

The Impact of Artificial Intelligence Marketing on Enhancing Digital Service Quality: A Case Study of SONELGAZ –Batna-

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Abstract: This study aims to measure the impact of AI marketing on enhancing the quality of digital services at Sonelgaz (Distribution Directorate–Batna). To achieve this objective, a questionnaire was utilized as the primary tool for data collection from a sample of 46 employees. Statistical findings revealed a significant impact of AI marketing dimensions on the improvement of digital service quality. However, the results indicated variance in the significance of these dimensions; while the personalization and ethics dimensions demonstrated a statistically significant impact, no significant effect was found for the remaining dimensions technological, analytical and automation. These findings underscore that the synergy between intelligent technologies and human expertise constitutes the fundamental pillar for the sustainable enhancement of organizational performance and the digital customer experience.

Keywords: Artificial Intelligence (AI); Digital Services Quality (DSQ); AI in Marketing (AIM); Dimensions; Sonelgaz.

JEL Codes: M31 ; O33 ; L94.

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Introduction:

The contemporary global landscape has undergone a radical paradigm shift toward comprehensive digitalization, where technology has evolved from a mere auxiliary tool into the primary catalyst for innovating resilient business models capable of navigating an accelerated competitive environment. Within this context, AIM has emerged as a sophisticated managerial and technical philosophy, leveraging Big Data and Artificial Intelligence to decipher and predict customer needs with unprecedented precision. As a fundamental pillar of modern digital transformation, AIM utilizes predictive analytics to redefine the concept of quality, shifting it from a traditional product-centric focus toward the broader horizon of DSQ. Consequently, the efficiency of electronic platforms and digital responsiveness have become the core benchmarks for customer evaluations of organizational performance.

These transformations have compelled service-oriented organization, particularly those managing vital sector to re-engineer their processes in alignment with global standards of DSQ. The modern customer no longer seeks the service in isolation but prioritizes a seamless digital

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experience that eliminates transactional barriers. Accordingly, DSQ has become the cornerstone of corporate reputation and the primary metric for fostering digital customer loyalty. For major service entities such as the Sonelgaz Group, specifically the Distribution Directorate of Batna, digital transformation is no longer a strategic option but an imperative necessity to enhance service performance efficiency. This transition from traditional paradigms toward AIM aims, primarily, to optimize digital services, ranging from facilitating electronic bill payments to accelerating technical fault response times and personalizing the customer experience to meet evolving expectations.

Research Problem

Sonelgaz stands as a leading institution committed to digitalizing its services to meet the evolving needs of millions of customers. As the organization pivots toward adopting AIM, there is a pressing need to evaluate the effectiveness of its various dimensions in elevating the standard of DSQ. Accordingly, the central research question is formulated as follows:

To what extent do AIM dimensions impact the enhancement of DSQ at the Sonelgaz Batna?

Based on this research problem, a set of sub-questions is formulated as follows:

- What is the adoption level of AIM dimensions (Technological, Analytical, Personalization, Automation, and Ethical dimensions) at the Sonelgaz Batna?
- What is the level of DSQ provided by the Sonelgaz Batna?
- Is there a statistically significant impact of AIM dimensions on improving the DSQ at Sonelgaz Batna?

Research Hypotheses

To answer these questions, the following hypotheses were developed. The main hypothesis is:

- **There is a statistically significant impact of Artificial Intelligence marketing dimensions on improving the quality of digital services at Sonelgaz.**

The main hypothesis is subdivided into the following sub-hypotheses:

- There is a statistically significant impact of the **technological dimension** on improving the quality of digital services at Sonelgaz Batna.
- There is a statistically significant impact of the **analytical dimension** on improving the quality of digital services at Sonelgaz Batna.
- There is a statistically significant impact of the **personalization dimension** on improving the quality of digital services at Sonelgaz Batna.
- There is a statistically significant impact of the **automation dimension** on improving the quality of digital services at Sonelgaz Batna.
- There is a statistically significant impact of the **ethical dimension** on improving the quality of digital services at Sonelgaz Batna.

Objectives of the Study:

This study aims to:

- To highlight modern concepts of AI marketing and digital service quality.
- To identify the extent to which Sonelgaz Batna adopts AI marketing dimensions in delivering its services to customers.
- To determine the nature of the relationship and the statistical impact of using AI marketing dimensions on digital service quality.
- To identify the various obstacles that may limit the effectiveness of using AI in marketing operations to enhance digital service quality within the institution under study.
- To provide a set of practical recommendations and solutions for the management of Sonelgaz Batna to enhance the digital customer experience and achieve long-term satisfaction.

Significance of the Study:

The significance of this study lies in:

- Its focus on relatively modern concepts within the service industry, namely AI-driven marketing and Digital Service Quality. This importance is reflected in the attempt to establish a theoretical and empirical framework for the relationship between AI-driven marketing dimensions and digital quality standards, thereby opening new research horizons regarding digital transformation across various service sectors.
- Furthermore, the study contributes significantly to the applied field by providing insights into transforming traditional administrative procedures into seamless digital experiences. By leveraging AI-driven strategies, organizations can transition from routine service delivery to creating enhanced digital journeys that foster higher levels of customer satisfaction and loyalty.

