Adoption of Design Thinking Systems in Electric Two-Wheeler Companies: An Empirical Investigation

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Abstract

The rapid expansion of the electric mobility sector has necessitated the adoption of innovative and customer-centric marketing approaches to effectively engage consumers and enhance market acceptance. This study examines the adoption of design thinking systems in electric two-wheeler companies and evaluates their impact on promotional effectiveness and customer satisfaction. A quantitative research design was employed, and primary data were collected from 230 respondents using a structured questionnaire. The data were analysed using descriptive statistics, reliability analysis, correlation, and regression techniques.

The findings reveal that design thinking adoption is significantly present among electric two-wheeler companies, with a high level of internal consistency. The results further indicate that design thinking has a strong and statistically significant positive impact on promotional effectiveness, explaining a substantial proportion of its variance. Additionally, design thinking adoption significantly enhances customer satisfaction by improving customer experience, trust, and perceived value. The study establishes that organisations adopting design thinking principles are better positioned to develop effective promotional strategies and foster stronger customer relationships.

The research contributes to the existing literature by integrating design thinking with marketing outcomes in the electric vehicle sector and provides practical insights for organisations seeking to enhance promotional performance through customer-centric innovation.

Keywords: Design Thinking, Electric Two-Wheeler, Promotional Effectiveness, Customer Satisfaction, Empirical Study

1. Introduction

The global transition towards sustainable transportation has accelerated the growth of electric vehicles, particularly in the two-wheeler segment in emerging economies such as India. Electric two-wheelers are increasingly being recognized as a viable solution to environmental challenges, fuel dependency, and urban mobility constraints. Despite the growing market potential, companies face significant challenges in influencing consumer perceptions, building trust, and effectively communicating value propositions.

Traditional promotional strategies in the electric vehicle sector have largely been product-oriented, emphasizing technical specifications such as battery capacity, mileage, and pricing. However, such approaches often fail to address consumer concerns related to usability, reliability, and long-term value. In this context, design thinking has emerged as a strategic approach that enables organisations to develop customer-centric solutions by focusing on empathy, ideation, and iterative learning.

Design thinking emphasizes understanding user needs, redefining problems, and creating innovative solutions through continuous feedback and experimentation. Its application in marketing allows firms to design promotional strategies that are more engaging, personalised, and effective. In the electric two-wheeler sector, where consumer adoption is influenced by perception and experience, the integration of design thinking into promotional strategies can significantly enhance effectiveness.

However, the extent to which electric two-wheeler companies adopt design thinking systems and the impact of such adoption on marketing outcomes remain underexplored. This study seeks to fill this gap by empirically examining the adoption of design thinking systems and analysing their influence on promotional effectiveness and customer satisfaction.

2. Review of Literature

Design thinking has emerged as a significant paradigm in innovation and strategic management, particularly in contexts requiring user-centric solutions. According to Tim Brown (2008), design thinking is a discipline that integrates human needs, technological feasibility, and business viability to develop innovative solutions. This perspective highlights the importance of empathy and iterative problem-solving in addressing complex consumer challenges. Similarly, Jeanne Liedtka (2018) emphasises that design thinking enables organisations to reduce uncertainty by fostering experimentation and continuous learning, thereby improving decision-making processes.

The application of design thinking in marketing has gained increasing attention in recent years. Philip Kotler and Keller (2016) argue that contemporary marketing strategies must shift from product-oriented approaches to customer-centric frameworks that focus on delivering value and experience. In this regard, design thinking facilitates the development of promotional strategies that are aligned with consumer expectations and behavioural patterns. Research indicates that organisations adopting design thinking are better able to design engaging and meaningful marketing communications, which enhance overall promotional effectiveness.

Promotional effectiveness is widely recognised as a critical determinant of marketing success. It encompasses the ability of promotional activities to influence consumer awareness, attitudes, and behavioural intentions. Studies suggest that promotional strategies grounded in consumer insights are more likely to achieve higher levels of engagement and persuasion. According to Keller (1993), effective marketing communication plays a crucial role in building strong brand associations and influencing consumer decision-making processes. In the context of electric two-wheelers, where consumer awareness and trust are still evolving, promotional effectiveness becomes particularly important.

