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Unveiling the Role of Artificial Intelligence: Navigating Personalized Content Marketing, Customer Engagement, and Commitment with Data Transparency and Security

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ABSTRACT

This empirical and quantitative study delves into the complex interplay between personalized content marketing, customer engagement, artificial intelligence (AI), data transparency, security, and customer commitment in the healthcare sector. With the proliferation of digital technologies, organizations are increasingly turning to personalized content marketing strategies to enhance customer engagement and foster long-term commitment. This study investigates how AI serves as a mediator between the relationship of personalized content marketing and customer engagement, ultimately impacting customer commitment. Additionally, the moderating role of data transparency and security is explored to understand their potential to reinforce the link between personalized content marketing and customer engagement. Drawing from a sample of 231 respondents within the healthcare sector, data was collected using a structured questionnaire. The analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS SEM) via Smart PLS 4.0, enabling a robust assessment of the hypothesized relationships. The findings of this study offer significant insights into the role of AI in mediating the link between personalized content marketing and customer engagement, thereby influencing customer commitment. The results demonstrate the moderating effect of data transparency and security, indicating their capacity to strengthen the connection between personalized content marketing and customer engagement. These findings hold implications for healthcare organizations seeking to optimize their marketing strategies in the digital age, fostering deeper engagement and commitment among their customer base.

Keywords: Artificial Intelligence, Personalized Content Marketing, Customer Engagement, Customer Commitment, Data Transparency and Security
JEL Classifications: D83, M31, L86, G23, O33

1. INTRODUCTION

In the rapidly growing landscape of the healthcare sector, effective customer engagement has emerged as a crucial determinant of organizational success. Leveraging personalized content marketing strategies, healthcare organizations aim to establish deeper connections with their customers, fostering not only engagement but also long-term commitment. With the advent of advanced technologies, artificial intelligence (AI) has emerged as a pivotal enabler in enhancing customer interactions and experiences (Hanaysha et al., 2021). Concurrently, issues of data transparency and security have gained prominence, as customers become more cognizant of their data's usage (Amponsah, 2024; Sukkari, 2024). This research endeavors to explore the intricate dynamics within these elements by investigating the mediating role of AI and the moderating impact of data transparency and security on the relationship between personalized content marketing and customer engagement in the healthcare sector.

The UAE's healthcare landscape is witnessing transformative changes with the integration of digital technologies and innovative marketing approaches. As personalized content marketing gains traction as a strategic tool to tailor information and services to individual needs, understanding its link to customer engagement and commitment becomes paramount (Hanaysha and Alzoubi, 2022). However, the influence of AI, data transparency, and security on this relationship remains underexplored, particularly within the context of the UAE's healthcare industry. The mediating role of AI in facilitating personalized interactions, predictive analytics, and efficient service delivery can significantly impact customer engagement levels. AI's ability to customize content delivery, provide real-time responses, and anticipate customer preferences holds immense potential in shaping engagement experiences (Al-sa'di and Miller, 2023). Moreover, the moderating effects of data transparency and security on the personalized content marketing and engagement linkage warrant examination, considering the ethical implications surrounding data usage and privacy.

In light of these considerations, this study seeks to fill the existing research gap by investigating the mediating role of AI and the moderating effects of data transparency and security in the relationship between personalized content marketing, customer engagement, and commitment in the UAE healthcare sector. The outcomes of this research can offer valuable insights to healthcare organizations and marketers, aiding in the formulation of informed strategies that maximize customer engagement while maintaining data integrity and security. By shedding light on these dynamic interactions, this study contributes to the advancement of marketing theory and practice in the context of the evolving healthcare landscape of the UAE.

In the contemporary healthcare landscape of the United Arab Emirates (UAE), the strategic importance of customer engagement and commitment has escalated, prompting healthcare organizations to adopt personalized content marketing as a means to foster stronger connections with their clientele. This paradigm shift necessitates a comprehensive understanding of the factors that mediate and moderate the relationship between personalized content marketing and customer engagement, particularly in the context of the UAE's healthcare sector. Therefore, this study aims to address the gap in knowledge by examining the mediating and moderating roles of AI, data transparency, and security in shaping the relationship between personalized content marketing, customer engagement, and commitment. By unraveling these complexities, this research contributes to a more nuanced understanding of how healthcare organizations can effectively leverage AI and navigate data-related challenges to optimize customer engagement strategies and cultivate lasting commitment in the dynamic context of healthcare industry.

2. THEORETICAL FRAMEWORK

2.1. Personalized Content Marketing

According to (Petrescu et al., 2022), at the core of personalized content marketing lies the principle of customer-centricity, which emphasizes the importance of understanding and meeting the specific desires and expectations of individual customers. This perspective aligns with the idea that customers are more likely to engage with and respond positively to content that resonates with their personal interests and needs. It is evident theoretically that, building upon the foundation of customer-centricity, personalized content marketing draws heavily from segmentation and targeting theories (Chandra et al., 2022). Prior studies has highlighted the significance of dividing customer populations into distinct segments based on demographic, psychographic, and behavioral characteristics (Alshurideh et al., 2023). By identifying these segments, marketers can tailor content to align with the preferences and behaviors of each group. Personalized content marketing also finds theoretical support in the realm of relationship marketing, which posits that building strong and enduring relationships with customers is vital for long-term business success. Customized content fosters a sense of individual attention and care, reinforcing positive relationships and enhancing customer loyalty.

2.2. Customer Engagement

Customer engagement refers to the depth and quality of interactions between customers and a brand, encompassing emotional, cognitive, and behavioral dimensions. According to (Ballester et al., 2021), Service-dominant logic the co-creation of value between customers and brands. Engaged customers are seen as active participants in value creation, collaborating with brands to shape their experiences and outcomes. Customer engagement refers to the dynamic and multifaceted interaction between customers and a brand, encompassing a range of emotional, cognitive, and behavioral connections (Touni et al., 2020). It entails a reciprocal exchange of value, where customers actively participate in meaningful interactions with a brand, leading to increased emotional attachment, cognitive involvement, and committed actions. Rooted in theories of social exchange, emotional attachment, and cognitive processing, customer engagement reflects the extent to which customers invest their time, attention, and resources to connect with a brand, ultimately driving loyalty, advocacy, and a sense of belonging within a brand's community (Al Kurdi, 2024; Alshurideh, 2024).

