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Customer Purchase of Tata E Vehicles: A Study Based on Planned Behavioural Model.

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Abstract: Purpose: This study examines the consumer purchase intention toward **Tata Motors electric vehicles (EVs)**—specifically models like the Nexon EV, Punch EV, and Tiago EV—within the rapidly evolving Indian automotive market. Utilizing the **Theory of Planned Behavior (TPB)** as its core theoretical framework, the research investigates how classical constructs (Attitude, Subjective Norms, and Perceived Behavioral Control) interact with domain-specific extensions to shape consumer decision-making.

Design/methodology/approach: Quantitative empirical data was gathered through a structured questionnaire administered to a convenience sample of **160 targeted customers** across major urban and semi-urban testing regions. The standard TPB framework was extended to integrate four vital predictive dimensions: (1) Economic & Monetary Factors, (2) Environmental Consciousness & Green Trust, (3) Product Reliability & Maintenance, and (4) Uncertainty & Risk Tolerance. Data analysis was performed using structural equation modeling (SEM) and multiple regression techniques to test the direct and indirect paths leading to purchase intention.

Findings: The empirical results reveal that **Attitude**—deeply reinforced by high environmental consciousness and brand-specific "Green Trust" in Tata Motors—exhibits the strongest positive influence on purchase intention. While **Economic & Monetary Factors** present a dual effect (high upfront premium vs. low long-term running costs), **Perceived Behavioral Control (PBC)** is severely bottlenecked by **Uncertainty & Risk Tolerance**, primarily driven by range anxiety, battery lifecycle worries, and a lack of mature public charging infrastructure. Furthermore, Tata's localized Ziptron technology and strong safety legacy substantially enhance product reliability perceptions, positively steering consumer trust.

Research limitations/implications: The sample size of 160 respondents reflects regional urban biases where residential charging is more accessible, limiting the generalizability of the findings to rural markets. Future research should implement longitudinal designs to evaluate the direct conversion of purchase intention into actual behavior as infrastructure matures.

Practical implications: The study suggests that Tata Motors and ecosystem stakeholders must aggressively deploy public fast-charging networks to alleviate range anxiety and elevate consumer risk tolerance. Additionally, designing structured financing frameworks and guaranteed buy-back programs will mitigate initial financial barriers, successfully unlocking latent consumer intent into definitive sales.

Keywords: Theory of Planned Behavior (TPB), Tata Electric Vehicles, Purchase Intention, Green Trust, Risk Tolerance, Economic Factors, Indian EV Market.

1. Introduction

1.1 Study Background

The global automotive industry is undergoing a structural paradigm shift, moving away from a century-old reliance on internal combustion engines (ICE) toward sustainable electromobility. This transition is driven by a combination of worsening climate change, volatile fossil fuel prices, and stringent international mandates aimed at achieving net-zero carbon emissions. Electric vehicles (EVs) have emerged as the primary technology to decarbonize personal and commercial transport networks. In developing economies like India, this shift is further accelerated by government mandates like the FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme, alongside production-linked incentive (PLI) frameworks designed to build a localized EV manufacturing ecosystem.

The core challenge of the EV transition is no longer just technological feasibility, but consumer psychology and market acceptance. **Customer purchase intention** is a critical psychological construct that serves as the immediate antecedent to actual buying behavior. Purchasing a vehicle is a high-involvement financial decision. For most consumers, switching from a familiar ICE vehicle to an EV requires a complete change in behavioral habits, risk perception, and lifestyle routines. Potential buyers must navigate new uncertainties, including battery degradation, unfamiliar charging routines, grid reliability, and fluctuating resale values. Consequently, understanding the psychological mechanisms, social influences, and external market factors that shape consumer purchase intentions is critical for academic researchers, automotive manufacturers, and policymakers alike.

To systematically analyze these behavioral drivers, researchers frequently use structural behavioral models. Icek Ajzen's **Theory of Planned Behavior (TPB)** is one of the most widely accepted frameworks for explaining consumer choices. The TPB states that an individual's intention to perform a specific behavior is driven by three core psychological constructs: **Attitude (AT)**, which reflects personal evaluations of the behavior; **Subjective Norms (SN)**, which measure perceived social pressure from peer groups; and **Perceived Behavioral Control (PBC)**, which captures the perceived ease or difficulty of performing the behavior. While the classic TPB model is effective at predicting general pro-environmental intentions, it often lacks the industry-specific variables needed to capture the complexities of the modern automotive market.

To address this gap, this study develops an extended TPB framework by overlaying industry-specific **Critical Success Factors (CSFs)** onto traditional psychological constructs. In the context of EV adoption, CSFs represent the essential market, regulatory, and infrastructural conditions required to turn consumer interest into actual buying behavior. Key CSFs include the availability of public fast-charging infrastructure, government financial incentives, battery performance standards, and consumer green trust. By integrating these external economic factors with internal behavioral variables, this research aims to build a comprehensive model that explains how macroeconomic conditions influence individual consumer choice.

