good
Negative WOM	.798	—	Acceptable

The most important measurement caveat was obtained by a parallel analysis. The first observed eigenvalue is 12.813, much higher than its random-data benchmark of 1.782, while the second observed eigenvalue is 1.002, lower than the random benchmark of 1.619. Thus only one dominant empirical factor remained. The forced six-factor solution accounted for 42.48% of the variance and did not justify six naturally differentiated reflective constructs. We do not suppress this finding, but rather interpret the six domains as content valid, formative aspects of a strongly general gap perception. Such an interpretation is consistent with the construct definition: charging and service gaps are not interchangeable manifestations, but overall negative evaluation can lead to highly correlated item responses.

Confirmatory measurement assessment

CFA revealed χ^2(2,008) = 2,142.44, p =.019. Given this complexity, it is not surprising that the χ^2 is significant. Incremental and residual fit indices were strong (CFI =.987; TLI =.986; RMSEA =.017). The GFI =.831, AGFI =.814 and NFI =.831 were lower and warn against concluding that the fit was excellent altogether. Convergent validity was strong for the BPEG domains (CR =.848–.884; AVE =.648–.682) and for trust, satisfaction, loyalty, PWOM, NWOM, risk and dissonance. Focal-brand attribution had an acceptable CR of.742, but low AVE of.365; external attribution was borderline (CR =.793; AVE =.490); dealer attribution failed both criteria. Additionally, brand response was borderline (CR =.775; AVE =.464). Thus, the structural analysis emphasizes constructs with defensible reliability, but treats focal-brand attribution as provisional.

Construct	CR	AVE	Assessment
BPEG—charging	.884	.656	Adequate
BPEG—power	.856	.665	Adequate
BPEG—service	.884	.656	Adequate
BPEG—battery	.848	.650	Adequate
BPEG—digital	.865	.682	Adequate

BPEG—market	.880	.648	Adequate
Focal-brand attribution	.742	.365	AVE deficient
External attribution	.793	.490	Borderline

Construct	CR	AVE	Assessment
Dealer attribution	.415	.263	Inadequate
Brand trust	.881	.597	Adequate
Satisfaction	.913	.725	Strong
Loyalty	.862	.609	Adequate
Positive WOM	.893	.675	Strong
Negative WOM	.794	.562	Adequate

The VIFs in the formative domains ranged from 3.015 to 3.640. These values suggest large overlap, but are below a conservative threshold of 5. The domain weights were very similar (.165–.169), as expected given the simulation design and not to be assumed of field data. The evidence as a whole supports the use of a parsimonious overall BPEG composite, while retaining the domain scores for managerial diagnosis.

Structural model and hypothesis tests

Structural results provided support for ten of twelve direct hypotheses. BPEG had a significant effect on focal-brand attribution (β =.621, p <.001, f^2 =.377), supporting H2a. It reduced brand trust (β = −.594, p <.001, f^2 =.348) and satisfaction (β = −.545, p <.001, f^2 =.332), supporting H1 and H3a. Brand attribution also decreased trust (β = −.322, p <.001, f 2 =.157), supporting H2b. However, attribution was not significantly related to satisfaction (β = −.011, p =.855). H3b was not supported. Trust improved satisfaction (β =.310, p <.001, f^2 =.149) supporting H4.

Trust and satisfaction predicted relationship outcomes. Trust increased loyalty (β =.431, p <.001, f^2 =.252) and PWOM (β =.389, p <.001, f^2 =.238) confirming H5a and H6a. H5b and H6b are supported as satisfaction increased loyalty (β =.414, p <.001, f 2 =.184) and PWOM (β =.458, p <.001, f 2 =.260). H7a: BPEG had a particularly large direct association with NWOM (β =.752, p <.001, f^2 =.744). Focal brand attribution did not produce a significant NWOM effect (β =.087, p =.104). H7b was not supported.

