Future of Work and Digital Management Journal

Article type:
Original Research

Article history:
Received 29 September 2025
Revised 14 November 2025
Accepted 28 December 2025
Published online 01 March 2026

Designing an Artificial Intelligence–Based Digital Marketing Model in the ICT Industry

Elmira. Karimnejad[1], Azam. Rahiminik[1*], Seyed Abbas. Heidari[1]

1 Department of Business Administration, CT.C., Islamic Azad University, Tehran, Iran

Corresponding author email address:
aza.rahiminik@iau.ac.ir

How to cite this article:
Karimnejad, E., Rahiminik, A., & Heidari, S. A. (2026). Designing an Artificial Intelligence–Based Digital Marketing Model in the ICT Industry. *Future of Work and Digital Management Journal, 4*(1), 1-17. https://doi.org/10.61838/fwdmj.205

ABSTRACT

The present study was conducted with the aim of designing an artificial intelligence–based digital marketing model in the ICT industry. The research adopted a mixed-methods design. In the qualitative phase, the statistical population consisted of executive managers in the ICT industry and university faculty members specializing in digital marketing. Within the executive group, individuals who were professionally active in the city of Tehran and had practical experience with digital marketing were considered. In the academic group, faculty members and digital marketing experts who possessed sufficient knowledge and experience in this field and had conducted relevant research were selected as members of the statistical population. To select participants for the qualitative phase from both executive managers and academic experts, purposive judgmental sampling and snowball sampling methods were employed. In the quantitative phase of the study, the model derived from the qualitative findings was empirically tested. The statistical population included employees, specialists, and managers of marketing units in companies operating in the national ICT industry, as well as digital marketing faculty members at leading universities in Tehran, with an estimated total population of approximately 900 individuals. Based on the Morgan table, a sample size of 269 participants was selected. The data collection instrument in this phase was a researcher-developed questionnaire grounded in the qualitative findings. The collected data were analyzed using SPSS and SmartPLS software packages. Initially, confirmatory factor analysis was conducted to assess construct validity and instrument reliability, followed by testing the proposed model using the structural equation modeling (SEM) approach. The results of the analyses indicated that the final model demonstrated an acceptable level of goodness of fit, and the relationships among the main variables were statistically significant and confirmed. Ultimately, the final artificial intelligence–based digital marketing model in the ICT industry comprised dimensions such as data-driven infrastructure, human capital empowerment, digital trust building, intelligent market adaptability, and marketing decision-making based on intelligent analysis of customer behavior, which can lead to improved efficiency, cost reduction, and enhanced effectiveness of marketing activities in this industry.

Keywords: Digital marketing; Artificial intelligence; ICT industry.

Introduction

The rapid evolution of digital technologies has fundamentally transformed the landscape of marketing across industries, positioning digital marketing as a central strategic function in contemporary organizations. The proliferation of online platforms, mobile technologies, and data-driven communication channels has shifted marketing from a mass-oriented approach toward more interactive, personalized, and analytics-driven practices. Within this transformation, artificial intelligence (AI) has emerged as a critical enabler that reshapes how organizations collect, analyze, and operationalize customer data in digital marketing environments [1, 2]. AI technologies enable marketers to process vast volumes of

structured and unstructured data, identify complex behavioral patterns, and automate decision-making processes with unprecedented speed and accuracy, thereby redefining the foundations of digital marketing strategy [3, 4].

Digital marketing has increasingly become inseparable from data analytics and intelligent systems, particularly in industries characterized by high technological intensity and rapid innovation cycles, such as the information and communication technology (ICT) sector. The ICT industry generates extensive streams of customer interaction data across digital touchpoints, including websites, mobile applications, social networks, and smart devices, creating fertile ground for AI-driven marketing applications [5, 6]. In this context, AI functions not merely as a technological tool but as a strategic capability that enhances firms' ability to anticipate customer needs, optimize marketing campaigns, and adapt dynamically to market changes [7, 8].

Recent scholarship emphasizes that AI-based digital marketing extends beyond automation and efficiency gains, contributing to deeper forms of customer engagement and value co-creation. Through machine learning algorithms, predictive analytics, and sentiment analysis, organizations can deliver highly personalized content, recommendations, and advertisements tailored to individual customer preferences and behaviors [9, 10]. These capabilities support hyper-personalization strategies that enhance customer satisfaction, loyalty, and long-term relationship quality [11, 12]. Moreover, AI-driven personalization has been shown to significantly improve advertising effectiveness and return on investment by aligning marketing messages with real-time customer contexts [13, 14].

Despite the growing adoption of AI in digital marketing, researchers argue that its successful implementation depends on a complex configuration of organizational, technological, and strategic factors. Digital infrastructure readiness, data governance mechanisms, and cybersecurity capabilities constitute essential prerequisites for leveraging AI technologies effectively [15, 16]. Without reliable data architectures and secure information systems, AI applications risk producing biased, inaccurate, or ethically problematic outcomes, potentially undermining customer trust and organizational legitimacy [17, 18]. Consequently, AI-based digital marketing must be embedded within a broader organizational framework that integrates technological preparedness with ethical and regulatory considerations.

Human capital plays a decisive role in this transformation, as AI-driven marketing systems require specialized analytical skills, interdisciplinary collaboration, and continuous learning capabilities. Studies highlight that organizations adopting AI in marketing must invest in upskilling employees and fostering a digital culture that supports experimentation and innovation [19, 20]. The ability of marketing teams to interpret AI-generated insights and translate them into strategic actions remains a critical success factor [21, 22]. In the absence of such capabilities, AI technologies risk being underutilized or misaligned with organizational objectives.

Another prominent dimension in AI-based digital marketing research concerns intelligent market adaptation. Rapid technological change, evolving consumer expectations, and intensified competition require organizations to continuously recalibrate their marketing strategies. AI systems support this adaptability by enabling real-time monitoring of market trends, customer sentiment, and competitive dynamics [23, 24]. Through collaborative and data-driven decision-making processes, organizations can respond proactively to environmental shifts and sustain competitive advantage [16, 25].

The ICT industry represents a particularly relevant context for examining AI-based digital marketing models due to its high dependence on innovation, digital platforms, and customer-centric service delivery. Empirical evidence suggests that ICT firms increasingly rely on AI-powered marketing automation, predictive customer analytics, and intelligent segmentation to manage complex customer ecosystems [26, 27]. However, existing studies often focus on isolated applications of AI, such as

predictive analytics or personalized advertising, rather than offering integrated models that capture the interdependencies among technological infrastructure, organizational readiness, strategic orientation, and marketing outcomes [28, 29].

Recent reviews and conceptual frameworks underscore the need for comprehensive and empirically validated models that explain how AI-driven digital marketing capabilities are configured and how they generate value across organizational levels [2, 30]. Such models are particularly scarce in emerging and developing digital ecosystems, where contextual factors such as institutional regulations, cultural norms, and technological maturity may shape AI adoption trajectories differently from those observed in advanced economies [31, 32]. Addressing this gap is essential for advancing both theoretical understanding and practical implementation of AI-based digital marketing strategies.

Moreover, ethical and governance challenges have gained increasing attention in AI-driven marketing research. Issues related to data privacy, algorithmic bias, transparency, and accountability pose significant risks if not adequately managed [17, 33]. Scholars argue that trust-building mechanisms and responsible AI practices are integral components of sustainable digital marketing models, particularly in data-intensive industries such as ICT [18, 34]. Incorporating these considerations into model design enhances the legitimacy and long-term viability of AI-enabled marketing systems.