2.3. Artificial Intelligence

Artificial Intelligence (AI) refers to the field of computer science and technology focused on the development of systems that can perform tasks that typically require human intelligence (Cao et al., 2020). These tasks include learning from experience, understanding natural language, recognizing patterns, making decisions, and solving complex problems (Akour et al., 2024; Nasim et al., 2022). AI systems utilize algorithms and data to simulate cognitive functions, enabling them to analyze, interpret, and respond to information, often surpassing human capabilities in terms of speed and accuracy (Alzoubi et al., 2022; Hirzallah and Alshurideh, 2023). AI encompasses various subfields, such as machine learning, natural language processing, computer vision, and robotics, and has applications across industries, from healthcare and finance to manufacturing and entertainment.

2.4. Customer Commitment

As highlighted by (Keiningham et al., 2015), customer commitment refers to the steadfast and enduring attachment that customers

develop toward a brand, product, or service, often characterized by their intention to continue engaging with and supporting the offering over the long term. Rooted in theories of relationship marketing and brand loyalty, customer commitment reflects a deep sense of dedication and loyalty that transcends transactional interactions. Engaged and committed customers are more likely to repurchase, recommend, and defend the brand, fostering a mutually beneficial relationship that can withstand competitive pressures and external influences (Guergov, 2022; Lariviere et al., 2014). This commitment is nurtured through positive experiences, consistent value delivery, and emotional connections, ultimately contributing to sustained business success and customer advocacy.

2.5. Data Transparency and Security

(Kavenius, 2020) defined data Transparency and Security refer to the practices and measures implemented to ensure the ethical and responsible handling of data, encompassing the openness, accessibility, and integrity of data usage while safeguarding it from unauthorized access, breaches, and misuse. Rooted in principles of privacy, ethics, and regulatory compliance, data transparency involves clear communication to individuals about how their data is collected, processed, and shared, enabling them to make informed decisions. According to (Khubrani, 2021), data security, on the other hand, entails the implementation of technical, organizational, and procedural safeguards to protect data from unauthorized access, loss, or alteration, aiming to maintain its confidentiality, availability, and integrity. Together, data transparency and security establish a foundation of trust between organizations and individuals, facilitating responsible data management and contributing to the ethical and sustainable use of information in various contexts.

3. LITERATURE REVIEW

3.1. Relationship and Impact of Personalized Content Marketing on Artificial Intelligence

Artificial intelligence has emerged as a transformative force in the realm of personalized content marketing (Mustak et al., 2021). Through sophisticated algorithms and data analytics, AI empowers marketers to analyze vast amounts of customer data, enabling the creation of highly tailored content that resonates with individual preferences and behaviors. This, in turn, enhances customer engagement by delivering content that is not only relevant but also timely and contextual (Kabiraj and Joghee, 2023). According to Khan (2021), the impact of AI on personalized content marketing is profound. AI-driven recommendation systems leverage user data to offer product suggestions, content recommendations, and personalized offers. These recommendations, backed by machine learning algorithms, continually refine their accuracy, leading to increased customer engagement as users discover relevant content effortlessly. Furthermore, AI allows for real-time adaptation, responding dynamically to user interactions and adjusting content delivery strategies to maximize engagement metrics.

Conversely, the impact of personalized content marketing on AI is equally significant investigated in one of the study of (Qasaimeh and Jaradeh, 2022). The demand for AI-driven solutions has been fueled by the need to process and interpret the massive volumes of data required for effective personalization. It is highlighted by, personalized content marketing generates invaluable user data that AI algorithms feed on, enabling them to become increasingly adept at predicting user preferences and behaviors. This feedback loop drives the evolution of AI algorithms, ultimately benefiting not only marketing endeavors but also AI applications in various other domains. Prior studies underscores the intricate and mutually beneficial relationship between personalized content marketing and artificial intelligence. AI amplifies the precision and reach of personalized content, amplifying customer engagement, while personalized content marketing, in turn, fuels the advancement of AI algorithms by providing essential data for learning and refinement. The evolving synergy between these two domains holds immense potential, with ethical considerations serving as a cornerstone for responsible and effective implementation. Based on the literature the following hypothesis have developed for current study:

H_{01}: Personalized Content Marketing has no statistical impact on Artificial Intelligence in Healthcare Sector UAE.

3.2. Relationship and Impact of Personalized Content Marketing on Customer Engagement

The relationship between personalized content marketing and customer engagement has been extensively explored in prior literature, highlighting the profound impact of tailored strategies on enhancing customer interactions and brand relationships. According to (Radwan and Farouk, 2021), personalized content marketing revolves around delivering content that resonates with individual preferences, behaviors, and needs. Prior studies consistently show that this approach leads to higher levels of customer engagement. By catering to specific interests and addressing pain points, personalized content captures the audience's attention and prompts deeper interactions. Previous research indicates that personalized content increases the time customers spend engaging with a brand's content. Whether it's personalized product recommendations, targeted emails, or individualized social media content, customers are more likely to linger, explore, and interact with content that aligns with their preferences (Al Ali, 2021).

Furthermore, personalized content marketing fosters a sense of connection and loyalty. Customers perceive brands that understand their needs as more attentive and caring. This emotional connection translates into higher engagement rates, as customers are not only more likely to engage with content but also to actively advocate for the brand within their networks. Several studies have also highlighted the positive impact of personalized content on conversion rates (Lammervo, 2021). By tailoring content to a customer's stage in the buying journey and providing relevant information, brands can guide customers toward making purchasing decisions. This demonstrates that personalized content marketing doesn't just drive engagement for engagement's sake but also contributes to tangible business outcomes (Neyara, 2022). However, it's important to note that while personalized content marketing holds immense promise, it must be executed thoughtfully. Ethical concerns regarding data privacy and the potential for over-personalization have been raised in the literature. Striking the right balance between customization and

privacy is crucial to maintaining customer trust and ensuring the sustainability of engagement efforts (Alkitbi et al., 2021). Based on the literature discussion a hypothesis have been developed below:

H_{02}: Personalized Content Marketing has no statistical impact on Customer Engagement in Healthcare sector UAE.