I.Theoretical Framework

1. AI in Marketing

1.1 Dification:

- AI provides a pragmatic and comprehensive framework for leveraging data-driven marketing strategies, thereby enabling organizations to optimize performance and attain peak competitive success (Gabelaia, 2022, p. 02). Stebiuk and Kopeikina (2019) examined the operational efficacy of contemporary AI-driven instruments currently integrated into marketing infrastructures (Volodymyr Nesterenko, 2022, p. 170).

- The marketing landscape has undergone a fundamental transformation driven by AI, which has catalyzed growth, redefined strategic frameworks, and optimized operational workflows, thereby accelerating digital transformation. AI applications in this domain are multifaceted, encompassing everything from predictive data analytics to the delivery of hyper-personalized customer experiences. Consequently, as organizations continue to allocate substantial capital toward AI-driven infrastructures, there has been a notable surge in scholarly interest and empirical research within the field (Madanchian, 2024, p. 03).

- AI marketing It involves the integration and deployment of technological frameworks and intelligent systems within marketing operations. This serves to aggregate, analyze, and segment customer data for predictive behavioral modeling, thereby facilitating precise, real-time data-driven decisions.

1.2 The importance of artificial intelligence in marketing:

The significance of AIM is manifested in (Oluwafemi, 2021, p. 428):

- The integration of AI has fundamentally revolutionized the marketing paradigm, facilitating the analysis of high-dimensional datasets, the automation of complex workflows, and the delivery of hyper-personalized customer experiences.
- By leveraging advanced architectures—including Machine Learning, Natural Language Processing, and Deep Learning, marketers can develop sophisticated predictive models to anticipate customer behavior, optimize multi-channel campaigns, and bolster engagement across diverse touchpoints.
- The strategic application of AI encompassing targeted advertising, granular segmentation, recommendation engines, and sentiment analysis affords organizations an unprecedented capacity for individualized customer connectivity and data-driven value creation.
- Emergence of Ethical Ramifications: While the operational advantages of AIM are unequivocal, the associated ethical implications have transitioned into a critical focal point for both scholars and industry practitioners.
- Data Sovereignty and Algorithmic Transparency: The reliance of AI systems on expansive personal datasets has intensified concerns regarding data sovereignty, the lack of algorithmic transparency, and the potential erosion of customer trust.
- Requirement for a Holistic Framework: A comprehensive understanding of AI's role in marketing necessitates a dual approach: recognizing its transformative potential while proactively addressing the normative considerations inherent in its strategic deployment.

1.3 The role of AIM:

AI assumes a pivotal role in marketing, manifested in (Volodymyr Nesterenko, 2022, p. 171):

- AI is increasingly recognized as the definitive future of the marketing industry, with its integration becoming a fundamental prerequisite for business viability. AI offers multifaceted opportunities across three core dimensions: strategic formulation, including segmentation, targeting, and positioning (STP); market intelligence, encompassing systematic data collection, advanced market analysis, and deep customer insights; and operational execution, specifically through the standardization, personalization, and relationalization of marketing campaigns. Consequently, leveraging these AI-driven capabilities is essential for organizations to maintain a competitive advantage in an increasingly automated landscape.

- The capacity of AI to execute analytical processes beyond the scope of human cognitive limitations represents one of its most transformative attributes. This computational superiority

renders the future integration of AI an inevitable necessity, while its current deployment remains critical for optimizing organizational efficiency and driving competitive advantage.

1.4 Dimensions of AIM:

The dimensions of AI revolve around the capacity of intelligent technologies to transmute big data into precise and effective marketing strategies. Based on contemporary studies, these dimensions can be synthesized into the following aspects:

1.4.1 Technological Dimension:

AI catalyzes the transition toward data-centric marketing paradigms, facilitating real-time optimization across a spectrum of digital touchpoints, including programmatic advertising, email scheduling, and personalized product recommendations. Notably, Real-Time Bidding frameworks such as those integrated into Google Ads and Meta Ads Manager leverage AI to autonomously calibrate campaign parameters in alignment with evolving user engagement patterns and performance analytics. This technological shift represents a fundamental evolution in marketing practice, where data is not merely aggregated but instantaneously operationalized to maximize Return on Investment and enhance the overall customer experience (ataouat, 2025, p. 66). AI algorithms effectively process voluminous datasets to generate actionable analytical outputs. Within the marketing domain, these systems aggregate extensive customer data—including transactional histories and digital footprints, to discern latent patterns and emerging trends. These insights are subsequently leveraged to enhance the efficacy of strategic campaigns. Furthermore, organizations increasingly deploy AI-driven instruments to facilitate personalized communication and targeted advertising, such as providing bespoke product recommendations tailored to individual customer preferences (Hussain, 2023, p. 09).