In parallel, advances in generative AI and intelligent content systems are reshaping marketing communication and education, introducing new possibilities for automated creativity, customer interaction, and strategic learning [19, 35]. These developments further reinforce the need for holistic frameworks that integrate emerging AI capabilities with organizational strategy, market adaptation, and customer experience management [15, 36].

Taken together, the literature reveals substantial progress in understanding specific applications of AI in digital marketing, yet also highlights fragmentation and conceptual gaps regarding the integration of these applications into coherent organizational models. Existing studies often lack empirical validation across multiple dimensions or fail to account for the unique characteristics of the ICT industry's digital ecosystem [27, 33]. Consequently, there is a pressing need for research that systematically identifies key components of AI-based digital marketing and empirically examines the relationships among them within an industry-specific context.

Accordingly, the aim of the present study is to design and empirically validate a comprehensive artificial intelligence–based digital marketing model for the ICT industry by identifying its key dimensions and examining the structural relationships among them.

Methodology

The present study is of a mixed-methods design (a combination of qualitative and quantitative approaches), adopting a foundational–exploratory approach in the qualitative phase and an applied–confirmatory approach in the quantitative phase. The primary objective of this research was to design an artificial intelligence–based digital marketing model for the national ICT industry, such that by identifying key components and validating the relationships among them, a scientific and practical framework could be provided to enhance digital marketing performance in this industry.

In the first phase (qualitative phase), the grounded theory method was employed. At this stage, the researcher conducted a systematic review of the theoretical background and domestic and international studies to extract core concepts related to digital marketing and artificial intelligence. Subsequently, in-depth and semi-structured interviews were conducted with academic experts and executive managers in the ICT industry in order to identify the main and infrastructural components of

the model. The qualitative population consisted of faculty members from reputable universities (University of Tehran, Allameh Tabataba'i University, Tarbiat Modares University, Shahid Beheshti University, and Islamic Azad University) and senior managers of organizations and companies active in the ICT sector, such as the Ministry of Information and Communications Technology, Mobile Telecommunication Company of Iran, Shatel, Asiatech, and Telecommunication Company of Iran. Sampling at this stage was carried out using purposive judgmental sampling, and theoretical saturation was achieved after conducting 13 semi-structured interviews.

The interviews in this study were designed to identify the components of the artificial intelligence–based digital marketing model in the ICT industry and to capture the practical experiences of experts. The interview type was semi-structured and included academic experts in the field of digital marketing as well as executive managers active in ICT companies with practical experience in implementing digital marketing. The duration of each interview ranged from 30 to 50 minutes, and depending on participants' conditions, interviews were conducted either in person or online (via videoconferencing). At the beginning of each interview, the researcher introduced themselves and explained the research objectives and the interview process to the participants. Subsequently, informed consent was obtained for participation in the study and for recording the interviews to enable accurate data analysis. In each interview, key concepts related to the dimensions of artificial intelligence–based digital marketing were extracted from the experts' perspectives and analyzed using three-stage coding (open, axial, and selective). Validity and reliability in the qualitative phase of the present study were established based on criteria such as credibility, member checking, data source triangulation, negative case analysis, and transferability.

In the second phase (quantitative phase) of the research, the model derived from the qualitative phase was empirically tested. The statistical population included employees, specialists, and managers of marketing units in companies active in the national ICT industry, as well as faculty members specializing in digital marketing at leading universities in Tehran, with an estimated total population of approximately 900 individuals. Using the Morgan table, a sample size of 269 participants was selected. The data collection instrument in this phase was a researcher-developed questionnaire based on the qualitative findings. The questionnaires were distributed both in person and online among members of the statistical population to provide the required data for structural equation modeling (SEM) analysis. In addition, questionnaire validity was assessed through factor loadings and the average variance extracted (AVE) index, while reliability was evaluated using Cronbach's alpha coefficient and composite reliability. Finally, the collected data were analyzed using SPSS and SmartPLS software packages.

Findings and Results

In the qualitative phase of this study, the selected academic experts were drawn from various universities, including Allameh Tabataba'i University (one participant), University of Tehran (one participant), Tarbiat Modares University (one participant), Shahid Beheshti University (one participant), and Islamic Azad University (two participants). In the executive sector, participants were selected from diverse organizations such as the Ministry of Information and Communications Technology, Mobile Telecommunication Company of Iran, Shatel, Asiatech, and Telecommunication Company of Iran as the interview sample. All participants held at least a master's degree. A particularly important point regarding these organizations is that, due to the nature of their activities, the scope of operations is extensive; therefore, the likelihood that an invited

interviewee would dominate the interview environment with a purely sectional perspective and provide information solely from their own viewpoint was reduced. Table 1 presents the characteristics of the interviewees.

Table 1

Characteristics of the Interviewees

Group	Years of Experience	Academic/Organizational Rank	Position	No.
Academic	15 years	Assistant Professor of Marketing	Faculty Member, Allameh Tabataba'i University	1
Academic	18 years	Associate Professor of Business Management	Faculty Member, University of Tehran	2
Academic	14 years	Assistant Professor of Marketing Management	Faculty Member, Tarbiat Modares University	3
Academic	20 years	Full Professor of Information Technology Management	Faculty Member, Shahid Beheshti University	4
Academic	12 years	Associate Professor of Marketing	Faculty Member, Islamic Azad University	5
Academic	10 years	Assistant Professor of Digital Marketing	Faculty Member, Islamic Azad University	6
Companies	17 years	Director General of Planning and Market Development	Ministry of Information and Communications Technology	7
Companies	20 years	Digital Innovation Projects Manager	Mobile Telecommunication Company of Iran	8
Companies	11 years	Marketing Manager	Shatel Company	9
Companies	8 years	Market Development Manager	Asiatech Company	10
Companies	27 years	Deputy of Marketing and Sales	Telecommunication Company of Iran	11
Companies	12 years	Senior Market Development Expert	Telecommunication Company of Iran	12
Companies	29 years	Commercial Deputy	Telecommunication Company of Iran	13

All interviews were transcribed verbatim. Data saturation occurred after the 11th interview; however, to ensure data adequacy, 13 interviews were conducted. In each interview, the purpose of the research and the interview process were explained to the interviewee. During the interview process, both closed-ended questions and initial open questions were used. Analysis of the interviews was conducted step by step and immediately after the completion of each interview. The written transcripts were typed, and key points and codes were gradually extracted. Ultimately, after a comprehensive review of all interviews, analysis of participants' statements and viewpoints, and a systematic review of the literature, a total of 242 final codes were extracted at the open coding stage.

In the next stage, the researcher used axial coding to link subcategories to more central categories. Table 2 presents the classification of the main and subcomponents of the study.

