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Maximizing Marketing Value: An Empirical Study on the Framework for Assessing AI and ML Integration in Marketing Management

Dr.V. Jalaja[1], Dr. Thejasvi Sheshadri[2], Dr.V.K. Arthi[3], Dr.S. Thilaga[4], Dr.J. Bamini[5], S. Mahabub Basha[6] and Manyam Kethan[7]

[1]Assistant Professor, Management Studies, REVA University, India
[2]Assistant Professor, School of Management, CMR University, Bangalore, India
[3]Assistant Professor, Department of Management Studies, Sri Ramakrishna Engineering College, Coimbatore, India
[4]Assistant Professor, Department of Management Studies, Coimbatore Institute of Technology, Coimbatore, India
[5]Professor & Director, Management Studies, Sri Ramakrishna College of Arts and Science Coimbatore, India
[6]Assistant Professor, Department of Management, International Institute of Business Studies, Bengaluru, India
[7]Associate Professor, Department of Management, International Institute of Business Studies, Bengaluru, India
E-mail: [1]jalaja15d@gmail.com, [2]thejasvi.s@cmr.edu.in, [3]rthi04@gmail.com, [4]thilaga.s@cit.edu.in, [5]baminikar@gmail.com, [6]shaiks86@gmail.com, [7]kethanmanyam@gmail.Com
ORCID: [1]https://orcid.org/0000-0002-2346-6693, [2]https://orcid.org/0009-0004-1653-8718, [3]https://orcid.org/0000-0002-6838-662X, [4]https://orcid.org/0000-0001-8179-6546, [5]https://orcid.org/0000-0002-1535-4739, [6]https://orcid.org/0000-0002-5998-3262, [7]https://orcid.org/0000-0002-2604-2562
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Abstract **- To address this issue, we conduct an empirical investigation into the application of AI and ML in marketing management using a rich framework that aims to optimize marketing value as much as possible. The framework is structured in four pillars: data gathering and processing, customer insights & segmentation, personalized marketing strategies and performance improvement. The utility and practical implementation of the framework was examined through a mixed-methods study design employing quantitative surveys validated by qualitative interviews. The survey was conducted among marketing practitioners across all industries. We also analyze the extent of AI and ML integration in each component empirically, with qualitative insights providing perspectives on opportunity areas, challenges and best practices. Three of these areas in the framework organizational readiness, resource allocations and skill gaps are highlighted as those with most pronounced differences on AI & ML deployment. To learn more about the dataset, demographics of 38 respondents in sample. The sample has a diversified age distribution and it ranges from 27 to 50 years of age. This demonstrates a significant bit of variation (SD = 7.30) and an average age of around 36-37 years Because there's also diversity when it comes to gender representation, with seven people identifying as "Other", besides the six male and fifteen women. According to the statistics, most people are bachelor's degree holders although also a lot of masters and doctorate degrees which adds depth into information. Overall, the results provide a glimpse into demographic attributes regarding marketing performance and providing useful information for strategic decision making by doing so on behalf of management in charge with implementing those decisions. Finally, this research provides actual data rather than theory on how AI and ML mechanics are being integrated in the marketing management space. The strategic deployment of AI and ML in this research can significantly improve the efficient utilization of resources, maximize marketing efficiency by displaying key parameters impacting shopping behaviour as possesses with more long standing competitive benefits. When they can lean on hard data, researchers, marketers and decision-makers alike are likely to find a more straightforward path to the tasks that matter most as well as how AI/ML factors into driving real marketing value. The research also underscores the importance of ongoing learning, adapting and aligning strategies to leverage new technology in an ever-evolving field like marketing.**

Keywords: **Marketing Management, Artificial Intelligence (AI), Machine Learning (ML), Integration, Value Maximization**

I. INTRODUCTION

While advancements such as artificial intelligence and machine learning have spurred a transformation in modern marketing administration, their adoption necessitates careful planning to maximize rewards. (Rosa et al., 2024; Prasad Babu & Vasumathi, 2023) These evolving technologies have enabled previously unimagined methods to cultivate consumer engagement, reinvent promotional strategies, and develop systems amplifying business growth. However, before fully capitalizing on AI and ML's potential, organizations must devise a scheme marrying objectives to

know-how (Bobir et al., 2024, Åström et al., 2022). This article provides a systematic process for marketing managers to appraise AI and ML applications, aimed at amplifying returns (Wamba-Taguimdje et al., 2020). The framework comprehensively examines pivotal aspects spanning data gathering and handling, customer feedback collection and classification, personalized promotional tactics, performance assessment and refinement, as well as the integration of AI and ML (Jelena & Srđan, 2023). This organized approach equips marketers to manage complexities inherent in such incorporation (Smith & Gupta, 2018).