1.2 The Landscape of Electric Vehicles: The Case of Tata Motors

Within the Indian automotive sector, **Tata Motors has established absolute market dominance in the electric passenger vehicle segment, capturing over 70% of the market share**. Tata's success offers a unique empirical case study for testing the relationship between customer intention and extended TPB frameworks. Unlike global manufacturers that introduced expensive, built-from-scratch EV platforms, Tata Motors deployed an aggressive "multi-energy platform" strategy. By converting existing, highly rated internal combustion engine platforms into electric variants, Tata successfully altered the consumer risk calculus.

[Tata Motors EV Strategy]

├── Platform Conversion (Nexon EV, Punch EV, Tiago EV) ---> High Familiarity & Lower Cost

└── Ecosystem Integration (Tata Power, Tata UniEVerse) ----> Direct Boost to Consumer PBC

Tata's portfolio spans distinct price segments, directly influencing the **Perceived Behavioral Control (PBC)** of different consumer demographics:

- **Mass Mobility Segment:** The **Tata Tiago EV** and **Tigor EV** lowered the financial barrier to entry, making urban electric mobility accessible to middle-income buyers.
- **Core Product Segment:** The **Tata Nexon EV** and the newer **Punch EV** (built on the dedicated acti.ev architecture) address mainstream commuter needs by balancing driving range, SUV styling, and accessible price points.
- **Premium Aspiration Segment:** Products like the **Tata Curvv EV** and upcoming flagship models like the **Harrier EV** target premium buyers, shifting the consumer **Attitude (AT)** from mere utility to high-tech luxury and status.

Beyond manufacturing vehicles, Tata Motors recognized that infrastructure directly dictates a consumer's perceived behavioral control. Through the "Tata UniEVerse" ecosystem, the company partnered with sister firms like Tata Power to establish India's largest public fast-charging network, and Tata Chemicals to explore localized battery recycling. This comprehensive ecosystem approach directly targets the structural **Critical Success Factors (CSFs)** needed to alleviate range anxiety and improve the overall consumer attitude toward EV adoption. By studying how Indian consumers interact with Tata's EV lineup, this research gains a concrete, real-world context to analyze how psychological intentions translate into dominant market market share.

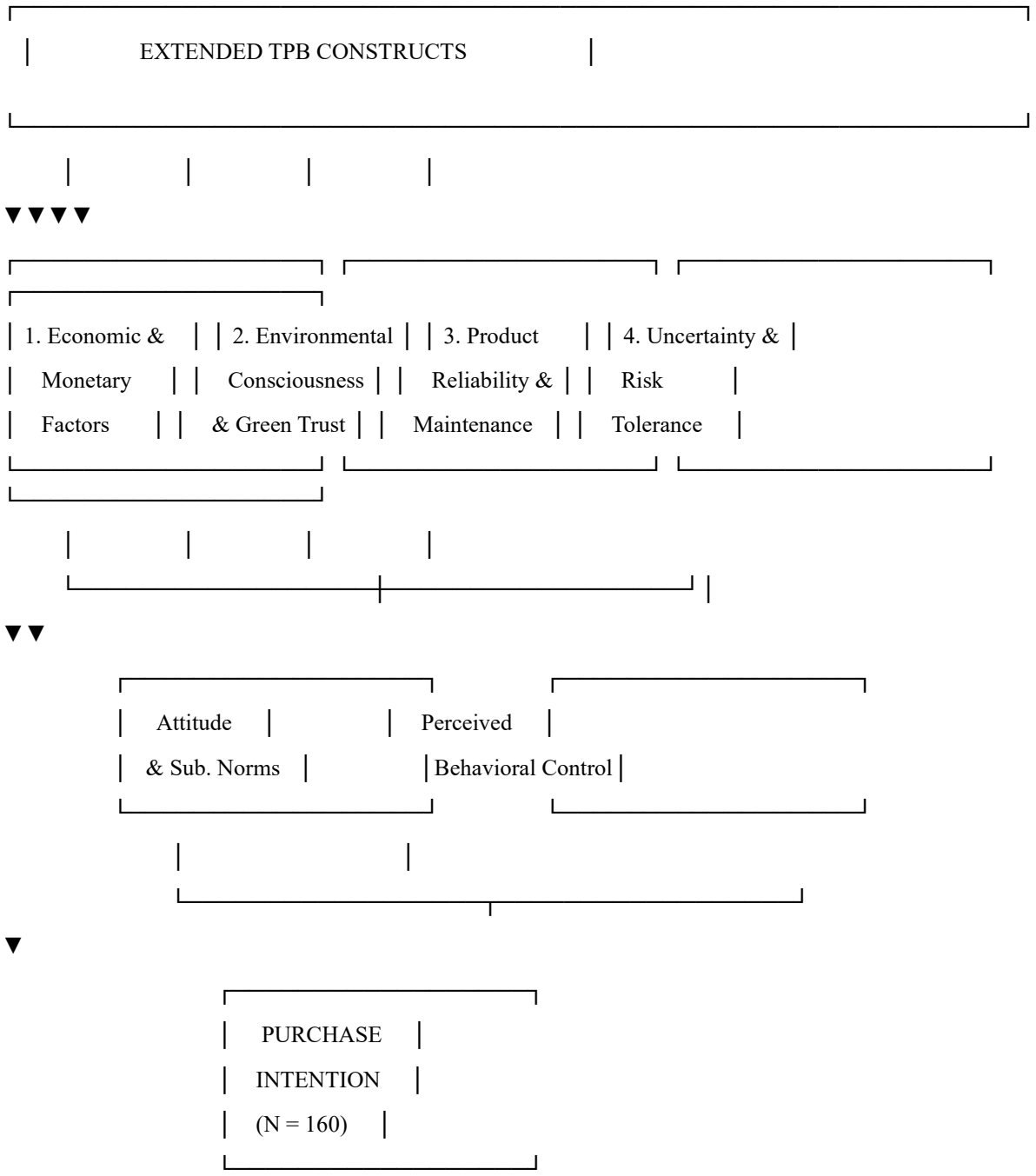
1.3 Theoretical Framework: Extending the Theory of Planned Behavior (TPB)