Table 2

Classification of the Main and Subcomponents of the Study

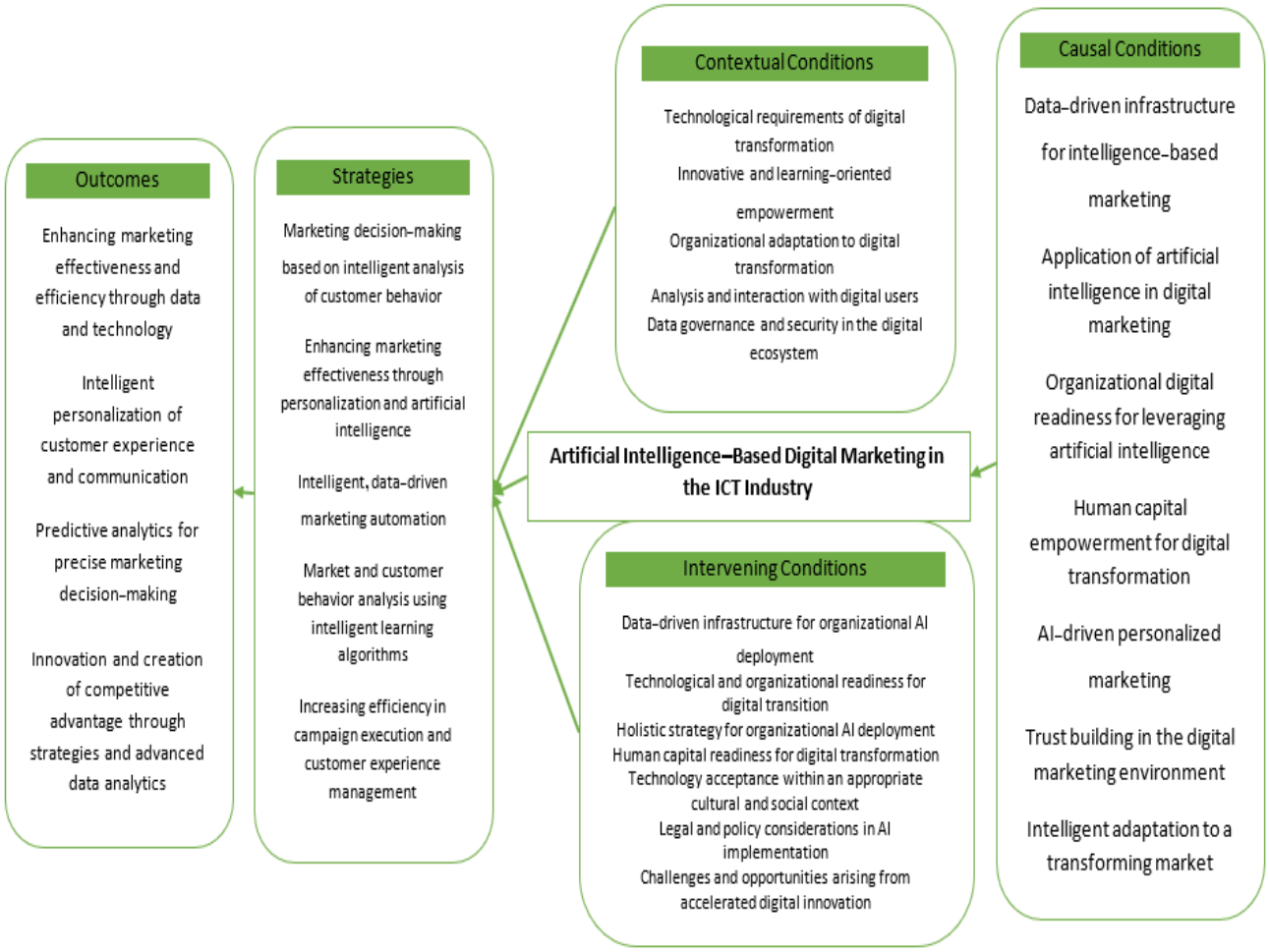
Dimension	Main Category	Subcategories
Causal Conditions	Data-driven infrastructure for intelligence-based marketing	Diversity of data sources and data breadth
		Accessibility and quality of big data
		Advanced data analytics
		Intelligent predictive capability
	Application of artificial intelligence in digital marketing	Deployment of advanced algorithms
		Intelligent learning models
		Intelligent interactive tools
	Organizational digital readiness for leveraging artificial intelligence	Technological and infrastructural capabilities
		Integrated organizational infrastructure
	Human capital empowerment for digital transformation	Specialized skills within the organization
		Enhancement of employees' digital skills
		Adoption of a digital transformation culture
	AI-driven personalized marketing	Delivery of targeted customer experiences
		Increased customer engagement and loyalty
	Building trust in the digital marketing environment	Data governance and information security
		Ethical and legal requirements in technology
	Intelligent adaptation to a transforming market	Changes in the competitive and technological environment
		Changes in customer behavior and needs
Contextual Conditions	Technological requirements of digital transformation	Digital and communication infrastructures

		Environmental technological transformations
	Innovative and learning-oriented empowerment	Innovation and research capacity
		Readiness for innovation
	Organizational adaptation to digital transformation	Organizational readiness and transformation
		Transformation of organizational structures and processes
	Analysis and interaction with digital users	Training and empowerment of human resources
		Competitiveness in the digital market
		Market maturity for digital transformation
	Data governance and security in the digital ecosystem	Data quality and accessibility
		Data analysis and processing
		Data-related laws and regulations
Intervening Conditions	Data-driven infrastructure for organizational AI deployment	Quality and accessibility of analytical data
		Capability of data analytics tools and advanced processing
	Technological and organizational readiness for digital transition	Technical and infrastructural readiness to implement emerging technologies
		Organizational adaptability to new technologies
	Holistic strategy for organizational AI deployment	Strategic design and implementation of technology
		Cross-functional synergy in technology deployment
	Human capital readiness for digital transformation	Empowerment of digital human capital
		Specialized organizational skills for analysis and execution
	Technology acceptance within an appropriate cultural and social context	Digitally receptive organizational culture
		Economic dynamism and market adaptability
	Legal and policy considerations in AI implementation	Laws governing data and technology
		Governance frameworks for data and technology
	Challenges and opportunities arising from accelerated digital innovation	Rapid transformations in digital technologies
		Social implications of digital transformation
Strategies	Marketing decision-making based on intelligent analysis of customer behavior	Advanced analytics based on consumer data
		Prediction of customer behavior and needs through data analysis
	Enhancing marketing effectiveness through personalization and artificial intelligence	Data-driven personalization of customer experience
		Precise targeting and optimization of digital advertising
	Intelligent, data-driven marketing automation	Application of artificial intelligence in marketing campaigns
		Transformation of marketing processes through artificial intelligence
	Market and customer behavior analysis using intelligent learning algorithms	Application of machine learning and artificial intelligence in market analysis
		Intelligent tools for customer interaction
	Increasing efficiency in campaign execution and customer experience management	Improved efficiency of digital marketing channels
		Managerial innovation in digital marketing
Consequences	Enhanced marketing effectiveness and efficiency through data and technology	Increased productivity and resource optimization in digital marketing
		Automation and optimization of marketing decision-making
		Data-driven analysis to guide decisions
	Intelligent personalization of customer experience and communication	Data-driven personalized advertising and services
		Improved effectiveness of digital advertising and targeted strategies
	Predictive analytics for precise marketing decision-making	Prediction and simulation of customer behavior using data
		Intelligent and sustainable customer relationships
		Optimization of the digital customer experience
	Innovation and creation of competitive advantage through strategies and advanced data analytics	Creation of competitive advantage and development of new business opportunities
		Strategy optimization

In grounded theory development, data integration is of critical importance. In the research process, after data collection, analysis, and interpretation, the stage of model presentation, conclusion, and synthesis of findings is reached. The following figure illustrates the paradigm model of artificial intelligence–based digital marketing in the ICT industry.

