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BEYOND ADOPTION: UNPACKING THE DIRECT IMPACT OF AI UPON MARKETING ADVANCEMENT: MODERATING ROLE OF TECHNICAL CAPABILITIES

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KEYWORDS

Compatibility, Relative advantage, Complexity, Perceived Usefulness, Tangibility, Anthropomorphism, Cost effectiveness, Marketing Practices, Technical Capabilities, AI Adoption

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ABSTRACT

The present research examines inputs of compatibility, relative advantage, complexity, perceived usefulness, perceived ease of use, anthropomorphism, tangibility, and cost effectiveness in determining advancement of marketing practices in Pakistan, with moderating input from technical capabilities, and the mediating input from AI adoption. With quantitative research approach, the study used a questionnaire survey as primary data to conduct the analysis. The study used the convenience sampling technique to collect 384 responses from operations and marketing managers of pharmaceutical companies of Karachi, Pakistan, and utilized the structural equation model (SEM) as a statistical technique to perform the analysis using SMART PLS. The study found that AI adoption significantly advances marketing practices. The key factors like anthropomorphism, compatibility, complexity, cost effectiveness, perceived use, relative advantage, and technical capabilities all significantly influence both AI adoption and advancement of marketing. The study found AI adoption significantly advances marketing practices, driven by factors like anthropomorphism, compatibility & perceived ease of use. Still, the blend of AI adoption and technical proficiencies showed no significant influence. Interestingly, perceived usefulness did not impact adoption but did augment marketing outcomes.

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INTRODUCTION

Research unswervingly highlights that AI-based marketing solutions and advance practices boost business profitability over vital attributes. Their efficiency is driven by computability, relative advantage and perceived usefulness/usability, that help bring into line the customer expectations with tangible outcomes (Malhotra & Ramalingam, 2025; Chen, Li, & Chen, 2021; Belanche, Casaló & Flavián, 2019). Explicit traits like anthropomorphism & cost- effectiveness

further help in overpowering marketing tasks (Alshurideh, Kurdi & Salloum, 2019). Though the efficacious application of AI heavily depends upon technical competencies, while strong IT infrastructure and skilled personnel capitalize on AI's potential (Na, Heo, Han, Shin & Roh, 2022; Glikson & Woolley, 2020), a deficiency in technical aptitude can misalign AI abilities and impede successful amalgamation (Huang & Rust, 2021). The literature discloses a lack of clear understanding regarding the AI's capabilities, leading to misconceptions as well as integration challenges that complicate marketing workflows (Nam, Dutt, Chathoth, Daghfous & Khan, 2021).

The AI enables effective data application, resistance to change persists in traditional practices, highlighting AI's importance in addressing advancement barriers, potentially moderated by technical abilities (Alshurideh, Kurdi & Salloum, 2019). Despite active investigation, untapped dimensions remain about adoption barriers in advancing marketing solutions and outcomes (Payne, Peltier & Barger, 2018). The relative advantage of AI tools increases the adoption rates and marketing outcomes (Glikson & Woolley, 2020). However, perceived usefulness and ease of use remain undermined amid the practitioners, requiring clearer demonstration of relative advantage to overcome complexity in adoptability (Alhashmi, Salloum & Mhamdi, 2019). AI solutions demonstrate compatibility that enhances the adoptability and improves marketing outcomes (Na et al., 2022). It helps marketing students comprehend modern AI marketing phenomena, supports researchers in exploring untapped dimensions & adoption barriers. For marketers, it demonstrates the reputation of AI tools in advancing the practices and achieving viable outcomes through current trends. Finally, it guides the regulatory bodies, particularly in Pakistan, in sympathetic AI's role in shaping modern marketing practices to address emerging challenges.

Research Background

There are several studies conducted in Pakistan to examine the role of AI in the transformation of business practices, but they still face challenges in terms of infrastructure, awareness, and its adoptability among participants (Khan, Imran & Nadir, 2024). There is significant importance in the adoption of AI in Pakistan to bring about the reshaping of marketing practices and act as a catalyst to promote innovation, efficiency, and customer-centric strategies in advancement of marketing practices (Ahmed, 2022). The input of AI has been evolving in the case of Pakistan with the rapid adoption of AI-based solutions in business practices; however, the penetration rate and knowledge of AI practices are low (Haider, Zubair & Saleem, 2024). AI has emerged as a strategic tool in enabling marketers to collect, analyse, leverage vast amounts of consumer data in real time; however, the application of AI has still not found sufficient empowerment in marketing practices to fulfill its role in attainment of marketing goals (Obaid & Rashid, 2024). The input of the data-driven approach has led to enhanced decision-making and personalized customer experiences and optimization of marketing drives (Rahman, Ullah, Jalal & Yousafzai, 2024).

AI has found its transformative role in promotion of marketing practices to bring uniformity across organizations (Shahid & Li, 2019). The role of technical capabilities is found essential in the determination of the advancement of marketing practices. Pakistan is a country in the

process of transforming its marketing practices from traditional to digital ones; however still in a transition phase (Zaman, 2024). Literature, in Pakistan, has reported role of AI in determining the future of businesses; however, the significance of AI has not yet been significantly explored and needs further research-based investigation in the case of Pakistan (Haider et al, 2024). AI technologies range from the machine learning algorithms and natural language processing to predictive analytics and chatbots. Business practices are found in the transformative phase to engage marketers to gain interaction with the targeted audience (Hameed, Khurshid & Khan, 2023; Obaid & Rashid, 2024). Although literature has found studies on AI and its implications on business practices in Pakistan, it is still in its initial phase (Shahid & Li, 2019). Pakistan is a country with the immense potential for the AI-based solution on business practices and, most importantly, its role in advancing marketing practices with its diversified implications (Zaman, 2024).