Hyp.	Path	β	p	f^2	Decision
H1	BPEG → trust	−.594	<.001	.348	Supported
H2a	BPEG → brand attribution	.621	<.001	.377	Supported
H2b	Brand attribution → trust	−.322	<.001	.157	Supported
H3a	BPEG → satisfaction	−.545	<.001	.332	Supported
H3b	Brand attribution → satisfaction	−.011	.855	—	Not supported
H4	Trust → satisfaction	.310	<.001	.149	Supported
H5a	Trust → loyalty	.431	<.001	.252	Supported
H5b	Satisfaction → loyalty	.414	<.001	.184	Supported

Hyp.	Path	β	p	f^2	Decision

H6a	Trust → PWOM	.389	<.001	.238	Supported
H6b	Satisfaction → PWOM	.458	<.001	.260	Supported
H7a	BPEG → NWOM	.752	<.001	.744	Supported
H7b	Brand attribution → NWOM	.087	.104	—	Not supported

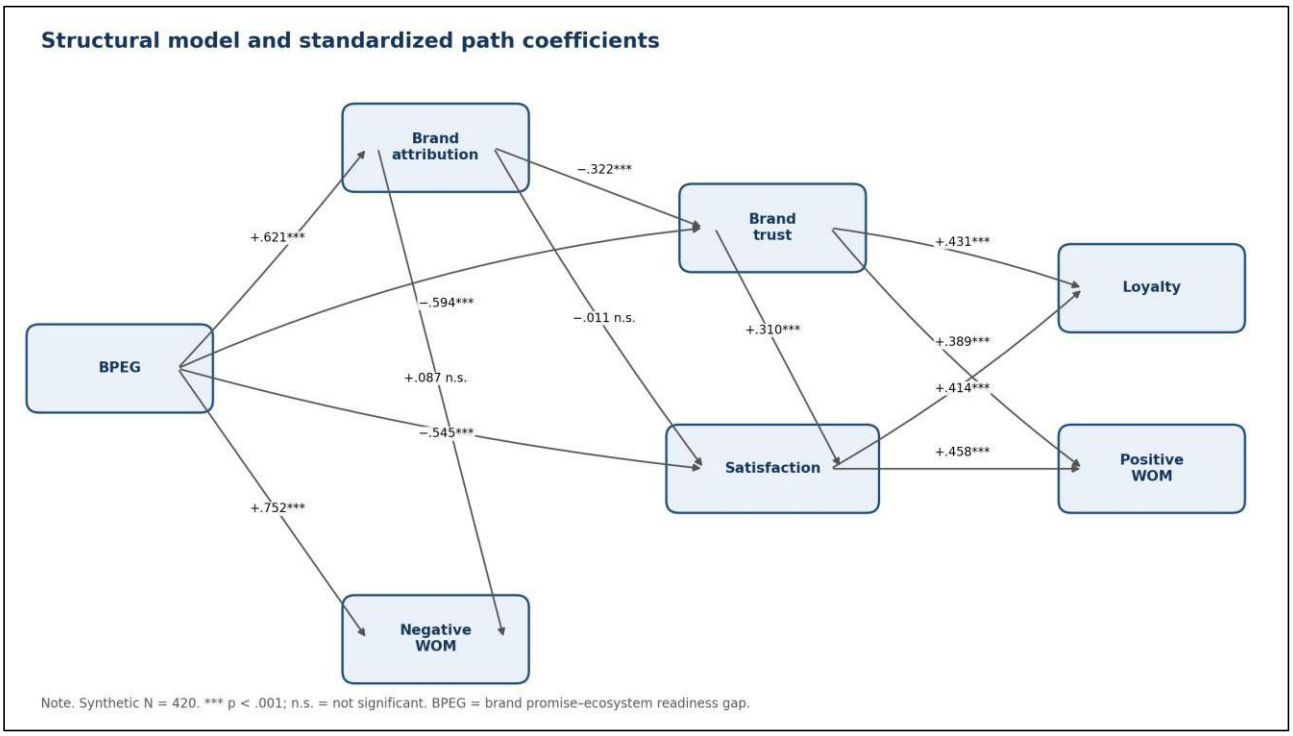

Figure 1. Structural model and standardized coefficients.