Figure 1

Paradigm Model of Artificial Intelligence–Based Digital Marketing in the ICT Industry



A normality test is used to examine the type of data distribution (normality of data distribution). The results of this test are presented in Table 3.

Table 3

Kolmogorov–Smirnov Test

Main Category	Z Statistic	Significance Level
Data-driven infrastructure for intelligence-based marketing	0.205	0.000
Application of artificial intelligence in digital marketing	0.215	0.000
Organizational digital readiness for leveraging artificial intelligence	0.211	0.000
Human capital empowerment for digital transformation	0.212	0.000
AI-driven personalized marketing	0.197	0.000
Trust building in the digital marketing environment	0.235	0.000
Intelligent adaptation to a transforming market	0.206	0.000
Technological requirements of digital transformation	0.199	0.000
Innovative and learning-oriented empowerment	0.175	0.000
Organizational adaptation to digital transformation	0.198	0.000
Analysis and interaction with digital users	0.129	0.000
Data governance and security in the digital ecosystem	0.200	0.000
Data-driven infrastructure for organizational AI deployment	0.199	0.000
Technological and organizational readiness for digital transition	0.219	0.000
Holistic strategy for organizational AI deployment	0.205	0.000
Human capital readiness for digital transformation	0.203	0.000

Technology acceptance within an appropriate cultural and social context	0.230	0.000
Legal and policy considerations in AI implementation	0.198	0.000
Challenges and opportunities arising from accelerated digital innovation	0.118	0.000
Marketing decision-making based on intelligent analysis of customer behavior	0.190	0.000
Enhancing marketing effectiveness through personalization and artificial intelligence	0.189	0.000
Intelligent, data-driven marketing automation	0.110	0.000
Market and customer behavior analysis using intelligent learning algorithms	0.187	0.000
Increasing efficiency in campaign execution and customer experience management	0.199	0.000
Enhancing marketing effectiveness and efficiency through data and technology	0.217	0.000
Intelligent personalization of customer experience and communication	0.211	0.000
Predictive analytics for precise marketing decision-making	0.226	0.000
Innovation and creation of competitive advantage through strategies and advanced data analytics	0.218	0.000

Because the obtained significance level for all research variables is less than 0.05, the null hypothesis (H0) and the assumption of normal data distribution are rejected. Given that the normality assumption is not met, hypothesis testing is conducted using structural equation modeling with the partial least squares (PLS) approach.

In Figure 2, the model is presented in the significance values (T-values) mode.

In confirmatory factor analysis, variables and their corresponding indicators are first selected based on the initial theory, and then factor analysis is applied to examine whether these variables and indicators load on the predicted factors as expected or whether their composition has changed and they load on other factors. If a factor loading is negative, it indicates an inverse direction of the questionnaire's effect on the latent variable. A factor loading value below 0.40 is considered weak and should be removed from the model. The results of the confirmatory factor analysis using SmartPLS software are presented in Table 4.

Table 5

Results of the Confirmatory Factor Analysis of the Research Variables

Main Category	Items	Factor Loading	T-Statistic
Data-driven infrastructure for intelligence-based marketing	Item 1	0.898	72.543
	Item 2	0.877	65.078
	Item 3	0.888	105.948
	Item 4	0.875	57.281
Application of artificial intelligence in digital marketing	Item 5	0.895	78.591
	Item 6	0.892	63.877
	Item 7	0.911	101.204
Organizational digital readiness for leveraging artificial intelligence	Item 8	0.933	120.476
	Item 9	0.940	142.083
Human capital empowerment for digital transformation	Item 10	0.902	76.379
	Item 11	0.923	122.024
	Item 12	0.913	98.453
AI-driven personalized marketing	Item 13	0.915	89.120
	Item 14	0.918	109.299
Trust building in the digital marketing environment	Item 15	0.932	113.475
	Item 16	0.936	127.234
Intelligent adaptation to a transforming market	Item 17	0.926	123.058
	Item 18	0.926	111.232
Technological requirements of digital transformation	Item 19	0.922	107.949
	Item 20	0.918	92.560
Innovative and learning-oriented empowerment	Item 21	0.933	134.877
	Item 22	0.925	106.253
Organizational adaptation to digital transformation	Item 23	0.923	110.563
	Item 24	0.920	94.164
Analysis and interaction with digital users	Item 25	0.863	40.087
	Item 26	0.911	78.652
	Item 27	0.920	90.286
Data governance and security in the digital ecosystem	Item 28	0.899	76.324
	Item 29	0.901	77.954

	Item 30	0.905	72.693
Data-driven infrastructure for organizational AI deployment	Item 31	0.936	105.423
	Item 32	0.931	86.458
Technological and organizational readiness for digital transition	Item 33	0.922	93.180
	Item 34	0.955	343.538
Holistic strategy for organizational AI deployment	Item 35	0.908	79.396
	Item 36	0.920	107.835
Human capital readiness for digital transformation	Item 37	0.917	101.986
	Item 38	0.923	108.692
Technology acceptance within an appropriate cultural and social context	Item 39	0.931	123.085
	Item 40	0.935	147.780
Legal and policy considerations in AI implementation	Item 41	0.930	121.115
	Item 42	0.926	118.204
Challenges and opportunities arising from accelerated digital innovation	Item 43	0.946	189.798
	Item 44	0.937	129.854
Marketing decision-making based on intelligent analysis of customer behavior	Item 45	0.922	124.191
	Item 46	0.911	85.371
Enhancing marketing effectiveness through personalization and artificial intelligence	Item 47	0.947	157.600
	Item 48	0.927	99.477
Intelligent, data-driven marketing automation	Item 49	0.931	143.701
	Item 50	0.921	106.083
Market and customer behavior analysis using intelligent learning algorithms	Item 51	0.921	99.056
	Item 52	0.920	108.369
Increasing efficiency in campaign execution and customer experience management	Item 53	0.932	133.408
	Item 54	0.925	113.910
Enhancing marketing effectiveness and efficiency through data and technology	Item 55	0.921	113.664
	Item 56	0.901	68.249
	Item 57	0.452	6.799
Intelligent personalization of customer experience and communication	Item 58	0.924	74.142
	Item 59	0.939	99.565
Predictive analytics for precise marketing decision-making	Item 60	0.903	73.465
	Item 61	0.903	78.732
	Item 62	0.899	67.447
Innovation and creation of competitive advantage through strategies and advanced data analytics	Item 63	0.937	99.818
	Item 64	0.929	77.250
Artificial intelligence–based digital marketing	Item 65	0.864	54.135
	Item 66	0.893	90.907
	Item 67	0.862	62.968
	Item 68	0.880	61.537

The results in Table 4 indicate that since none of the factor loadings for the variables are below 0.40 and most factor loadings are close to 1.00, the construct validity of the questionnaire can be confirmed. Regarding the T-statistic values, all obtained values exceed 1.96, indicating that all research items are confirmed for measuring the study variables. Based on these results, none of the questionnaire items were removed.

Table 5 presents the results of the confirmatory and exploratory factor analyses of the study.

