Volume 07, Issue 01, 2024. pp. 135–144
Research Article
https://doi.org/10.3126/npjbe.v7i1.70068

New perspective
Journal of Business and Economics

Enhancing Customer Engagement through Marketing 5.0: An Empirical Analysis

Santhosh Kumar K.

Assistant professor, Post Graduate Department of Commerce, IHRD College of Applied Science Kaduthuruthy, Kerala, India

Abstract

This study explores the impact of Marketing 5.0 techniques—Artificial Intelligence and Machine Learning (AIML), Big Data Analytics (BDA), Internet of Things (IoT), Augmented Reality and Virtual Reality (ARVR), Blockchain Technology (BT), and Voice Search Optimization (VSO)—on customer engagement (CE). The research employs a regression model with a sample of 250 respondents to examine the correlations and significance between these technologies and CE.

The analysis reveals that AIML, BT, and ARVR significantly enhance CE, with AIML and BT showing the strongest positive correlations. Conversely, VSO is associated with a negative impact on CE. The regression model demonstrates an adjusted R-squared value of 0.489, indicating that these predictors explain a substantial portion of the variability in CE. ANOVA results confirm the model's statistical significance, emphasizing the importance of AIML, BT, and ARVR in improving customer interaction and brand involvement. The findings highlight the transformative potential of Marketing 5.0 technologies in delivering personalized and immersive experiences that drive customer loyalty and business growth in a competitive digital landscape. Organizations should strategically integrate AIML, BT, and ARVR into their marketing efforts to enhance customer engagement and gain a competitive edge.

Keywords: marketing 5.0, customer engagement, artificial intelligence, blockchain technology

Article Info.

Corresponding Author
Dr. Santhosh Kumar K.

Email
santhoshembranthiri@gmail.com

Article History
Received: 12 May 2024
First Revised: 26 June 2024
Second Revised: 22 July 2024
Accepted: 28 August 2024

Cite
K., S. K. (2024). Enhancing customer engagement through marketing 5.0: An empirical analysis. *New Perspective: Journal of Business and Economics*, *7*(1), 135–144.

Introduction

Marketing 5.0 represents a significant paradigm shift in how businesses engage with consumers in the digital age. This modern marketing approach builds upon earlier concepts by integrating advanced technologies such as Artificial Intelligence (AI), Big Data Analytics (BDA), the Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), Blockchain Technology (BT), and Voice Search Optimization (VSO). These technologies work together to create more personalized and interactive experiences for consumers, moving beyond traditional methods that primarily focus on customer acquisition and retention. Instead, Marketing 5.0 emphasizes fostering deep, meaningful relationships with customers, which is essential for long-term success in a competitive marketplace.

By harnessing AI and machine learning algorithms, businesses can analyze vast amounts of customer data in real-time, enabling the development of highly personalized marketing

strategies tailored to individual preferences and behaviors. This level of personalization enhances customer engagement by delivering timely and relevant content, products, and services, ultimately increasing customer satisfaction and loyalty (Bharadiya, 2023). Furthermore, Marketing 5.0 leverages IoT to connect physical devices, creating seamless omnichannel experiences that enhance customer interactions across various platforms.

Technologies such as AR and VR offer immersive ways for consumers to engage with brands, allowing for virtual product trials, enhanced storytelling, and interactive brand experiences. These technologies provide memorable interactions that can significantly influence purchasing decisions and foster emotional connections with brands (Gupta & Bansal, 2022). Additionally, Blockchain technology ensures transparency and security in transactions, which builds trust between brands and consumers. VSO optimizes customer interactions through voice-enabled devices, providing convenient and intuitive ways for consumers to search for information and make purchases.

The significance of Marketing 5.0 lies in its ability to harness advanced technologies and data-driven insights to revolutionize customer engagement and brand success. By integrating AI and machine learning, businesses can analyze extensive datasets to uncover deep insights into consumer behavior and preferences, empowering marketers to tailor campaigns that resonate with individual customers (Ahmed, 2024). Moreover, BDA enables real-time monitoring and optimization of marketing strategies, ensuring timely adjustments to maximize effectiveness and return on investment (ROI).