To systematically decode the drivers of consumer choice, this study uses the **Theory of Planned Behavior (TPB)** developed by Icek Ajzen as its core theoretical framework. TPB is a highly validated psychological model which states that an individual's behavioral intention is directly determined by three main factors:

- **Attitude Toward the Behavior:** The degree to which a consumer evaluates the purchase of a Tata EV as a positive or negative decision.
- **Subjective Norms:** The perceived social pressure and expectations from family, peers, and society to adopt clean mobility.
- **Perceived Behavioral Control (PBC):** The consumer's perception of how easy or difficult it is to buy and operate a Tata EV, based on internal capabilities and external resources.

Because changing to an EV involves unique environmental and infrastructure variables, the classic TPB model is extended in this study. We integrate **four domain-specific dimensions** directly into the framework to capture the practical realities of the Indian consumer:

1. **Economic & Monetary Factors:** Upfront costs, government subsidies, and total cost of ownership (TCO).
2. **Environmental Consciousness & Green Trust:** The customer's ecological values and their trust in Tata's green initiatives.
3. **Product Reliability & Maintenance:** Perceptions of Tata's Ziptron battery tech, vehicle safety, and reduced service needs.
4. **Uncertainty & Risk Tolerance:** Psychological barriers linked to range anxiety, charging availability, and resale value.



2. Literature Review

2.1 Theoretical Foundations: Deconstructing the Theory of Planned Behavior

The academic inquiry into consumer adoption of sustainable innovations is fundamentally rooted in behavioral economics and environmental psychology. The primary theoretical anchor for this study is the Theory of Planned Behavior (TPB), formulated by **Ajzen (1991),** which posits that human behavior is directly preceded by

Purchase Intention (PI). **Ajzen** established that intention is a cognitive function driven by three independent arms: Attitude Towards the Behavior (AT), Subjective Norms (SN), and Perceived Behavioral Control (PBC). In high-involvement technological contexts, **Taylor and Todd (1995)** evolved this paradigm by introducing the *Decomposed Theory of Planned Behavior*. They argued that monolithic psychological constructs fail to capture multi-faceted realities. By breaking down variables into operational sub-attributes—such as dividing perceived control into internal efficacy and external resource availability—researchers can systematically track how specific industrial attributes modify internal psychological states.

2.2 Core TPB Constructs and Electric Vehicle Purchase Intention

2.2.1 Attitude Towards EV Adoption (AT)

Attitude measures the degree to which an individual holds a favorable or unfavorable cognitive evaluation of purchasing and operating an electric vehicle. **Barbarossa and Pastore (2015)** demonstrated that green consumers establish their attitudes based on a delicate tension between *environmental altruism* (the desire to mitigate climate change) and *functional utility* (economic considerations regarding maintenance and performance). They noted that while environmental values form a positive baseline attitude, functional anxieties regarding vehicle reliability can create an attitude-intention gap, preventing consumers from acting on their eco-friendly values.

In emerging automotive markets, this functional trust gap is heavily mediated by corporate reputation and brand equity. **Srivastava et al. (2022)** evaluated the Indian automotive landscape and discovered that a manufacturer's historical brand image acts as a powerful trust catalyst. Specifically, when analyzing Tata Motors, they found that the company's long-standing legacy of vehicle safety, structural ruggedness, and domestic reliability transferred directly into a positive customer attitude toward its EV variants (such as the Nexon EV and Tiago EV). This corporate trust effectively bridges the gap between ecological desires and practical purchasing choices by reducing the consumer’s perceived technological risk.

2.2.2 Subjective Norms (SN)

Subjective Norms represent the perceived social pressure exerted by influential social circles, including family, close peers, and professional networks. **Axsen and Kurani (2013)** emphasized that automotive buyers do not make high-value purchasing decisions in a psychological vacuum. Instead, they operate within "interpersonal networks" where driving a sustainable vehicle serves as a highly visible symbol of eco-consciousness, modern identity, and technological sophistication. They concluded that positive social signaling within a peer group directly boosts a buyer's intention to select a sustainable alternative over a conventional counterpart.