3.3. Relationship and Impact of Personalized Content Marketing with its dimensions Personal Preferences, Time and Delivery, and Location and Environment

The dimensions of Personalized Content Marketing, Personal Preferences, Time and Delivery, and Location and Environment have been extensively explored in prior literature, showcasing the Personalized Content Marketing that caters to individual preferences has been consistently shown to lead to higher levels of customer engagement (Shahid and Ayaz, 2018). Prior literature highlights that delivering content aligned with users' interests and past behaviors fosters a sense of relevance and connection. Brands that understand and respond to customers' unique preferences through tailored recommendations, product suggestions, and content are more likely to capture attention and encourage deeper interactions. As suggested by Ibrahim (2022), this approach not only enhances engagement but also contributes to brand loyalty and advocacy.

The timing and delivery of personalized content have a substantial impact on customer engagement, as supported by prior research. Studies reveal that delivering content when customers are most likely to be active and receptive significantly boosts engagement metrics. Tailoring content distribution to users' time zones, browsing habits, and even device usage patterns enhances the likelihood of content being seen and interacted with (Qasaimeh and Jaradeh, 2022). Moreover, the immediate availability of content when customers are seeking information or solutions increases the chances of capturing their attention and encouraging meaningful engagement.

Previously, a research emphasizes the role of location and environment in shaping personalized content marketing's impact on engagement (Ghazal et al., 2021). Localized content that considers customers' geographical context, cultural nuances, and environmental factors demonstrates higher resonance and engagement. For instance, content that reflects local events, holidays, or language preferences is more likely to capture users' attention (Chandra et al., 2022). Additionally, content tailored to specific locations or environments enhances relevance and encourages users to interact and share, thereby amplifying engagement and extending content reach. The dimensions of Personalized Content Marketing; Personal Preferences, Time and Delivery, and Location and Environment all contribute significantly to customer engagement, as evidenced by prior research. By catering to individual preferences, optimizing content delivery timing, and considering contextual factors, brands can establish deeper connections with customers, increase interaction rates, and foster long-term loyalty. The holistic integration of these dimensions allows marketers to create a more impactful and tailored engagement strategy, aligning marketing efforts with customers' needs and behaviors. Based on the above literature author has developed following hypothesis:

H_{02a}: Personal Preferences has no statistical impact on Customer Engagement in Healthcare sector UAE

H_{02b}: Time and Delivery has no statistical impact on Customer Engagement in Healthcare sector UAE

H_{02c}: Location and Environment has no statistical impact on Customer Engagement in Healthcare sector UAE.

3.4. Relationship and Impact of Artificial Intelligence on Customer Engagement

Various studies consistently demonstrates that AI-driven personalization significantly enhances customer engagement (Alzoubi and Aziz, 2021). AI algorithms analyze vast amounts of customer data to discern patterns, preferences, and behaviors, enabling businesses to deliver content and experiences that resonate with individual customers. By tailoring recommendations, offers, and interactions, AI-powered systems foster a deeper sense of relevance, capturing customer attention and encouraging prolonged engagement. As highlighted by (Alzoubi et al., 2022), AI's ability to predict customer behaviors and preferences based on historical data empowers businesses to engage customers proactively. Predictive analytics, as highlighted in previous research (Farouk, 2021), enable timely interventions and proactive interactions. This anticipatory engagement, where businesses address customer needs before they arise, not only demonstrates attentiveness but also cultivates a stronger emotional connection, resulting in higher engagement levels.

The integration of AI-driven chatbots and virtual assistants in customer support has revolutionized engagement. Prior literature indicates that AI-powered chatbots can provide immediate responses to customer queries, streamline issue resolution, and offer personalized assistance around the clock. These interactions improve customer satisfaction, increase engagement with the brand, and elevate the overall customer experience. AI's capacity to process and analyze vast volumes of data provides businesses with profound insights into customer behaviors and preferences. Previous studies show that this deeper understanding translates to more effective engagement strategies (Farouk, 2021). By identifying trends and patterns, businesses can craft content and offers that align with customer expectations, leading to heightened engagement and conversion rates. AI's role in content optimization is well-documented in the literature. Dynamic content creation and A/B testing enabled by AI contribute to improved engagement rates. AI algorithms continually assess and optimize content elements, such as headlines, images, and layouts, ensuring that customers receive content that resonates with their preferences and maximizes engagement.

While the potential of AI in customer engagement is promising, literature also highlights the importance of ethical considerations. Transparency in AI processes, data usage, and privacy protection is critical to maintaining customer trust (Lee and Ahmed, 2021). Research underscores that customers are more likely to engage when they understand how AI impacts their interactions and how their data is being utilized. In conclusion, prior literature emphasizes the strong positive relationship between Artificial Intelligence and customer engagement (Ramakrishna and Alzoubi, 2022). AI's ability to enhance personalization, anticipate customer

needs, provide efficient support, offer data-driven insights, optimize content, and address ethical concerns collectively contribute to a holistic approach that fosters deeper connections, increased interaction rates, and improved customer loyalty. As businesses continue to leverage AI (Alshurideh et al., 2023), understanding these dynamics is paramount to developing effective engagement strategies that align with evolving customer expectations.

H_{03}: Artificial Intelligence has no statistical impact on Customer Engagement in Healthcare sector UAE

3.5. The relationship and Impact of Personalized Content Marketing on Customer Engagement with Mediating Effect of Artificial Intelligence

Personalized content marketing has emerged as a powerful strategy for enhancing customer engagement in the digital age. By tailoring marketing messages, recommendations, and experiences to individual preferences and behaviors, businesses can create more relevant and appealing interactions with their customers. This approach has been further amplified by the integration of Artificial Intelligence (AI), which facilitates the efficient analysis of vast amounts of data and enables real-time customization. The impact of personalized content marketing on customer engagement, with AI as a mediating factor, has been extensively explored in past researches. According to (Lammervo, 2021), personalized content marketing enables businesses to deliver messages and offers that align with customers' interests, needs, and past behaviors. This high level of relevance fosters a stronger emotional connection between the customer and the brand. AI plays a pivotal role in identifying patterns and preferences from customer data, enabling the delivery of content that resonates with individual users.