An AI-based solution has been found with its potential to overcome cost burden on product structuring and pricing (Ahmed, 2022). AI-based solutions are cost-effective in the nature and encompass automation of solutions as per customer segmentation and targeting (Khan et al, 2024). AI has embedded power to provide customer-specific content and address customers' queries with the engagement (Rahman et al, 2024). AI-based solutions are found with enabling functions with hyper-personalization of content and application of dynamic pricing strategies (Zaman, 2024). The literature reveals a lack of clear understanding regarding AI's capabilities, leading to misconceptions, integration challenges that complicate marketing workflows (Nam et al., 2021). The organizations have adopted AI technologies, real challenge lies in translating adoption into tangible performance outcomes. AI tools can process vast datasets to identify consumer behavior patterns, optimize targeting strategies & automate campaign management. The resistance to change is one of advanced barriers in enabling AI-enabled data gadgets and applications, is moderated by technical acumen of employees (Alshurideh, Kurdi & Salloum, 2019).

There have been studies of this deficiency, but still more research is required to tap untapped and productive dimension barricading the advancement of effective marketing endeavours with a progressive approach (Payne, Peltier & Barger, 2018). The relative advantage of AI tools increases adoption rates and marketing outcomes (Glikson & Woolley, 2020). Still, perceived usefulness and ease of use remain undermined among the practitioners, requiring the clearer demonstration of the relative advantage to overcome complexity in adoptability (Alhashmi, Salloum & Mhamdi, 2019). Organizations with strong technical capabilities can fully leverage AI tools, ensuring accurate data interpretation, seamless system integration, and continuous optimization. AI solutions demonstrate compatibility that enhances adoptability and improves marketing outcomes (Na et al., 2022). It can be summarized as follows. "To investigate the input of compatibility, relative advantage, complexity, perceived usefulness, perceived ease of use, tangibility, anthropomorphism, and cost effectiveness in AI adoption and its role in the determination of advancement of marketing practices in Pakistan, moderating role of technical capabilities."

Research Questions

1. What is impact of complexity, perceived usefulness, perceived ease of use, tangibility, anthropomorphism & cost effectiveness in determination of AI adoption in Pakistan?
2. What is the impact of AI adoption on the advancement of the marketing practices in Pakistan?
3. What is moderating input of technical capabilities amid AI adoption & advancement of marketing practices in Pakistan?

LITERATURE REVIEW

The input of the perceived complexities of AI was also found to be hindrance to its adoptability in marketing practices (Mohr & Kühl, 2021). Literature has also found that complexities are a challenging factor in integrating AI-based solutions in definition of workflows, which leads to development of user-friendly interfaces. The input of inclusive training found its constructive role in the determination of AI technology application in marketing practices (Huang & Rust, 2021).

Compatibility of AI Adoption & Advancement of Marketing Practices

AI-based personalization has found its role in improved customer experiences with increased engagement level (Payne, Peltier & Barger, 2018). AI compatibility has also been found with its role in determining customer loyalty & conversion rate, with determination of competitiveness of modern marketing practices (Pillai & Sivathanu, 2020). The input of AI-powered chatbots and virtual assistants has been found to enhance customer services and assist 24/7 to come up with active support, improved brand accessibility and responsiveness (Sadriwala & Sadriwala, 2022). AI has also found its ability to revolutionize marketing campaign management and with improved analytics (Chatterjee, Chaudhuri, Kamble, Gupta & Sivarajah, 2023). Another study revealed that the application of AI to bring up with the automated testing and optimization of advertising spends, predictability of customer responses (Chen, Zhou & Frankwick, 2025). AI computability has resulted in targeted and cost-effective marketing strategies (Chen & Tajdini, 2024).

Relative Advantage of AI Adoption & Advancement of Marketing Practices

AI has also found its power to perform with predictive analytics and allow the marketers to anticipate customers' needs and behavior (Vrontis, Chaudhuri & Chatterjee, 2022). AI enables automated campaigns and proactive processes instead of reactive ones (Chaudhuri et al, 2023). AI has found its role for business to forecast trends and pricing strategies with the adjustment of inventory level in real time, with enhanced overall business process agility (Chen, 2024). The input of AI is also found to be supportive in decision-making, along with improved insights on customer journey and examination of campaign performance (Zeng et al, 2022). AI has been found helpful in fine tuning of strategies to optimize ROI for business and also in marketing actions.

Complexity of AI Adoption & Advancement of Marketing Practices

Data collection, its management, and safeguarding have been found challenging for firms in organizations, henceforth confrontation with privacy regulations is the significant hurdle to AI

adoption (Pillai & Sivathanu, 2020). Consequently, the ethical usage of data with the decisions based on AI exists as a perilous issue, with expanding difficulties for transparency and fairness in automatic marketing processes (Chatterjee, Chaudhuri, Kamble, Gupta & Sivarajah, 2023). Another important dimension of complexity has been observed in the form of organizational readiness (Chen et al, 2025). Organizations often lack ability to possess infrastructure, skilled personnel and strategic vision that are required to implement the AI effectively (Chen & Dong, 2024).