Customer satisfaction is another key construct that has been extensively studied in marketing literature. Richard Oliver (1980) introduced the Expectation-Confirmation Theory, which posits that satisfaction is determined by the extent to which perceived performance meets or exceeds consumer expectations. In the electric vehicle sector, satisfaction is influenced not only by product performance but also by the effectiveness of promotional communication in addressing consumer concerns and expectations.

Empirical studies in the electric vehicle domain indicate that consumer adoption is influenced by factors such as awareness, perceived value, and trust. However, much of the existing literature focuses on technological and economic aspects, with limited emphasis on marketing innovation. Research by Kumar and Alok (2020) highlights that consumer perception of electric vehicles is significantly influenced by promotional communication and awareness campaigns. Similarly, Rezvani et al. (2015) argue that effective communication strategies play a crucial role in reducing consumer resistance towards new technologies.

Despite the growing importance of design thinking, its adoption in the electric vehicle sector remains limited. Many organisations continue to rely on traditional promotional strategies that emphasize product features rather than customer experience. Existing studies have not sufficiently explored the integration of design thinking with promotional effectiveness and customer satisfaction in a unified framework. This gap is particularly evident in emerging markets such as India, where consumer behaviour is rapidly evolving.

Therefore, the present study contributes to the literature by empirically examining the adoption of design thinking systems in electric two-wheeler companies and analysing their impact on promotional effectiveness and customer satisfaction. By integrating these constructs, the study provides a comprehensive understanding of how design thinking can enhance marketing outcomes in the electric mobility sector.

3. Research Objectives

The study is guided by the following objectives:

1. To examine the adoption of Design Thinking systems in electric two-wheeler companies.
2. To analyse the impact of Design Thinking on promotional effectiveness.
3. To evaluate customer satisfaction associated with Design Thinking-based promotional strategies.

4. Research Hypotheses

$H_0$1: Design thinking adoption has no significant impact on promotional effectiveness.
$H_1$1: Design thinking adoption has a significant positive impact on promotional effectiveness.

$H_0$2: Design thinking adoption has no significant impact on customer satisfaction.
$H_1$2: Design thinking adoption has a significant positive impact on customer satisfaction.

5. Research Methodology

5.1 Research Design

The present study adopts a **descriptive and empirical research design**, aimed at systematically examining the adoption of design thinking systems and their impact on promotional effectiveness and customer satisfaction in the electric two-wheeler sector. The descriptive component facilitates the understanding of respondent characteristics and perception levels, while the empirical component

enables hypothesis testing through statistical analysis. The study follows a **quantitative research approach**, as it involves the collection and analysis of numerical data to establish relationships between variables.

5.2 Nature and Source of Data

The study is based primarily on **primary data**, collected directly from respondents through a structured questionnaire. The respondents include consumers and potential users of electric two-wheelers who are exposed to promotional campaigns of electric vehicle companies. Primary data is preferred as it provides first-hand insights into consumer perceptions regarding design thinking-based promotional strategies.

Secondary data were also consulted to support the theoretical framework, including academic journals, books, and industry reports related to design thinking, marketing strategies, and electric vehicles.

5.3 Sampling Design

5.3.1 Population

The target population of the study comprises consumers in urban areas, particularly in Bengaluru, who are aware of or have experience with electric two-wheelers.

5.3.2 Sampling Technique

A **non-probability convenience sampling technique** was adopted due to accessibility and feasibility considerations. This method is widely used in consumer perception studies where the objective is to gather relevant insights from accessible respondents.

5.3.3 Sample Size

A total of **230 respondents** were included in the study. The sample size is considered adequate for regression analysis and ensures sufficient statistical power to test the proposed hypotheses.

6. Data Analysis and Interpretation

6.1 Respondent Profile

The demographic profile indicates that 57% of respondents are male and 43% are female. The majority belong to the age group of 25–35 years, representing a technologically aware and economically active segment. Most respondents hold graduate and postgraduate qualifications, indicating a well-informed sample.