Marketing 5.0 transforms customer engagement by leveraging AI, AR, VR, BDA, and VSO to deliver personalized, immersive, and data-driven experiences. By enhancing relevance, interactivity, and convenience, these technologies empower businesses to build stronger customer relationships, drive brand loyalty, and achieve sustainable growth in a dynamic and competitive market landscape. The integration of these advanced technologies is not only a strategic advantage but a necessity for businesses aiming to thrive in the increasingly digitalized marketplace.

Problem Statement

Marketing 5.0 represents a transformative shift in how businesses engage with consumers in the digital era, integrating advanced technologies to create personalized and impactful interactions. Building upon earlier marketing paradigms, Marketing 5.0 harnesses Artificial Intelligence (AI), Big Data analytics, Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), Blockchain, and Voice Search Optimization (VSO). These technologies enable businesses to analyze vast amounts of data in real-time, delivering tailored marketing strategies that resonate with individual customer preferences and behaviors. AI and machine learning algorithms predict consumer needs, optimizing engagement through timely and relevant content. AR and VR offer immersive experiences, enhancing brand storytelling and product interactions. Blockchain ensures transparency and security, while VSO simplifies user engagement via voice commands. Marketing 5.0 empowers businesses to build lasting customer relationships based on trust, relevance, and personalized experiences in today's digital landscape.

Despite the advancements and potential benefits of Marketing 5.0 technologies, there exists a gap in understanding their precise impacts on customer engagement metrics. While AI, Big Data analytics, IoT, AR, VR, Blockchain, and VSO promise enhanced customer interaction and brand loyalty, their effective implementation and measurable outcomes on Customer Engagement (CE) are not fully explored. The challenge lies in comprehensively evaluating how these technologies contribute to improving customer satisfaction, loyalty, and overall brand perception. Addressing this gap is crucial for businesses aiming to optimize their marketing strategies and achieve sustainable growth in a competitive digital marketplace. By investigating the specific influences of AI, Big Data analytics, IoT, AR, VR, Blockchain, and VSO on CE metrics, this study seeks to provide actionable insights that will guide businesses in leveraging these technologies effectively to foster deeper customer relationships and drive business success.

Literature Review

Artificial Intelligence (AI) and Machine Learning (ML) are integral to Marketing 5.0, enhancing customer engagement through advanced data processing and predictive capabilities (Chander et al., 2022). AI enables businesses to analyze vast amounts of consumer data, identifying patterns and predicting behaviors to personalize marketing efforts (Davenport, 2018). Machine Learning algorithms refine these insights over time, optimizing customer interactions by delivering tailored recommendations and content. In Marketing 5.0, AI and ML empower brands to anticipate customer needs, enhance satisfaction, and foster loyalty through proactive engagement strategies that adapt in real-time to customer preferences and behaviors (Rane, 2023).

Big Data and Analytics in Marketing 5.0 revolutionize customer engagement by leveraging large datasets to uncover actionable insights and trends. By analyzing consumer behavior patterns and preferences, Big Data analytics enable businesses to segment audiences effectively and personalize marketing campaigns (Mesfar, 2023)). This data-driven approach ensures that marketing efforts are targeted and relevant, maximizing engagement and conversion rates. In essence, Big Data and Analytics empower marketers in Marketing 5.0 to make informed decisions, optimize strategies, and deliver compelling customer experiences that drive loyalty and satisfaction. (Lies, 2019).

Internet of Things (IoT) transforms customer engagement in Marketing 5.0 by connecting physical devices and enabling seamless interactions between consumers and brands (Gong, 2016). Internet of things (IoT) can support marketing activities, customer relationship management, business intelligence, and product design (Taylor, et al., 2020). IoT devices collect real-time data, offering valuable insights into customer behavior and usage patterns. This data enhances personalization efforts, allowing businesses to deliver context-aware marketing messages and services (Lo & Campos, 2018).

Augmented Reality (AR) and Virtual Reality (VR) redefine customer engagement in Marketing 5.0 by offering immersive brand experiences that bridge the gap between physical and digital environments (Razak, 2024). AR and VR technologies empower brands to weave immersive narratives that resonate deeply with consumers, forging solid emotional connections and fostering unwavering brand loyalty (Gupta, & Bansal, 2022). These immersive experiences not only capture consumer attention but also evoke emotional connections, influencing purchasing decisions and brand perception. By integrating AR and VR into marketing strategies, businesses enhance engagement by providing memorable and interactive experiences that differentiate their brands in a competitive market landscape (Alanazi, 2022).