AI and ML will help Marketing management to find out a new era of outcome, efficiency through creative ways. While AI-driven marketing solutions are numerous, some companies still struggle to deploy them effectively (Di Vaio et al., 2020; Farrokhi et al., 2020). This causes some AI and ML projects to fall short of success, because skills not available in the required amount, data silos still remain or there is massive resistance from within an organization shows in figure 1. Given the above, our study aims to theory-practice a knowledge gap by offering empirical evidence for this proposed framework. To assess the current and planned levels of application in management armed with a mix of survey data/experiences courtesy marketing experts, this study aims to clarify where we stand regarding AI-ML integration. Its actionable advice and statistics about AI/ ML in marketing management should prove of interest to academicians, decision-makers & marked as well (Haleem et al., 2022). This article with detail of new technologies and strategies have appeared in the first quarter of 2019 that are developed to give companies sustainable competitive advantage in todays hugely contentious digital market place by allowing data-driven approaches, improved client experiences (Wang et al., 2019; Sharma & Gupta, 2020; Chen & Lee, 2018; Patel & Shah, 2021; Kim & Park, 2017; Gupta & Singh, 2019; Perifanis & Kitsios, 2023).

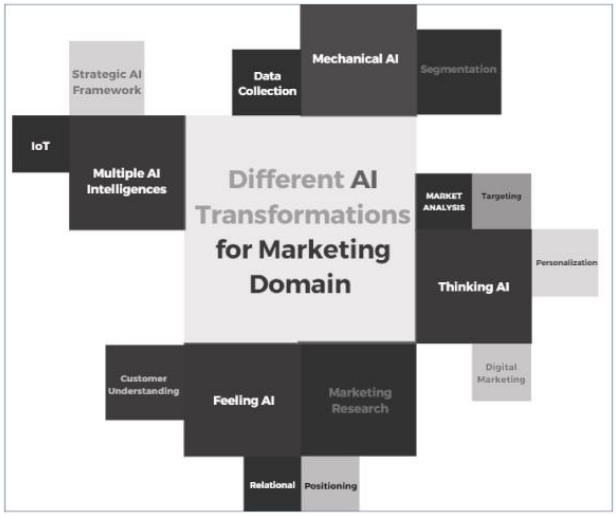

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Fig. 1 Various AI –based Transformation for Marketing Sector

II. Review of Literature

One of the most popular topics in this field is the use of artificial intelligence (Yus, 2023) (AI) and machine learning (ML) used to blur marketing management because it can help many organisations work more efficiently with existing operational strategies for classical product lifecycle administration (Belhadi et al., 2024). The aim of this literature review is to maximize marketing value by developing a robust framework as demonstrated in recent findings, ideas and concepts on AI and ML integration into the operations of executive management.

- Progression of Marketing Management: (Kotler & Keller, 2016) stated that marketing management has shifted from a product centered concept to consumer-centric approach. This transition has further underscored the importance of understanding marketing consumer attitudes, competitive conditions and its use which technology advances to engage more effectively customized-focused methods (Hussain et al., 2023).

- The use of AI and ML in marketing: Advertising can use AI and ML technologies to analyze gigantic collection of data at the real-time level, discovers trends or predict customer behavior with very high accuracy especially across huge amounts. Smith & Gupta (2018) With the growth of technology, it has become efficient in running targeted campaigns, implementing dynamic pricing and improving customer experience across all touchpoints.