As investigated by (Kurdi et al., 2022), customized content enhances the overall customer experience by providing value and solutions specific to each customer. This positive experience not only increases customer satisfaction but also encourages repeat interactions. AI-driven algorithms can analyze customer behavior, browsing history, and demographic information to predict what content or products will appeal most to each individual, contributing to an improved experience. One of the study by (Ng et al., 2020) discussed, personalization, when executed effectively, leads to higher engagement rates as customers are more likely to interact with content that speaks directly to their interests. This can include personalized product recommendations, tailored emails, or dynamically generated website content. AI's ability to process data at scale helps identify content that drives the most engagement, further optimizing the personalization strategy. (Wong et al., 2015) research suggests that personalized content marketing positively influences conversion rates. By presenting customers with relevant offers and information, businesses can guide them through the sales funnel more effectively. AI, through machine learning algorithms, assists in predicting customer preferences and behaviors, thereby optimizing the conversion process.

In addition, personalization fosters a sense of being understood and valued by the brand, which can lead to increased brand loyalty and advocacy. Satisfied customers are more likely to become brand advocates, sharing their positive experiences with others. AI-powered personalization contributes to this by consistently delivering content that aligns with customers' evolving preferences. According to (Mustak et al., 2021), AI-driven personalized content marketing generates valuable insights into customer behavior and preferences. These insights can be used to refine marketing strategies, develop new products, and improve customer service. The feedback loop created by AI-mediated personalization allows businesses to continuously learn and adapt to changing customer dynamics. The deep analysis of prior studies can be concluded as personalized content marketing, when integrated with AI technology, has significant impact on customer engagement (Syam and Sharma, 2018). The mediation of AI enhances the effectiveness of personalization by enabling data analysis, pattern recognition, and real-time adaptation. As technology continues to evolve, businesses that leverage personalized content marketing with AI stand to gain a competitive advantage in building lasting customer relationships and driving business growth. Based on the above discussion following hypothesis have been developed:

H_{04}: Personalized Content Marketing has no statistical impact on Customer Engagement with mediating effect on Artificial Intelligence in Healthcare sector UAE.

3.6. Moderating Effect of Data Transparency and Security on the Relationship between Personalized Content Marketing and Customer Engagement

Prior studies suggest that data transparency plays a significant role in shaping customer perceptions of personalized content marketing efforts. When customers have a clear understanding of how their data is being collected, used, and protected, they are more likely to trust the brand (Ozturk, 2024; Zahra, 2024). Transparent communication about data practices can lead to increased confidence in the personalized content provided, thereby positively influencing customer engagement. As investigated by (Kanchan et al., 2015), the perceived security of personal data is closely linked to customer engagement. Research indicates that customers are more willing to engage with personalized content when they feel their data is adequately protected from unauthorized access or breaches. Strong data security measures can alleviate concerns about privacy and encourage customers to interact more freely with personalized marketing initiatives.

(Ghazal, 2021) Argued, privacy concerns are known to influence customer engagement with personalized content. When customers perceive that their data is not being handled securely or ethically, they may disengage or even actively avoid interacting with personalized marketing efforts. However, transparent data practices and robust security measures can mitigate these concerns, allowing customers to engage with personalized content more confidently. Some studies suggest that the level of data transparency can moderate the relationship between personalized content marketing and customer engagement (Ng et al., 2020). Higher levels of transparency can amplify the positive impact of personalized content by reducing uncertainty and building trust. On the other hand, lower transparency levels might hinder engagement, especially if customers are uncertain about how their data is being utilized. Achieving the right balance between personalized content and data privacy is crucial. Research of (Chandra et al., 2022), indicates that customers appreciate tailored experiences but not at the expense of their privacy. Brands that can

demonstrate a commitment to data security and transparency while delivering relevant content are likely to see enhanced engagement levels. Based on the above discussion following hypothesis have been developed:

H_{o5}: There is no moderating effect of Data Transparency and Security on the relationship between personalized content marketing and customer engagement in Healthcare sector UAE.

3.7. Relationship and impact of Customer Engagement on Customer Commitment

Customer engagement refers to the emotional and psychological connection that customers have with a brand, while customer commitment refers to the dedication and loyalty a customer feels toward a brand. According to (Kashif et al., 2021), customer engagement often generates positive emotions, such as satisfaction, enjoyment, and a sense of belonging. These emotional experiences contribute to the development of customer commitment. Engaged customers are more likely to feel emotionally connected to a brand, which in turn increases their commitment to the brand. (Shahid and Ayaz, 2018) highlighted, engaged customers tend to trust the brand more and perceive it as reliable. This trust is a key factor in building customer commitment. When customers believe that a brand consistently meets their needs and expectations, they are more inclined to stay loyal over time.

Engaged customers actively participate in various brand-related activities, such as making purchases, providing feedback, and sharing experiences. These repeated interactions create habitual behavior patterns that reinforce commitment. Engaged customers are more likely to continue these interactions, solidifying their commitment to the brand or service. This reduced intention to switch stems from the strong emotional attachment and satisfaction derived from the engagement. As a result, customer commitment is positively influenced by the engagement's effect on reducing switching behaviors. It has explored by (Keiningham et al., 2017), customer engagement is more likely to share their positive experiences with others, leading to positive word-of-mouth marketing and brand advocacy. This advocacy reflects a higher level of commitment as customers actively promote the brand to their social circles. Based on the above discussion following hypothesis has been developed:

H_{o6}: Customer Engagement has no statistical impact on Customer Commitment in Healthcare sector UAE. The research model is presented in Figure 1.

4. METHODOLOGY

This research focuses on assessing the perceptions and attitudes of managerial and IT department staff in 22 hospitals located in Dubai, UAE, regarding the personalized content marketing and its impact on customer engagement and commitment. An online questionnaire consisting of 33 items was developed and distributed online to the managerial and IT departments of the selected hospitals. The questionnaire employed a 5-point Likert scale to measure respondents' agreement levels with each item. A sample size of 231 participants was drawn from the target population, reflecting a diverse range of roles and experiences within hospital management and IT. The study utilized the SmartPLS 4.0 software for data analysis, a powerful tool for Structural Equation Modeling (SEM) that is well-suited for exploring complex relationships among variables. The research employed rigorous methodologies to validate the questionnaire's construct validity. Convergent validity was assessed by examining the extent to which items within the same construct were positively correlated. Discriminant validity was also examined to ensure that items measuring different constructs were less correlated, indicating distinct concepts. Upon establishing the validity of the questionnaire, the study proceeded with hypothesis testing. Hypotheses were formulated based on prior literature and the expected relationships between the variables under investigation. The collected data was then analyzed using SmartPLS 4.0, allowing for a comprehensive assessment of the proposed hypotheses.