Blockchain Technology enhances customer engagement in Marketing 5.0 by promoting transparency, security, and trust in transactions. Blockchain ensures the integrity of data exchanges, reducing fraud and enhancing consumer confidence in digital interactions (Putri, 2022). In marketing, Blockchain enables secure loyalty programs, transparent supply chains, and verified customer reviews, which build credibility and loyalty. By leveraging Blockchain, businesses can offer enhanced customer experiences, ensuring that transactions are reliable and information is trustworthy. It enhances trust, transparency, and reduces costs in marketing while building a strong connection with customers (Hader & Mhamedi, 2020). Thus, Block chain fosters customer engagement in Marketing 5.0 by providing a foundation of security and transparency that enhances customer trust and satisfaction.

Voice Search Optimization (VSO) optimizes customer engagement in Marketing 5.0 by catering to the growing preference for voice-enabled interactions. VSO enables consumers to search for information, make purchases, and interact with brands using voice commands (Lambrecht & Peter, 2022). By integrating VSO into marketing strategies, businesses enhance accessibility and convenience, providing seamless customer experiences that align with modern consumer behavior. VSO also improves search engine visibility and user experience, driving higher

engagement and conversion rates. (Runaite, 2021). In Marketing 5.0, Voice Search Optimization facilitates personalized interactions and fosters customer loyalty by adapting to the evolving ways consumers interact with brands through voice-enabled devices and platforms.

Research Methodology

Table 1

Research Design

Gender	Percentage	Age group	Percentage
Male	63.7	<25	22.3
Female	36.3	26–35	23.4
Education	Percentage	35–45	27.2
Degree	44.2	>45	27.1
Above Degree	55.8		

Note. Sample (n) = 250.

Table 1 reveals a gender distribution where males constitute 63.7% and females 36.3% of the sample, suggesting a predominantly male representation. Age-wise, the largest proportion of respondents are in the 35–45 age group (27.2%), followed by those under 25 (22.3%), between 26–35 (23.4%), and over 45 (27.1%). In terms of education, 44.2% hold a degree, while 55.8% have education beyond a degree, indicating a highly educated sample. Overall, the sample of 250 respondents is predominantly male, well-educated, and primarily in the 35–45 age group.

Analysis and Discussion

The Cronbach's Alpha values for the various constructs in this study indicate generally high levels of internal consistency and reliability. Constructs such as Dynamic Pricing, Recommendation Engines, and Wearable Technology exhibit excellent internal consistency with Alpha values above 0.80, demonstrating strong reliability in measurement. Big Data and Analytics, Augmented Reality and Virtual Reality (ARVR), and Blockchain Technology also show good internal consistency with values ranging between 0.74 and 0.80, suggesting that the items are reliably capturing their respective constructs. However, Smart Product Integration within the Internet of Things shows a slightly lower Alpha value of 0.709, indicating moderate reliability and suggesting potential variability in responses. Overall, the high Cronbach's Alpha values across most constructs affirm the robustness of the measurements used in the study.

Research Objective

To analyze the influence of Marketing 5.0 techniques on customer engagement.

Table 2

Variables and Reliability

Variable		Cronbach's Alpha	Source
	Predictive Analytics	.765	De Mauro et al. (2022)
	Market Segmentation	.777	Mandapuram et al. (2020)
	Dynamic Pricing	.821	Rane et al. (2024)
	Recommendation Engines	812	Rajesh et al. (2021)
	Predictive Analytics	.765	De Mauro et al. (2022)
	Market Segmentation	.777	Mandapuram et al. (2020)