Table 5

Results of the Confirmatory and Exploratory Factor Analyses

P Value	T-Statistic	Standard Deviation	Mean	Path Coefficient	Relationship
0.000	13.910	0.043	0.601	0.602	Technological readiness → Strategies
0.000	18.289	0.081	1.473	1.473	AI-based digital marketing → Strategies
0.000	15.101	0.061	0.922	0.927	Holistic strategy → Strategies
0.000	40.424	0.020	0.799	0.798	Strategies → Marketing automation
0.000	39.486	0.020	0.789	0.789	Strategies → Effectiveness enhancement
0.000	36.574	0.022	0.789	0.787	Strategies → Productivity enhancement
0.000	43.918	0.019	0.819	0.819	Strategies → Market analysis
0.000	34.576	0.022	0.761	0.761	Strategies → Marketing decision-making
0.000	34.250	0.022	0.766	0.764	Strategies → Outcomes
0.000	8.580	0.040	0.347	0.348	Human capital → Strategies
0.000	35.830	0.022	0.789	0.788	Contextual conditions → Technological requirements of digital transformation

0.000	9.673	0.043	0.419	0.421	Contextual conditions → Analysis and interaction
0.000	30.768	0.024	0.752	0.752	Contextual conditions → Innovative empowerment
0.000	8.416	0.046	0.389	0.393	Contextual conditions → Governance and security
0.041	1.989	0.047	0.492	0.492	Contextual conditions → Strategies
0.000	28.247	0.025	0.718	0.719	Contextual conditions → Organizational adaptability
0.000	25.401	0.028	0.705	0.703	Causal conditions → Organizational digital readiness
0.000	29.151	0.025	0.731	0.731	Causal conditions → Trust building
0.000	62.968	0.014	0.862	0.861	Causal conditions → AI-based digital marketing
0.000	27.462	0.026	0.705	0.704	Causal conditions → Personalized marketing
0.000	29.854	0.025	0.737	0.737	Causal conditions → Human capital empowerment
0.000	105.948	0.008	0.888	0.888	Causal conditions → Data-driven infrastructure
0.000	24.983	0.028	0.711	0.710	Causal conditions → Intelligent adaptability
0.000	30.041	0.024	0.722	0.721	Causal conditions → AI application
0.000	32.325	0.023	0.755	0.755	Outcomes → Effectiveness and efficiency enhancement
0.000	8.872	0.043	0.384	0.388	Outcomes → Predictive analytics
0.000	9.273	0.044	0.408	0.408	Outcomes → Intelligent personalization
0.000	7.477	0.046	0.340	0.342	Outcomes → Innovation and competitive advantage

In the partial least squares technique, the structural model fit is assessed using the coefficient of determination (R^2), the redundancy index, and the goodness-of-fit (GOF) measure. Based on the values reported in Table 6, most R^2 values in the model exceed 0.33 (the benchmark for moderate values); therefore, the structural model demonstrates an acceptable level of fit according to this criterion.

Table 6

R^2 Values

Main Category	R^2 Coefficient	Communalities
Data-driven infrastructure for intelligence-based marketing	0.788	0.782
Application of artificial intelligence in digital marketing	0.521	0.808
Organizational digital readiness for leveraging artificial intelligence	0.497	0.877
Human capital empowerment for digital transformation	0.543	0.833
AI-driven personalized marketing	0.497	0.839
Trust building in the digital marketing environment	0.534	0.872
Intelligent adaptation to a transforming market	0.505	0.857
Technological requirements of digital transformation	0.622	0.846
Innovative and learning-oriented empowerment	0.566	0.863
Organizational adaptation to digital transformation	0.516	0.849
Analysis and interaction with digital users	0.176	0.807
Data governance and security in the digital ecosystem	0.151	0.813
Data-driven infrastructure for organizational AI deployment	—	0.871
Technological and organizational readiness for digital transition	—	0.881
Holistic strategy for organizational AI deployment	—	0.835
Human capital readiness for digital transformation	—	0.846
Technology acceptance within an appropriate cultural and social context	—	0.870
Legal and policy considerations in AI implementation	—	0.861
Challenges and opportunities arising from accelerated digital innovation	—	0.886
Marketing decision-making based on intelligent analysis of customer behavior	0.579	0.840
Enhancing marketing effectiveness through personalization and artificial intelligence	0.623	0.872
Intelligent, data-driven marketing automation	0.638	0.857
Market and customer behavior analysis using intelligent learning algorithms	0.671	0.847
Increasing efficiency in campaign execution and customer experience management	0.622	0.862
Enhancing marketing effectiveness and efficiency through data and technology	0.570	0.621
Intelligent personalization of customer experience and communication	0.166	0.867
Predictive analytics for precise marketing decision-making	0.148	0.813
Innovation and creation of competitive advantage through strategies and advanced data analytics	0.116	0.870
Artificial intelligence–based digital marketing	0.743	0.765