1.4.2 Analytical Dimension:

Through Predictive and Behavioral Analytics, AI facilitates the generation of profound customer insights, enabling hyper-personalized engagements and the forecasting of future behaviors via Machine Learning frameworks. A critical component of a bespoke marketing strategy lies in the precision of target audience segmentation; in this regard, AI leverages historical datasets to reliably infer and anticipate future market dynamics. By modeling past customer interactions, these systems can project purchase inclinations under specific conditions, thereby allowing organizations to transition from reactive to proactive strategic planning (Sakib, 2022, p. 07). Generative AI-driven predictive analytics facilitate the forecasting of individual customer preferences, enabling the synthesis of compelling brand narratives and hyper-personalized experiences. These systems anticipate engagement trajectories and modulate purchasing decisions, while simultaneously optimizing customer acquisition and retention costs. By synthesizing immersive behavioral and transactional datasets, AI fosters emotional brand resonance and cultivates long-term customer loyalty. Furthermore, the integration of visual merchandising analytics leveraging large-scale historical and product data is instrumental in decoding spending patterns and behavioral habits. This comprehensive data-driven approach enhances brand awareness, optimizes customer lifetime

value, and minimizes product returns through the configuration of innovative and adaptive purchasing environments. (George Lăzăroiu, 2024, p. 826).

1.4.3 Personalization Dimension:

AI serves a pivotal function in facilitating connectivity between marketers and prospective customers by effectively bridging the gap between raw data aggregation and strategic operationalization. Notably, the capacity of AI to generate granular audience insights significantly enhances the efficacy of marketing initiatives. This analytical depth allows for the sophisticated calibration of customer profiles, enabling the delivery of hyper-personalized messaging at optimal intervals with minimal human intervention and maximum operational efficiency (Gabelaia, 2022, p. 02).

The implementation of personalization yields substantial strategic benefits for organizations and costumers; these advantages are distinguished by the following attributes (Brooklyn, 2024, p. 02):

- **Augmented Customer Experience:** Personalization facilitates the creation of highly relevant and immersive interactions, thereby fostering elevated levels of customer satisfaction and brand loyalty.
- **Elevated Conversion Efficacy:** By disseminating content and value propositions that align with individual customer preferences, firms can significantly enhance conversion rates and catalyze revenue growth.
- **Optimized Fiscal Allocation:** AI-enabled insights allow for the precise deployment of marketing budgets. This is achieved by identifying high-propensity audiences and continuously refining campaign performance metrics.
- **Data-Centric Strategic Governance:** AI empowers marketers with actionable intelligence derived from empirical data, facilitating evidence-based decision-making and the agile recalibration of marketing strategies.

1.4.4 Automation Dimension:

AI instruments possess the capacity to synthesize user engagement metrics, thereby identifying the content that resonates most effectively with target demographics. These analytical outputs facilitate the autonomous calibration of content strategies, keyword optimization, and messaging personalization to enhance performance across digital ecosystems. A practical application is observed in AI-driven conversational agents, which automate customer service by resolving recurring inquiries and delivering bespoke responses tailored to individual behavioral patterns. Furthermore, as highlighted by Ziakis and Vlachopoulou (2023), AI is fundamentally transforming email marketing by enabling the dissemination of personalized communications at optimal temporal intervals, significantly augmenting open rates and click-through metrics (Islam, 2024, p. 6501).

1.4.5 Ethical Dimension:

The ethical dimension of AIM is predominantly focused on data governance and customer protection. Insights from industry practitioners, such as Saleem Ashfaq, suggest that organizations can mitigate privacy risks through data anonymization, ensuring that datasets are decoupled from individual identities. (Muhammad Zafeer Shahid, 2019, p. 31). The deployment of AIM necessitates a rigorous examination of its ethical implications, particularly regarding algorithmic bias and systemic unfairness. If AI models are trained on non-representative or skewed datasets, they may produce biased targeting and segmentation outcomes that unfairly prioritize certain customer segments over others. For instance, the exclusion of specific demographic groups from promotional opportunities constitutes discriminatory practice, which is fundamentally unethical. Consequently, it is imperative for marketers to implement robust testing protocols to identify and mitigate algorithmic bias. Furthermore, upholding customer agency requires transparency; organizations must provide intelligible explanations regarding their data processing practices and the logic underlying AI-driven recommendations. A deficit in transparency not only compromises customer trust but also fosters perceptions of institutional unfairness. Ultimately, the integration of AI necessitates proactive strategies to address the profound privacy concerns inherent in the utilization of customer data (Madanchian, 2024, p. 06).

2. Digital Service Quality:

2.1 Difinition:

- Parasuraman et al. (2005) conceptualize DSQ as the degree to which a digital platform facilitates the efficient and effective execution of shopping, procurement, and delivery processes. This definition implies that DSQ is a longitudinal construct, spanning from the pre-purchase phase encompassing ease of use and information transparency to the post-purchase stage, including logistics and customer support (Nguyen, 2023, p. 50). According to Santos (2003), DSQ is defined as the comprehensive consumer perceptions, subjective judgments, and evaluations regarding the excellence of services delivered via electronic media (Sadaf Firdous, 2019, p. 1659). The concept of DSQ pertains specifically to the evaluation of services facilitated within digital or online environments (Opuni, 2023, p. 46). DSQ is conceptualized as a metric to evaluate the degree of consumer satisfaction derived from the utilization of internet-based platforms for the procurement of products in an online environment (Naufal, 2024, p. 119).