Indirect effects, explanation, and prediction

Bootstrap analysis supported the mediation of the attribution on trust. The indirect effect of BPEG on trust via brand attribution was −.201 (95% CI [−.280, −.128]). The serial indirect effects through attribution and trust were significant for loyalty (−.086; CI 95% [−.130, −.050]) and PWOM (−.078; CI 95% [−.116, −.046]). However, the mediation through attribution to satisfaction was not significant (-
.007; 95% CI [-.076,.063]) nor was the attribution pathway to NWOM (.054; 95% CI [-.009,.119]). These results suggest that attribution is mainly in the relational-trust channel, not in immediate satisfaction or warning behaviour.

The variance explained was high; R^2 =.388 for brand attribution,.616 for trust,.748 for satisfaction,.673 for loyalty,.717 for PWOM, and.670 for NWOM. All Q^2 values were positive,.343,.587,.723,.645,.690, and.637, respectively, showing predictive relevance in the synthetic holdout logic. These values should be read as a model-recovery check, not as expected field performance. Synthetic calibration usually produces cleaner signal than real surveys.

Endogenous construct	R^2	Q^2	Reading
Focal-brand attribution	.388	.343	Moderate
Brand trust	.616	.587	Substantial
Satisfaction	.748	.723	Substantial
Loyalty	.673	.645	Substantial
Positive WOM	.717	.690	Substantial

Negative WOM	.670	.637	Substantial

Discussion

What the model reveals

The simulation shows a consistent process by which external-system weakness can lead to brand damage. BPEG had two ways of working. The first was the direct disconfirmation route, where a larger gap led to a decrease in trust and satisfaction and strongly stimulated negative word of mouth. The second was an attributional route in which BPEG increased blame of the focal brand, which subsequently reduced trust. In theory, this distinction is helpful. Consumers need not believe that the manufacturer physically created a charger outage to conclude that the brand overpromised, chose weak partners, failed to warn consumers, or did not build adequate recovery capability.

The unsupported attribution-to-satisfaction path makes the distinction more pointed. Once you took into account the size of the lived gap and trust, blame added almost nothing to cumulative satisfaction. Satisfaction may be experience-proximal. Waiting, detouring, app failure and service delay are costly, regardless of causal locus. Trust is inference-near: blame directly affects beliefs about competence, honesty and benevolence. Thus, the effect of attribution on the relational meaning of the failure, rather than on the unpleasantness of the episode, explains the significant serial effects on loyalty and PWOM.

The unsupported attribution-to-NWOM path provides a parallel insight. Even if they blame public or third-party actors, owners may warn peers of unusable infrastructure. Negative word of mouth may be informational, rather than retaliatory. The very high BPEG→NWOM coefficient indicates that the content of the gap itself was highly shareable: where charging failed, how long service took, whether an advertised feature worked locally. "There's no explicit blame, but that does not mean there's no reputational risk for brand managers. A story can displace consideration by rendering the ownership proposition untenable.

Downstream, trust and satisfaction were complementary. Their similar effects on loyalty imply that a sustainable relationship needs both relational confidence and positive accumulated experience. Satisfaction was the stronger predictor of PWOM, consistent with advocacy being driven by memorable experience. Trust remained important because recommendation exposes the advocate to social risk. These patterns are consistent with brand-trust and loyalty theory (Chaudhuri & Holbrook, 2001; Oliver, 1999), but extend it to network-dependent offerings.

Theoretical contributions

First, BPEG identifies a missing level of analysis, between product quality and macro infrastructure. Existing EV studies often model charging, cost, range or policy as separate drivers of adoption (Goel et al., 2021; Hu et al., 2023; Yadav et al., 2024). Instead, BPEG asks if the ecosystem is ready against the ownership proposition a particular brand is communicating. The same objective infrastructure can therefore produce different gap perceptions across brands, segments and places. A premium brand that promises easy national mobility sets up a different benchmark for comparison than a city-focussed brand that clearly limits its use case.