Figure 2

Model in the Significance Values (T-Values) Mode

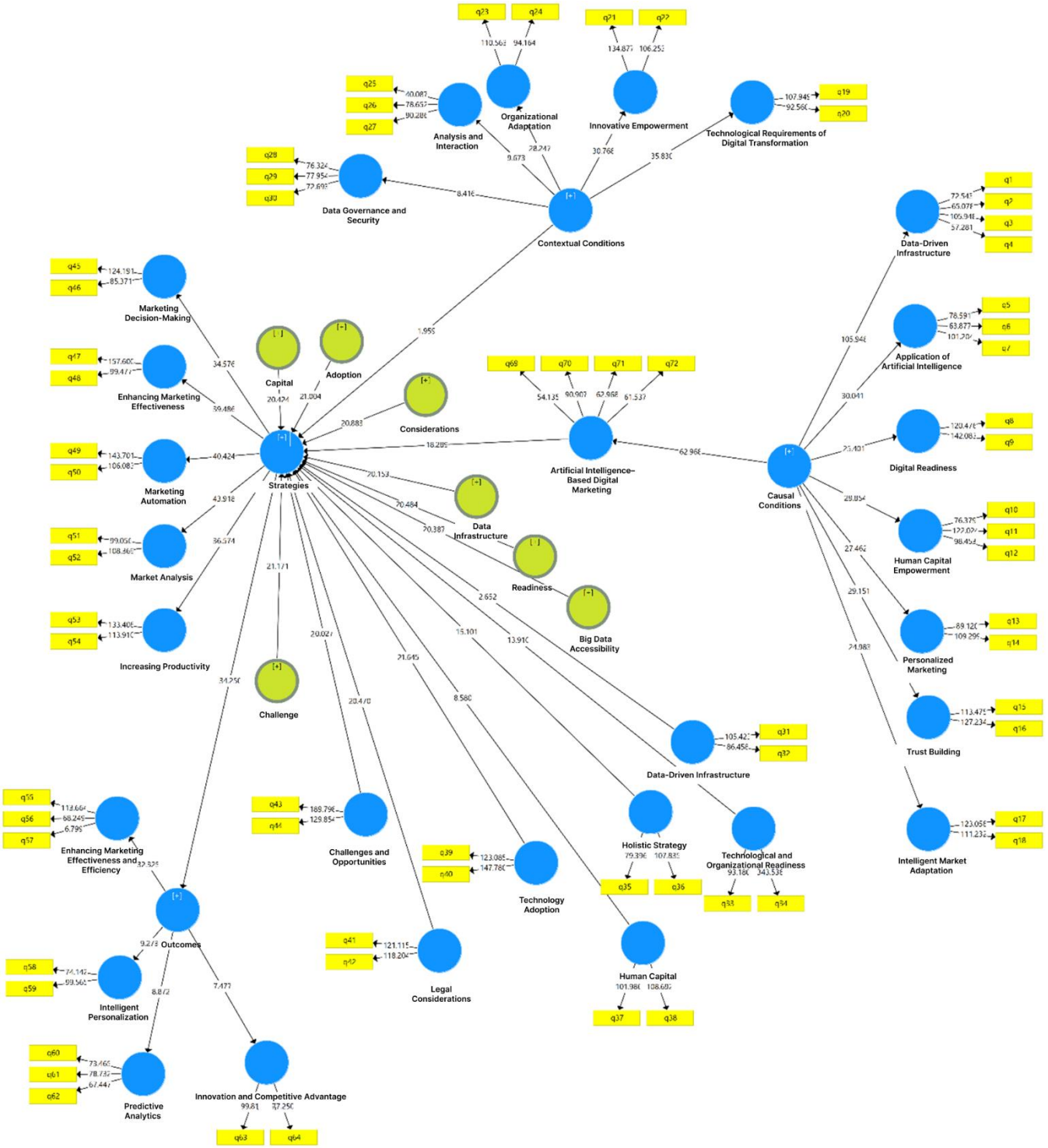
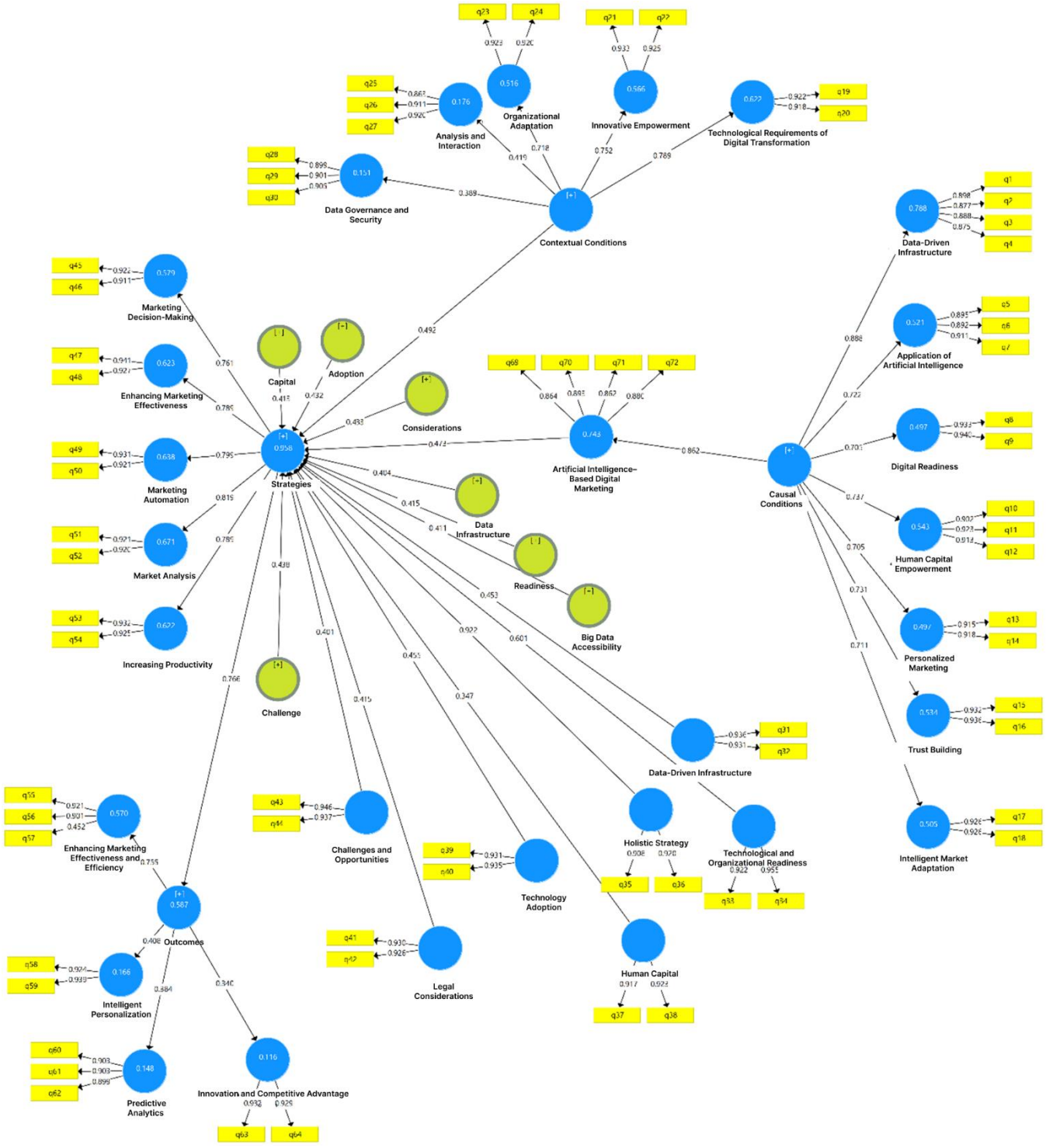


Figure 3

Model in the Standardized Coefficients Mode



The overall model includes both the measurement and structural components, and by confirming their fit, the assessment of fit in the complete model is achieved. To evaluate the fit of the overall model, it is sufficient to compute a single criterion known as GOF:

$$GOF = \sqrt{[(\overline{Communalities}) \times (\overline{R^2})]}$$

To calculate $(\overline{R^2})$, the mean of all R^2 values in the model is considered, resulting in $(\overline{R^2}) = 0.490$.

Accordingly, the GOF value is calculated as:

$$GOF = \sqrt{[(0.838) \times (0.490)]} = 0.640$$

Considering the three benchmark values of 0.01, 0.25, and 0.36 introduced as weak, moderate, and strong levels for GOF, respectively, obtaining a value of 0.640 for this index indicates a good overall fit of the research model.

Discussion and Conclusion

The present study aimed to design and empirically validate an artificial intelligence–based digital marketing model in the ICT industry, and the findings provide substantial evidence regarding the structural coherence and explanatory power of the proposed model. The results of the structural equation modeling indicated that the overall model demonstrated a strong goodness of fit, confirming that the identified dimensions and pathways collectively offer a robust explanation of how AI-driven digital marketing capabilities are formed and translated into strategic actions and outcomes within ICT organizations. This finding is consistent with prior analytical frameworks that emphasize the necessity of integrating technological, organizational, and strategic components to fully capture the value-creation mechanisms of AI in digital marketing [2, 30].

One of the central findings of this study is the significant role of causal conditions—particularly data-driven infrastructure, AI application in digital marketing, organizational digital readiness, and human capital empowerment—in shaping AI-based digital marketing capabilities. The strong path coefficients between causal conditions and core marketing constructs indicate that without adequate data quality, advanced analytics capabilities, and AI deployment, digital marketing strategies cannot reach their full potential. This result aligns with the argument that big data analytics and AI are foundational enablers that transform raw data into actionable marketing insights [3, 4]. The empirical support for data-driven infrastructure reinforces earlier findings that emphasize the critical importance of data accessibility, integration, and analytical sophistication in AI-powered marketing environments [6, 21].

The significant effect of AI application on digital marketing outcomes further confirms that machine learning models, predictive analytics, and intelligent automation are no longer peripheral tools but core components of contemporary marketing systems. The results corroborate previous studies demonstrating that AI enhances marketing precision, targeting accuracy, and campaign optimization, particularly in digitally intensive industries [31, 37]. Moreover, the strong relationship between AI-based digital marketing and strategies in the model supports empirical evidence suggesting that AI-driven insights directly inform strategic decision-making rather than merely supporting operational efficiency [7, 8].