- DSQ is defined by the capacity of a digital intermediary to align with customer needs and expectations, ensuring the efficient and effective execution of transactions. This quality framework facilitates the seamless completion of digital services, thereby fostering customer satisfaction, robust security protocols, and the generation of significant added value.

2.2 Dimensions of Digital Service Quality:

To empirically measure this construct, Parasuraman et al. introduced two distinct scales E-S-QUAL and E-RecS-QUAL (Nguyen, 2023, p. 50):

- The **E-S-QUAL** scale evaluates core service attributes through four primary dimensions : **Efficiency** (the speed and ease of platform navigation), **System Availability** (the technical reliability and functional stability of the site), **Fulfillment** (the accuracy of product availability and delivery promises), and **Privacy** (the robustness of data protection protocols).

- Complementing this, **the E-RecS-QUAL** scale serves as a specialized sub-dimension focused on **service recovery** and the resolution of non-routine inquiries. This scale comprises **Responsiveness** (the efficacy of problem-handling and feedback mechanisms), **Compensation** (the extent to which the firm remediates service failures), and **Contact** (the availability of proactive support through human or virtual agents). Synthesizing these theoretical frameworks, e-SQ can be interpreted as a multidimensional infrastructure comprising navigational ease, aesthetic appeal, customization, reliability, responsiveness, security, and information quality.

The SERVQUAL scale has served as the foundational instrument for assessing service quality, originally identifying ten determinants that were subsequently refined into the five-dimensional RATER model (**Tangibles, Reliability, Responsiveness, Assurance, and Empathy**). As commerce migrated to digital platforms, scholars adapted these dimensions to the electronic context. Zeithaml et al. (2000), through exploratory focus groups, initially identified eleven dimensions of e-SQ, including flexibility, ease of navigation, and site aesthetics. By 2002, Zeithaml further refined this framework into a seven-dimension model, distinguishing between a core e-SQ scale (**Efficiency, Reliability, Fulfillment, and Privacy**) and an e-SQ recovery scale (**Responsiveness, Compensation, and Contact**), the latter becoming critical only when service failures occur (Sadaf Firdous, 2019, p. 1659).

Relationship between AIM and DSQ:

Within the corporate landscape, AI serves a dual function by optimizing operational frameworks while simultaneously generating strategic value for both consumers and suppliers. The deployment of AI is extensively documented across diverse functional domains including inventory management, content automation, and customer engagement underscoring its pivotal role in augmenting service quality and driving organizational efficiency (Van, 2025, p. 2237).

AI-powered recommendation engines and personalized marketing strategies facilitate the delivery of bespoke customer experiences, thereby significantly augmenting customer satisfaction and long-term retention. Furthermore, the integration of AI-driven conversational agents and virtual assistants enables the provision of interactive and personalized service, allowing for the real-time resolution of customer inquiries and complex issues (Yusrin, 2025, p. 218).

Chatbots are conceptualized as automated computational programs designed to facilitate human-computer interaction through text-based or conversational interfaces. These systems enable users to retrieve product-specific information, execute e-commerce transactions, and facilitate real-time service requests. The proliferation of such programs is driven by their inherent accessibility, operational flexibility, and cost-efficiency for both organizations and end-users. Consequently, approximately 80% of contemporary enterprises have either integrated or intend to deploy conversational agents to ensure ubiquitous (24/7) connectivity and efficient problem resolution (Ashfaq, 2020, p. 2).

Scholarly investigations into the application of AI-driven conversational agents within customer service frameworks indicate that systems leveraging Natural Language Processing and Machine Learning algorithms are highly proficient in resolving routine inquiries and minimizing response latency. However, their efficacy diminishes when addressing complex problem-solving tasks or fostering interpersonal customer trust. Similarly, research regarding AI-enabled service encounters suggests that personalization technologies—specifically recommender systems and advanced customer analytics—significantly enhance service quality and customer satisfaction. Nevertheless, the successful deployment of these instruments necessitates a rigorous strategic design to mitigate inherent privacy risks and address burgeoning ethical concerns (Nwachukwu, 2023, p. 49).

II. Field Study:

1. Study Sample, Tools, and Methodology:

1. Study Sample:

The study population comprised employees of the Distribution Directorate. A comprehensive census (**total population sampling**) approach was adopted to ensure the inclusivity of results and to mitigate the impact of potentially invalid responses. Out of 50 questionnaires distributed across the agency, 46 valid instruments were recovered for statistical analysis, yielding a high response rate of 92%. This rate is considered statistically significant to ensure the representation of the studied population and to enhance the reliability and stability of the findings.

2. Study Instrument:

A structured questionnaire was employed as the primary data collection instrument to elicit responses from the participants. This method was selected for its efficacy in gathering standardized data suitable for rigorous quantitative analysis and for its suitability in addressing the study's research questions.