Second, the model is a combination of expectation-disconfirmation and attributions. Disconfirmation accounts for evaluation of mismatch; attribution accounts for how mismatch becomes diagnostic of a relationship partner. This combination solves an apparent paradox: the brand can be harmed even if consumers know that some other actor caused the immediate failure. The more the brand claims orchestration, has superior knowledge or fails to design safeguards, the greater the responsibility. The transfer of responsibility is formalised as the indirect BPEG→attribution→trust effect.

Third, the model extends service-dominant logic from a promise-governance perspective. Value co-creation also generates co-failure. Firms cannot always control institutional and partner resources; however, they can control what they promise, who they certify as partners, what contingencies they provide and how they recover. Participation in the ecosystem thus redefines the operational and rhetorical boundaries of the brand.

Fourth, the measurement results are a constructive falsification. Internal consistency and CFA fit alone may lead to researchers reporting six BPEG dimensions as empirically distinct. Parallel analysis tells another story. It is more defensible to treat the domains as theory-specified formative facets, although field data are needed to test whether the general factor reflects real halo effects, common method variance, item redundancy, or an authentic overarching perception. Transparent reporting of this tension makes the model more testable.

Managerial and policy implications

The key implication for EV brands is the management of the promise boundary. Marketing claims should be geographically and temporally matched to verified charger uptime, service capacity, network coverage and parts availability. A readiness dashboard should be in place and updated at the district level prior to market-entry campaigns. "When readiness is not uniform,

universal language can be less credible than specific qualifiers. This is not an argument for timid marketing. This is an argument for claims that the operating system can deliver.

Second, companies need to view ecosystem incidents as brand incidents before responsibility is settled. The strongest direct paths are BPEG to trust, satisfaction and NWOM, so delaying jurisdictional debate is costly. Single point of contact, proactive status communication, portable charging or towing contingencies, cross-network roaming, and service level agreements all can help reduce the perceived gap. Recovery metrics should measure customer effort and time to restore mobility, not just ticket closure.

Third, attribution can be ethically influenced via transparency not deflection. Tell me what went wrong, who is fixing it, what the brand could and could not control, and what compensation or prevention is in place. Blaming public infrastructure may protect the firm in the short term but reinforce a sense of helplessness and low reliability in the future. Visible coordination shows competence and stops external failure from being misinterpreted as indifference to the brand.

Fourth, managers should separate diagnosis from scoring overall. The overall BPEG composite is useful in predicting relationship outcomes; the six domain scores are more actionable. A high charging gap needs roaming partnerships and uptime enforcement; a high service gap needs mobile technicians and parts stocking; and a high digital gap needs offline fallback. Synthetic weights close to one another

should not be the basis of resource allocation. Field-derived importance performance analysis and cost-to-close estimates are necessary.

Policy makers should understand that infrastructure failures can slow adoption through reputational spillover. Charger interoperability, uptime disclosure, consumer redress, technician training and stable incentive administration support not just physical access but confidence in the category. In non-metro markets, minimum viable ecosystems may require coordinated launch sequencing among OEMs, utilities, local governments and service partners. Installation counts are not enough — functional uptime and time to repair should be published on public dashboards.

Limitations and a Field-Validation Agenda

The key limitation is that every observation is synthetic. The findings indicate that the proposed design can recover the intended theoretical pattern under the assumptions of its data generation; they do not indicate that real owners think or behave this way. For any submission, the words simulation, synthetic or proof-of-concept should be retained in the title, abstract, method, results interpretation and declarations unless the analysis is replaced with real field data. It would be methodologically and ethically unacceptable to treat the present coefficients as survey evidence.

Another limitation is the dimensionality of the construct. Although the theory specifies six content domains, parallel analysis supported one dominant factor. Qualitative item generation from critical incident interviews across vehicle types, regions, genders and duration of ownership should be the starting point for field validation. Expert raters should map items to domains and rate their relevance. A pilot should then compare bifactor, correlated-factor, hierarchical reflective, and reflective-formative specifications after cognitive interviewing. Remove items that simply repeat a general complaint. Domain-specific items should refer to observable encounters with the ecosystem.