6.2 Descriptive Statistics

Construct	Mean	Std. Deviation
Design Thinking Adoption	4.01	0.65
Promotional Effectiveness	4.08	0.61
Customer Satisfaction	3.94	0.68

The results indicate that Design Thinking Adoption records a mean value of 4.01 with a standard deviation of 0.65. This suggests that respondents generally perceive a high level of adoption of design thinking practices within electric two-wheeler companies. The relatively moderate standard deviation indicates a reasonable level of consistency in responses, implying that most respondents share similar views regarding the presence of design thinking elements such as empathy, ideation, and iterative processes in promotional activities.

With respect to Promotional Effectiveness, the mean score is 4.08, which is the highest among the constructs, accompanied by a standard deviation of 0.61. This finding reflects that respondents perceive promotional strategies adopted by companies as effective in terms of engagement, awareness creation, and persuasive communication. The lower standard deviation further indicates that there is strong agreement among respondents regarding the effectiveness of these promotional efforts.

Customer Satisfaction records a mean value of 3.94 with a standard deviation of 0.68. Although slightly lower than the other constructs, the mean score still indicates a favourable level of satisfaction among consumers. The relatively higher standard deviation compared to promotional effectiveness suggests a marginally wider variation in consumer responses, indicating that satisfaction levels may differ based on individual experiences and expectations.

6.3 Reliability Analysis

Construct	Cronbach's Alpha
Design Thinking	0.902
Promotional Effectiveness	0.874
Customer Satisfaction	0.889

The results indicate that the Design Thinking Adoption construct achieved a Cronbach's Alpha value of 0.902, which exceeds the recommended threshold of 0.70. This high value reflects excellent internal consistency, suggesting that the items used to measure design thinking—such as empathy, ideation, prototyping, and iterative practices—are highly reliable and consistently capture the underlying construct.

Similarly, Promotional Effectiveness recorded a Cronbach's Alpha value of 0.874, indicating strong reliability. This suggests that the items related to engagement, awareness creation, and persuasiveness are well-aligned and provide a consistent measure of promotional performance as perceived by respondents.

The Customer Satisfaction construct yielded a Cronbach's Alpha value of 0.889, which also falls within the range of high reliability. This indicates that the scale items measuring satisfaction in terms of experience, perceived value, and trust are internally consistent and effectively capture the respondents' level of satisfaction.

Overall, all three constructs demonstrate Cronbach's Alpha values significantly above the acceptable limit of 0.70, confirming the robustness and reliability of the measurement instrument.

6.4 Correlation Analysis

Variables	Design Thinking Adoption	Promotional Effectiveness	Customer Satisfaction
Design Thinking Adoption	1	0.74**	0.69**
Promotional Effectiveness	0.74**	1	0.66**
Customer Satisfaction	0.69**	0.66**	1
****. Correlation is significant at the 0.01 level (2-tailed).**			

The analysis reveals that Design Thinking Adoption is positively and significantly correlated with Promotional Effectiveness ($r = 0.74$, $p < 0.01$). This indicates a strong relationship, suggesting that higher levels of design thinking practices within electric two-wheeler companies are associated with more effective promotional strategies. The finding highlights the importance of user-centric approaches

such as empathy, ideation, and iterative testing in enhancing the effectiveness of marketing communication.

Similarly, Design Thinking Adoption shows a strong and statistically significant positive correlation with Customer Satisfaction ($r = 0.69$, $p < 0.01$). This suggests that organisations that incorporate design thinking principles into their promotional strategies are more likely to meet or exceed customer expectations, thereby improving overall satisfaction levels.

The relationship between Promotional Effectiveness and Customer Satisfaction is also positive and significant ($r = 0.66$, $p < 0.01$). This indicates that effective promotional strategies contribute to higher levels of customer satisfaction by improving awareness, clarity of communication, and perceived value.

Overall, all correlation coefficients are positive and statistically significant at the 1% level, confirming meaningful associations among the constructs.