3. Statistical Data Processing:

To process and analyze the collected data, the **Statistical Package for the Social Sciences (SPSS)** V22 was utilized. The following statistical methods and tests were applied:

3.1 Reliability of the study Instrument:

To ensure the validity and reliability of the questionnaire, Cronbach's Alpha coefficient was employed. As one of the most widely recognized measures of internal consistency, it calculates the correlation between the various items of the instrument. A value approaching 1.0 indicates high reliability, confirming that the questionnaire accurately represents the study population. The results are presented in the following table:

Table (1): Results of Cronbach's Alpha Reliability Coefficient

Dimensions	Number of Items	Cronbach's Alpha
Technological Dimension	3	0,866
Analytical Dimension	3	0,728
Personalisation Dimension	3	0,915
Automation Dimension	3	0,861
Ethical Dimension	3	0,814
Total reliability coefficient for Dimensions of AIM	15	0,757
Total reliability coefficient for DSQ	10	0,752
Overall reliability coefficient for all study variables	25	0,825

Source: Prepared by the researcher based on SPSS V22 outputs.

As observed in the preceding table, the reliability coefficient values exceed 0.60 across all sections. Specifically, the Total reliability coefficient for Dimensions of AIM was 0.757, while the Total reliability coefficient for DSQ reached 0.752. Furthermore, the Overall reliability coefficient for all study variables was 0.825. Consequently, it can be concluded that the questionnaire demonstrates a high degree of reliability, confirming its validity and representativeness of the study population.

3.2 Description of the Study Sample Characteristics:

This section provides a detailed description of the study sample characteristics, based on the demographic variables collected. The following tables illustrate the distribution of respondents according to their gender, age, academic qualifications, job level and years of experience.

3.2.1 Gender: the following table illustrates the distribution of the study sample according to the gender variable:

Table (2): Distribution of the Study Sample According to Gender

Gender	Frequency	Percentage %
Male	33	71.7
Female	13	28.3
Total	46	100

Source: Prepared by the researcher based on SPSS V22 outputs

The above table indicates that males constitute the majority of the study sample, accounting for 71.7% (n = 33), while females represent 28.3% (n = 13). This disparity may be attributed to the nature of the workforce within the distribution and electricity sector. Nevertheless, the sample remains representative of the target population for this study.

3.2.2 Age: the distribution of study participants by age is presented in the table below:

Table (3): Distribution of the Study Sample According to Age

Age	Frequency	Percentage %
Under 25 years old	2	4,3
25-35 years	6	13
36-45 years	15	32,6
Over 45 years old	23	50
Total	46	100

Source: Prepared by the researcher based on SPSS V22 outputs

The preceding table indicates that half of the study sample fell within the over 45 years age group, accounting for 50%, followed by the 36-45 years age group at 32.6%. This reflects that the majority of respondents possess significant experience and seniority. Conversely, the under 25 years age category recorded the lowest percentage at 4.3%.

3.2.3 Academic Qualifications: the following table illustrates the distribution of the study sample according to academic qualifications variable:

Table (4): Distribution of the Study Sample According to Academic Qualifications

Academic Qualifications	Frequency	Percentage %
Secondary Education	7	15,2
University Degree	31	67,4
Postgraduate	5	10,9
Other	3	6,5
Total	46	100

Source: Prepared by the researcher based on SPSS V22 outputs

The preceding table indicates that the University Degree educational level was the most frequent among the sample members, accounting for 67.4%, followed by the secondary level at 15.2%, and postgraduate studies at 10.9%. These results suggest that the study population possesses a high cultural and educational level. Furthermore, they demonstrate a sufficient capacity to comprehend the questionnaire terminology, making them well-qualified to perceive the study dimensions and respond to the items with accuracy and objectivity.

3.2.4 Job Level: the distribution of study participants by job level is presented in the table below:

Table (5): Distribution of the Study Sample According to Job level

Job level	Frequency	Percentage %
Head of Departement	3	6,5
Head of Service	6	13
Cadre	16	34,8
Employee	21	45,7
Total	46	100

Source: Prepared by the researcher based on SPSS V22 outputs

The preceding table, illustrating the distribution of the study sample by job level, reflects a balanced hierarchical diversity that encompasses executive (employees), supervisory, and leadership categories. The Employee category ranked first at 45.7%, followed by the Cadre

category at 34.8%, while leadership roles (Head of Service and Head of Department) accounted for 19.5% of the total sample. This diversity contributes to enriching the study's findings by gathering perspectives from various functional levels with differing tasks and responsibilities.

3.2.5 Years of Experience: the distribution of study participants by years of experience is presented in the table below:

Table (6): Distribution of the Study Sample According to Years of Experience

Years of Experience	Frequency	Percentage %
Less than 05 years	6	13
5-10 years	4	8,7
11-15 years	13	28,3
More than 15 years	23	50
Total	46	100

Source: Prepared by the researcher based on SPSS V22 outputs

The results in the table indicate that the study sample is characterized by extensive professional experience. Specifically, 50% of the respondents have over 15 years of experience, followed by 28.3% with 11 to 15 years. This collective total signifies that 78.3% of the participants possess substantial expertise in the evolution of administrative systems and digital transformations. Such experience enhances the reliability of the responses and reflects a profound awareness of work requirements and the challenges of adopting AI within Sonelgaz. Furthermore, new employees (less than 5 years) accounted for 13%, indicating that the study population exhibits job stability, providing an ideal environment for measuring the DSQ.