5. DATA ANALYSIS

5.1. Demographic Data

The research survey incorporated a comprehensive demographic analysis to capture a nuanced understanding of the study's participants. In Table 1 by examining key demographic factors such as age, gender, and professional status, the study aimed to gain insights into the diverse perspectives and experiences of the surveyed individuals. The findings showed a high ratio of male respondents 68%, female respondents are 32%. Most of the respondents were from the age above 36 years.

5.2. Measurement Model Assessment

By employing SmartPLS 4.0, we were able to assess both the measurement and structural models, thereby elucidating the latent constructs' underlying dimensions and interactions. The iterative process involved in model estimation allowed us to refine and validate the model, ensuring robustness in our findings. Through this method, we sought to unravel the multifaceted connections between variables, uncover causal pathways, and quantify the strength and significance of these relationships. The utilization of SmartPLS facilitated a thorough examination of our research hypotheses, enabling a deeper understanding of the underlying dynamics and contributing to the advancement of knowledge in our study area.

As directed in Table 2, the present study model is composed of 33 items drawn from the five variables and three dimensions. This study model's dependability is evaluated using Cronbach's alpha (Hair et al., 2016). According to Hair et al. (2016), Cronbach's

Table 1: Demographic statistics

Title	Description	Frequency	Percentage
Gender	Male	158	68.39
	Female	73	31.61
Age	18-25 year	24	10.39
	26-35 year	95	41.12
	36 and above	112	48.49
Job Status	IT and Development Manager	88	38.09
	Technical Team Lead	92	39.82
	Administrative Officer	51	22.09
Total		231	100%

N=231

alpha values of >0.7 are considered adequate. All Cronbach's alpha values are greater than 0.7, as shown in Table 2. The convergent validity of the current research model is assessed using the composite reliability (CR) and average variance extract (AVE) (Hair et al., 2016). According to experts, the CR and AVE values (for each construct) should be higher than 0.7 and 0.5, respectively. All CR and AVE values satisfy the acceptance criteria, as shown in Table 2.

5.3. Discriminant Validity

The discriminant validity analysis conducted through the Partial Least Squares Structural Equation Modeling (PLS-SEM) method revealed several significant relationships between research constructs. Notably, the correlation coefficients between each pair of constructs were found to be lower than the square roots of the Average Variance Extracted (AVE) values for each construct. This indicates that the constructs are distinct from one another and provides evidence for discriminant validity.

In Table 3 for the HTMT criterion, the recommended threshold for discriminant validity is generally considered to be 0.85. This criterion directly compares the correlations between constructs (Heterotrait relationships) to the correlations between items measuring the same construct (Monotrait relationships). If the HTMT value for a pair of constructs is below 0.85, it indicates acceptable discriminant validity. The output values of our analysis indicated a significant relationship among constructs, as they have acceptable discriminant validity.

Table 2: Convergent Validity, VIF, CA, CRc and AVE

Construct	Items	VIF	Cronbach's Alpha	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Personalized Content Marketing (PCM)	PCM1	1.443	0.761	0.843	0.553
	PCM2	1.652			
	PCM3	2.987			
	PCM4	1.435			
Personal Preference (PP)	PP1	1.457	0.882	0.826	0.532
	PP2	1.377			
	PP3	2.021			
Time and Delivery (TD)	TD1	1.302	0.776	0.935	0.664
	TD2	1.766			
Location and Environment (LE)	LE1	1.534	0.834	0.872	0.733
	LE2	1.459			
	LE3	2.901			
Artificial Intelligence (AI)	AI1	1.852	0.851	0.824	0.621
	AI2	2.454			
	AI3	1.674			
	AI4	1.346			
	AI5	1.998			
	AI6	1.553			
Customer Engagement (CE)	CE1	1.702	0.725	0.802	0.539
	CE2	1.279			
	CE3	1.434			
	CE4	2.877			
	CE5	1.692			
Customer Commitment (CC)	CC1	2.067	0.869	0.950	0.649
	CC2	1.868			
	CC3	1.352			
	CC4	1.547			
	CC5	1.789			
Data Transparency and Security (DTS)	DTS1	1.545	0.831	0.882	0.654
	DTS2	2.575			
	DTS3	2.678			
	DTS4	1.567			
	DTS5	1.785			

CA: Cronbach's alpha, CR: Composite reliability, AVE: Average variance extracted, VIF: Variance inflation factor
CA>0.7, CR>; AVE>0.5, significance Level at <0.05**

Table 3: Heterotrait Monotrait-Ratio (HTMT)

	1	2	3	4	5	6	7	8
Artificial Intelligence (AI)								
Customer Commitment (CC)	0.736							
Customer Engagement (CE)	0.787	0.617						
Data Transparency and Security (DTS)	0.534	0.803	0.803					
Location and Environment (LE)	0.891	0.753	0.728	0.404				
Personal Preference (PP)	0.721	0.637	0.616	0.666	0.781			
Personalized Content Marketing (PCM)	0.702	0.692	0.588	0.722	0.675	0.674		
Time and Delivery (TD)	0.511	0.545	0.583	0.585	0.769	0.754	0.761	

Table 4 illustrates the Fornell-Larcker criterion method demonstrating highlighted value is meeting the benchmark. The Fornell-Larcker criterion suggests that the square root of the Average Variance Extracted (AVE) for each construct should be higher than the correlations between that construct and other constructs in the model. A commonly accepted threshold for discriminant validity is when the AVE's square root is greater than its highest correlation with other constructs.

5.4. Structured Equation Model

A Structural Equation Model (SEM) is a powerful statistical framework used to illustrate and analyze complex relationships between constructs in a theoretical model. In an SEM diagram, constructs are depicted as latent variables, which are not directly measurable but are inferred from observed variables. The relationships between these constructs are represented by arrows, indicating the direction and strength of their connections in Figure 2. Each arrow signifies a hypothesized causal or associative link between the constructs.