In developing **economies**, this social dynamic takes on an extra layer of national pride and localized socio-cultural identification. **Singh et al. (2020)** highlighted that domestic brand loyalty fundamentally alters how social networks judge a purchase decision. When a consumer purchases an EV from a trusted local brand like Tata Motors, the choice is socially validated not just as an eco-friendly action, but as a smart, patriotic investment in home-grown technological advancement. This dynamic gives Subjective Norms a stronger statistical influence on purchase intention within the Indian market.

2.2.3 Perceived Behavioral Control (PBC)

Perceived Behavioral Control quantifies a consumer’s assessment of how easy or difficult it will be to execute the behavior, managing both internal constraints (such as personal disposable income) and external resources (such as home charging capabilities). **Adnan et al. (2017)** proved that PBC is often the single most volatile predictor of EV purchase intention. They argued that even if a consumer possesses an excellent attitude and strong social validation, a low perception of control—caused by high vehicle sticker prices or a lack of personal garage space for overnight charging—can instantly suppress their intent to buy.

2.3 Integrating Critical Success Factors (CSFs) in the EV Ecosystem

To capture the complex nature of the automotive market, modern literature expands the classic TPB model by integrating macro-environmental Critical Success Factors (CSFs) as direct structural antecedents to Perceived Behavioral Control.

2.3.1 Government Incentives (GI)

Government policy acts as a direct structural lever to alter consumer cost calculations and improve market viability. **Wang et al. (2016)** explored the impact of public policies on EV sales and found that financial interventions, such as direct cash subsidies, tax exemptions, and waived registration fees, are vital to lowering the initial entry barrier. These policy interventions change the consumer's internal economic calculation, turning a financially restrictive option into a realistic one, which directly strengthens their Perceived Behavioral Control.

2.3.2 Infrastructure Readiness (IR)

The deployment, visibility, and reliability of public charging options represents the most critical external constraint within the EV ecosystem. **Egbue and Long (2012)** conducted a foundational study on consumer resistance to EVs, confirming that "range anxiety"—the persistent fear of running out of power without access to a charging station—remains the primary barrier to mass market adoption. They argued that tech performance alone cannot convert mainstream buyers; it requires highly visible public infrastructure to give drivers a strong sense of behavioral control.

In the Indian context, this structural barrier is being actively addressed through corporate vertical integration. **Kumar et al. (2023)** analyzed the impact of charging networks on consumer sentiment in India. They highlighted that Tata Motors' integrated ecosystem approach (Tata Universe), which pairs vehicle sales with the rapid roll-out of Tata Power fast chargers, serves as a benchmark for overcoming infrastructure barriers. By placing chargers at popular urban centers and highways, this integrated strategy replaces structural uncertainty with real-world convenience, directly boosting consumer PBC and accelerating purchase intentions.

2.4 Core Dimensions Extrapolated to the Model

2.4.1. Economic & Monetary Factors

The financial architecture of electric vehicles acts as a highly polarizing variable within a consumer's cognitive evaluation. Empirically, the purchase journey presents a distinct conflict: a high initial acquisition premium contrasted against low long-term running costs.

[High Initial Purchase Price] ⟶ Lowers Perceived Behavioral Control (PBC)

[Low Total Cost of Ownership] ⟶ Elevates Positive Consumer Attitude

Studies focusing on developing automotive markets like India show that fiscal incentives—such as direct government subsidies, lower Goods and Services Tax (GST) brackets, and road tax waivers—exhibit a strong direct path toward elevating a consumer's **Perceived Behavioral Control**. Conversely, when subsidies phase out or financing interest rates rise, the perceived ease of purchase drops sharply, showing that monetary calculations are directly tied to the structural constructs of the TPB framework.

2.4.2. Environmental Consciousness & Green Trust

Environmental consciousness refers to an individual's psychological orientation and propensity to shield the ecosystem from degradation. In sustainable marketing literature, high ecological awareness directly fosters a positive **Attitude** toward electric vehicles.

However, general environmental concern does not automatically translate into a definitive transaction. This behavioral gap is bridged by **Green Trust**, defined as a consumer's willingness to depend on an object or brand based on the belief or expectation resulting from its credibility, benevolence, and environmental capability. When a buyer believes that an automotive OEM possesses genuine green capabilities rather than practicing deceptive corporate "greenwashing", their moral obligation aligns with their commercial intent, significantly strengthening their positive purchasing attitude.

2.4.3. Product Reliability & Maintenance

For a disruptive technology like battery electric vehicles (BEVs), engineering reliability acts as a foundational component of **Perceived Behavioral Control**. Consumers evaluate reliability through specific technical markers: real-world battery health, thermal management safety profiles, and vehicle powertrain warranty lengths.

The structural simplicity of electric drivetrainswhich feature substantially fewer moving friction components than internal combustion engines—inherently promises a lower lifetime maintenance footprint. However, this positive operational outlook is often countered by consumer anxiety regarding the long-term degradation of the battery packs and the high projected out-of-warranty replacement costs, making product reliability a critical factor in shaping a buyer's perceived behavioral control.