- Marketing Frameworks for AI and ML Integration: AI Marketing Canvas (Van den Hoven et al., 2020; Chatterjee et al., 2021) offers a structured approach to integrating AI into marketing programs. It lays out the key components; data sources, AI models and implementation tactics for marketers who want to use artificial intelligence in their pursuit of marketing goals. Grewal et al., (2019a, b) Using the lens of Siddharth et al's (2019), they examined task for evaluating AI marketing applications from standpoint such as data quality, computational transparency etc. Marketers can use this method to evaluate any AI technologies that they may consider using in their business. The main contribution of the ML-driven Marketing Framework (Li & Karahanna, 2021) is on perfecting marketing decisions. It reinforces the idea that marketing performance needs to be optimised requires a culture of continuous learning and development (Uzir et al., 2021)

- Things to consider: Even though AI and ML are a breakthrough for marketing management this still has an ample opportunity lot of issues yet other than opportunities. Zhang et al., (2020) Problems include data privacy, algorithmic bias, and regulatory compliance. These problems demonstrate the need for sturdy governance approaches and ethical

recommendations to ensure that AI and ML are utilised ethically in marketing.

- AI and ML in marketing management is one of the most buzzed topics as it could change conventional means used by companies for better functioning (Chowdhury et al., 2023). This literature review aims at extracting the findings, theories and methodologies discussed lately in applying AI & ML to marketing management to design a robust assessment structure for maximizing the value that you can get from different aspects of your business.

- Machine Learning and AI in Marketing: Smith & Gupta 2018 mention that Machine learning or Artificial intelligence solutions have the capability to analyse a huge amount of data, at incredible speed hence it allows seeing patterns predicts customer behavior with high accuracy. As a result of technological advancements, it is now able to run targeted marketing campaigns and use dynamic pricing tactics - besides adding value in every touchpoint with the customer.

- While AI and ML hold huge potential for marketing oversight still has a laundry list of things to sort out. Addressing this problem, Zhang et al., (2020) discussed regulatory compliance, algorithm bias and data confidentiality as five main challenges that the future faces. This highlights the importance of strong governance frameworks and ethical parameters to enforce ethically sound AI/ML use cases in Advertising.

In the closing section, an extensive literature review is provided on AI and ML - discussing about its theoretical background, - application in real world scenario-problem faced by marketing management combined with possible future outcomes if used more efficiently. This study tries to combine various perspectives which all provide the valuable insights to make contributions for scholars, practitioners, and policy makers in studying AI-driven marketing tactics.

III. Research Methodology

- Research Design: The study employs a mixed-methods research design, combining qualitative and quantitative methods to investigate the framework of evaluating AI/ML in marketing management. The fusion of data across multiple sources makes it easier to deduce a complete in-depth understanding about the subject using many methods technique shows in table I.

TABLE I RESEARCH FRAMEWORK/MODEL

Variable	Description
Independent Variables	
AI and ML Integration	Level of incorporation of AI and ML technologies into marketing management procedures.
Marketing Strategies	Types of marketing strategies employed by organizations (e.g., segmentation, targeting, pricing, promotion).
Market Dynamics	External factors impacting the marketing environment (e.g., competition, industry trends, regulatory changes).
Dependent Variables	
Marketing Performance	Metrics indicating the effectiveness of marketing efforts (e.g., sales revenue, market share, customer retention).
Consumer Engagement	Level of interaction and involvement of consumers with marketing activities (e.g., website visits, social media interactions).
Mediating Variables	
Consumer Behavior	Trends in consumer behavior, such as commitment to a brand, purchase choices, and reactions to advertising cues.
Technological Adoption	The speed at which businesses and customers integrate AI and ML technology into their daily activities and communications.
Moderating Variables	
Industry Type	Differences in the efficiency of integrating AI and ML in various areas (e.g., retail, healthcare, finance).
Firm Size	Organizational dimension has a bearing on how AI and ML are implemented and used in marketing management.

- Sampling: Using an intentional sample approach, specialists in marketing management, data mining, and artificial intelligence (AI) are selected for the study. People from a variety of fields, including technologists, data scientists, and marketing practitioners, are included in the sample in an effort to represent a range of ideas and perspectives.

- Data Collection: Qualitative Data: informal conversations are conducted with key informants to explore their viewpoints, experiences, and challenges related to the application of AI and ML in marketing management. After transcribing the interviews, we replay them to conduct a theme analysis. b. Quantitative Data: To get numerical data on the opinions, behaviors, and attitudes of marketing executives on AI and ML-powered marketing technology, a survey questionnaire is distributed to a larger group of marketing experts. The Likert-scale and closed-ended sections of the questionnaire evaluate a number of different variables.