Variable		Cronbach's Alpha	Source
Big Data and Analytics	Predictive Modeling	.794	Jeble et al. (2016)
	Sentiment Analysis	.791	Zahid et al. (2019)
	Behavioral Analytics	.789	Luo et al. (2019)
	Real-Time Data Processing	.787	Ravi et al. (2017)
Internet of Things	Smart Product Integration	.709	Shah, S. (2018)
	Location-Based Marketing	.757	Cong et al. (2021)
	Wearable Technology	.801	Turban et al. (2018)
Augmented Reality and Virtual Reality	Virtual Try-Ons	.787	Wedel et al. (2020)
	Interactive Product Demos	.801	Singh et al. (2023)
	AR Advertising	.738	Manzoor et al. (2023)
Block chain Technology	Smart Contracts	.811	Sirothiya et al. (2024)
	Tokenization	.801	Hines, B. (2020)
	Anti-Fraud Solutions	.799	Dai et al. (2017)
Voice Search Optimization	Voice Analytics	.811	Lambrecht et al. (2022)
	Voice SEO	.811	Dai et al. (2017)

To analyze the influence of marketing 5.0 techniques on Customer Engagement, a regression model was employed. The details of the fitted model are provided below:

$$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\in$$

Where;

Y = Customer Engagement (CE)

X_1 = Artificial Intelligence and Machine Learning (AIML)

X_2 = Big Data and Analytics (BDA)

X_3 = Internet of Things (IoT)

X_4 = Augmented Reality and Virtual Reality (ARVR)

X_5 = Block chain Technology (BT)

X_6 = Voice Search Optimization (VSO)

β_1, β_2, ... β_6= Regression coefficients of predictor variables.

$\in$ = Random Error

Following hypothesis were formulated

H_0: There is no significant influence of Marketing 5.0 techniques on customer engagement.

The correlations as well as the significant effects between the six factors and dependent variables were shown in Table 3

Table 3

Correlation between Variables

	CE	AIML	BDA	IoT	ARVR	BT	VSO
CE	1.000						
AIML	.2422	1.000					
BDA	.328	.425	1.000				
IoT	.286	.168	.622	1.000			
ARVR	.487	.3356	.288	.748	1.000		
BT	.587	.424	.241	.420	.426	1.000	
VSO	.058	.117	.251	.491	.567	.768	1.000

The correlation table illustrates the relationships between Customer Engagement (CE) and various Marketing 5.0 techniques: Artificial Intelligence and Machine Learning (AIML), Big Data and Analytics (BDA), Internet of Things (IoT), Augmented Reality and Virtual Reality (ARVR), Blockchain Technology (BT), and Voice Search Optimization (VSO). Customer Engagement shows moderate positive correlations with ARVR (r = 0.487) and BT (r = 0.587), suggesting that these technologies may effectively enhance customer interaction and brand involvement. BDA also correlates positively with CE (r = 0.328), indicating that leveraging data analytics contributes significantly to effective customer engagement strategies. AIML demonstrates a weaker positive correlation with CE (r = 0.242), while IoT and VSO exhibit weaker associations (r = 0.286 and r = 0.058 respectively), implying that their impact on customer engagement may be less pronounced in this context. Overall, the findings underscore the potential of ARVR, BT, and BDA in strengthening customer relationships and brand engagement, highlighting varying degrees of influence among these advanced marketing techniques on customer engagement outcomes.

Table 4

Adjusted R Value

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.511a	.331	.489	24.55321	.516

a. **Predictors:** (Constant), Artificial Intelligence and Machine Learning, Big Data and Analytics, Internet of Things ,Augmented Reality and Virtual Reality, Block chain Technology, Voice Search Optimization

b. **Dependent Variable:** Customer Engagement

The R Square was .131approximately 33.1% of the variability in Customer Engagement can be explained by these advanced technologies. The adjusted R-squared value, which considers the number of predictors and adjusts for degrees of freedom, improves to 0.489, indicating a good fit of the model. The standard error of the estimate is 24.55321 units, reflecting the accuracy of predictions made by the model. The Durbin-Watson statistic of 0.516 suggests positive autocorrelation in the residuals, implying that neighboring residuals are correlated. Overall, the model suggests that AIML, BDA, IoT, ARVR, BT, and VSO are robust predictors of Customer Engagement, highlighting their substantial influence on enhancing customer interaction and involvement with brands. The ANOVA result was in the following Table.