4. Descriptive Analysis of Study Respondents Perspectives:

To analyze the responses, **Mean** and **standard deviations** were calculated for each item and dimension. To Interpretation of Means scores of the participants responses, the following scale was adopted to determine the level of agreement:

4.1 Analysis of AIM dimension items:

The following table illustrates the attitudes of the study sample members toward the dimensions of AIM at Sonelgaz Batna, as follows:

Table (7): Analysis of the items of the First Axis

N°	AIM Statement	Mean	Standard Deviation
1	The institution leverages intelligent technologies to streamline communication and enhance engagement with its customer	3,69	1,09
2	The institution leverages smart metering technologies to capture and transmit real-time data on consumption patterns	3,63	0,99
3	The institution leverages cloud-based platforms to facilitate the storage, processing, and seamless accessibility of big data	3,69	1,11
3	Technological Dimension	3,67	0,95
4	The institution is able to predict customer behavior based on their data and energy consumption patterns	3,76	1,11

5	The institution has the capacity to process information for the extraction of consumption patterns	3,84	1,11
6	The institution leverages automated processes to analyze and interpret customer perceptions via its website and social media platforms.	3,65	1,25
3	Analytical Dimension	3,75	0,93
7	The institution issues personalized offers and alerts tailored to each customer's geographic location and financial consumption patterns.	3,23	1,40
8	The institution provides personalized offers and services based on customer location, timing, and prior behavioral patterns of consumer interactions.	3,28	1,29
9	The design of personalized digital interfaces that dynamically adapt to individual customer preferences	3,30	1,20
3	Personalisation Dimension	3,27	1,20
10	The institution employs an automated system to issue payment reminders, ensuring consistent and timely communication with customers	3,50	1,11
11	The institution utilizes automated systems to route digital complaints to the relevant department without manual employee intervention	3,32	1,23
12	The institution utilizes chatbot to provide immediate technical support on a 24/7 basis	3,00	1,09
3	Automation Dimension	3,27	1,01
13	The company designs and programs automated systems to process customer requests impartially without discrimination.	3,76	0,94
14	The company utilizes a security system to safeguard customer data from breaches	3,95	0,86
15	The company discloses data usage practices to customers and obtains their informed consent	4,08	0,93
3	Ethical Dimension	3,93	0,78
15	Overall Mean for AIM	3,58	0,54

Source: Prepared by the researcher based on SPSS V22 outputs

Based on the overall results presented in the table above, the general mean for all study dimensions was 3.58, with a standard deviation of 0.54. This result indicates a high level of agreement among the study sample regarding the dimensions as a whole. Furthermore, the low standard deviation reflects a high degree of consistency and consensus in the respondents answers, reinforcing the reliability of the findings.

The observed variations in perspectives may be attributed to the nature of tasks or differing levels of awareness regarding the importance of this dimension among employees. These differences could also stem from the diversity of job positions within the sample; department heads and senior staff often possess a strategic vision that differs from that of executive employees, which occasionally led to fluctuations in responses and resulted in the recorded statistical variance.

4.2 Analysis of DSQ dimension items:

The distribution of the study sample's attitudes regarding DSQ dimensions at Sonelgaz Batna is presented in the table below:

Table (8): Analysis of the items of the Second Axis

N°	DSQ Statement	Mean	Standard Deviation
16	The institution deploys efficient digital integration frameworks that enable clientele to precisely monitor their consumption patterns through mobile application platforms	3,58	1,06
17	The institution deploys efficient digital integration frameworks that enable clientele to precisely monitor their consumption patterns through mobile application platforms	3,82	0,92
18	The institution deploys real-time digital alert systems to support data-driven consumption monitoring and customer-centric regulatory controls.	3,43	1,04
19	The institution's integrated e-payment system ensures utmost reliability and seamless transactional facilitation in financial collection processes through CIB bank cards and the Gold Card.	4,30	0,89
20	The intelligent assistant system delivers immediate and precise responses to frequently encountered inquiries, thereby mitigating the operational burden associated with manual processing workflows.	2,89	1,03
21	The Geographic Positioning System (GPS) has significantly contributed to expediting field intervention protocols through the precise geolocation of visually documented malfunction sites.	2,84	1,21
22	Through the digital platform, customer can autonomously initiate contractual capacity enhancement procedures with high operational efficiency, thereby rendering in-person service visits unnecessary.	2,95	1,19
23	Data-driven analytical models are utilized by the institution to dynamically tailor consumption optimization interventions to each customer's real-time behavioral patterns	3,67	1,07
24	The institutional digital dashboard facilitates the optimized deployment of maintenance teams towards high-priority affected zones, grounded in real-time analytical processing of reported service complaints.	4,17	0,82
25	The digital invoice delivery framework demonstrates superior temporal efficiency and engagement effectiveness by utilizing preference-calibrated communication channels for targeted customer outreach.	3,58	1,06
10	Overall Mean for DSQ	3,53	0,58

Source: Prepared by the researcher based on SPSS V22 outputs

The results in the preceding table indicate that the dispersion in responses (specifically in values 1.21 and 1.19) is attributed to the varying levels of digital literacy among the participants. While employees with technical backgrounds perceive these digital services as effectively implemented, those in traditional departments may encounter difficulties in utilizing them, leading to a polarization of opinions.