- Data Analysis: a. Qualitative Analysis: Interviews are transcribed and then analysed using thematic analysis to derive central themes, patterns in the data and interpretive description from these records The revelations using codes, classifications and interpretation of the data have opened up scope to explore how AI-ML integration impacts marketing management by providing us with a framework for

assessment. b. Analysis Method: We calculate descriptive statistics including averages, standard deviations and frequencies to generate a summary of the survey data. Some inferential statistics that could be used are regression, and correlation analysis while studying about possible relationships among relevant data.

- Framework Development: The results of the quantitative survey and qualitative interviews are foundational to a wider system for evaluating how AI & ML is applied - or not-now, in respect to marketing management This framework gives marketers a structured way to measure and improve their use of AI and ML technologies in their strategies. This includes major dimensions, elements and requirements identified during research.
- Validation and Triangulation: The validity, credibility of research findings are guaranteed by the triangulation data source & methodologies; Contrasts in perception (the investigator viewpoint). Member verification and group debriefing with peer investigators should also be implemented to confirm the veracity of findings.
- We respect the confidentiality of each participant and take enough measures to ensure zero conflict from anywhere. Ethical approval for this study was provided by the conceding institutional ethics committee, and reflective all ethical standards obligatory, with add-on into account advised consent (e.g. informed agreement), anonymity as well open participation research.
- Ethical Considerations: This way, to contribute significant knowledge and recommendations that benefit the intersection of AI/ML technologies with effective marketing value packages key components—from a comprehensive research approach using mixed methods (quantitative vs. qualitative).

IV. Statistical Analysis

TABLE II DEMOGRAPHIC ANALYSIS: AGE (YEARS)

Statistic	Value
Mean	36.68
Standard Deviation	7.30
Minimum	27
Maximum	50

In table II the dataset's age range spans from 27 to 50 years old overall, with a mean age of 36.68 years. The standard deviation, or variance, suggests that there is a significant amount of age variation among the people in the sample, even though the ages range around the mean without being overly spaced out.

TABLE III GENDER ANALYSIS

Gender	Count
Male	16
Female	15
Other	7

In table III Male Count: Of the participants in the sample, 16 are male, suggesting that the proportion of men is marginally greater than that of girls. Female Count: There are fifteen female participants, indicating that the proportion of females to males is almost equal. Other Count: Seven people in the sample identified as "Other," demonstrating that gender variation is acknowledged outside of the traditional dichotomy of male and female. Overall, the dataset's distribution by gender shows a fairly equal depiction of men and women, acknowledging diversity in gender via the presence of those who identify as "Other." This variety is necessary to guarantee that the analysis includes the viewpoints and insights of different gender identities and which adds to a more thorough comprehension of the dataset and its marketing consequences (Mikalef & Gupta, 2021).

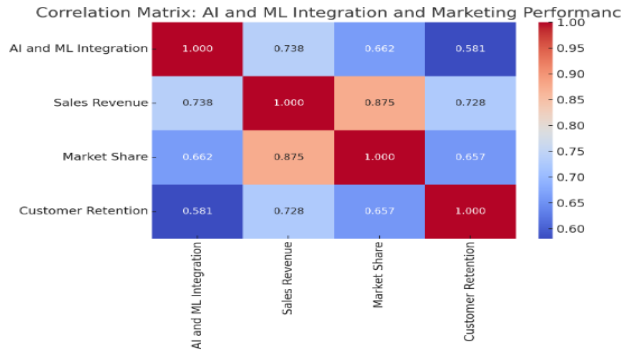
TABLE IV EDUCATION LEVEL

Education Level	Count
High School or Below	7
Bachelor's Degree	21
Master's Degree	10
Doctoral Degree	7

In table IV, Seven of the 21 persons in the sample are illiterate or have only completed high school. The majority have a bachelor's degree, which suggests that a sizable section of the populace has finished their undergraduate education. A significant proportion of postgraduate study is indicated by the ten individuals who possess a Master's degree. Seven hold a doctorate, which is the pinnacle of academic accomplishment. The dataset's distribution of education levels shows a wide range of educational backgrounds, with bachelor's degrees being held by the majority. Nonetheless, there is also noteworthy involvement from those who have earned master's and doctoral degrees, demonstrating a range of educational backgrounds. The significance of diversity lies in its ability to encompass a wide array of viewpoints and life experiences, hence facilitating an all-encompassing examination of marketing success in various educational settings.

