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ROLE OF AI AND BIG DATA ANALYTICS IN SHAPING CONSUMER BUYING BEHAVIOUR TOWARDS FMCG GOODS

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ABSTRACT

Digital strategies are crucial for altering consumers' buying patterns and behaviors in FMCG e-commerce.This study explores the substantial impact of digital marketing, AI technologies, and big data analytics on consumer patterns, focusing on advertising methods and the strategic use of consumer data.Advanced approaches, such as chatbots, sophisticated algorithms, and user behavior research, can assist companies to better understand their clients and provide morepersonalized and customer-focused online purchasing experiences.

Customized digital strategies that leverage consumer data to provide unique e-commerce experiences are largely accountable for this change. This approach is also applicable to advertising, as data-driven methods are utilized to create relevant and captivating commercials customized to the particularneeds and likings of FMCG consumers. Customer engagement and purchasing patterns are significantly affected by the use of digital technology, artificial intelligence, and big data analytics techniques in FMCG e-commerce advertising. According to the study's findings, artificial intelligence (AI) and big data analytics have arisen as potent instruments for changing customer purchasing patterns in the fast-moving consumer goods (FMCG) industry. These technologies enable organizations to collect, analyze, and interpret large amounts of customer data, thereby facilitating more strategic and informed decision-making. Businesses can provide individualized experiences, enhance customer targeting, and boost operational efficiency by knowing client preferences, purchase histories, and market trends.

Keywords: Artificial intelligence, Big Data Analytics, FMCG Sector, Buying pattern, Consumer behavior.

INTRODUCTION

"Consumer packaged goods (CPG)", also known as "fast-moving consumer goods (FMCG)", are one of the largest and fastest growing industries in the world ***(Sethi & Chaudhary, 2021).*** Convenience foods and beverages, skincare items, soap, and household supplies were included in the "FMCG sector" because they are convenient and affordable. The FMCG industry is a highly distinctive and dynamic industry,aside from its constant adaptation to customers' changing preferences, actions, and forecasts. "From 2022 to 2031, the global FMCG market is projected to expand at a compound annual growth rate (CAGR) of 5.1%, reaching $18,939.4 billion, from an anticipated $11,490.9 billion in 2021. The FMCG industry employs approximately 420 million people and accounts for 10% of the global GDP, making it a major contributor to the global economy ***(Costa and Ferreira, 2023).***

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Online reviews and ratings impact customer purchases in online marketplaces. How are consumer trust, perceived risk, perceived value, and buying intention affected by Internet ratings and reviews? Emotions, personality traits, situational considerations, product quality, and marketing stimuli affect customers' impulsive purchasing behavior. Effects of impulsive purchasing on marketing strategy and consumer welfare ***(Rodrigues & Varela, 2021).*** When AI chatbots are used in educational institutions, they can help students study, provide individualized education, and facilitate skill development. This will save time and supportacademics. Consumer awareness is the approach of acquiring the information, abilities, and mindsets required to make responsible and informed judgements in the marketplace ***(Greeley 2023).***

Customers' perceptions and comprehension of how various edible packaging materials, such as paper/cardboard, plastic, glass, metals, and biodegradable plastics affect the environment.Environmental expansion, recycling level, reuse rate, and decomposition rate are among the parameters used in the scientific evaluation of the environmental sustainability of food packaging from a consumer perspective ***(Otto et al., 2021).***Little research concentrates on the entire process of customer purchasing behavior, as opposed to just specific phases or results.

This study does not analyze the mediating factors or causal mechanisms that explain how AI influences customer behavior and business performance (***Dias et al., 2023).***This study did not compare the relationship between AI-enabled customer experience and consumer perception factors across various AI types.This study treats artificial intelligence as a homogenous and broad phrase, without distinguishing between different AI applications or methodologies.

Customers' perceptions of artificial intelligence (AI) and marketing that employs AI communication in diverse contexts and cultures were not examined in this study. No behavioral effects were observed; the study only examined consumer perceptions of AI and marketing connected to intelligence (***Chen et al., 2021).*** This study ignores the potential risks and challenges of AI, such as concerns about security, privacy, accountability, transparency, bias, and confidence, and how these can affect customer behavior and perceptions of AI marketing. This study did not investigate the moderating and mediating factors that affect the association between AI, consumer behavior, and information sharing ***(Olan et al., 2021).***

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Understanding and influencing consumer purchasing behavior has been revolutionized by artificial intelligence (AI) and big data analytics, particularly in the FMCG industry.Businesses can acquire profound insights into customer preferences, habits, and buying patterns by utilizing enormous amounts of consumer data gathered via social media interactions, Internet purchases, and in-store transactions. Artificial intelligence systems examine these data to segment customers, forecast their future purchasing patterns, and tailor marketing campaigns. This enhances consumer engagement and brand loyalty by allowing FMCG companies to tailor their product recommendations, refine their pricing strategies, and implement targeted marketing initiatives.