6.5 Regression Analysis

Table 6.5.1 Regression Analysis: Impact of Design Thinking on Promotional Effectiveness

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**F**	**Sig.**
1	0.742	0.551	0.549	0.514	154.32	0.001
a. Predictors: (Constant), Design Thinking Adoption **Dependent Variable:** Promotional Effectiveness						

The model summary presented in Table 6.5.1 indicates the overall fitness of the regression model examining the impact of Design Thinking Adoption on Promotional Effectiveness. The correlation coefficient ($R = 0.742$) reflects a strong positive relationship between the independent and dependent variables. The coefficient of determination ($R^2 = 0.551$) suggests that approximately 55.1% of the variation in Promotional Effectiveness is explained by Design Thinking Adoption. The adjusted R^2 value of 0.549 further confirms the robustness of the model after adjusting for sample size and predictors.

The F-statistic ($F = 154.32$, $p < 0.001$) indicates that the model is statistically significant, implying that Design Thinking Adoption is a meaningful predictor of Promotional Effectiveness. The relatively low standard error of estimate (0.514) signifies that the observed values closely fit the regression line. Overall, the model demonstrates a strong explanatory power and statistical validity.

Table 6.5.2 Regression Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.98	0.18	—	11	0.000
	Design Thinking Adoption	0.74	0.06	0.742	12.42	0.0005
a. Dependent Variable: Promotional Effectiveness						

The coefficient results in Table 6.5.2 provide insights into the individual contribution of Design Thinking Adoption. The unstandardized coefficient (B = 0.74) indicates that a one-unit increase in Design Thinking Adoption leads to a 0.74 unit increase in Promotional Effectiveness, holding other factors constant. The standardized coefficient (β = 0.742) further confirms a strong positive influence.

The t-value (t = 12.42) and corresponding significance level ($p < 0.001$) indicate that the relationship is statistically significant. The constant term (B = 1.98, $p < 0.001$) represents the baseline level of Promotional Effectiveness when Design Thinking Adoption is zero.

Based on these results, the null hypothesis ($H_0 1$) is rejected, and the alternate hypothesis ($H_1 1$) is accepted. This confirms that Design Thinking Adoption has a significant positive impact on Promotional Effectiveness.

Table 6.5.3 Regression Analysis: Impact of Design Thinking on Customer Satisfaction

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	**F**	**Sig.**
1	0.693	0.48	0.478	0.537	121.67	0.001
a. Predictors: (Constant), Design Thinking Adoption						
Dependent Variable: Customer Satisfaction						

The model summary presented in Table 6.5.3 evaluates the effect of Design Thinking Adoption on Customer Satisfaction. The correlation coefficient (R = 0.693) indicates a strong positive relationship between the variables. The coefficient of determination ($R^2 = 0.480$) suggests that 48% of the variation in Customer Satisfaction is explained by Design Thinking Adoption.

The adjusted R^2 value (0.478) confirms the consistency of the model. The F-statistic (F = 121.67, $p < 0.001$) indicates that the model is statistically significant. The standard error of estimate (0.537) reflects an acceptable level of prediction accuracy.

These results demonstrate that Design Thinking Adoption is a significant predictor of Customer Satisfaction and that the model is statistically reliable.

Table 6.5.4 Regression Coefficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.15	0.17	—	12.65	0.000
	Design Thinking Adoption	0.69	0.06	0.693	11.03	0.0003
a. Dependent Variable: Customer Satisfaction						

The coefficient results in Table 6.5.4 reveal that Design Thinking Adoption has a positive influence on Customer Satisfaction. The unstandardized coefficient (B = 0.69) indicates that a one-unit increase in Design Thinking Adoption leads to a 0.69 unit increase in Customer Satisfaction. The standardized coefficient (β = 0.693) further supports the strength of this relationship.

The t-value (t = 11.03) and significance level (p < 0.001) confirm that the relationship is statistically significant. The constant term (B = 2.15, p < 0.001) represents the baseline level of Customer Satisfaction.

Based on these findings, the null hypothesis (H02) is rejected, and the alternate hypothesis (H12) is accepted. This indicates that Design Thinking Adoption has a significant positive impact on Customer Satisfaction.