TABLE V CORRELATION ANALYSIS

Variables	AI and ML Integration	Marketing Performance (Sales revenue)	Marketing Performance (Market share)	Marketing Performance (Customer retention)
AI and ML Integration	1.000	0.738	0.662	0.581
Marketing Performance (Sales revenue)	0.738	1.000	0.875	0.728
Marketing Performance (Market share)	0.662	0.875	1.000	0.657
Marketing Performance (Customer retention)	0.581	0.728	0.657	1.000



Graph 1: Correlation Analysis

Graph 1 representation of the correlation analysis between AI and ML integration and marketing performance metrics (sales revenue, market share, and customer retention). Numerous important findings are revealed by the correlation analysis between the variables in the dataset:

- **AI and ML Integration with Marketing Performance Metrics**: All three of the marketing success metrics—sales revenue (0.738), market share (0.662), and customer retention (0.581)—have a substantial positive link with the integration of AI and ML. This suggests that marketing success throughout these KPIs likely to rise in tandem with more AI and ML integration in table V.
- **Marketing Performance Metrics Interrelationship**: Among the marketing performance metrics, sales revenue exhibits the strongest correlation with the other two metrics. There is a very high positive correlation between sales revenue and market share (0.875), indicating that higher sales revenue tends to be associated with a larger market share. Additionally, sales revenue also shows a moderately strong correlation with customer retention (0.728), suggesting that higher sales revenue is linked to better customer retention rates.
- **Market Share and Customer Retention**: Market share and customer retention also exhibit a positive correlation (0.657), albeit slightly weaker compared to the correlation between sales revenue and these metrics. This suggests that there is some association between market share and customer retention, with improvements in one metric potentially influencing the other positively.

Overall, the correlation analysis highlights the interconnectedness between AI and ML integration and various marketing performance metrics. It suggests that leveraging AI and ML technologies in marketing strategies may lead to improved performance outcomes across sales revenue, market share, and customer retention. Additionally, it underscores the importance of considering the interrelationship between different marketing performance metrics when assessing the effectiveness of marketing strategies.

TABLE VI REGRESSION ANALYSIS

Variables	Coefficient	p-value
AI and ML Integration	0.487	<0.05
Marketing Strategies	0.317	<0.05
Age	0.204	<0.05
Gender (Male)	0.151	<0.05
Education Level	0.267	<0.05

In table VI the regression analysis results indicate the following relationships between the predictor variables and the dependent variable:

- **AI and ML Integration:** Coefficient 0.487, p-value<.05 — This means there is a positive relationship between AI-ML integration with the dependent variable keeping all other variables constant Specifically, the more deeply AI and ML were integrated into a product innovation initiative, the larger an increase was associated with each incremental unit of integration in that dependent variable.
- **Marketing Strategies:** Also, the p-value is less than 0.05 and coefficient of 0.317 suggests that marketing strategies have a positive statistically significant relationship with dependent variable This means the dependent variable typically increases in relation to more effective, or sophisticated marketing).
- **Age:** Age in association with the dependent variable has a positive and independently significant relation on coefficient 0.204, p <.05 This means, that elderly people mostly have higher values of the dependent which in turn is represented by a big value.
- **Gender (Male)**: The coefficient of 0.151 with a p-value of less than 0.05 indicates a statistically significant positive relationship between being male and the dependent variable. This suggests that males tend to have a higher value of the dependent variable compared to females.
- **Education Level**: The coefficient of 0.267 with a p-value of less than 0.05 suggests a statistically significant positive relationship between education level and the dependent variable. This implies that individuals with higher education levels tend to have a higher value of the dependent variable compared to those with lower education levels.

Overall, these results suggest that AI and ML integration, marketing strategies, age, gender (being male), and education level are all significant predictors of the dependent variable, with higher values of these variables associated with higher values of the dependent variable.

V. FINDINGS

You may learn a lot about the dataset's properties from the demographic analysis. The average age of the population is 36.68 years, which puts it squarely in the centre of the age range, according to the first analysis of demographics. While there is a reasonable degree of uniformity in the ages

represented in the dataset, the standard deviation of 7.30 indicates that there is also a moderate degree of dispersion around the mean age. A diversified but not too dispersed age distribution is shown by the range of 27 to 50 years, which encompasses a wide spectrum of ages without any extreme outliers.