Moreover, real-time data analytics helps FMCG companies respond quickly to market trends and alter their consumer preferences. Businesses may monitor changing consumer preferences and modify their supply chains and inventories in response to sentiment analysis, machine learning, and predictive modeling. Guaranteeing that products are available and relevant not only boosts operational efficiency, but also enhances consumer experience. In an

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increasingly competitive and data-driven market, the combination of AI and Big Data Analytics is changing how FMCG companies perceive, connect, and retain their customers.

LITERATURE REVIEW

Patdono Suwignjo et al..(2023) In the fast-moving consumer goods (FMCG) sector, maximizing inventory efficiency through the application of predictive analytics is crucial for guaranteeing market product availability and enhancing competitiveness. The authors used predictive analytics with a Gradient Boosting model to address the issues of understock and overstock in a wide range of products. The model demonstrated its effectiveness in anticipating and effectively resolving inventory imbalances using predictors such as sales, demand projections, inventory coverage weeks, and existing inventory status. The authors created a regression model to estimate the degree of overstocking and understocking and a categorization model to predict inventory status. Using these models, stakeholders at different organizational levels can make well-informed decisions regarding product shipments and conduct a thorough analysis of the variables that impact inventory events.

Jos´e Nicol´as Valbuena Godoy (2022): The author provides an explanation based on FMCG demand forecasts.Theauthor examined various techniques for estimating product demand, including qualitative projections, stochastic forecasting, and classical models.The study also cites experiments in which the authors employed neural network models to enhance sales estimates, modified forecasting models to reduce waste, and suggested models based on features that measure commonalities among items.Additionally, this study analyzes the work of other researchers who have strived to forecast consumer behavior towards specific products.It discusses various methodologies that the author has attempted to determine, including new artificial intelligence algorithms, statistical approaches, and conventional methods.

Zenah Yaser Alzubaidi (2020)This study offers a summary of forecasting techniques pertinent to fast-moving consumer goods (FMCG) corporations.They discussed clustering, product classification, machine learning, and conventional statistical forecasting methods. This study sets the foundation for a comparative study that addresses the applicability, drawbacks, and possible advantages of different approaches for enhancing the accuracy of forecasts for FMCG companies. The necessity of optimizing inventory levels while fulfilling market demand, the large volume of transactions, and the significance of precise forecasting for FMCG companies were also highlighted.It also highlights the difficulties in industry forecasting, including fluctuations, unpredictability, and the influence of external variables, such as trends, seasonality, and rivalry.

Luyao Wang, Hong Fan, and Tianren Gong (2018) The author employs geographic approaches to investigate consumer demand and buying patterns for FMCG businesses. The objective is to create purchasing strategies that optimize customer demand and sales performance and estimate market demand on a microscale.To forecast consumer demand, earlier studies usedtraditional techniques, such as time-series analysis and moving averages, which ignore consumer behavior and spatial patterns.This study suggests optimizing purchase tactics based on the stability of consumer demand in various areas and presents a novel approach to microscale consumer demand estimation. This strategy seeks to provide merchants with useful advice to increase revenue and reduce product waste.

Sodiq, Odetunde, et al. (2024) examined the potential of artificial intelligence (AI) to transform marketing strategies through customization. The study found that AI significantly improved the personalization of marketing initiatives by tailoring experiences and content to

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the unique demographics and behaviors of each customer. AI-enabled customization leads to higher conversion rates, engagement, and customer satisfaction. AI-powered gamified marketing strategies effectively engage and motivate people through tailored challenges and rewards. AI technologies have also been effective in forecasting consumer preferences and behaviors by assessing vast amounts of data and enabling the production of customized advertisements and content.Natural language processingtechnologies and chatbots powered by artificial intelligence enhance customer sentiment analysis and provide personalized assistance, thereby boosting customer engagement.