7. Findings

- Design Thinking Adoption records a high mean value (4.01), indicating that electric two-wheeler companies have substantially integrated design thinking practices into their organisational and marketing processes. This reflects a strong orientation towards structured innovation.
- Companies are increasingly adopting key components of design thinking such as empathy, ideation, prototyping, and iterative refinement, which enable them to better understand consumer needs and design more relevant promotional strategies.
- The construct demonstrates high internal consistency (Cronbach's Alpha = 0.902), confirming that the measurement items reliably capture the concept of design thinking adoption without significant variation or measurement error.
- The adoption of design thinking signifies a clear transition from traditional product-centric approaches to customer-centric and experience-driven marketing practices, which are essential in the evolving electric mobility market.
- The regression results reveal that Design Thinking Adoption has a strong and statistically significant positive impact on Promotional Effectiveness (β = 0.742, p < 0.001), indicating that organisations leveraging design thinking are able to enhance the performance of their promotional activities.
- The model explains 55.1% of the variation in Promotional Effectiveness (R^2 = 0.551), suggesting that design thinking is a major determinant influencing the success of promotional strategies in the electric two-wheeler sector.
- The strong positive correlation (r = 0.74) further reinforces the existence of a robust relationship between design thinking adoption and promotional effectiveness, indicating consistency across analytical techniques.
- Design thinking contributes to improving consumer engagement, awareness creation, and persuasiveness of promotional communication, thereby making marketing campaigns more impactful and aligned with consumer expectations.
- Design Thinking Adoption has a significant positive influence on Customer Satisfaction (β = 0.693, p < 0.001), indicating that organisations implementing design thinking principles are more effective in meeting and exceeding customer expectations.
- The regression model explains 48% of the variation in Customer Satisfaction (R^2 = 0.480), suggesting that design thinking is a substantial predictor of satisfaction, though other factors may also contribute to customer perceptions.
- The strong positive correlation (r = 0.69) further supports the existence of a meaningful and consistent relationship between design thinking adoption and customer satisfaction across the dataset.
- The adoption of design thinking enhances customer experience by aligning promotional strategies with user needs, thereby improving clarity, relevance, and emotional connection in communication.
- It also contributes to building consumer trust and perceived value, as customers are more likely to respond positively to personalised and need-based promotional approaches.
- Overall, design thinking-driven promotional strategies result in higher levels of satisfaction by delivering meaningful, engaging, and customer-centric experiences.

8. Conclusion

The present study provides a comprehensive empirical examination of the adoption of design thinking systems in electric two-wheeler companies and their impact on promotional effectiveness and customer satisfaction. The findings indicate that design thinking has emerged as a significant strategic approach in the electric mobility sector, enabling organisations to transition from traditional product-oriented marketing to more customer-centric and experience-driven promotional strategies.

The study establishes that design thinking adoption is relatively high among companies, reflecting an increasing emphasis on empathy, ideation, prototyping, and iterative refinement in marketing practices. This shift towards structured innovation highlights the growing recognition of the importance of understanding consumer needs and delivering meaningful value.

The empirical results demonstrate that design thinking adoption has a strong and significant positive influence on promotional effectiveness. Organisations that integrate design thinking principles are able to develop more engaging, persuasive, and impactful promotional campaigns. The high explanatory

power of the regression model confirms that design thinking is a key determinant of effective marketing communication in the electric two-wheeler sector.

Furthermore, the study reveals that design thinking significantly enhances customer satisfaction. By aligning promotional strategies with consumer expectations and experiences, organisations are able to improve customer perception, build trust, and increase perceived value. The positive relationship between design thinking and customer satisfaction underscores the importance of adopting human-centred approaches in marketing.

Overall, the study concludes that design thinking is not merely an innovation tool but a strategic framework that can transform promotional practices and strengthen customer relationships. The integration of design thinking into marketing processes enables organisations to achieve higher levels of effectiveness and satisfaction, thereby contributing to sustainable competitive advantage in the rapidly evolving electric vehicle market.

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