Third, focal-brand attribution needs to be redeveloped. The AVE was.365 and the attribution of the dealer is not usable at α =.436. Future measures should distinguish causal locus, controllability, foreseeability and recovery responsibility. Dealer attribution requires three or four nonredundant items. External attribution should distinguish between public policy, electricity supply, charger operator and user constraints. Promise breadth, partner branding, control and recovery could be manipulated in vignettes to establish causal validity experimentally.

Fourth, while self-report data are cross-sectional it is not possible to ascertain temporal ordering of the variables. A rigorous field program would recruit owners soon after delivery, measure promise perceptions at baseline, record ecosystem incidents via monthly diaries or app-triggered experience sampling, and measure trust and satisfaction after incidents and recovery. Repeated measures would allow for within-person models of trust erosion and restoration. Common-source bias would be reduced by linking survey responses to charger uptime, service records, and geospatial access.

Fifth, heterogeneity is probable. Different charging routines for two-wheelers and cars, and different constraints for apartment residents and homeowners, city tier, ownership duration, income, gender and prior EV experience, may change both exposure and attribution. Claims of universal effects must be preceded by multi-group invariance and latent-class analysis. Researchers should also test nonlinearity: small gaps may be acceptable but repeated failures that threaten mobility may cross a threshold and abruptly

damage trust.

Alternative explanations and boundary conditions

There are a number of theoretically important boundary conditions that could weaken or reverse the suggested paths. Consumer expertise may enhance causal discrimination: technically knowledgeable owners may be able to discriminate between vehicle, charger, grid and user failures more accurately, reducing indiscriminate brand attribution. However, expertise could also increase blame if knowledgeable owners believe that the manufacturer should have anticipated interoperability problems. Having prior category experience may set realistic expectations and reduce disconfirmation, while first time owners may see ordinary learning costs as ecosystem failure. These possibilities make experience a modulator and not a routine control.

Brand positioning should be important too. A vertically integrated brand advertising its own charging and service network requires more attribution than a low-cost brand selling a bounded urban use product. Price may also magnify this effect as premium payment is an implicit promise of coordination and recovery. In contrast, a very trusted brand can receive a leniency of attribution initially. This protection is unlikely to endure indefinitely: repeated or serious incidents may convert prior trust into a sense of betrayal, producing a steeper decline than a brand making fewer relational claims. Such nonlinear trust-buffer and trust-violation effects should be tested in future work.

Place is not a passive setting. The same charger density has different practical meaning depending on trip distances, climate, parking access, grid stability and alternative transport. Therefore, objective readiness and perceived BPEG should be modeled separately. Geospatial charger access, verified uptime, dealer distance, service capacity, and outage frequency can be correlated to owner perceptions. Their divergence is informative; high perceived BPEG with low objective readiness may reflect overpromising, poor communication, or unusable interoperability, while low perceived BPEG with a modest gap in objective readiness may reflect accurate expectation setting, adaptive routines, or low dependence.

And other competing hypotheses should be falsified, too. General brand negativity may inflate gap ratings and downstream outcomes making BPEG a consequence not a cause. Similar covariance could be produced by negative affectivity and technology anxiety. The dominant first eigenvalue may be due to a general common method factor. Stronger designs need to assess pre-ownership expectations, include objective logs of incidents, separate occasions for measurement, and obtain selected outcomes from behavioural sources such as use of referrals, complaint records, renewal, or resale. Cross-lagged and random-intercept models can separate stable response tendencies from event-driven change.

Robustness and alternative model tests for field study

A field analysis suitable for journal publication should compare the proposed model to plausible alternatives. First, a reverse model where low trust inflates perceived BPEG should be estimated and tested against temporal evidence. Second, BPEG can be viewed as a first-order general factor, a bifactor model, a second-order reflective factor and a reflective-formative hierarchical component. Model choice should not be driven by fit alone, but by conceptual direction and out-of-sample performance. Third, the attribution process has to be explored as a mediator, moderator, and competing-cause variable. For instance, brand attribution could reinforce the effect of the same gap on trust, rather than simply communicate it.