S. Aiswarya, S Sangeetha (2024) assessed the perceptions of FMCG consumers regarding the advantages of artificial intelligencefollowing its implementation. The survey found that AI has a major impact on consumers' perceptions of product innovation, consumer interaction, and customized marketing in the FMCG sector. A one-way ANOVA revealed significant differences in opinions regarding these elements based on respondents' educational attainment. However, the Wilcoxon Mann-Whitney U test results revealed that gender had no effect on consumer perceptions of the benefits of AI in the FMCG industry. The findings reveal how consumers' impressions of AI's impact of AI are influenced by their educational background, while also demonstrating how AI may improve several facets of the FMCG business.

Shameek et al. (2024) investigated how AI could enhance the marketing capabilities of Indian FMCG companies by focusing on dynamic capabilities (DC). The poll found that AI significantly enhanced marketing strategies for the FMCG sector in India, particularly in four key areas: strategic goal alignment, consumer interaction, marketing automation, and customization. By using AI in these core areas, Indian FMCG companies can boost their marketing proficiencies, gain a competitive edge, and become more efficient and successful in their operations. The report also presents a framework for AI-enabled Marketing 4.0, and highlights the importance of dynamic capabilities (DC) in leveraging AI techniques to assist FMCG companies in optimizing their marketing strategies.

S, Gautham., Shanta, S., Rao. (2024) examined the effects ofAI on tailored marketing strategies. The study claims that by improving targeting precision, artificial intelligence (AI) significantly enhances personalized marketing, leading to more effective and relevant campaigns. AI technology enhances customer engagement by tailoring marketing strategies to specific consumer interests, behaviors, and demographics. This led to higher conversion rates. This investigation focuses on how AI affects the connection between consumers and brands and the significance of understanding how AI influences the shifting nature of marketing in the digital era.

Bharathi, N, S., et al. (2024) described and assessed how the incorporation of artificial intelligence (AI) has changed the marketing paradigm. As to the research, artificial intelligence is revolutionising marketing tactics by enabling "data-driven insights, tailored experiences, predictive analytics, and automation possible." This has resulted in significant advances in decision-making processes, precise advertising targeting, and consumer contact.AI-powered marketing tactics have proven to be more accurate, successful, and flexible.This study claims that AI has significantly improved marketing efficacy and customization in the hospitality industry.According to this study, further developments in AI will enhance content creation, customization, and ethical considerations, thereby impacting the marketing landscape for years to come.

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Matz, S. C., et al. (2024) examined the impact of large language models (LLMs), such as ChatGPT, on customized persuasion in message approaches. The study's findings demonstrated that individualized persuasion— communication tailored by LLMs to receivers' psychological profiles–had a significantly greater impact than did non-individualized persuasion.In addition to psychological characteristics, such as personality traits and moral convictions, this impact has been seen across a broad array of subjects, including consumer items, political ideology, health advice, and societal issues.The results showed that tailored persuasion can be scaled and automated, thereby improving its effectiveness and efficiency.

Steven, R., Talbot. (2023) examined the implementation of artificial intelligence inFMCG marketing. The findings demonstrate that AI-driven strategies, such as word-of-mouth advertising and personalized recommendations, significantly influence consumer behavior and decision-making.AI's ability to support multichannel customer management, advanced retail analytics, and consumer segmentation improves marketing strategies in the FMCG sector.

Yue, H. (2023) examined the potential applications of artificial intelligence (AI) in developing a system for custom product packaging design. The trial findings indicated that the AI-driven packing system maintained a running time of less than a second, thereby meeting the minimum requirements for the system. This system uses data mining, image processing, and other pertinent algorithms to automatically produce packaging design schemes based on customer requirements and brand features. It features various choices and offers free modifications.

Andrii, & Daniela. (2023)explored new possibilities for tailoring marketing strategies enabled by advancements in artificial intelligence (AI). According to this study, AI has significantly expanded the potential for extremely individualized marketing experiences by tailoring communication and interactions according to distinct behavioral patterns. This provides theoretical insights into AI, machine learning, personalization, and the GPT model. Customized email campaigns and chatbots serve as examples of how AI can be applied in practical settings to accomplish individualized marketing. These practical examples provide companies with a starting point for developing or improving their personalization efforts.