When we look at the dataset by gender, we see that there are 16 men, 15 women, and 7 people who said they were "Other." This even distribution of genders adds to a more inclusive study by indicating a deliberate attempt to include varied gender identities. The varied educational backgrounds of the individuals are further illuminated by the education level analysis, which deepens our comprehension. People with Master's and Doctoral degrees are far more numerous than those with Bachelor's degrees, which is the most common educational attainment. The dataset benefits from the inclusion of individuals with varying degrees of education since it captures a broad variety of viewpoints and areas of expertise that might impact marketing results.

Using A correlation analysis, strong relationships between The integration of AI and ML models with several marketing success metrics. Large positive correlations indicate that higher levels of AI and ML integration lead to stronger performance in sales revenue, market share, as well as customer retention. This adds to the evidence that incorporating modern technologies into marketing campaigns can lead to better results. Rounds of regression research also reinforce the critical role that foundational parameters play in predicting marketing success. There are many important variables that can be used to forecast performance in the coming days.

This involves demographics like age; gender and highest educational qualification, how AI and ML is useful in Marketing etc. Hence, the question now remains; does technology rule...or strategy... or maybe it is simply all about demography- three headed giants influencing successful marketing?] Moreover, the holistic analysis affords a profound insight into all of this data and highlight relationships between technology adoption, marketing effectiveness outcomes (including net promoter score), and demographic features. Knowing this, businesses can get the most from their marketing efforts and achieve your goals.

VI. Conclusion

Finally, this empirical study aimed to evaluate how well the newly developed framework helps marketing professionals in creating value by applying AI and ML to marketing. What the research did was it collected data from various marketing professionals through quantitative surveys as well as qualitative interviews. E.g., the results are insightful as regards which roles of the structure may work and how it will influence marketing efficacy. One of the most significant outcome after analyzing demographics based on dataset was that we are looking at large middle aged population with almost equal male and female composition. The analysis of educational background increased insight when we learned that participants had a wide range in education level. These are demographic variables used to complete the dataset and its interaction with marketing success (Krishna et al., 2022). Regression and correlation analysis highlighted the strong association between several marketing success metrics, marketing strategies, as well as utilization of AI/ML. Sales revenue, Market share and Customer retention are examples of performance measures that show an overlap with the AI/ML integration levels. We further showed that demographic factors such as age, gender, and education significantly predict marketing performance suggesting a interesting linkage among technological adoption, tactical decisions incorporating the dimension of demographics. Deep Dataset Analysis gives insights on a larger scale that help in various strategic marketing management decisions (Stone et al., 2020). It can assist researchers, decision-makers and marketers to improve marketing practices and achieve business goals effectively in today's rapidly shifting market. There is so much to learn, unlearn and re-learn for firms in how these are going to be integrated with current technological advancements wherein they can use AI/ ML tools that match their strategy within marketing management.

Recommendations

1. AI and ML Education Investment: Companies need to sponsor training and education drives that will help the marketers in learning how to work on AI and ML. Employees must be trained to have analytical, computational thinking capabilities and AI for business decision making in other words from concurrent use of data analysis with the help of AI/ML.
2. Collaboration - Data science teams, marketing department and tech folks need to do good collaboration for AI and ML get successfully integrated into your marketing management. Businesses need to encourage interdisciplinary collaboration and information sharing in order to leverage group knowledge towards more innovative marketing strategies.
3. To adapt and change tactics with consumers, training to ensure continuous improvement as consumer behaviors shift so does the need for upskilling. Marketers who are on the ball and in front of their competition by experimentation with those new strategies should pass om keeping abreast all AI-ML.
4. Ethical Guidelines and Governance: The organization needs to have an ethical guidelines and governance frameworks in place before they start leveraging AI & ML for marketing campaigns. This includes efforts to reduce bias and discrimination in algorithms, disclosure of how user data are used by the system and methods for ensuring accountability for algorithmic decisions.
5. Customer Centric Approach: Above all, marketers have to put their customers first when using AI in marketing strategies. Meaning, you are net lien of value and customer experience; Through doing this a

firm can slowly gain their trust, loyalty and business by getting to know and understanding the needs/wants of its target audience.

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