Sensitivity checks should include estimators for ordinal indicators, bootstrapped confidence intervals, heteroskedasticity-robust standard errors, and sensitivity to item parceling (ideally no parcels in the primary analysis). Preregistered criteria for excluding extremely short completion times, patterned responses, failed attention checks, and unverified owners should be applied and results re-estimated. Missing data should be addressed using full-information maximum likelihood or multiple imputation under stated assumptions, with sensitivity analysis for nonignorable attrition in longitudinal waves.

Discriminant validity is of particular interest as trust, satisfaction and overall gap evaluation may be empirically close. Confidence intervals, cross-loadings, and theoretically justified criterion variables should be reported for HTMT. Measurement invariance testing is recommended before comparing path coefficients between two-wheelers and cars, brands, languages or city tiers. Predictive claims require holdout sample or cross validation. High in sample R^2 is not evidence of portability. Finally, effect sizes and prediction errors need to be afforded at least equal attention to p values, especially in large samples where trivial associations become significant.

Recommended field protocol

A staged design would give the most robust validation. Stage 1 should include about 30-40 critical-incident interviews with owners, dealer staff, charger operators and roadside-assistance personnel. The sampling should maximize variation in terms of city tier, vehicle type, gender, access to home-charging, and years owned.

Interviews should reveal the language consumers use to describe their promises, failures, responsibility and recovery. In Stage 2, expert sorting and cognitive interviews should be used to reduce the item pool and establish content validity. Respondents are asked to talk through each item, identify the reference actor, and distinguish expectation from experience.

Stage 3 should pilot the revised questionnaire with 150–250 verified owners. Refinement should be guided by parallel analysis, ordinal EFA, item information, floor and ceiling effects, and test-retest reliability. Stage 4 is to carry out the preregistered confirmatory study with an independently recruited sample. The recruitment sources should be diversified from owner clubs and dealer lists to avoid enthusiasm and brand-selection biases. Verification can be based on vehicle registration, purchase invoice, charging-app history or service documentation, with privacy-preserving procedures. Respondents should not be told that the focal mechanism is brand blame.

Stage 5 should be time and behaviour. Brand promise, prior trust, use case and objective access can be recorded with baseline measures Incident diaries can then capture what happened, severity, responsible actor, recovery and immediate affect. Follow-up waves can measure trust, satisfaction, recommendation, complaint and switching consideration. Multilevel structural models can estimate within-person erosion and between-market ecosystem effects with sufficient incidents nested within owners and owners nested within markets. A design like this would make the current proof of concept a plausible causal and contextual account.

The minimum confirmatory field study should include approximately 600 verified EV owners in at least six non-metro states, with quotas for vehicle type and time of ownership. It is recommended to pre-register hypotheses, item wording, exclusion rules, estimator, missing-data procedure, and fit criteria. A holdout sample should be reserved for predictive evaluation. If data are nested within brands, cities, dealers or charging networks, multilevel SEM is preferred. Where consent and commercial

agreements permit, the dataset, codebook, analysis code and de-identified materials should be deposited in an archive.

Conclusion

Brands that are dependent on ecosystems are not only judged on what they create, but also whether the system around the product can deliver on their promise. This consequential mismatch is captured in the brand promise–ecosystem readiness gap. The gap created in the simulation lead to brand attribution, trust and satisfaction erosion, loyalty and positive advocacy reduction through relational mechanisms, and directly resulted in negative word of mouth. Lived inconvenience mattered even without explicit blame. Attribution mattered most for trust. These patterns provide a focused description of the way infrastructure gaps can lead to brand damage in emerging-market electric mobility.