The Table 5 illustrate the statistical analysis results, that showed positive significant relationship in order to accept or reject our study hypothesis. PCM→AI β = 0.50, t = 12.04 indicating Ho1 is supporting. PCM→CE 0.606, t = 9.94 supporting the H_{o2}. The sub hypothesis explaining whether personal preferences have more ability to grab customer engagement, time and delivery of the service or suitable location and time. According to our study analysis the (PCM) dimension personal preferences have positive significant impact on customer engagement PP→CE β = 0.242, t = 5.61 depicted as accepted hypothesis H_{o2a}. The time and delivery statistically has positive significant impact on customer engagement TD→CE β = 0.414, t = 3.58 declared H_{o2b} as accepted hypothesis. Third dimension has proven as significant with β = 0.226, t = 3.61 shows a positive significant relationship. Thus, H_{o2c} is accepted in this study. H_{o3} has also accepted in this study as AI→CE path coefficient is β = 0.228, t = 1.87. The independent variable, personalized content marketing (PCM), demonstrates a significant influence on the mediating variable, artificial intelligence (AI), PCM→AI→CE with a path coefficient of 0.403. This indicates that as personalized content marketing strategies are employed, there is a positive and noteworthy impact on the adoption and integration of artificial intelligence technologies. The statistical significance of the path coefficient (t-value = 3.37) supports the robustness of the observed relationships, indicating that the relationships between personalized content marketing, artificial intelligence, and customer engagement are unlikely to occur unintended. The lower and upper confidence interval bounds (LCI = 0.256 and UCI = 0.683) provide a range within which

Table 4: Fornell-Larcker criterion

	1	2	3	4	5	6	7	8
Artificial Intelligence (AI)	0.743							
Customer Commitment (CC)	0.577	0.729						
Customer Engagement (CE)	0.622	0.711	0.814					
Data Transparency and Security (DTS)	0.736	0.605	0.626	0.856				
Locaion and Environment (LE)	0.650	0.533	0.613	0.810	0.788			
Personal Preference (PP)	0.608	0.566	0.511	0.594	0.484	0.734		
Personalized Content Marketing (PCM)	0.580	0.543	0.597	0.649	0.506	0.681	0.805	
Time and Delivery (TD)	0.677	0.607	0.467	0.822	0.505	0.597	0.559	0.808

Figure 1: Research model

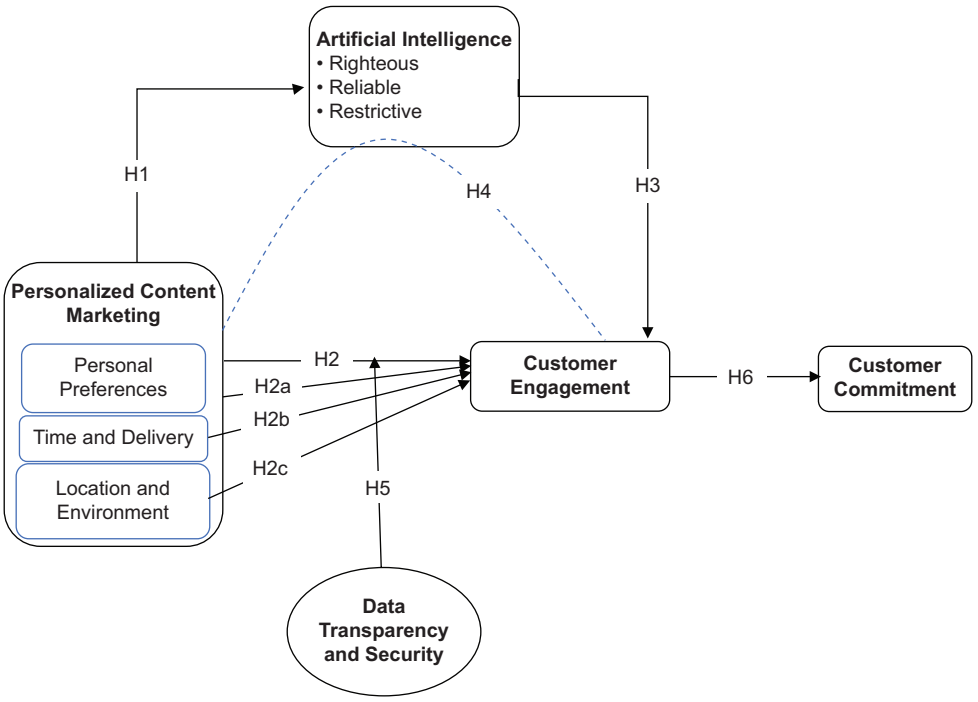
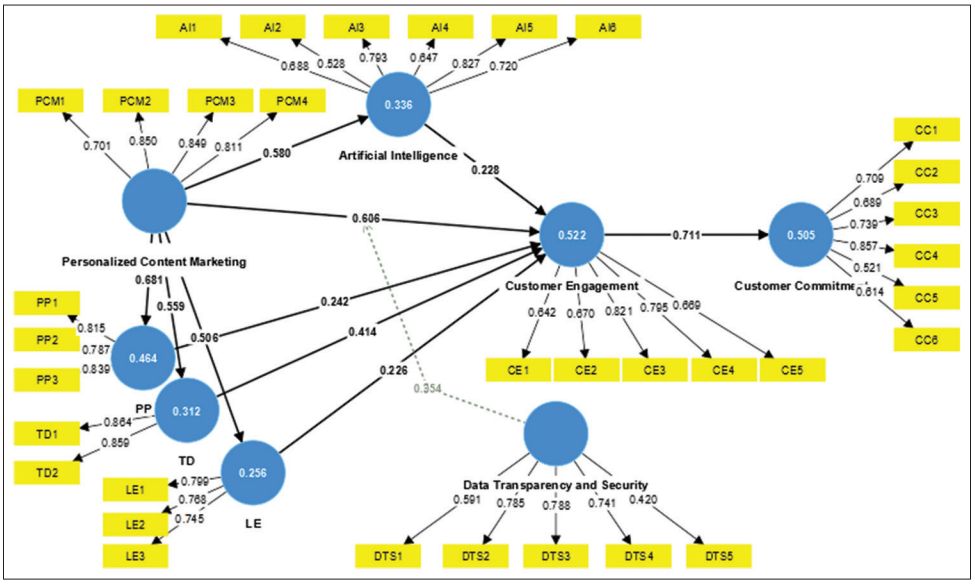


