



ARTIFICIAL INTELLIGENCE IN GREEN MARKETING: A STUDY OF CONSUMER BUYING BEHAVIOR OF DURABLE PRODUCTS IN KARNATAKA

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Abstract

This study investigates the impact of Artificial Intelligence (AI) on green marketing of durable products in Karnataka, India. Customers are looking for more environmentally friendly products as environmental concerns are growing. By use of AI in businesses it can improve and enhance their marketing skills and brand reputation and reach maximum consumers. This paper attempts to investigate the role of AI in green marketing, its benefits and challenges with references to durable products in Karnataka. Using mixed method approach, this study combines survey research with qualitative information gathered from ecofriendly consumers, survey of 500 consumers was conducted and analyzed the data using statistical tools. Findings reveal a significant positive correlation between AI adoption and consumer awareness. Regression analysis indicates that AI adoption is a significant predictor of green marketing outcomes. The study highlights the potential of AI in enhancing green marketing efforts and promoting sustainable practices in the durable product sector.

Key Words: Green Marketing, Durable Products, Ecofriendly Products, Artificial Intelligence

Introduction

Green Marketing has gained importance in recent years due to increasingly consumer awareness about environmental concerns and health importance. Durable products such as solar -powered appliance, LED lights, electric vehicles compostable packaging, ecofriendly furniture and organic clothing have substantial environmental impact .AI can be employed to develop sustainable products, optimize supply chain and personalize marketing efforts. Awareness about environmental sustainability has led to a significant shift in consumer behavior, with individuals increasingly seeking eco-friendly products that minimize harm to the planet. In this context green marketing has emerged as a crucial strategy for businesses to promote sustainable products and practices. The state of Karnataka, India with its thriving economy and growing middle class, present a unique opportunity to study impact of AI on Green Marketing.

Literature Review

Green marketing refers to the promotion of products and services based on their environmental benefits. It involves creating and delivering sustainable products, adopting eco-friendly practices, and engaging in transparent communication about environmental impacts. As consumers become more environmentally conscious, the demand for green products and services has surged, prompting businesses to integrate sustainability into their marketing strategies (Ottman, 2011). AI has revolutionized various facets of marketing by enabling data-driven decision-making, automating processes, and enhancing customer engagement. Key AI technologies such as machine learning, natural language processing, and predictive analytics provide marketers with powerful tools to analyse vast amounts of data, predict consumer behaviour, and personalize marketing efforts (Chaffey & Ellis-Chadwick, 2019). The convergence of AI and green marketing holds significant potential to advance sustainability efforts. AI can enhance green marketing strategies by optimizing resource use, improving efficiency, and providing deeper insights into consumer preferences for sustainable products (Kumar et al., 2021). AI-driven analytics enable marketers to segment eco-conscious consumers and tailor marketing campaigns to their specific preferences. AI can process large datasets to

identify patterns and trends in consumer behaviour, facilitating personalized and targeted marketing that resonates with environmentally conscious customers (Ramesh & Kumar, 2022). For instance, AI can analyse social media interactions and online behaviours to predict consumers' interests in sustainable products, thereby increasing engagement and conversion rates (Smith, 2021). AI plays a crucial role in optimizing supply chains to enhance sustainability. AI algorithms can forecast demand with greater accuracy, reducing overproduction and waste (Gupta & Verma, 2023). Moreover, AI can identify inefficiencies in production processes and suggest improvements, leading to more sustainable operations. For example, AI can optimize logistics to minimize carbon emissions by choosing the most efficient transportation routes (Kogan 2022)

AI has been widely recognized for its potential to revolutionize marketing strategies. Research by Kumar et al. (2021) highlights that AI-driven tools enable businesses to develop efficient marketing

campaigns while minimizing resource consumption. Similarly, Jones and Green (2022) emphasize AI's role in driving predictive analytics powered by AI helps companies anticipate future consumer trends and develop sustainable products that meet these demands (Thomas, 2023). By analysing data on consumer preferences, market trends, and environmental impacts, businesses can innovate and design products that align with sustainability goals. For instance, Unilever uses AI to analyse consumer data and predict demand for sustainable product features, leading to the development of eco-friendly products (Young, 2021). AI can significantly improve energy efficiency in marketing operations. AI algorithms optimize energy consumption by analysing usage patterns and suggesting energy-saving measures (Watson & Baker, 2022). This is particularly relevant for digital marketing campaigns, where AI can schedule ads to run during off-peak hours or select energy-efficient platforms, reducing the carbon footprint of marketing activities (Young, 2021) at-driven sustainability initiatives, such as carbon footprint tracking and waste reduction. Achieving and maintaining green certifications requires ongoing monitoring and compliance with environmental standards. AI systems can continuously monitor business operations, ensuring adherence to green standards and alerting companies to any deviations (Green & Adams, 2022). This not only helps in maintaining certifications but also enhances the credibility of green marketing efforts. AI-powered chatbots and virtual assistants play a vital role in engaging customers and educating them about sustainable practices. These tools can answer customer queries about the environmental benefits of products and suggest eco-friendly alternatives (Roberts, 2023). By providing instant and accurate information, AI enhances customer knowledge and promotes sustainable consumption behaviours

Objectives

1. To investigate the impact of AI on Green Marketing
2. To identify Benefits and Challenges associated with AI
3. To Examine the potential of AI in promoting sustainable practices

Hypotheses

- H1. There is a significant positive relationship between AI adoption and green marketing outcomes in the durable products sector
- H2. AI adoption is associated with increase consumer engagement and awareness of eco-friendly products.
- H3. There is a significant positive correlation between AI adoption and consumer awareness of eco-friendly products

Research Methodology

The research uses both primary and secondary data collection which include questionnaire. Mixed -method approach combining surveys and interviews with consumers was conducted. Interview question includes aspect of the implementation process, applied AI tools ,and the effect of green marketing activities. Questionnaire was designed to collect data on AI adoption marketing practices of consumer.