The study is exploratory rather than confirmatory. It offers a construct definition, nomological network, questionnaire logic, measurement caveats, and analysis template that can be taken into preregistered field research. The next scientific step is not to refine synthetic coefficients any further, but to test them in a disciplined way with the experience of real owners. If the model passes that test, BPEG can help explain a growing strategic problem: the product may work, but the promise fails because the ecosystem does not.

References

1. Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin, 103(3), 411–423. https://doi.org/10.1037/0033-2909.103.3.411
2. Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. Journal of Marketing, 65(2), 81–93. https://doi.org/10.1509/jmkg.65.2.81.18255
3. Cruz-Jesus, F., Figueira-Alves, H., Tam, C., Pinto, D. C., Oliveira, T., & Venkatesh, V. (2023). Pragmatic and idealistic reasons: What drives electric vehicle drivers' satisfaction and continuance intention? Transportation Research Part A: Policy and Practice, 170, 103626. https://doi.org/10.1016/j.tra.2023.103626
4. Diamantopoulos, A., & Winklhofer, H. M. (2001). Index construction with formative indicators: An alternative to scale development. Journal of Marketing Research, 38(2), 269–277. https://doi.org/10.1509/jmkr.38.2.269.18845
5. Folkes, V. S. (1984). Consumer reactions to product failure: An attributional approach. Journal of Consumer Research, 10(4), 398–409. https://doi.org/10.1086/208978
6. Fornell, C., & Larcker, D. F. (1981).

Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.2307/3151312

7. Goel, S., Sharma, R., & Rathore, A. K. (2021). A review on barrier and challenges of electric vehicle in India and vehicle to grid optimisation. Transportation Engineering, 4, 100057. https://doi.org/10.1016/j.treng.2021.100057
8. Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203
9. Hasan, S., Simsekoglu, Ö., & Aker, A. R. (2021). Assessment of electric vehicle repurchase intention: A survey-based study on the Norwegian EV market. Transportation Research Interdisciplinary Perspectives, 11, 100439. https://doi.org/10.1016/j.trip.2021.100439
10. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43, 115–135. https://doi.org/10.1007/s11747-014-0403-8
11. Hu, X., Zhou, R., Wang, S., Gao, L., & Zhu, Z. (2023). Consumers' value perception and intention to purchase electric vehicles: A benefit–risk analysis. Research in Transportation Business & Management, 49, 101004. https://doi.org/10.1016/j.rtbm.2023.101004
12. Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. Journal of Consumer Research, 30(2), 199–218. https://doi.org/10.1086/376806
13. Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. Journal of Marketing, 80(6), 69–96. https://doi.org/10.1509/jm.15.0420
14. Liang, C., Yang, Q., Sun, H., & Ma, X. (2024). Unveiling consumer satisfaction and its driving factors of EVs in China using an explainable artificial intelligence approach. Humanities and Social Sciences Communications, 11, 1575. https://doi.org/10.1057/s41599-024-04120-z
15. Lin, B., & Yang, M. (2024). Changes in consumer satisfaction with electric vehicle charging infrastructure: Evidence from two cross-sectional surveys in 2019 and 2023. Energy Policy, 185, 113924. https://doi.org/10.1016/j.enpol.2023.113924
16. Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions.
17. Journal of Marketing Research, 17(4), 460–469. https://doi.org/10.1177/002224378001700405
18. Oliver, R. L. (1999). Whence consumer loyalty? Journal of Marketing, 63(Special Issue), 33–44. https://doi.org/10.1177/00222429990634s105
19. Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. Journal of Applied Psychology, 88(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879
20. Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 40, 879–891. https://doi.org/10.3758/BRM.40.3.879
21. Vargo, S. L., & Lusch, R. F. (2016). Institutions and axioms: An extension and update of service-dominant logic. Journal of the Academy of Marketing Science, 44, 5–23. https://doi.org/10.1007/s11747-015-0456-3
22. Yadav, R., & Yadav, R. (2024). Are consumers ready to adopt electric vehicles? Analyzing the barriers and motivators associated with electric vehicle adoption in India: Policy implications for various stakeholders. Energy Policy, 190, 114173. https://doi.org/10.1016/j.enpol.2024.114173