Perceived Usefulness of AI Adoption & Marketing Practices

Traditional practices are compared to AI found with reliance on the limited demographic data, while AI has enabled marketers to analyze behavior, preferences, and real-time interactions (Belanche, Casaló & Flavián, 2019). AI has also found its role in precise targeting and tailoring of marketing campaigns (Glikson & Woolley, 2020). Similarly, AI-driven tools are found with the application of chatbots and application of recommendation engines to improve customer experiences (Malhotra & Ramalingam, 2025). In this drive, the perceived usefulness of the AI was also found to be associated with increased conversion rate, with the offering of timely and relevant interaction to the targeted audience (Na et al, 2022). The input of the AI has also been found productive in enhancing the content creation and optimization (Payne, Peltier & Barger, 2018).

Perceived Ease of Use of AI Adoption & Marketing Practices

The perceived ease of use of AI-powered tools resulted in the management of vast amounts of customer data in real time, which has been found helpful to the marketers in delivering more targeted and relevant messages (Zeng et al, 2022). The input of chatbots and virtual assistants has also been found useful to bring up with customer support and improve experiences (Roux et al, 2023). The ability of AI has also been found in the prediction of consumer behavior based on data, with a proactive rather than a reactive approach of an AI-based solution, hence found with a better level of perceived ease of use (Bezuidenhout et al, 2023). The perceived ease of use was found to foster input based on cultural elements in experimentation for marketing teams to come up with more willingness to test & adapt with new AI-driven approaches (Roux et al, 2023).

Tangibility of AI Adoption & Marketing Practices

AI has been determined as tangible asset and embedded with tools that are used by marketers daily to come up with enriched customer relationship management & content creation (Mikalef et al, 2023). AI has appeared as an asset to translate repetitive tasks with automation (Chen & Tajdini, 2024). There was time when email marketing was resolute as labor-intensive activity, but AI has streamlined it through personalization, optimization, and audience segmentation. AI-based automation has been found to have better engagement rates (Chatterjee et al, 2023). The input of Chat-bots & virtual assistants has observed greater customer service by providing instant, personalized responses, offering a 24/7 touchpoint for consumers (Pillai & Sivathanu, 2020).

Anthropomorphism of AI Adoption & Marketing Practices

AI-based emotional resonance is also found with an increased customer satisfaction, loyalty, and even willingness to share data (Chen & Dong, 2024). AI-based solutions are also highly valuable in digital marketing strategies (Li & Jin, 2024). Anthropomorphic AI has found a way to bridge gap amid automation and empathy (Soni, 2023). Brands in use of AI-driven chatbots found that mimicking conversational tone, humor creates notable interactions and reinforces brand identity (Feng et al, 2024). The input of chatbots is also observed to handle vast volumes of customer queries capably, along with management of human touch (Chaudhuri et al, 2023). Anthropomorphic AI human input found effective in customer service, engagement campaigns (Zeng et al, 2022). Over-humanizing of AI leads to unrealistic expectations, not only blurring the lines between authentic human interaction & programmed responses (Bezuidenhout et al, 2023).

Cost-Effectiveness of AI Adoption & Marketing Practices

AI-driven chatbots are also found with the application of virtual assistants with 24/7 customer service at a fraction of the cost of human representatives (Sadriwala & Sadriwala, 2022). The application of AI tools has also been observed with a reduction of labor expenses along with improved user experience and retention (Payne et al, 2018). AI has made realistic predictive analytics. AI has also found its role in helping marketers in forecasting consumers' behavior with an optimized approach and come up with data-driven decisions in the maximization of ROI (Na et al, 2022). AI has been empowered with optimized pay-per-click (PPC) advertising, suggesting SEO improvements, and generating content through natural language processing (Malhotra & Ramalingam, 2025). Although the initial investment in AI technology is high, its long-term benefits are observed with efficiency and precision (Alhashmi et al, 2019). Similarly, scalability of AI has found its cost-effective solution to address marketing challenges (Belanche et al, 2019).

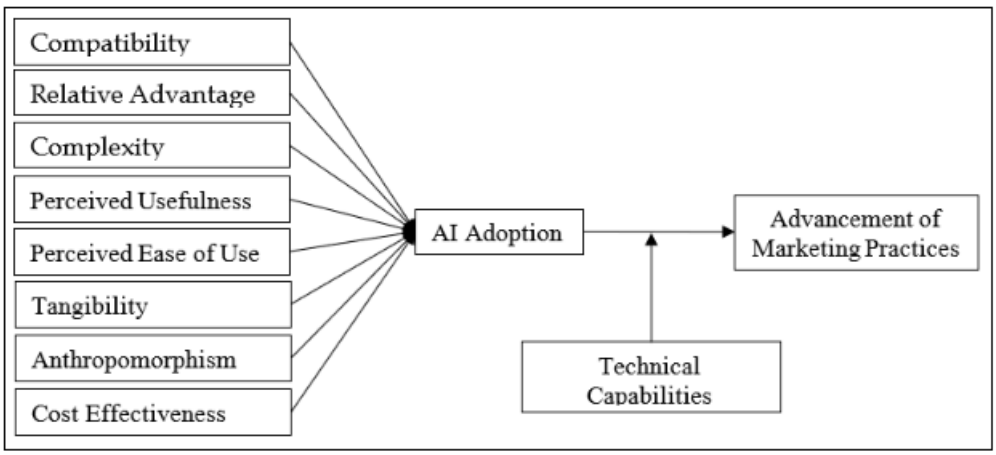
AI Adoption, Technical Capabilities & Marketing Practices