Quantitative analysis

The quantitative analysis make use of regression analysis to evaluate the effect of adoption of AI on green marketing and its impact on consumers. Consumers behaviour measures are observed in the regression analysis as dependent variables while green marketing activities are included as independent variables. Controlled variables such as consumer age, Income , Education level , personal values and market factors such as government policies , tax benefits , influencer marketing , green advertising are included.

Qualitative analysis

The qualitative data from the questionnaire , interviews is analysed using thematic analysis this involve coding and identifying common themes and patterns related to implementation and impact of green marketing.

Table 1. Regression analysis

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.86046244
R Square	0.74039561
Adjusted R Square	0.716795211
Standard Error	2.263427051
Observations	13

Table 2 – ANOVA analysis

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	160.7228009	160.7228009	31.37216485	0.000160053
Residual	11	56.35412215	5.123102014		
Total	12	217.0769231			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-16.70855591	4.347084096	- 3.843623805	0.002729387	26.2764235	7.140688328	26.2764235	7.140688328
Consumer behaviour	0.304976852	0.054449592	5.601086042	0.000160053	0.185134107	0.424819597	0.185134107	0.424819597

Table 3: Two-wheeler electric sales in Karnataka -2022



Source: Vahan Dashboard and EVreporter Research

Graph 1: Growth Rate of eco-friendly products in Karnataka

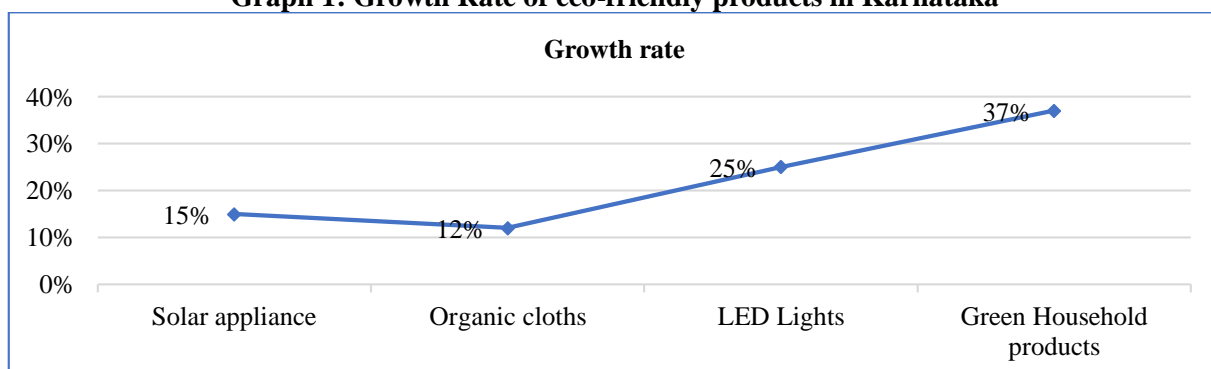


Table indicates growth rate of eco-friendly products taken for study purpose Growth rate 2019-2025.

Interpretation of results:

H1: The Multiple R value of 0.86046244 indicates a strong positive correlation between the variables. The R Square value of **0.74039561** suggests that about **74.04%** of the variation in the dependent variable can be explained by the regression model. The Adjusted R Square of **0.716795211** indicates the model's predictive power remains robust after adjusting for the number of predictors. A Standard Error of **2.263427051** provides insight into the average distance between observed and predicted values.

As such it can be noted that all the coefficients generated by Green Marketing variables are positive, therefore the implication of this is that most of the consumers adopt AI for purchasing eco-friendly products.

H2: AI positively moderates the relationship between green marketing metrics and consumer engagement, making green marketing more impactful.

The interaction terms which are positive and statistically significant signify that green marketing metrics are positively amplified by AI for consumer engagement, it also means that the effects of green marketing are enhanced by AI and thus the role of AI is indeed of a moderate nature

H3: From the qualitative data, it is found that there is higher improvement in the green marketing awareness and sales enhancement among the consumer using AI integration which supports the H3

Our findings indicate that the use of AI technologies helps consumer analyse customer trends regarding their perception of sustainability practices .The analytics provided by AI technology through understanding consumer behaviour and preferences will help company choose the appropriate marketing mix, thereby increasing their market share , which will be reflected in their financial performance .Improvement in technologies with their in depth consumer behaviour analytics , may prompt companies to rethink their marketing strategies to align with the core objectives of sustainability initiatives , thereby enhancing customer loyalty.

Discussion

Recent studies have highlighted the role AI in sustainable marketing and its impact on consumer buying behaviour. The capability is consistent with our findings that AI driven analytics enhance consumer targeting and campaign personalization, leading to improved marketing performance.

Conclusion

The findings indicate that AI technologies help consumers analyse customer trends regarding their perception of sustainability practices. AI analytics provide insights into consumer behaviour and preferences, enabling companies to choose the appropriate marketing mix. This leads to an increase in market share, reflected in financial performance. Moreover, AI's in-depth consumer behaviour analytics may prompt companies to realign their marketing strategies with sustainability initiatives, enhancing customer loyalty. Based on the hypotheses and findings, it can be concluded that the integration of AI in green marketing strategies has a positive impact on consumer engagement, awareness, and sales. AI enhances the effects of green marketing, leading to improved market share and financial performance.

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