Table 5: Hypothesis testing

H	Relationship	Coefficients	R^2	t-value	P-value	LCI 2.5%	UCI 97.5%	Significant
Direct Effect								
H_{o1}	PCM→AI	0.580	0.336	12.04	0.000			Yes
H_{o2}	PCM→CE	0.606	0.522	3.942	0.001			Yes
H_{o2a}	PP→CE	0.242		5.621	0.000			Yes
H_{o2b}	TD→CE	0.414		3.581	0.000			Yes
H_{o2c}	LE→CE	0.226		3.614	0.002			Yes
H_{o3}	AI→CE	0.228		1.870	0.001			Yes
H_{o6}	CE→CC	0.711	0.505	2.581	0.001			Yes
Mediating Effect								
H_{o4}	PCM→AI→CE	0.403		3.376	0.000	0.256	0.683	PM
Moderating Effect								
H_{o5}	PCM*DTS→CE	0.354		2.542	0.000	0.141	0.732	Yes

PCM: Personalized content marketing, AI: Artificial intelligence, CE: Customer engagement, CC: Customer commitment, PP: Personal preferences, TD: Time and delivery, LE: Learning environment. Significant at: $P<0.05$, NS: Not significant, PM: Partial mediation
Source: Authors' calculation

Figure 2: Structured model



the true population parameter is likely to lie, suggesting a strong confidence in the estimated path coefficient.

5.5. Mediating Effect

The positive path coefficient of 0.344 signifies that as personalized content marketing efforts increase, AI's mediating role further amplifies the impact on various dimensions of customer engagement. This implies that when AI is leveraged effectively to mediate between personalized content marketing and customer engagement, the engagement levels of customers are likely to rise significantly. The corresponding t-value of 4.16 underscores the statistical robustness of this finding, lending confidence to the interpretation of the relationship as shown in Figure 3.

5.6. Moderating Effect

When considering the personalized content marketing dimensions, the path coefficient of 0.354 with a t-value of 2.54 suggests a positive and significant relationship between personalized content marketing and customer engagement as shown in Figure 4. This indicates that as personalized content marketing efforts increase, customer engagement tends to strengthen. However, this relationship's strength is moderately influenced by the level of data transparency and security. On the other hand, when evaluating the relationship without taking personalized content marketing dimensions into account, the path coefficient of 0.317 with a higher t-value of 7.01 demonstrates a stronger and more significant connection between personalized content marketing and customer engagement. In this context, the moderating effect of data transparency and security seems to diminish the strength of the relationship between personalized content marketing and customer engagement.

6. DISCUSSION

The empirical evidence does suggest that personalized content marketing can lead to increased customer engagement. Tailoring content to individual preferences and behaviors appears to resonate with audiences, resulting in higher click-through rates, longer time spent on platforms, and, in some cases, enhanced conversion rates. This aligns with the notion that relevance drives engagement, as users are more likely to engage with content that directly

Figure 3: Structural model (mediating effect)

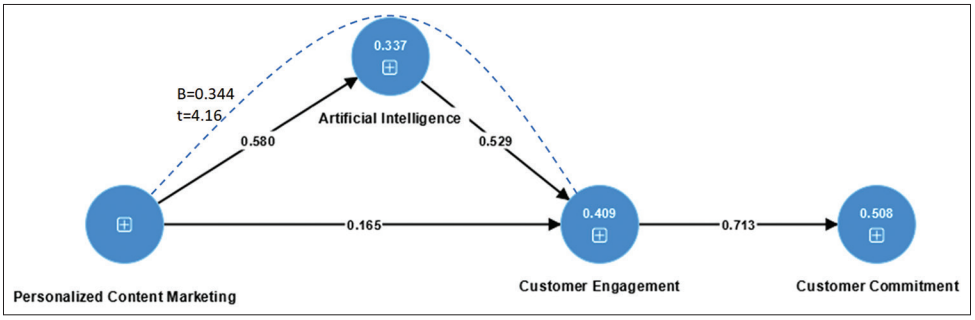
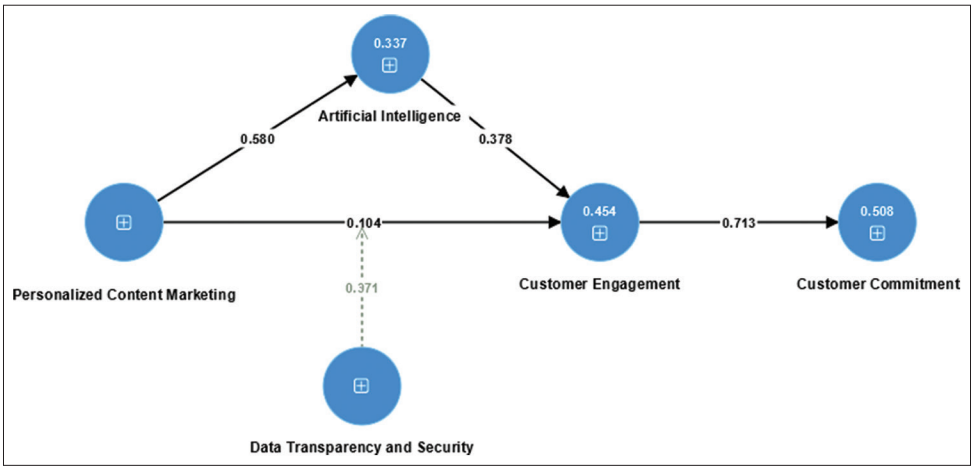


Figure 4: Structural model (moderating effect)



addresses their interests and needs. Moreover, the statistical investigation of the mediating role of AI in this relationship signifies the recognition of AI's potential to enhance personalized interactions and tailor content to individual preferences. This aspect of the study adds depth to the understanding of how AI-driven customization influences customer engagement and, in turn, customer commitment. Statistical techniques like Partial Least Squares Structural Equation Modeling (PLS SEM) allow for the estimation of direct and indirect effects, aiding in the identification of AI's mediating impact. However, the mediating effect of AI warrants careful scrutiny. While AI has the capability to personalize content, its efficacy in creating genuine emotional connections that lead to customer commitment needs to be explored further. The complexity lies in distinguishing between algorithmically generated personalization and the kind of human-to-human interaction that genuinely resonates with customers.