The input of the technology acceptance model is also explained by role of perceived usefulness and use of AI-based solution in its adoptability in the marketing practices (Pillai & Sivathanu, 2020). Another study also revealed a positive association between the perceived usefulness of AI and marketing innovations. Another study revealed that the role of perceived ease of use to emphasize the AI's ability to enhance marketing efforts as a driver to its acceptance (Nam et al, 2021). In addition, AI compatibility has found with better forecasting of trends and consumer behavior with enabling power that is reported proactive instead of reactive strategies (Chen & Dong, 2024). Instead of challenges, the input of AI functions has found with the transformation of marketing practices, enabling a role to perform with hyper-targeted advertising, dynamic content generation, use of chat-bots for 24/7 customer service, real-time decision-making (Li & Jin, 2024). Hence, in order to increase ROI and multiply engagement, it serves as a vital factor (Soni, 2023). Still, change from old-style marketing strategy to AI-based strategies too upsets well-known roadmaps, requires recurrent knowledge enhancement and adaptation (Feng et al, 2024).

Research Hypotheses

H1: There is a significant impact of Anthropomorphism on AI Adoption
H2: There is a significant impact of Compatibility on the AI Adoption
H3: There is a significant impact of Complexity on the AI Adoption
H4: There is a significant impact of Cost Effectiveness on AI Adoption
H5: There is a significant impact of Perceived Ease of Use on AI Adoption
H6: There is a significant impact of Perceived Usefulness on AI Adoption
H7: There is a significant impact of Relative Advantage on AI Adoption
H8: There is a significant impact of the Tangibility on the AI Adoption
H9: There is significant impact of Anthropomorphism on advancement of Marketing Practices
H10: There is a significant impact of Compatibility on the advancement of Marketing Practices
H11: There is a significant impact of Complexity on the advancement of Marketing Practices
H12: There is a significant impact of Cost Effectiveness on Advancement of Marketing Practice
H13: There is significant impact of perceived use on the advancement of marketing practices
H14: There is a impact of the perceived usefulness on the advancement of marketing practices
H15: There is significant impact of relative advantage on advancement of marketing practices
H16: There is significant impact of technical abilities on advancement of marketing practices
H17: There is a significant impact of AI Adoption on the advancement of Marketing Practice
H18: There is significant impact of AI adoption & technical capabilities on marketing practices

Figure 1
Conceptual Framework



RESEARCH METHODOLOGY

The research design of the current research work is quantitative in nature. The current research study utilized a survey-based research design. The targeted population of the current study is the 384 respondents from operations and marketing managers of pharmaceutical companies of Karachi, Pakistan, whose opinions were collected through a Google form. The purpose of the selection of the Google form is to make it easy for the respondents to share their responses. The

current study has utilized the convenience sampling technique. The purpose of the selection of the convenience sampling is to assist the purpose of the present work, with limitations due to a limited time to perform analysis. (Chaudhuri et al., 2023). The research used a questionnaire for response collection. Questionnaire is based on closed-ended questions for demographics, while study-specific variables are based on the Likert scale ranging from 1 to 5. 1 stands for strongly disagree, 2 stands for disagree, 3 stands for neutral, 4 stands for agree, and 5 stands for strongly agree. The study used SMART PLS for structural equation modeling (SEM) on the primary collected responses to empirically test developed conceptual framework & hypothesis testing.

Table 1

Research Instruments & Scale Measures

Variable	Reference	Items	Scale
Compatibility	(Chen et al., 2021; Flavian et al., 2019)	5	1 to 5
Relative Advantage	(Barger et al., 2018; Han et al., 2022)	5	1 to 5
Complexity	(Chen et al., 2021; Han et al., 2022)	5	1 to 5
Perceived Usefulness	(Barger et al., 2018; Han et al., 2022)	5	1 to 5
Perceived ease of use	(Salloum et al., 2022; Mohr et al., 2021)	5	1 to 5
Tangibility	(Salloum et al., 2022; Flavian et al., 2019)	4	1 to 5
Anthropomorphism	(Rust et al., 2021; Pillai et al., 2020)	5	1 to 5
Cost Effectiveness	(Rust et al., 2021; Han et al., 2022)	5	1 to 5
Market Practices	(Salloum et al., 2022; Han et al., 2022)	5	1 to 5
AI Adoption	(Barger et al., 2018; Chen et al., 2021)	5	1 to 5
Technical Capabilities	(Chen et al., 2021; Salloum et al., 2022)	5	1 to 5