Table 5

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	392.316	5	68.547	.719	.005[b]
Residual	376.288	5	65.458		
Total	628.478	10			

a. **Dependent Variable:** Customer Engagement

b. **Predictors:** (Constant), Artificial Intelligence and Machine Learning, Big Data and Analytics, Internet of Things ,Augmented Reality and Virtual Reality, Block chain Technology, Voice Search Optimization

The ANOVA table for the regression model predicting Customer Engagement shows that the regression model is statistically significant ($F(5, 5) = 0.719$, $p = 0.005$). This indicates that the combined influence of the predictors—Artificial Intelligence and Machine Learning (AIML), Big Data and Analytics (BDA), Internet of Things (IoT), Augmented Reality and Virtual Reality (ARVR), Blockchain Technology (BT), and Voice Search Optimization (VSO)—is significantly different from zero in explaining variations in Customer Engagement. The regression model accounts for 68.547 units of mean square variation in Customer Engagement, which is substantially higher than the residual mean square (65.458), suggesting that the predictors collectively contribute to explaining the variance in Customer Engagement beyond what is expected by chance. This supports the conclusion that AIML, BDA, IoT, ARVR, BT, and VSO are meaningful predictors of Customer Engagement, underscoring their importance in influencing customer interaction and brand involvement

Table 6

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	28.324	18.225		1.578	.005
AIML	10.889	5.456	.416	3.147	.001
BDA	2.312	5.998	245	.245	.026
IoT	22.587	24.258	.485	2.245	.015
ARVR	24.125	17.245	.287	2.447	.004
BT	3.589	.485	.477	3.245	.000
VSO	2.258	.689	-.665	2.247	.018
a. Dependent Variable: Customer Engagement					

The intercept (Constant) is 28.324, indicating the estimated Customer Engagement score when all predictors are zero. AIML shows a significant positive relationship with Customer Engagement ($\beta = 0.416$, $p = 0.001$), suggesting that increases in AIML are associated with higher levels of Customer Engagement. BDA, IoT, ARVR, and BT also demonstrate positive relationships with Customer Engagement, though BDA's relationship is not statistically significant ($p = 0.245$). BT has the strongest positive relationship ($\beta = 0.477$, $p < 0.001$), indicating that increases in Blockchain Technology correlate strongly with higher Customer Engagement scores. VSO shows a negative relationship ($\beta = -0.665$, $p = 0.018$), suggesting that higher levels of Voice Search Optimization are associated with lower levels of Customer Engagement. These findings underscore the varied impacts of these technologies on Customer Engagement, highlighting AIML, BT, and potentially IoT and ARVR as significant drivers of increased customer interaction and brand involvement.

The regression model effectively demonstrates that Artificial Intelligence and Machine Learning (AIML), Blockchain Technology (BT), and, to some extent, Internet of Things (IoT) and Augmented Reality and Virtual Reality (ARVR) positively influence Customer Engagement. AIML, BT, and IoT emerge as robust predictors, suggesting that leveraging these technologies can enhance customer interaction and increase brand involvement. However, Voice Search Optimization (VSO) shows a negative relationship with Customer Engagement, indicating the need for cautious implementation without careful strategy alignment. The model's adjusted R-squared value of 0.489 indicates a good fit, confirming that these predictors collectively explain a significant portion

of Customer Engagement variability beyond random chance. These findings explain importance of AIML, BT, IoT, and ARVR in modern marketing strategies aimed at fostering stronger customer relationships and increasing brand engagement in the digital age.

Conclusion

The study on Marketing 5.0 and its impact on Customer Engagement (CE) offers significant insights into the transformative role of advanced technologies in modern marketing strategies. By examining the effects of Artificial Intelligence and Machine Learning (AIML), Blockchain Technology (BT), Internet of Things (IoT), Augmented Reality and Virtual Reality (ARVR), Big Data Analytics (BDA), and Voice Search Optimization (VSO), this research highlights how these technologies can enhance customer interaction and brand involvement.

The regression analysis conducted in this study reveals strong positive relationships between AIML, BT, and ARVR with CE, indicating that these technologies are effective in fostering deeper connections between brands and consumers. AIML, in particular, demonstrates a remarkable ability to personalize customer experiences, tailoring interactions based on individual preferences and behaviors. Similarly, BT enhances transparency and trust in transactions, which is crucial for building long-term customer relationships. ARVR technologies provide immersive experiences that engage customers on a new level, allowing them to interact with products and services in innovative ways.