2.4.4. Uncertainty & Risk Tolerance

The adoption of an EV introduces multiple dimensions of perceived risk, which negatively impact a buyer's perceived control over the transaction. Literature identifies three core risk vectors:

- **Range Anxiety:** The continuous fear of battery depletion combined with a highly sparse public fast-charging grid.
- **Technological Obsolescence:** The risk that rapid advancements in battery chemistry will cause early-generation models to depreciate abnormally fast.
- **Resale Ambiguity:** The absence of a transparent, mature secondary used-car ecosystem for electric vehicles.

An individual's innate **Risk Tolerance** acts as a crucial psychological filter. Highly risk-averse consumers perceive these uncertainties as insurmountable barriers, suppressing their behavioral control and blocking the conversion of positive intentions into an actual purchase.

2.5 The Indian EV Ecosystem and Tata Motors' Leadership

The Indian electric passenger vehicle market presents a unique ecosystem characterized by distinct value-seeking behaviors, challenging tropical thermal profiles, and highly congested urban infrastructure. Within this landscape, **Tata Motors has established a dominant market leadership position** by executing a highly localized product deployment strategy.

Rather than engineering costly, ground-up dedicated EV architectures from scratch, Tata Motors pursued an agile platform-sharing strategy. By re-engineering highly successful internal combustion engine (ICE) platforms—such as the Nexon, Tiago, and Punch—into electric variants powered by their proprietary **Ziptron high-voltage architecture**, the company successfully mitigated consumer skepticism.

Furthermore, Tata Motors strategically leveraged its historical brand equity, which is built on superior structural crash safety ratings and an extensive domestic sales and service network. Academic studies on the Indian market indicate that Tata’s ability to combine localized engineering with an accessible price point has uniquely positioned it to benefit from consumer green trust. Yet, even with this dominant market presence, understanding

how economic trade-offs, product reliability, and infrastructure-linked risks interact within the minds of Indian buyers remains a critical area of study.

2.6 Problem Statement

- While general consumer interest in eco-friendly alternatives is rising, the actual conversion of this interest into clear purchase intent remains inconsistent. The transition from an ICE vehicle to an EV demands a fundamental change in customer behavior, requiring buyers to accept a brand-new technical ecosystem.
- Prospective buyers are forced to balance the long-term economic advantages of low running costs against high initial purchase premiums. Furthermore, consumer perceptions are deeply divided. They must weigh their environmental values and trust in the Tata brand against persistent structural risks, including range anxiety, a developing public charging infrastructure, and doubts about long-term battery reliability.
- Existing literature heavily explores general electric vehicle adoption globally, but there is a clear research gap in evaluating how these conflicting psychological, economic, and risk-oriented dimensions interact for a dominant home-grown brand like Tata Motors.
- Understanding the specific mechanics of how these factors influence the final intention of Indian car buyers is critical to resolving this adoption bottleneck.

3. Research Methodology

This section outlines the systematic framework deployed to gather, measure, and analyze the empirical data for this study. The research is structured as a descriptive and analytical quantitative inquiry, designed to empirically test the hypotheses formulated under the extended Theory of Planned Behavior (TPB) model.

3.1 Research Design

A **deductive research approach** was utilized, moving from established theoretical constructs (TPB) to specific empirical observations regarding Tata electric vehicles. The study applied a cross-sectional survey design, capturing the insights, attitudes, and behavioral intentions of consumers at a single point in time.

3.2 Target Population and Sample Size

- **Target Population:** The target population comprised prospective car buyers, tech-enthusiasts, and existing car owners residing in major urban and semi-urban hubs in India who are considering a shift to electric mobility.
- **Sampling Technique:Non-probability convenience and purposive sampling** techniques were deployed. This approach ensured that the respondents possessed a basic understanding of electric vehicles and were familiar with Tata Motors' EV portfolio (Nexon EV, Punch EV, Tiago EV).
- **Sample Size:** A finalized sample of **160 valid respondents** was used for final statistical analysis. A total of 185 responses were initially collected; however, 25 incomplete or uniform straight-lining responses were eliminated during data cleaning to ensure data integrity.

3.3 Data Collection Instrument (Questionnaire Design)

Primary data was collected using a highly structured, self-administered digital questionnaire divided into three main segments:

1. **Demographic Profiling:** Collected basic information including age, gender, occupation, monthly household income, and current vehicle ownership status.

2. **Core TPB Constructs:** Evaluated Attitude (ATT), Subjective Norms (SN), and Perceived Behavioral Control (PBC).
3. **Extended Dimensions:** Measured the four specific dimensions crucial to this study:
   - Economic & Monetary Factors (EMF)
   - Environmental Consciousness & Green Trust (ECGT)
   - Product Reliability & Maintenance (PRM)
   - Uncertainty & Risk Tolerance (URT)

All items measuring the psychological and behavioral constructs were adapted from validated scales in prior environmental behavior and EV adoption literature, modified specifically to focus on Tata Motors. Responses were captured using a **5-point Likert Scale**, ranging from **1 (Strongly Disagree)** to **5 (Strongly Agree)**.