Darshana, Desai. (2022) examined hyperpersonalization strategies using machine learning (ML) and artificial intelligence (AI) to enhance customer-centric e-commerce marketing. This study introduced a hyperpersonalization approach that utilizes ML and AI algorithms for segmentation, targeting, and positioning, all of which are based on real-time data.By delivering the necessary information to customers through the appropriate channel at the optimal moment, AI-driven personalization can meet customers' unspoken needs and generate increased profits.

RESEARCH GAP

Although AI and big data analytics are progressively being used in the FMCG industry, little is known about their direct influence on consumer purchasing decisions. While little research has been conducted on how consumers' psychology and behavior are impacted by AI-driven tactics, such as personalized marketing, dynamic pricing, and predictive suggestions, the majority of studies to date have concentrated on technology developments and business consequences. Furthermore, there is a paucity of empirical research on how different demographic categories perceive and react to data-driven assistance in purchasing decisions. Addressing this gap is crucial for creating moral, efficient, and customer-focused AI solutions in the FMCG industry.

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OBJECTIVES

- To study the role of AI and Big Data Analytics in Shaping Consumer Buying Behaviour towards FMCG Goods.
- To understand the importance of AI And Big Data Analytics in FMCG sector.

RESEARCH METHODOLOGY

This study was based on conceptual research. Therefore, an in-depth study was conducted. This study discusses the influence of AI and big data analytics in shaping consumer buying behavior towards FMCG Goods to recognize the value that AI and Big Data Analytics hold and the role of AI and big data analytics in shaping consumer buying behaviors towards FMCG goods.This study addresses the knowledge gap regarding demographic variations in consumer perceptions and responses to AI-driven purchase assistance for FMCG goods. By examining these differences, this study contributes to the creation of more ethical, efficient, and customer-centric AI solutions in the FMCG industry. The research methodology employs a conceptual approach, utilizing an in-depth study to explore the impact of AI and big data analytics in influencing consumer buying behavior for FMCG goods.

Secondary data were used, and previous studies have identified various aspects associated with the topic.The introduction and literature review were compiled from research papers, articles, and various online sources.

MAJOR FINDINGS

- In the FMCG industry, demand forecasting is a perpetual process that businesses must carry out to endure or expand in the market owing to the constant shift in consumer preferences. This can be accomplished using scientific tools such as Prophet, Random Forests, XGBoost, and Artificial Neural Networks.
- Researchers have also covered various aspects of brand valuation, such as how a company's brand name can help it sell its products in these fast-forwarding sectors.Real-time data analytics helps FMCG companies respond quickly to market trends and change consumer preferences.
- In the FMCG sector, companies use various sales forecasting methods, such as time-series analysis, correlation, and regression, which help themcompete significantly with their rivals.AI systems analyze data to segment customers, predict future purchasing patterns, and personalize marketing campaigns.
- The application of predictive analysis to comprehend customers in various locations with varying purchasing habits is also discussed. Thus, Internet-based marketing is feasible, and companies can gain insights into consumer preferences, habits, and buying patterns by utilizing consumer data from various sources.
- Significance of precise forecasting, comprehension of consumer behavior, and competitive advantage through marketing strategy optimization. This can help them succeed in the long term.AI and big data analytics enable FMCG companies to optimize their inventories, reduce waste, and enhance their distribution.
- Businesses in the FMCG sector can benefit greatly from the use of big data analytics in supply chain and logistics management, especially in forecasting demand and consumer behavior research.Nonetheless, it is crucial to address issues related to data quality and privacy to guarantee the effectiveness of these analytics.

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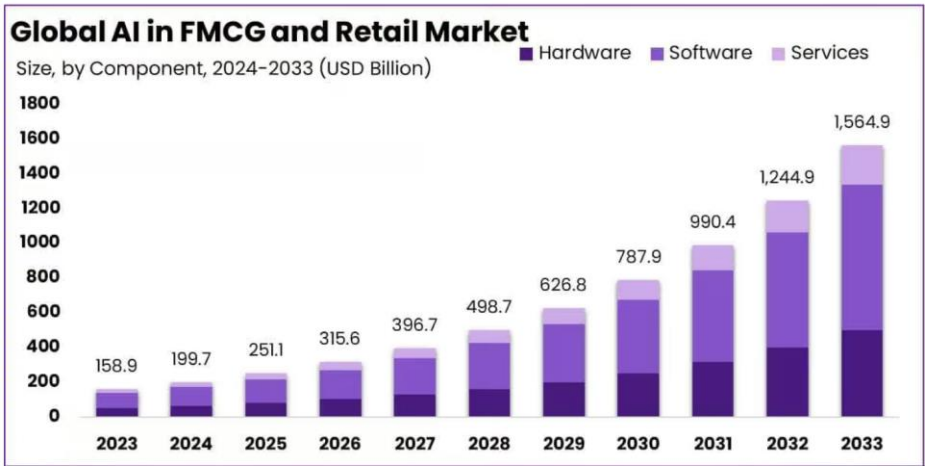