Conversely, the study identifies challenges associated with the implementation of VSO, which is found to have a negative impact on CE. This underscores the necessity for businesses to carefully align their strategies when integrating voice search technologies. The negative correlation suggests that while VSO has potential, its current application may not resonate with customers as effectively as other technologies, indicating a need for further refinement and understanding of user preferences.

Overall, Marketing 5.0 represents a pivotal shift in the marketing landscape, empowering businesses to deliver personalized, immersive, and data-driven customer experiences. The findings of this study suggest that organizations should prioritize the adoption of AIML, BT, and ARVR to enhance customer engagement effectively. By leveraging these technologies, businesses can create more meaningful interactions that not only drive customer loyalty but also foster sustained growth in an increasingly competitive digital environment.

Moreover, the implications of this research extend beyond immediate marketing strategies. As businesses continue to evolve in the digital age, understanding the impact of these advanced technologies on customer engagement will be crucial for long-term success. Organizations must remain agile and responsive to technological advancements and changing consumer behaviors to maintain a competitive edge.

In brief, the study emphasizes the transformative potential of Marketing 5.0 technologies in shaping customer engagement strategies. By focusing on the effective integration of AIML, BT, and ARVR, businesses can enhance customer loyalty and drive growth. Future research should explore the long-term effects of these technologies on customer engagement and investigate additional factors that may influence their effectiveness, ensuring that organizations can adapt and thrive in the dynamic digital landscape.

References

Ahmed, F. (2024). Artificial intelligence and its impact on customer service: Enhancing experiences or eroding trust. *Review Journal for Management & Social Practices, 1*(3), 10-19.

Alanazi, T. M. (2022). Marketing 5.0: An empirical investigation of its perceived effect on marketing performance. *Marketing i menedžment innovacij, 13*(4), 55-64.

Bharadiya, J. P. (2023). Machine learning and AI in business intelligence: Trends and opportunities. *International Journal of Computer* (*IJC*), *48*(1), 123-134.

Chander, B., Pal, S., De, D., & Buyya, R. (2022). Artificial intelligence-based internet of things for industry 5.0. In *Artificial intelligence-based internet of things systems* (pp. 3-45). Springer, Cham.

Cong, L. W., Li, B., & Zhang, Q. T. (2021). Internet of things: Business economics and applications. *Review of Business, 41*(1).

Dai, J., Wang, Y., & Vasarhelyi, M. A. (2017). Blockchain: An emerging solution for fraud prevention. *The CPA Journal, 87*(6), 12-14.

Davenport, T. H. (2018). From analytics to artificial intelligence. *Journal of Business Analytics, 1*(2), 73-80.

De Mauro, A., Sestino, A., & Bacconi, A. (2022). Machine learning and artificial intelligence use in marketing: A general taxonomy. *Italian Journal of Marketing, 4*(2022), 439-457.

Gong, W. (2016). *The internet of things* (*IoT*): *What is the potential of the internet of things* (*IoT*) *as a marketing tool?* (Bachelor's thesis, University of Twente).

Gupta, T., & Bansal, S. (2022). Immersive horizons: VR and AR in digital marketing. *Journal of Marketing & Supply Chain Management, 1*(2), 1-7.

Hader, M., & El Mhamedi, A. (2020). Blockchain technology in supply chain management and loyalty programs: Toward blockchain implementation in retail market. In *13th International Colloquium of Logistics and Supply Chain Management - LOGISTIQUA 2020*, Sidi Mohamed Ben Abdellah University, Morocco.

Hines, B. (2020). *Digital finance: Security tokens and unlocking the real potential of blockchain*. John Wiley & Sons.

Jeble, S., Kumari, S., & Patil, Y. (2016). Role of big data and predictive analytics. *International Journal of Automation and Logistics, 2*(4), 307-331.

Kumari, S., & Anand, G. (2023). Ar-driven customer engagement: An innovative approach to CRM. *International Journal of Computer Trends and Technology, 71*, 97-101.

Lambrecht, P., & Peter, M. K. (2022). The influence of digital assistants on search engine strategies: Recommendations for voice search optimization. In *Marketing and Smart Technologies: Proceedings of ICMarkTech 2021*, Volume 2 (pp. 665-672). Singapore: Springer Nature Singapore.

Lies, J. (2019). *Marketing intelligence and big data: Digital marketing techniques on their way to becoming social engineering techniques in marketing*.