Regarding the moderating effects of data transparency and security, the analysis adds a layer of ethical and privacy considerations to the study. These moderating factors indicate the importance of establishing a sense of trust and confidence among customers, particularly in the age of data breaches and privacy concerns. Statistical analysis can reveal whether data transparency and security indeed amplify the positive relationship between personalized content marketing, customer engagement, and commitment. Yet, it is crucial to acknowledge that transparency and security are multifaceted concepts that can be challenging to quantify and operationalize accurately. The statistical analysis of the mediating role of AI and the moderating effects of data transparency and security in the relationship between personalized content marketing, customer engagement, and commitment offers valuable intuitions. However, it's important to approach the analysis with a nuanced understanding of the multifaceted nature of AI, data transparency, and security. A thorough interpretation of our study findings consider the parallel outcomes to the literature and prior studies.

Furthermore, the impact of the three personalized content marketing dimensions personal preferences, time and delivery, and location and environment on customer engagement is a multifaceted dynamic that significantly influences how customers interact with product or service. The dimension of personal preferences refers to tailoring content based on individual customer likes, dislikes, interests, and purchasing behaviors. When businesses effectively align their marketing messages with a customer's preferences, it creates a sense of relevance and connection. Customers are more likely to engage deeply when they feel that a brand understands and caters to their unique tastes. This can lead to increased interaction with marketing materials, higher levels of brand loyalty, and a stronger emotional bond with the brand. The dimension of time and delivery involves delivering content to customers at the right time and through their preferred channels. Recognizing when customers are most receptive to marketing messages and ensuring that content reaches them through their preferred communication channels enhances engagement.

Additionally, the location and environment dimension involve tailoring content to suit the physical or virtual spaces where

customers engage with it. This could mean adapting marketing messages to fit a specific geographical location or considering the context in which customers access the content (e.g., at home, during their commute, or while shopping). When content aligns with the customer's environment, it creates a seamless and immersive experience. This can lead to higher engagement levels, as customers are more likely to respond positively to content that feels attuned to their surroundings.

Based on the statistical findings and the comparison of path coefficients, it is evident that the "Time and Delivery" dimension holds the highest impact on customer engagement, as indicated by the substantial beta value of 0.414. This suggests that the timing and manner in which content is delivered play a significant role in driving customer engagement. In comparison, the "Personal Preferences" dimension, with a beta value of 0.242, and the "Location and Environment" dimension, with a beta value of 0.226, exhibit lower impacts (Table 4). While personal preferences and environmental factors do contribute to engagement, the notably higher beta value for "Time and Delivery" underscores its greater influence in shaping customer engagement outcomes.

Collectively, these personalized content marketing dimensions play a pivotal role in shaping customer engagement. By catering to individual preferences, delivering content at the right time and through preferred channels, and considering the customer's environment, businesses can foster a deeper connection with their audience. This deeper connection often translates into increased interaction, stronger loyalty, and a more favorable perception of the brand. As a result, businesses that master these personalized content marketing dimensions are better poised to cultivate lasting relationships with customers and achieve their marketing objectives.

7. CONCLUSION

In conclusion, the empirical research conducted on the interplay of artificial intelligence (AI), data transparency and security, personalized content marketing, customer engagement, and customer commitment sheds light on the intricate dynamics that shape modern marketing strategies. This study has successfully unraveled the complex relationships between these variables and provided insights into their combined influence on achieving lasting customer commitment. The findings of the research reveal that AI plays a pivotal mediating role between personalized content marketing and customer engagement. The capabilities of AI in tailoring content, predicting preferences, and enhancing user experiences have been demonstrated to significantly amplify customer engagement levels. This underscores the potential of AI as a transformative tool in forging stronger connections with customers, eventually leading to increased commitment.

Furthermore, the moderating effects of data transparency and security within this context highlight their indispensable role in reinforcing the relationship between personalized content marketing, customer engagement, and commitment. The empirical analysis showcases that when customers perceive transparent data practices and robust security measures, their engagement is not only heightened but also more likely to translate into long-term commitment. Moreover, this research contributes to both theory and practice by shedding light on the intricate mechanisms through which AI, data transparency, and security interact with personalized content marketing to shape customer engagement and commitment in the healthcare sector. The results underscore the need for organizations to harness the potential of AI while ensuring transparency and security, in order to cultivate lasting and meaningful relationships with their customers.

7.1. Practical Implications

Healthcare organizations can leverage AI to create personalized content that aligns with patients' needs, preferences, and medical histories. This study highlights the potential for AI to mediate the relationship between content marketing and engagement, allowing for more tailored and effective patient communication. Establishing transparent data practices and robust security measures will enhance patient trust. Healthcare providers should communicate clearly about how patient data is collected, stored, and used, thereby fostering an environment of transparency and data security. Understanding the moderating effect of data transparency and security can guide healthcare marketers in optimizing engagement strategies. By prioritizing transparency and security, they can create a conducive environment for patients to actively engage with personalized content.

7.2. Limitations and Future Work

Firstly, the empirical research is conducted in the specific context of healthcare. The findings might not fully apply to other industries due to variations in customer behavior, technology adoption, and ethical considerations. Secondly, the study's focus on a particular region or sector could limit the diversity of responses. Future research should aim for broader geographic and industry representation to enhance the external validity of the findings. Thirdly, the study adopts a cross-sectional design, capturing data at a specific point in time. A longitudinal approach could provide insights into the causal relationships and changes over time.

Researchers should replicate this study in different industries to determine if the relationships established hold consistently across various contexts. Conducting a longitudinal study would enable researchers to capture the temporal dynamics of how AI-mediated engagement and data transparency interact with customer engagement and commitment. It is also suggested to extend the study to explore how AI-mediated engagement and data transparency operate across various digital platforms, considering the rise of social media and mobile apps.

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