DATA ANALYSIS

Table 2

Measurement Model

Latent Variables	Items	O-Loadings	CA	RHO_A	CR	AVE
Advancement of Marketing Practices	ADMKTPRC1	0.8334	0.9072	0.9074	0.9309	0.7294
	ADMKTPRC2	0.8589				
	ADMKTPRC3	0.8604				
	ADMKTPRC4	0.8563				
	ADMKTPRC5	0.8609				
AI Adoption	AIADOPTN1	0.8581	0.8832	0.8852	0.9148	0.6829
	AIADOPTN2	0.7723				
	AIADOPTN3	0.8695				
	AIADOPTN4	0.8391				
	AIADOPTN5	0.7882				
Anthropomorphism	ANTHAIAD2	0.9215	0.9105	0.9496	0.9357	0.7847
	ANTHAIAD3	0.9001				
	ANTHAIAD4	0.8604				
	ANTHAIAD5	0.8597				

Table 2A
Measurement Model

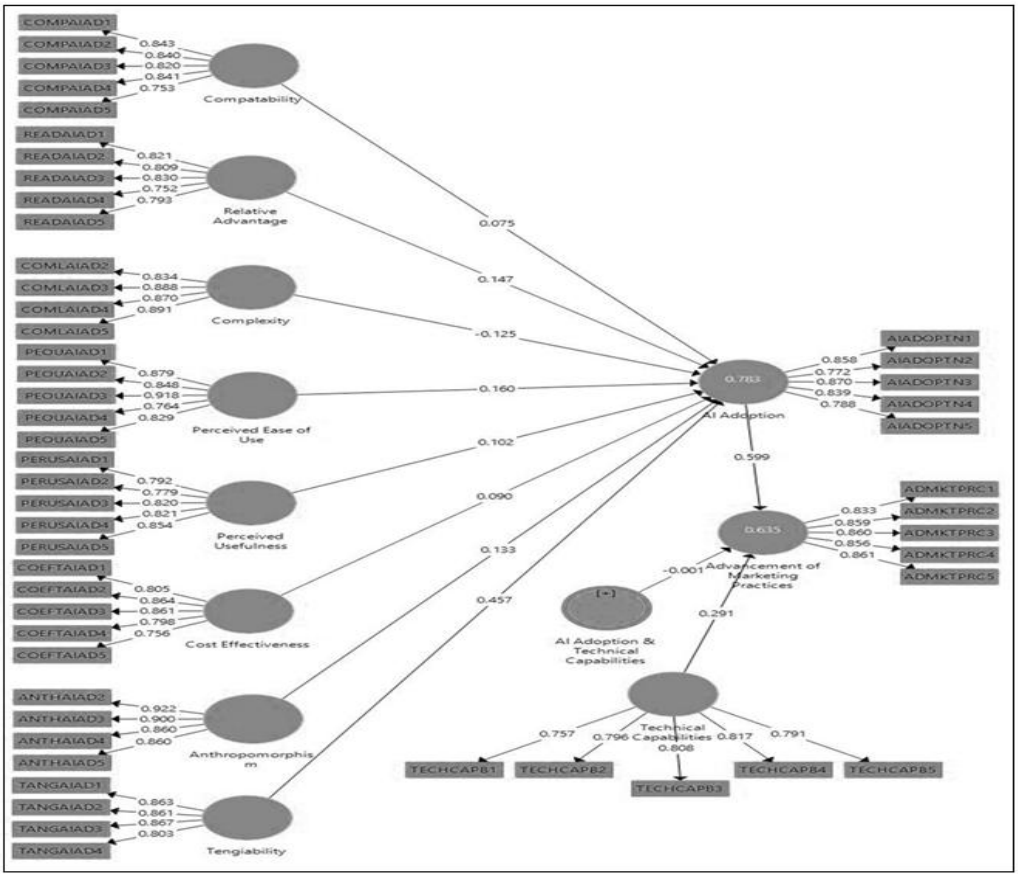
Latent Variables	Items	O-Loadings	CA	RHO_A	CR	AVE
Cost Effectiveness	COEFTAIAD1	0.8053	0.8756	0.8771	0.9098	0.6691
	COEFTAIAD2	0.8643				
	COEFTAIAD3	0.8610				
	COEFTAIAD4	0.7985				
	COEFTAIAD5	0.7556				
Complexity	COMLAIAD2	0.8344	0.8937	0.8967	0.9262	0.7585
	COMLAIAD3	0.8876				
	COMLAIAD4	0.8696				
	COMLAIAD5	0.8909				
Compatibility	COMPAIAD1	0.8431	0.8779	0.8809	0.9112	0.6727
	COMPAIAD2	0.8401				
	COMPAIAD3	0.8201				
	COMPAIAD4	0.8414				
	COMPAIAD5	0.7528				
Perceived Ease of Use	PEOUAIAD1	0.8789	0.9032	0.9200	0.9279	0.7210
	PEOUAIAD2	0.8479				
	PEOUAIAD3	0.9178				
	PEOUAIAD4	0.7644				
	PEOUAIAD5	0.8286				

Table 2B
Measurement Model

Latent Variables	Items	O-Loadings	CA	RHO_A	CR	AVE
Perceived Usefulness	PERUSAIAD1	0.7921	0.8721	0.8731	0.9073	0.6622
	PERUSAIAD2	0.7791				
	PERUSAIAD3	0.8200				
	PERUSAIAD4	0.8213				
	PERUSAIAD5	0.8542				
Relative Advantage	READAIAD1	0.8214	0.8607	0.8628	0.8997	0.6424
	READAIAD2	0.8091				
	READAIAD3	0.8298				
	READAIAD4	0.7522				
	READAIAD5	0.7927				
Tangibility	TANGAIAD1	0.8633	0.8725	0.8836	0.9116	0.7208
	TANGAIAD2	0.8613				
	TANGAIAD3	0.8666				
	TANGAIAD4	0.8030				
Technical Capabilities	TECHCAPB1	0.7570	0.8534	0.8544	0.8951	0.6306
	TECHCAPB2	0.7963				
	TECHCAPB3	0.8085				
	TECHCAPB4	0.8165				
	TECHCAPB5	0.7910				