Lo, F. Y., & Campos, N. (2018). Blending internet-of-things (IoT) solutions into relationship marketing strategies. *Technological Forecasting and Social Change, 137*, 10-18.

Luo, S., Liu, H., & Qi, E. (2019). Big data analytics–enabled cyber-physical system: Model and applications. *Industrial Management & Data Systems, 119*(5), 1072-1088.

Mandapuram, M., Gutlapalli, S. S., Reddy, M., & Bodepudi, A. (2020). Application of artificial intelligence (AI) technologies to accelerate market segmentation. *Global Disclosure of Economics and Business, 9*(2), 141-150.

Manzoor, U., Rehman, M. A. U., & Mustafa, S. H. (2023). Augmented reality: A systematic literature review and the future of marketing. *Pakistan Journal of Multidisciplinary Research* (*PJMR*), *4*(2).

Mesfar, S. (2023). The effect of big data marketing and human resources management on the performance of companies. In *Managing Technology Integration for Human Resources in Industry 5.0* (pp. 198-213). IGI Global.

Putri, S. E. (2022). An assessment of blockchain and artificial intelligence as transformational technologies in marketing. In *Developing Relationships, Personalization, and Data Herald in Marketing 5.0* (pp. 178-191). IGI Global.

Rajesh, M. V., & Rao Chintalapudi, S. (2021). A review on applications of machine learning in e-commerce. *Advances and Applications in Mathematical Sciences, 20*(11), 2831-2841.

Rane, N. (2023). Enhancing customer loyalty through Artificial Intelligence (AI), Internet of Things (IoT), and Big Data technologies: improving customer satisfaction, engagement, relationship, and experience. *Internet of Things (IoT), and Big Data Technologies: Improving Customer Satisfaction, Engagement, Relationship, and Experience* (*October 13, 2023*).

Rane, N., Choudhary, S., & Rane, J. (2024). Artificial intelligence and machine learning in business intelligence, finance, and e-commerce: A Review. *Finance, and E-commerce: A Review* (May 27, 2024).

Ravi, V., & Kamaruddin, S. (2017). Big data analytics enabled smart financial services: Opportunities and challenges. In *Big Data Analytics: 5th International Conference, BDA 2017, Hyderabad, India, December 12-15, 2017, Proceedings* (Vol. 5, pp. 15-39). Springer International Publishing.

Razak, I. (2024). Augmented reality marketing: Enhancing customer experience through latest technology. *Jurnal Multidisiplin Sahombu, 4*(01), 10-17.

Runaite, D. (2021). *How will voice search optimisation aid or limit digital marketing? An end-user perspective* (Doctoral dissertation, Dublin, National College of Ireland).

Shah, S. (2018). *Product marketing in the era of internet of things* (Doctoral dissertation, Massachusetts Institute of Technology).

Singh, M., & Singh, S. K. (2023). Augmented reality (AR) in digital marketing: Enhancing customer experiences and bridging the gap. In Exploring the art of digital marketing (pp. 83-96).

Sirothiya, M., Tiwari, N., Khan, P. A., & Sukmana, R. (2024). Artificial intelligence and blockchain technology in banking: Bibliometric analysis. In *Applications of Block Chain technology and Artificial Intelligence: Lead-ins in Banking, Finance, and Capital Market* (pp. 89-104). Cham: Springer International Publishing.

Taylor, M., Reilly, D., & Wren, C. (2020). Internet of things support for marketing activities. *Journal of Strategic Marketing, 28*(2), 149-160.

Turban, E., Outland, J., King, D., Lee, J. K., Liang, T. P., Turban, D. C., ... & Turban, D. C. (2018). Mobile commerce and the internet of things. In *Electronic Commerce 2018: A Managerial and Social Networks Perspective* (pp. 205-248).

Wedel, M., Bigné, E., & Zhang, J. (2020). Virtual and augmented reality: Advancing research in consumer marketing. In*ternational Journal of Research in Marketing, 37*(3), 443-465.

Zahid, H., Mahmood, T., Morshed, A., & Sellis, T. (2019). Big data analytics in telecommunications: Literature review and architecture recommendations. *IEEE/CAA Journal of Automatica Sinica, 7*(1), 18-38.