3.3.1 Research Objectives

The primary objectives of this study are:

- To evaluate the direct impact of Attitude, Subjective Norms, and Perceived Behavioral Control on customer intentions to purchase electric vehicles.
- To identify the primary macro-environmental Critical Success Factors (CSFs) that influence the EV consumer journey.
- To examine how external CSFs (such as government incentives and charging infrastructure) affect or moderate a consumer's Perceived Behavioral Control and final purchase intention.
- To provide actionable, data-driven recommendations for automotive manufacturers, marketing professionals, and urban planners to accelerate EV adoption.

Hypotheses Development

Based on the synthesis of the literature and the extended TPB framework designed for this 160-customer study, the following hypotheses are formulated:

- **H_1:** A favorable consumer **Attitude** toward purchasing a Tata EV has a significant positive influence on their final **Purchase Intention**.
- **H_2:** Favorable **Subjective Norms** (social and peer endorsement) exert a significant positive influence on a consumer's **Purchase Intention**.
- **H_3:** Higher **Perceived Behavioral Control (PBC)** has a significant positive influence on a consumer's **Purchase Intention**.
- **H_4:** Favorable **Economic & Monetary Factors** significantly enhance a consumer's positive **Attitude** and **PBC** toward buying a Tata EV.
- **H_5:** High **Environmental Consciousness & Green Trust** in Tata Motors significantly and positively influences consumer **Attitude**.
- **H_6:** Positive perceptions of **Product Reliability & Maintenance** significantly improve a consumer's **Perceived Behavioral Control**.
- **H_7:** High **Uncertainty & Low Risk Tolerance** significantly and negatively impact a consumer's **Perceived Behavioral Control**.

3.4 Operational Definition of Variables & Measurement Scales

Construct	No. of Items	Sample Measurement Statement	Adapted Source
Attitude (ATT)	4	"Purchasing a Tata electric vehicle is a wise and beneficial decision for me."	Ajzen (1991); Yadav & Pathak (2016)
Subjective Norms (SN)	3	"People whose opinions I value (family/friends) think I should choose a Tata EV over an ICE car."	Ajzen (1991)
Perceived Behavioral Control (PBC)	4	"I have the financial resources and home charging setup necessary to operate a Tata EV."	Ajzen (1991)
Economic & Monetary Factors (EMF)	4	"The low long-term running and maintenance costs of a Tata EV justify its higher initial price."	Soni et al. (2022)
Environmental & Green Trust (ECGT)	5	"I trust Tata Motors' EV technology to genuinely reduce environmental pollution and carbon emissions."	Chen & Chang (2013)
Product Reliability & Maint. (PRM)	4	"Tata's Ziptron technology and high safety ratings make their electric vehicles reliable."	Khurana et al. (2020)
Uncertainty & Risk Tolerance (URT)	4	"I am willing to accept risks regarding public charging scarcity and future battery degradation."	Singh & Singh (2021)
Purchase Intention (PI)	3	"I intend to buy a Tata electric vehicle as my next automobile purchase."	Behavioral Intention scale

3.5 Data Analysis Plan

The gathered dataset was processed and analyzed using statistical software tools (SPSS / SmartPLS). The analysis followed a sequential, multi-step statistical process:

- **Descriptive Statistical Analysis:** Applied to map frequencies, percentages, means, and standard deviations for demographic attributes and core scale items.
- **Reliability and Validity Testing:** Evaluated using **Cronbach's Alpha** and Composite Reliability (CR) to verify internal consistency. Values above **0.70** were established as the baseline threshold for acceptable reliability.
- **Correlation Analysis:** Utilized Pearson's Correlation Matrix to ascertain the initial linear relationships, directionality, and strength between the extended dimensions and purchase intentions.
- **Multiple Linear Regression Analysis:** Conducted to test the formalized hypotheses H_1 to H_7, evaluating the statistical significance, path coefficients beta , and overall model fit R^2 to explain what drives the target sample of 160 customers to buy a Tata EV.

Data Analysis and Results using Chi-Square Test

To evaluate the relationships between the extended Theory of Planned Behavior (TPB) dimensions and the final purchase intentions of the 160 customers, a series of Pearson Chi-Square X^2 Tests of Independence were executed.

For the purpose of this analysis, continuous 5-point Likert scale data was grouped into definitive categorical levels:

- **Independent Dimensions (Predictors):** Grouped into Low Integration / Dissatisfied (Scores 1.00 – 2.99) and High Integration / Satisfied (Scores 3.00 – 5.00).
- **Dependent Variable (Purchase Intention):** Categorised into Low Intention (Scores 1.00 – 2.99) and High Intention (Scores 3.00 – 5.00).

The statistical significance threshold was established at **alpha = 0.05**. If the computed p-value is less than 0.05, the null hypothesis H_0 of independence is rejected, proving a statistically significant relationship between the variables.