Figure 2

Measurement Mode



Discriminant Validity

The discriminant validity is used to analyze whether the latent variables are interlinked by a phenomenon of multicollinearity or not. There are two statistics that are given by the structural equation model in PLS Smart, i.e., Fornell-Larcker and HTMT. Fornell-Larcker requires that all diagonal values should be greater than respective horizontal non-diagonal values. As it is quite clear, which further supports the existence of the discriminant validity, there is no evidence of multicollinearity.

Table 3

Discriminant Validity – Fornell Larcker

Fornell-Larcker Criterion											
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
AI Adoption [1]	0.8264										
Marketing Practices [2]	0.7588	0.8540									
Anthropomorphism [3]	0.5709	0.5207	0.8858								

Compatibility [4]	0.6488	0.6754	0.4595	0.8202							
Complexity [5]	0.4763	0.4214	0.3915	0.3375	0.8709						
Cost Effectiveness [6]	0.7093	0.6777	0.4828	0.6157	0.4991	0.8180					
Perceived Ease of Use [7]	0.6624	0.5563	0.3778	0.5329	0.3955	0.5172	0.8491				
Perceived Usefulness [8]	0.7329	0.7823	0.4747	0.7205	0.4162	0.6768	0.5473	0.8138			
Relative Advantage [9]	0.7409	0.7383	0.5413	0.6751	0.4197	0.7775	0.5112	0.7647	0.8015		
Technical Capabilities [10]	0.5458	0.6186	0.5162	0.6511	0.4117	0.5231	0.5421	0.5654	0.5423	0.7941	
Tangibility [11]	0.7981	0.6518	0.4829	0.5284	0.6811	0.6674	0.6219	0.6672	0.6430	0.5115	0.8490

Table 4

Discriminant Validity – HTMT

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
AI Adoption [1]										
Marketing Practices [2]	0.8479									
Anthropomorphism [3]	0.6018	0.5562								
Compatibility [4]	0.7351	0.7563	0.4972							
Complexity [5]	0.5340	0.4666	0.4202	0.3793						
Cost Effectiveness [6]	0.8023	0.7600	0.5225	0.7016	0.5573					
Perceived Ease of Use [7]	0.7315	0.6107	0.3948	0.5994	0.4392	0.5740				
Perceived Usefulness [8]	0.8346	0.8795	0.5083	0.8260	0.4689	0.7721	0.6104			
Relative Advantage [9]	0.8484	0.8335	0.5959	0.7745	0.4789	0.9004	0.5729	0.8756		
Technical Capabilities [10]	0.6273	0.7007	0.5781	0.7479	0.4688	0.6031	0.6199	0.6530	0.6311	
Tangibility [11]	0.8852	0.7279	0.5224	0.5957	0.7844	0.7543	0.6895	0.7610	0.7373	0.6037

Model Fit & Significance

The model fit shows that the collective impact of independent variables on the AI Adoption observed with an R-square value of 0.7833 means 78.33 percent, which shows a strong impact on the dependent variable, i.e., AI Adoption, while the overall model is found to be accepted with the chi-square value of 11661.14. Furthermore, collective impact of independent variables on the Advancement of Marketing Practices observed with an R-square value of 0.7833 means 78.33%.

Table 5

Model Fit & Significance

	R Square	R Square Adjusted	Chi Square
AI Adoption	0.7833	0.7787	11661.146
Advancement of Marketing Practices	0.6353	0.6324	

Path Coefficient

Based on the results presented, the study reveals several significant relationships regarding AI adoption and marketing practices in Pakistan. Firstly, THE AI adoption demonstrates a strong positive impact on the advancement of marketing practices (β = 0.5939, p = 0.000). However, the interaction between AI adoption and technical capabilities shows no significant effect on marketing advancement (β = -0.0059, p = 0.9814). Several factors significantly influence both AI adoption & marketing advancement. Anthropomorphism positively affects both AI adoption (β = 0.1362, p = 0.000) & marketing advancement (β = 0.0808, p = 0.0001). Compatibility shows

positive impacts on AI adoption (β = 0.0734, p = 0.0490), marketing advancement (β = 0.0431, p = 0.0451).

Complexity validates a negative impact on AI adoption (β = -0.1279, p = 0.0042) but positively affects the marketing advancement (β = -0.0760, p = 0.0059). The cost effectiveness positively influences both AI adoption (β = 0.0914, p = 0.0457) and marketing advancement (β = 0.0541, p = 0.0467). Perceived ease of use shows strong positive effects on both AI adoption (β = 0.1580, p = 0.000), marketing advancement (β = 0.0936, p = 0.0000). Perceived usefulness significantly impacts AI adoption (β = 0.0996, p = 0.0477) but not affect marketing advancement (β = 0.0602, p = 0.0643). Relative advantage positively influences both AI adoption (β = 0.1468, p = 0.0023) and marketing advancement (β = 0.0874, p = 0.004). Technical capabilities impact marketing advancement (β = 0.2948, p = 0.000), tangibility strongly influences AI adoption (β = 0.4614, p = 0.000).