Human capital empowerment emerged as another critical driver within the model, exerting a significant influence on strategic marketing outcomes. This finding highlights that AI technologies alone do not guarantee superior marketing performance unless organizations possess skilled personnel capable of interpreting analytical outputs and integrating them into strategic processes. This result is consistent with prior research emphasizing the role of digital skills, interdisciplinary collaboration, and organizational learning in maximizing the benefits of AI adoption [19, 20]. It also aligns with studies suggesting that the effectiveness of AI in marketing is contingent upon the readiness of employees to engage with advanced analytical tools and adapt to data-driven decision cultures [22, 28].

The findings related to contextual conditions further deepen the understanding of AI-based digital marketing implementation. Technological requirements of digital transformation, innovative and learning-oriented empowerment, and organizational adaptation were found to significantly influence intermediate constructs and strategies. These results

reinforce the view that AI-based marketing systems must be embedded within a supportive organizational and technological context to be effective. Prior studies have similarly highlighted that IT infrastructure, cybersecurity, and digital capabilities constitute essential prerequisites for sustainable AI deployment in marketing functions [15, 16]. The empirical support for these contextual pathways suggests that ICT organizations must treat AI-driven marketing as part of a broader digital transformation agenda rather than as an isolated functional initiative.

The significant role of data governance and security within the model is particularly noteworthy. The results indicate that trust-building mechanisms and governance structures are integral to the successful implementation of AI-based digital marketing. This finding is in line with recent research emphasizing that ethical considerations, data privacy, and algorithmic transparency are central to maintaining customer trust in AI-mediated marketing interactions [17, 18]. In the ICT industry, where data intensity and regulatory scrutiny are high, effective governance frameworks appear to function as enabling rather than constraining factors, facilitating responsible AI use and long-term customer engagement [33, 34].

The results also demonstrate that intervening conditions—such as holistic AI strategy, organizational readiness for digital transition, and cultural acceptance of technology—play a meaningful role in translating contextual and causal factors into actionable strategies. The strong associations observed in the model suggest that strategic coherence and cross-functional alignment are essential for leveraging AI in digital marketing. This finding supports earlier conceptual work arguing that AI value creation depends on strategic integration across organizational units rather than siloed technology adoption [13, 36]. It also resonates with empirical evidence showing that organizations with a clear AI roadmap and adaptive culture achieve higher returns on AI-driven marketing investments [8, 17].

At the strategic level, the study found that AI-based marketing strategies significantly influence marketing automation, personalization, market analysis, and customer-focused decision-making. The strong path coefficients from strategies to operational marketing outcomes indicate that AI-driven strategies serve as a critical bridge between analytical capabilities and tangible performance improvements. This result aligns with prior research demonstrating that AI enhances marketing effectiveness by enabling real-time personalization, intelligent segmentation, and automated campaign management [9, 10]. It also supports findings that predictive analytics and intelligent learning algorithms improve the accuracy of customer behavior forecasting and demand anticipation [23, 29].

The consequences identified in the model—namely increased marketing effectiveness and efficiency, intelligent personalization, predictive decision-making, and innovation-driven competitive advantage—were all significantly explained by the proposed structural relationships. These results provide empirical validation for the argument that AI-based digital marketing contributes not only to operational improvements but also to strategic differentiation and long-term competitiveness. This conclusion is consistent with studies emphasizing that AI enables firms to move from reactive marketing approaches to proactive and predictive strategies that enhance customer lifetime value and market responsiveness [12, 24]. Furthermore, the link between AI-driven strategies and innovation supports research suggesting that advanced data analytics foster new business models and value propositions in digital ecosystems [16, 25].

Overall, the discussion of results suggests that the proposed model successfully integrates multiple strands of AI and digital marketing literature into a coherent and empirically supported framework tailored to the ICT industry. By simultaneously accounting for causal, contextual, intervening, strategic, and outcome dimensions, the model advances existing research that has often focused on isolated variables or single-level analyses. The findings underscore that AI-based digital marketing is a

systemic capability that emerges from the interaction of technology, people, strategy, and governance, rather than a standalone technological innovation [27, 33].

Despite the contributions of this study, several limitations should be acknowledged. First, the research was conducted within the context of the ICT industry, which may limit the generalizability of the findings to other sectors with different technological maturity levels or data environments. Second, the quantitative phase relied on self-reported data, which may be subject to common method bias or perceptual inaccuracies. Third, the cross-sectional design of the study restricts the ability to draw causal inferences regarding the long-term effects of AI-based digital marketing strategies. Finally, although the model captures a wide range of dimensions, it may not fully encompass emerging AI technologies, such as generative AI applications, that continue to reshape digital marketing practices.

Future research could extend this study by applying the proposed model to other industries, such as retail, finance, or healthcare, to assess its external validity and contextual adaptability. Longitudinal research designs would be valuable for examining how AI-based digital marketing capabilities evolve over time and how they influence sustained competitive advantage. In addition, future studies may incorporate objective performance metrics, such as financial outcomes or customer behavior data, to complement perceptual measures. Researchers may also explore the role of emerging AI technologies, ethical AI governance mechanisms, and cross-cultural factors as potential extensions of the model.

From a practical perspective, managers in ICT organizations should view AI-based digital marketing as an integrated organizational capability rather than a purely technological investment. Emphasis should be placed on developing robust data infrastructures, enhancing employee digital skills, and fostering a culture that supports data-driven decision-making. Organizations should also establish clear governance frameworks to address data privacy, security, and ethical concerns, thereby strengthening customer trust. Finally, practitioners are encouraged to align AI-driven marketing initiatives with broader digital transformation strategies to ensure strategic coherence and sustainable value creation.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

References

[1] E. Burns, N. Laskowski, and L. Tucci, "What is artificial intelligence (AI)? Definition, benefits and use cases," 2022. [Online]. Available: https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence.

[2] C. Ziakis and M. Vlachopoulou, "Artificial Intelligence in Digital Marketing: Insights from a Comprehensive Review," *Information*, vol. 14, no. 12, p. 664, 2023, doi: 10.3390/info14120664.

[3] S. LaValle, E. Lesser, R. Shockley, M. S. Hopkins, and N. Kruschwitz, "Big data, analytics and the path from insights to value," *MIT Sloan Management Review*, vol. 52, no. 2, pp. 21-32, 2021.

[4] S. Chaudhuri, U. Dayal, and V. Narasayya, "Data Warehousing and Big Data Analytics," *ACM Computing Surveys*, vol. 53, no. 1, pp. 1-41, 2020.

[5] W. Chen, Y. Shi, and Z. Zhang, "Personalized Experience in Digital Marketing: Leveraging Big Data for Customized Customer Engagement," *International Journal of Marketing*, vol. 49, no. 3, pp. 215-233, 2021.

[6] J. Martin and R. Thompson, "The Application of Artificial Intelligence in Customer Data Analysis and Digital Marketing," *International Journal of Business and Technology*, vol. 10, no. 2, pp. 102-115, 2023.

[7] F. Hosseini and M. Farhadi, "The Role of Artificial Intelligence in Optimizing Digital Marketing Strategies," *Journal of Marketing and Information Technology Studies*, vol. 18, no. 1, pp. 90-103, 2024.

[8] J. Hyun and S. Kim, "Artificial Intelligence in Optimizing Digital Marketing: An Empirical Model," *Journal of Marketing Innovations*, vol. 19, no. 4, pp. 21-33, 2023.