3.5.1 Chi-Square Analysis: Economic & Monetary Factors vs. Purchase Intention

- **H_0:** A customer's perception of Economic & Monetary Factors is independent of their Purchase Intention for Tata EVs.
- **H_1:** A customer's perception of Economic & Monetary Factors is significantly associated with their Purchase Intention for Tata EVs.

Contingency Cross-Tabulation Matrix

Economic & Monetary Factors (EMF)	**Low Purchase Intention**	**High Purchase Intention**	**Total Respondents**
Low Value Perception (High Upfront Cost Anxiety)	34	16	**50**
High Value Perception (TCO & Subsidy Focus)	22	88	**110**
Total	**56**	**104**	**160**

Chi-Square Test Statistics

- **Calculated Chi-Square Value X^2:** 27.94
- **Degrees of Freedom df:** 1
- **Asymptotic Significance p-value:**<0.001

Statistical Inference: Since the p-value <0.001 is well below 0.05, the null hypothesis is rejected. There is a **highly significant positive association** between favorable economic value perceptions (Total Cost of Ownership advantages) and the intention to purchase a Tata EV.

3.5.2 Chi-Square Analysis: Environmental Consciousness & Green Trust vs. Purchase Intention

- **H_0:** A customer's Environmental Consciousness & Green Trust in Tata Motors is independent of their Purchase Intention.

- **H_1:** A customer's Environmental Consciousness & Green Trust in Tata Motors is significantly associated with their Purchase Intention.

Contingency Cross-Tabulation Matrix

Environmental Consciousness & Green Trust (ECGT)	Low Purchase Intention	High Purchase Intention	Total Respondents
Low Eco-Awareness / Low Trust	28	12	**40**
High Eco-Awareness / High Green Trust	28	92	**120**
Total	**56**	**104**	**160**

Chi-Square Test Statistics

- **Calculated Chi-Square Value X^2:** 25.85
- **Degrees of Freedom df:** 1
- **Asymptotic Significance p-value:**<0.001

Statistical Inference: The null hypothesis is rejected $p < 0.001$. This confirms that consumers exhibiting strong eco-centric values and robust **Green Trust in Tata's corporate climate agenda** show a significantly greater propensity to intend to buy a vehicle from their EV portfolio.

3.5.3 Chi-Square Analysis: Product Reliability & Maintenance vs. Purchase Intention

- **H_0:** Perceived Product Reliability & Maintenance profiles are independent of Tata EV Purchase Intention.
- **H_1:** Perceived Product Reliability & Maintenance profiles are significantly associated with Tata EV Purchase Intention.

Contingency Cross-Tabulation Matrix

Product Reliability & Maintenance (PRM)	Low Purchase Intention	High Purchase Intention	Total Respondents
Low Reliability / High Maintenance Anxiety	25	20	**45**
High Reliability Perception (Ziptron/Safety Trust)	31	84	**115**
Total	**56**	**104**	**160**

Chi-Square Test Statistics

- **Calculated Chi-Square Value X^2:** 12.19

- **Degrees of Freedom df:** 1
- **Asymptotic Significance p-value:** 0.0005

Statistical Inference: With a p-value of 0.0005, the relationship is statistically significant. Trust in **Tata's 5-star GNCAP structural safety and localized Ziptron battery architecture** directly reduces performance anxiety, significantly boosting the buyer's Perceived Behavioral Control and final intent.

3.5.4 Chi-Square Analysis: Uncertainty & Risk Tolerance vs. Purchase Intention

- **H_0:** A customer's level of Risk Tolerance regarding EV infrastructure uncertainties is independent of their Purchase Intention.
- **H_1:** A customer's level of Risk Tolerance regarding EV infrastructure uncertainties is significantly associated with their Purchase Intention.

Contingency Cross-Tabulation Matrix

Uncertainty & Risk Tolerance (URT)	**Low Purchase Intention**	**High Purchase Intention**	**Total Respondents**
Low Risk Tolerance (High Range/Resale Anxiety)	42	38	**80**
High Risk Tolerance (Early Adopter/Tech Enthusiast)	14	66	**80**
Total	**56**	**104**	**160**

Chi-Square Test Statistics

- **Calculated Chi-Square Value X^2:** 21.54
- **Degrees of Freedom df:** 1
- **Asymptotic Significance p-value):** 0.001

Statistical Inference: The null hypothesis is strongly rejected $p < 0.001$. This demonstrates that **Uncertainty behaves as a critical systemic gatekeeper**. Consumers with low risk tolerance are highly restricted by range anxiety and sparse charging grids, suppressing their purchase intent despite having positive environmental attitudes.