Figure 3

Bootstrap Model/ Hypothesis Testing

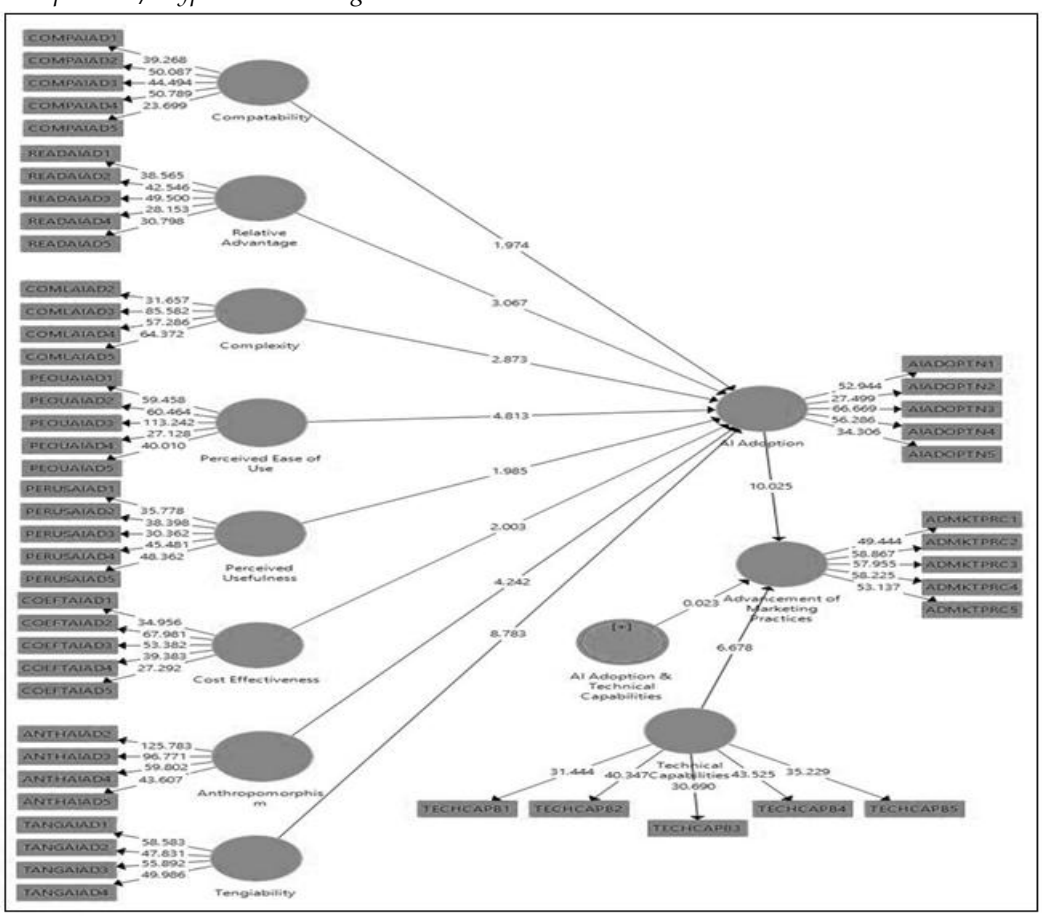


Table 6
Hypothesis Testing

	E-Value	SD	TS	PV
AI Adoption -> Advancement of Marketing Practices	0.5939	0.0598	10.0251	0.0000
AI Adoption & Technical Capabilities -> Marketing Practices	-0.0059	0.0431	0.0233	0.9814
Anthropomorphism -> AI Adoption	0.1362	0.0313	4.2421	0.0000
Anthropomorphism -> Advancement of Marketing Practices	0.0808	0.0202	3.9314	0.0001
Compatibility -> AI Adoption	0.0734	0.0381	1.9737	0.0490
Compatibility -> Advancement of Marketing Practices	0.0431	0.0224	2.0091	0.0451
Complexity -> AI Adoption	-0.1279	0.0434	2.8732	0.0042
Complexity -> Advancement of Marketing Practices	-0.0760	0.0270	2.7645	0.0059
Cost Effectiveness -> AI Adoption	0.0914	0.0450	2.0030	0.0457
Cost Effectiveness -> Advancement of Marketing Practices	0.0541	0.0271	1.9943	0.0467
Perceived Ease of Use -> AI Adoption	0.1580	0.0332	4.8133	0.0000
Perceived Ease of Use -> Advancement of Marketing Practices	0.0936	0.0209	4.5767	0.0000
Perceived Usefulness -> AI Adoption	0.0996	0.0512	1.9845	0.0477
Perceived Usefulness -> Advancement of Marketing Practices	0.0602	0.0328	1.8541	0.0643
Relative Advantage -> AI Adoption	0.1468	0.0480	3.0670	0.0023
Relative Advantage -> Advancement of Marketing Practices	0.0874	0.0305	2.8918	0.0040
Technical Capabilities -> Advancement of Marketing Practices	0.2948	0.0436	6.6783	0.0000
Tangibility -> AI Adoption	0.4614	0.0521	8.7832	0.0000