[9] M. Azar and A. Sharifi, "Artificial Intelligence and its Impact on Personalized Digital Advertising," *Journal of New Marketing Technologies*, vol. 11, no. 3, pp. 89-102, 2024.

[10] S. Kim and H. Park, "Artificial Intelligence and Its Impact on Personalized Digital Advertising," *Journal of Digital Advertising Research*, vol. 15, no. 3, pp. 35-48, 2024.

[11] M. Choudhury and et al., "Hyper-Personalization in Digital Marketing: Trends and Implications," *Journal of Marketing Technology*, vol. 11, no. 1, pp. 33-50, 2023.

[12] F. Yang and L. Zhang, "Investigating the Impact of Artificial Intelligence on Customer Experience in Digital Marketing," *International Journal of Marketing Technology*, vol. 22, no. 1, pp. 12-25, 2024.

[13] M. A. Al Khaldy, B. A. A. Al Obaydi, and A. J. Shari, "The Impact of Predictive Analytics and AI on Digital Marketing Strategy and ROI," in *Cutting Edge Business Technologies in the Big Data Era*, 2023, pp. 367-379.

[14] J. Wang and H. Li, "Artificial Intelligence in Targeted Advertising: Analyzing Customer Behavior in Digital Marketing," *Journal of Artificial Intelligence in Business*, vol. 19, no. 2, pp. 88-102, 2024.

[15] D. Morris, S. Taylor, and R. Ahmed, "Technological prerequisites for digital transformation: Infrastructure and cybersecurity considerations," *Information Systems Journal*, vol. 34, no. 2, pp. 215-237, 2024, doi: 10.1111/isj.12345.

[16] J. Chen, L. Wu, and T. Zhang, "Technological preparedness for digital transformation: The role of IT infrastructure and digital capability," *Information & Management*, vol. 61, no. 2, p. 103792, 2024, doi: 10.1016/j.im.2023.103792.

[17] C. Reed, M. Wynn, and R. Bown, "Artificial Intelligence in Digital Marketing: Towards an Analytical Framework for Revealing and Mitigating Bias," *Big Data and Cognitive Computing*, vol. 9, no. 2, p. 40, 2025, doi: 10.3390/bdcc9020040.

[18] S. Mahmoudi and M. Ghorbani, "Artificial Intelligence and Personalized Advertising in Digital Marketing," *Marketing Sciences Quarterly*, vol. 14, no. 1, pp. 45-58, 2024.

[19] J. Bustard and M. Ghisoiu, "Revolutionising Digital Marketing Education with Generative Artificial Intelligence Integration: An Asynchronous Approach," *Proceedings*, vol. 114, no. 1, p. 1, 2025, doi: 10.3390/proceedings2025114001.

[20] M. Gökerik and Ö. Aktaş, "Digital Marketing Trends Reshaped by Artificial Intelligence: A Bibliometric Approach," *JOEEP: Journal of Emerging Economies and Policy*, vol. 9, no. 1, pp. 75-90, 2024.

[21] S. Rahmani and A. H. Jafari, "Artificial Intelligence and Customer Data Analysis in Digital Marketing," *Journal of Marketing Science and Technology*, vol. 13, no. 2, pp. 12-25, 2024.

[22] S. M. Mousavi and F. Rezaei, "Using Artificial Intelligence in Customer Sentiment Analysis in Digital Marketing," *Journal of Marketing Research and Information Technology*, vol. 20, no. 1, pp. 34-47, 2023.

[23] S. Zhang and Z. Tan, "Predictive Models Based on Artificial Intelligence in Digital Marketing: Applications and Challenges," *Journal of Marketing Science*, vol. 17, no. 4, pp. 64-79, 2024.

[24] W. Huang and Q. Liu, "Artificial Intelligence and Sentiment Analysis: Impact on Digital Marketing Strategies," *Journal of Business Intelligence*, vol. 25, no. 2, pp. 32-46, 2024.

[25] S. Bormane and E. Blaus, "Artificial intelligence in the context of digital marketing communication," *Frontiers in Communication*, vol. 9, p. 1411226, 2024, doi: 10.3389/fcomm.2024.1411226.

[26] F. Mohammadi and N. Azizi, "Artificial Intelligence and Marketing Automation in the ICT Industry," *Specialized Journal of Digital Marketing and Information Technology*, vol. 9, no. 2, pp. 73-86, 2023.

[27] M. Saeidi and A. Hosseini, "Analysis of the Application of Artificial Intelligence in Improving Digital Marketing Strategies in the ICT Industry," *Iran Digital Marketing Quarterly*, vol. 15, no. 2, pp. 77-90, 2023.

[28] S. A. Norouzi and A. Pourali, "Artificial Intelligence in Customer Behavior Analysis: A Digital Marketing Approach," *Quarterly Journal of Marketing and Online Business*, vol. 19, no. 3, pp. 66-80, 2023.

[29] R. Ghasemi and H. Mousavi, "Models for Predicting Customer Behavior Using Artificial Intelligence in Digital Marketing," *Journal of Marketing and E-Commerce Research*, vol. 14, no. 4, pp. 55-69, 2023.

[30] H. Sundari, P. Rajeshkumar, K. Santhanalakshmi, and H. K.N, "Artificial Intelligence in Digital Marketing: A Systematic Review and Strategic Framework for AI-Augmented Marketing," *International Research Journal on Advanced Engineering and Management (IRJAEM)*, vol. 3, no. 8, pp. 2595-2611, 2025, doi: 10.47392/IRJAEM.2025.0410.

[31] M. Aghazadeh and J. Yazdi, "Using Machine Learning Models in Digital Marketing," *Journal of Management Sciences and Information Technology*, vol. 21, no. 4, pp. 98-112, 2023.

[32] N. Ebrahimzadeh, "Digital Marketing Strategy in Online Communities," in *The 4th National Conference on Management, Accounting, and Economics with Emphasis on Regional and Global Marketing*, Tehran, 2019. [Online]. Available: https://civilica.com/doc/915722.

[33] Y. Liu and Z. Wang, "Artificial Intelligence and Digital Marketing: A Qualitative Analysis," *Journal of Business Research*, vol. 28, no. 2, pp. 101-115, 2024.

[34] C. Acatrinei, I. Apostol, L. Barbu, and R. Chivu, "Artificial Intelligence in Digital Marketing: Enhancing Consumer Engagement and Supporting Sustainable Behavior Through Social and Mobile Networks," *Sustainability*, vol. 17, no. 14, p. 6638, 2025, doi: 10.3390/su17146638.

[35] A. Joy, Y. Zhu, C. Peña, and M. Brouard, "Digital future of luxury brands: Metaverse, digital fashion, and non-fungible tokens," *Strategic Change*, vol. 31, no. 3, pp. 337-343, 2022, doi: 10.1002/jsc.2502.

[36] N. Toros Ntapiapis, "Artificial intelligence in digital marketing: Descriptive analysis of companies' artificial intelligence strategies with random sampling," *Etkileşim,* vol. 12, pp. 368-387, 2023, doi: 10.32739/etkilesim.2023.6.12.226.

[37] K. Chaitanya, G. Chandra Saha, H. Saha, S. Acharya, and M. Singla, "The Impact of Artificial Intelligence and Machine Learning in Digital Marketing Strategies," *European Economic Letters*, vol. 13, no. 3, pp. 982-992, 2023.