Furthermore, this variance may stem from the professional experience factor; as 50% of the sample possesses more than 15 years of experience, they may hold more stringent standards for digital quality compared to less experienced staff. Consequently, these divergent expectations have led to a significant spread of responses around the mean, accounting for the observed statistical disparity.

5. Hypotheses Testing:

5.1 Normality test:

To assess the normality of the data distribution, the Shapiro-Wilk test was conducted, as the sample size is 46.

Table (9): Results of the Normality Test

Dimensions	Shapiro-Wilk	
	Statistic	Sig
AIM	0,990	0,950
DSQ	0,963	0,154

Source: Prepared by the researcher based on SPSS V22 outputs

As indicated in the previous table, all significance levels (Sig.) exceed 0.05. The normality test results show that both AIM ($p = .950$) and DSQ ($p = .154$) are normally distributed. Therefore, the study utilizes parametric tests.

Table (10): Results of Pearson Correlation

Variables	r
Technological Dimension	0.225
Analytical Dimension	0.139
Personalisation Dimension	0.343*
Automation Dimension	0.231
Ethical Dimension	0.411**
AIM Dimension	0.490**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Prepared by the researcher based on SPSS V22 outputs

The results presented in the table indicate a statistically significant, moderate positive correlation between the AIM and DSQ, with a correlation coefficient of ($r = 0.490$) at the (0.01) significance level. This finding demonstrates that the increased adoption of AIM directly contributes to enhancing the efficiency and DSQ provided by Sonelgaz.

5.2 Sub-hypotheses Testing: if the p-value exceeds the 0.05 significance level, the null hypothesis is retained. Conversely, a p-value less than 0.05 leads to the rejection of the null hypothesis in favor of the alternative hypothesis.

5.2.1 Testing the first sub-hypothesis: which states that:

(H₀): There is no a statistically significant impact of the technological dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of the technological dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (11): Regression Coefficients for the first Sub-hypothesis Testing

R²	F	B	T	Sig
0.051	2.345	0.457	1.531	0.133

Source: Prepared by the researcher based on SPSS V22 outputs

The significance level (Sig) is 0.133 Since this value is greater than the 0.05 alpha level, the result is statistically non-significant; accordingly, we fail to reject the null hypothesis.

5.2.2 Testing the second sub-hypothesis: which posits that:

(H₀): There is no a statistically significant impact of the analytical dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of the analytical dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (12): Regression Coefficients for the second Sub-hypothesis Testing

R²	F	B	T	Sig
0.019	0.867	0.286	0.931	0.357

Source: Prepared by the researcher based on SPSS V22 outputs

The Sig value is 0.357 Since this value exceeds the 0.05 threshold, the result is statistically non-significant; accordingly, we fail to reject the null hypothesis.

5.2.3 Testing the third sub-hypothesis: which posits that:

(H₀): There is no a statistically significant impact of the personalization dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of the personalization dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (13): Regression Coefficients for the third Sub-hypothesis Testing

R²	F	B	T	Sig
0.118	5.883	0.549	2.425	0.019

Source: Prepared by the researcher based on SPSS V22 outputs

The Sig value is 0.019 Since this value is less than the 0.05 threshold, the result is statistically significant; accordingly, we reject the null hypothesis and accept the alternative hypothesis.

5.2.4 Testing the fourth sub-hypothesis: which states that:

(H₀): There is no a statistically significant impact of the automation dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of the automation dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (14): Regression Coefficients for the Fourth Sub-hypothesis Testing

R²	F	B	T	Sig
0.054	2.490	0.440	1.578	0.122

Source: Prepared by the researcher based on SPSS V22 outputs

The Sig value is 0.122 Since this value exceeds the 0.05 threshold, the result is statistically non-significant; accordingly, we fail to reject the null hypothesis.

5.2.5 Testing the fifth sub-hypothesis: which posits that:

(H₀): There is no a statistically significant impact of the ethical dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of the ethical dimension on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (15): Regression Coefficients for the Fifth Sub-hypothesis Testing

R²	F	B	T	Sig
0.169	8.926	1.009	2.988	0.005

Source: Prepared by the researcher based on SPSS V22 outputs

The Sig value is 0.005 Since this value is less than the 0.05 threshold, the result is statistically significant; accordingly, we reject the null hypothesis and accept the alternative hypothesis.

5.2.6 Testing the main hypothesis: to validate the main hypothesis, which states that:

(H₀): There is no a statistically significant impact of AIM dimensions on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

(H₁): There is a statistically significant impact of AIM dimensions on improving the DSQ at Sonelgaz Batna at the significance level ($\alpha \leq 0.05$).