DISCUSSION

In Pakistan, the marketing practices can be enhanced with the adoption of AI, as they enhance the accessibility of the customer and response they require, hence leading to better customer services (Sadriwala & Sadriwala, 2022). Customer engagement is multifold by personalization (Payne et al., 2018), and when compatible values are experienced by them, they become loyal, and their affinity enhances with the brand (Pillai & Sivathanu, 2020). Eventually, with advent of AI support, marketing campaigns get better analytics, leading to a fortified and competitive advantage in the digital era (Chatterjee et al., 2023). On the contrary, the effect of AI adoption on the technical capabilities was found to be insignificant in relation to marketing practice in Pakistan, as TAM expresses that ease and usefulness of the AI features are critical in Pakistan (Pillai & Sivathanu, 2020). These enhancement features purport to predict customer behaviors and trends (Chen & Dong, 2024). Anthropomorphism is identified as an effective factor in AI adoption, as the satisfaction received from its promptness enhances satisfaction from within, hence drives emotional satisfaction and willingness to share personal data (Chen & Dong, 2024).

In other words, we can say that anthropomorphism bridges the gap between automation and empathy (Soni, 2023). Anthropomorphism supports predictive analytics by better articulation with customer values (Zeng et al., 2022; Na et al., 2022). PPC advertising is also optimized by AI tools with options of suggesting SEO enhancement as natural language processes generate organic content (Malhotra & Ramalingam, 2025). Sometimes these over-humanized aspects also create excessive expectations from customers (Bezuidenhout et al., 2023). These research findings express that data-based, personized services transform the traditional practices into

productive endeavors (Malhotra & Ramalingam, 2025). This helps to address the untapped and resourceful big data, leading to productive patterns and thrilling insights regarding the consumer patterns. Thus, this enhances the strategic decision-making by the C-Suite manager (Huang & Rust, 2021; Mohr & Kühl, 2021). With AI adoption, the compatibility of marketing practices and advancement is ensured through seamless integration of the CRM systems, social media apps and email services that enables tailored content for the customer in focus (Na et al., 2022).

The complex aspect of AI brings in enhanced opportunities and bigger challenges, reshaping customer service levels. (Alshurideh et al., 2019; Bezuidenhout et al., 2023), All of this is due to the dependence on high volumes of quality data (Mohr & Kühl, 2021; Nam et al., 2021), which is being translated into effective predictions for customer experiences beyond the expectations (Bezuidenhout et al., 2023; Roux et al., 2023). Moreover, research concludes that due to usage of AI tools leading to marketing success, it brings better ROI and hence leads to cost effectiveness (Chen, 2024), and improves efficiency (Vrontis et al., 2022). This synchronizes content created for the customer with the expectation developed by the customer (Larbi & Larbi, 2024). This reduces the labor effort of employee toward the repetitive activity and saves time and physical effort of the employees (Chatterjee et al., 2022). This facilitates the organization to analyze the data on greater frequency, develop focused marketing campaigns to have impactful marketing returns with full impact planning (Mikalef et al., 2023; Chen & Tajdini, 2024; Chatterjee et al., 2023).

CONCLUSION

The results of study discovered that AI adoption implicitly empowers marketing strategies. Still, the collaboration between AI adoption and technical capabilities depicted no noteworthy outcome on marketing plans. Anthropomorphism, compatibility, cost effectiveness, perceived ease of use, and relative advantage all verified significant positive impacts on AI adoption and marketing advancement. Complexity significantly inclined positively towards both variables, but with negative effects on adoption. Perceived usefulness significantly affected marketing advancement but not AI adoption. Technical capabilities showed a significant direct impact on AI adoption and marketing advancement. These conclusions offer valuable insights into the factors driving AI-enabled marketing transformation in Pakistan. For organizations to move forward, they must integrate features of AI into procedures and operations of the organization. Not every organization is ready for it, but without the AI integration, there is no sustainable future.

Recommendations

These research findings further the recommendation to the interested stakeholders of the AI industry in Pakistan that they need to prioritize gradual movement to AI-based approaches, based on consumer analytics, personalization, and automation, fulfilling the strategic needs of organizations. Managers attached to marketing campaign need to engage anthropomorphic AI tools, such as chatbots with human-like language, strengthening the engagement of consumer. The AI-based solutions should be audited with respect to whether they are aligned with local

market practices, are not focused on some alien and non-traditional practices of other regions. An advanced practice of global North would not be a practical tool in global South, as it will have low validity & acceptability. The deployed tools for AI adoption be put into practice once employees are well trained in them; hence, learning phase of employees is one of the critical factors.

The simplicity of AI interface, its response rate, its integration with whole system architecture, and understanding also enhance the compatibility and durability with its user. The employee will be more comfortable in using such AI tools if they provide the right decision with the least errors and redundancy, hence, perceived ease of use is justified here. While AI adoption is not totally dependent upon perceived ease of use, organization should have open and transparent communication system between the stakeholders, giving them a clear picture of progress and how AI-enabled efforts are servicing targeted audience and leading to sales growth. Several pilot projects be initiated to exemplify project capabilities of game plan under consideration. This not only enhances interest and efficacy of the workforce, but they also get ready to adopt it with more open and sturdier mind set of success. Better cross-functional teams, incentivized plans, and time guidelines bring sustainable approaches to sales and marketing strategies of organization.

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