Figure 1: Global AI in FMCG and Retail market with respect to hardware, software and services

Source:https://market.us/report/ai-in-fmcg-and-retail-market/

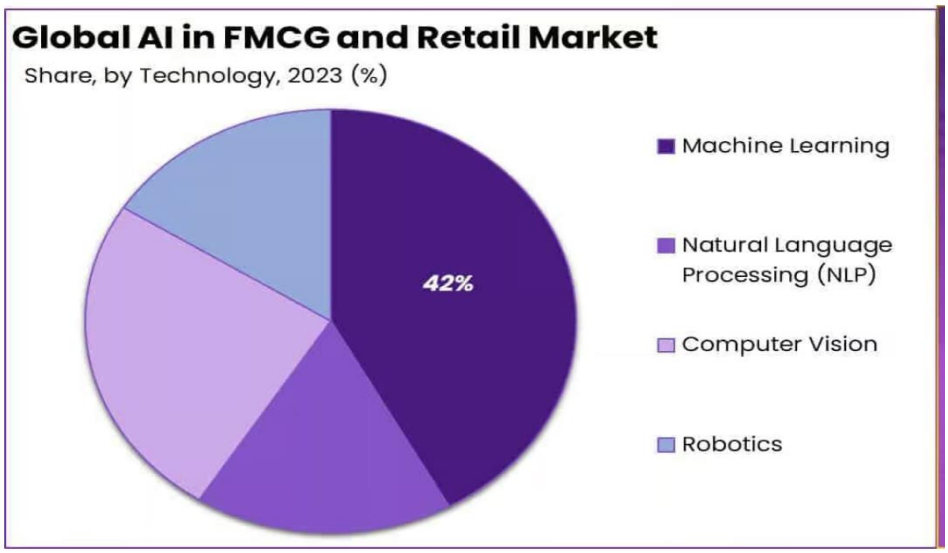

Figure 2: Global AI in FMCG and Retail market with respect to Technology

Source: https://market.us/report/ai-in-fmcg-and-retail-market/

Global AI in FMCG and Retail Market by Component (Hardware, Software, Services), By Application (Customer Service and Support, Sales and Marketing, Inventory Management, Supply Chain Optimization, Others), By Technology (Machine Learning, Natural Language Processing (NLP), Computer Vision, Robotics), Region and Companies–Industry Segment Outlook, Market Assessment, Competition Scenario, Trends and Forecast 2024-2033.

CONCLUSION

Artificial intelligence (AI) and big data analytics have arisen as powerful tools for changing consumer buying behavior in the FMCG industry. These technologies allow companies to gather, analyze, and interpret large amounts of consumer data, helping them make more strategic and informed decisions. By understanding consumer preferences, purchase histories, and market trends, businesses can enhance customer targeting, offer personalized experiences, and boost operational efficiency. This data-driven approach not only increases

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sales and brand loyalty but also helps FMCG companies stay competitive in a rapidly evolving market. AI and big data analytics in FMCG Corporations transform consumer behavior analysis, supply chains,logistics management,product development, and pricing strategies. Predictive analytics optimizes inventory, reduces waste, and enhances distribution, leading to reduced costs and improved sustainability. Chatbots and virtual assistants powered by AI offer instant and tailored support to customers.Advanced applications, such as electronic vision for quality assurance and facial recognition for targeted advertising, blur the lines between online and offline retail, creating seamless omni-channel experiences that meet modern consumer demands.

However, the full capacity of AI and Big Data to influence consumer behavior remains unfolding. As these technologies continue to evolve, businesses must address ethical concerns, data privacy issues, and the need for openness when handling consumer data. Further research is required to explore the long-term implications of AI-driven tactics on consumer trust and loyalty across diverse market groups. Finally, the effective integration of AI and Big Data Analytics in FMCG requires a balance between technological innovation, a thorough understanding of consumer psychology, and ethical data practices.

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