Table (16): Regression Coefficients for Main hypothesis testing

R²	F	B	T	Sig
0.240	13.877	0.352	3.725	0.001

Source: Prepared by the researcher based on SPSS V22 outputs

The Sig value is 0.001 Since this value is less than the 0.05 threshold, the result is statistically significant; accordingly, we reject the null hypothesis and accept the alternative hypothesis.

III. Conclusion

In conclusion, this study demonstrates that AI-driven marketing has evolved beyond a mere technical tool to become the primary catalyst for institutional performance development. It provides institutions with superior capabilities in predicting customer behavior and achieving hyper-personalization. Statistical findings corroborate this role in enhancing digital service efficiency through the integration of its core dimensions technological, analytical, personalization, automation and ethical.

Study results:

- The dimensions of AIM within the Sonelgaz institution are anchored in the transition from traditional marketing toward proactive, data-driven marketing. These dimensions are operationalized through practical applications designed to enhance digital service quality and optimize customer interaction efficiency through:

- Despite the high availability and substantial reliance on advanced technological infrastructures within the company, this technological dimension remains limited in its impact on enhancing digital service quality. This suggests a systemic gap between the acquisition of modern tools and the actual capacity to leverage them effectively to improve final outcome.
- While the empirical findings validate the institutional possession of analytical dimensions, the retention of the null hypothesis suggests a lack of statistical significance regarding their contribution to digital service quality. This discrepancy indicates that although the structural infrastructure for analytics is established, there is a distinct absence of operational leverage. Consequently, data remains latent within the technical architecture, failing to manifest into tangible service improvements. Thus, the mere existence of these advanced tools does not yield a substantive shift in the perceived quality of digital outputs.
- The operationalization of the personalization dimension within Sonelgaz is manifested in the substantive enhancement of individual customer experiences, facilitated by the strategic integration of AI-driven technologies into digital platforms. These innovations have fostered the development of adaptive intelligent interfaces capable of dynamically aligning with heterogeneous user behaviors and idiosyncratic preferences. This transition toward 'digital personalization' has optimized customer interactions by increasing responsiveness and fluidity, thereby directly correlating with a measurable elevation in the perceived quality of digital service.
- The automation dimension did not reach the level of statistical significance in this study, suggesting that current automation tools have yet to achieve the intended qualitative leap in quality. Although the institution has adopted these technologies as a strategic orientation, the findings indicate a discrepancy between this technological shift and actual operational efficiency. Consequently, these tools lack a functional impact on enhancing the DSQ.
- Statistical results demonstrated a highly significant impact for the ethical dimension. This is attributed to the fact that ethics constitute the foundational pillar of the institution's adoption of AI technologies, particularly as it manages sensitive data for millions of customers. The institution has succeeded in establishing a secure digital environment that fosters customer trust, which has reflected directly and positively on the DSQ services provided within the framework of its comprehensive digital transformation.

Recommendations:

In light of the empirical results, the following recommendations are put forward:

- **Aligning technology with the institution's strategic objectives:** This necessitates a redefinition of the digital transformation strategy, ensuring that the efficacy of intelligent technologies is evaluated through customer satisfaction and response latency, rather than the singular acquisition of applications and platforms.
- **Broadening the adoption of AI tools:** This involves intensifying the integration of artificial intelligence technologies within marketing analytics. The objective is to transition from traditional data collection toward leveraging data for predictive modeling of customer behaviors and preferences, thereby securing a robust sustainable competitive advantage.
- **Operationalizing the digital cloud:** This involves activating cloud-based platforms to facilitate data accessibility and accelerate processing speeds in resolving customer issues. The aim is to ensure that cloud technology streamlines complex tasks and enhances the overall quality of digital services.
- **Translating predictions into proactive measures:** It is imperative to activate AI systems capable of predicting technical failures and consumption patterns by autonomously linking them to customer notification systems. This ensures the enhancement of perceived reliability by informing customers prior to service disruptions.
- **Consolidating the customer relationship digitalization:** This involves offering highly granular services, such as personalized payment plans based on individual consumption patterns, thereby fostering trust and reinforcing the institutional image.
- **Developing service personalization strategies:** This entails leveraging customer data to deliver bespoke services tailored to individual needs, shifting away from a 'one-size-fits-all' service model toward highly differentiated offerings.
- **Continuous Professional Development:** The institution should institutionalize rigorous, ongoing training programs focused on the technical proficiency of emerging intelligent technologies. The primary objective is to ensure that these tools are effectively transmuted into value-added assets that catalyze institutional efficiency and optimize the delivery of digital services.
- **Strategic Integration of Automation within the Work Environment:** Streamlining and executing operational tasks to yield a positive impact on the overall quality of digital service delivery.
- **Investment in Intelligent Assistants:** Prioritizing investment to ensure the provision of digital services characterized by continuity and precision. This strategic investment aims to bridge the disparity between customer expectations and the actual performance of digital services.
- **Continuous Enhancement of Security Protocols:** Systematically updating security protocols to safeguard databases against potential breaches and ensure the confidentiality of customers' personal and financial information. Within this framework, cybersecurity should be leveraged as a strategic competitive advantage that underpins and sustains the overall quality of digital service.

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