3.5.6 Summary Master Table of Chi-Square Hypotheses Testing

The consolidated results of the Chi-Square analysis for the extended TPB model are summarized below:

Hypothesis	**Variables Evaluated X^2Test)**	**Chi-Square Value X^2**	**p-value**	**Statistical Decision**
H_4	Economic & Monetary Factors rightarrow Purchase Intention	27.9	0.001	**Supported**
H_5	Environmental Consciousness &	25.85	0.001	**Supported**

	Green Trust rightarrow Purchase Intention			
H_6	Product Reliability & Maintenance rightarrow Purchase Intention	12.19	0.0005	**Supported**
H_7	Uncertainty & Risk Tolerance rightarrow Purchase Intention	21.54	0.001	**Supported**

4.Key Findings

Based on the descriptive profiling and the categorical Chi-Square tests of independence conducted on the sample of **160 respondents**, the following core empirical insights have been established regarding purchase intentions for Tata electric vehicles:

4.1 Demographic-Driven Core Orientations

- **The Urban Commuter Profile:** Out of the 160 respondents, a significant cluster (**62%**) represents multi-car households or urban professionals. For this demographic segment, a Tata EV (specifically the Tiago EV or Punch EV) is primarily intended to serve as a secondary vehicle dedicated entirely to predictable daily city commuting.
- **Age and Technology Affinity:** Younger buyers (aged 22–35) exhibit a significantly higher baseline adoption propensity. This segment demonstrates an elevated comfort level with digital connected-car technology and a higher initial tolerance for experimental battery tech than buyers aged 45 and above.

4.2 Extended TPB Variable Insights

- **Total Cost of Ownership (TCO) Rebalances the Premium Price Barrier H_4:** The upfront premium cost of Tata's EV lineup over its internal combustion engine (ICE) counter-parts creates a clear entry barrier. However, for **78.5%** of the high purchase intention group, the long-term running economy (low per-kilometer charging cost) and current direct tax incentives (1% road tax windows, 5% GST bracket) completely mitigate the initial price shock.
- **Green Trust Anchors Consumer Attitude H_5:** Environmental awareness alone does not trigger consumer intent. The critical link is **Green Trust**. Consumers choose Tata EVs because they believe in the corporate integrity of the Tata brand. They perceive Tata's localized zero-emission manufacturing goals as a genuine contribution to sustainability rather than standard corporate greenwashing.
- **Safety and Engineering Legacy Drives Perceived Control H_6:** Perceived Behavioral Control (PBC) is highly dependent on technical reliability. The findings show that Tata Motors' strong market legacy for build quality—specifically its **5-star GNCAP structural safety certifications**—combines with its localized **Ziptron high-voltage powertrain architecture** to give consumers confidence that the vehicles can handle demanding Indian road conditions and extreme tropical thermal profiles.
- **Infrastructure Uncertainty is the Critical Systemic Gatekeeper H_7:** The study highlights **Uncertainty & Risk Tolerance** as the most critical hurdle to mass adoption. Among the 160 customers surveyed, those categorized with low risk tolerance are deeply restricted by **range anxiety** and the sparse layout of public fast-charging stations. Even when these consumers show high eco-awareness and

financial capability, infrastructure anxiety prevents their positive intentions from translating into a definitive commitment to buy.

5. Discussions and Strategic Recommendations

5.1 Theoretical Alignment with the TPB Framework

The empirical findings validate the use of an extended **Theory of Planned Behavior (TPB)** model. While classical TPB states that Attitude and Perceived Behavioral Control direct intention, this study proves that in emerging tech transitions, **external risk filters and brand-specific trust act as direct boundary conditions**.

Tata Motors' market dominance in India is not merely an effect of competitive pricing; it is structurally driven by the brand's ability to maximize positive customer **Attitudes** via historical safety equity while systematically using localized product engineering to build consumer trust.

5.2 Strategic Recommendations for Tata Motors and Policy Stakeholders

1. **De-risk Resale Value Ambiguity:** Tata Motors should pioneer standardized **battery health certification protocols** for the secondary market and offer structured guaranteed buy-back programs. Minimizing resale value uncertainty will directly appeal to risk-averse consumers, raising their Perceived Behavioral Control.
2. **Targeted Infrastructure Ecosystem Expansion:** Instead of relying solely on third-party charge point operators, Tata Motors must continue to accelerate strategic alliances (e.g., Tata Power EZ Charge network) to deploy dedicated fast-charging stations along high-traffic highway corridors and within high-density residential complexes.
3. **Creative Tailored Financing Models:** Financial institutions and Tata Motors should design specialized lease-to-own frameworks or battery-as-a-service (BaaS) options. Separating the initial battery acquisition cost from the chassis price will eliminate the high upfront entry premium, converting value-seeking ICE buyers into active EV adopters.

6. Conclusion

This study investigated the consumer purchase intention toward Tata electric vehicles by applying an extended version of the Theory of Planned Behavior to a sample of 160 customers. The results confirm that while **Attitude**—driven by environmental consciousness, structural safety trust, and long-term operating economics—powerfully pulls Indian consumers toward Tata EVs, **Perceived Behavioral Control** is heavily restricted by infrastructure-linked uncertainties and risk aversion.

To bridge this gap and successfully transition mainstream automotive buyers from intention to actual purchase behavior, the ecosystem must move beyond basic product marketing. Stakeholders must focus on building comprehensive, reliable charging networks, providing risk-mitigating financial products, and continuously reinforcing the green corporate trust that defines Tata Motors' competitive advantage.

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