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AI in Service Industries: Effects on Customer Satisfaction, Mediated by Service Quality, and Moderated by Customer Trust

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- Customer Trust in AI
- TAM
- Quality Perception

Abstract: This study examined the application of artificial intelligence in service industries and its impact on customer satisfaction, focusing on the mediating role of service quality perception and the moderating effect of customer trust in AI. AI-driven technologies have transformed customer service by improving efficiency, personalization, and responsiveness. However, the extent to which these enhancements translated into higher customer satisfaction depended on perceived service quality and trust in AI systems. Using a structured survey across various service industries, particularly in empathy-driven sectors like healthcare and education, the research employed statistical analysis to evaluate AI's direct and indirect effects on customer satisfaction. The findings indicated that AI significantly enhanced customer satisfaction, with a , substantial direct effect ($\beta = 0.642$, $p < 0.001$) and an additional indirect effect through service quality perception (indirect effect = 0.286, $p < 0.001$). Service quality perception acted as a crucial mediator ($\beta = 0.305$, $p < 0.001$), confirming its importance in shaping satisfaction outcomes. While customer trust positively influenced satisfaction ($\beta = 0.267$, $p < 0.001$), its moderating effect on AI-driven service interactions was not statistically significant ($p = 0.199$). These results show that AI adoption aligns with customer expectations and ethical considerations. Future research is recommended to explore the long-term impact of AI on customer trust and examine its effectiveness across various industries that require higher levels of emotional intelligence in service delivery.

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INTRODUCTION

Artificial Intelligence, or AI, has changed the way organizations operate, especially in customer service. It helps businesses handle tasks such as decision-making, learning, and problem-solving—activities that traditionally relied on human intelligence. According to Huang and Rust (2021), AI systems can learn from large amounts of data and adapt in real

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time. This ability allows businesses to make faster decisions in areas such as marketing, personalized service, and designing customer experiences (Kaplan and Haenlein, 2019). As AI becomes more common in-service operations, it improves the speed, accuracy, and personalization of services. Examples of these technologies include chatbots, virtual assistants, tools that understand customer emotions, and facial recognition systems. These tools can provide service at any time and offer personalized support that meets the specific needs of customers (Grewal et al., 2017; Liu, 2022; Gupta et al., 2023). As a result, many companies have become more efficient and have seen improvements in customer satisfaction (Huang and Rust, 2018; Adam et al., 2020). AI also helps businesses predict customer needs and solve problems early, which strengthens customer loyalty (Shankar, 2018; Bolton et al., 2021).

However, utilizing AI in industries such as healthcare and education can be challenging. These fields rely heavily on human interaction and emotional connection. Researchers such as Izadi and Forouzanfar (2024) and Almarzouqi et al. (2024) have noted that AI lacks the emotional intelligence necessary to comprehend patients or students fully. For example, a chatbot may give helpful medical information, but it may not offer the emotional support a patient needs. Similarly, in education, AI may struggle to accommodate diverse learning styles or effectively motivate students. These limitations indicate that further research is necessary to comprehend the impact of AI on customer satisfaction in contexts where human empathy plays a crucial role.

While we know that AI is technically practical, its emotional and psychological effects on customers are less well understood. In particular, there is a need to explore whether customer satisfaction is influenced by how customers perceive service quality, and whether trust in AI affects the effectiveness of AI. Service quality, encompassing aspects such as responsiveness, assurance, and personalization, plays a crucial role in determining customer satisfaction (Ullah, 2023; Li et al., 2023). Likewise, trust in AI—meaning confidence in its accuracy, reliability, and ethical use of data—is essential for customer acceptance and ongoing engagement (Nguyen and Malik, 2022; Prentice and Bowen, 2023).

This study employs two well-established theoretical models to guide its analysis. The first is the Technology Acceptance Model (TAM), developed by Davis (1989), which explains how people accept new technology based on its perceived usefulness and ease of use. The second is the SERVQUAL model, created by Parasuraman et al. (1988), which measures service quality based on five key factors: tangibles, reliability, responsiveness, assurance, and empathy. These models help us understand how AI affects customer satisfaction in both technical and emotional terms.

AI comes in three main forms: Weak AI, Artificial General Intelligence (AGI), and Artificial Superintelligence (Neuhofer et al., 2020). Right now, only Weak AI is used in practice. It performs specific tasks, such as facial recognition or answering questions through chatbots (Russell and Norvig, 2016). It is widely used in industries such as banking, travel, and retail, where speed and accuracy are important (Ivanov et al., 2017). But there is still limited

knowledge about how effective AI is in fields that require emotional understanding (Kaartemo and Helkkula, 2018), even though emotional intelligence is increasingly important in customer service roles.

Customer satisfaction is commonly defined as the extent to which a service meets or goes beyond what the customer expects (Oliver, 1981). It is a key factor in building customer loyalty (Rego et al., 2013). Although AI has been shown to improve satisfaction by making services more personalized and efficient, the lack of human elements in AI interactions can reduce its effectiveness, especially in industries where empathy is essential.

This study aims to fill these gaps by offering a framework that combines AI-based service, perceived service quality, and customer trust to explain satisfaction across different types of service environments. It helps us better understand how AI can serve customers not just efficiently, but also meaningfully. The findings are expected to support both researchers and practitioners in designing AI services that are ethical, trustworthy, and emotionally aware.

Hypotheses Development

H1 Rationale: AI technologies, such as chatbots and virtual assistants, enhance service speed, accuracy, and personalization. These improvements meet customer expectations for convenience and responsiveness, which are key drivers of satisfaction (Prentice et al., 2020; Dwivedi et al., 2021). As AI reduces wait times and improves support consistency, it is likely to have a positive influence on customer satisfaction.

H1: AI-driven customer service systems positively influence customer satisfaction.

H2 Rationale: Trust is essential when customers interact with AI systems. High trust increases willingness to rely on AI recommendations and services, while low trust may create doubt and dissatisfaction (Chen et al., 2018; Rust & Huang, 2018). Therefore, trust likely strengthens the impact of AI on satisfaction.

H2: Customer trust in AI systems moderates the relationship between AI implementation and customer satisfaction, such that higher levels of trust lead to higher satisfaction.

H3 Rationale: Perceived service quality is a key mediator between service design and customer satisfaction. AI systems that deliver fast, relevant, and reliable service are often viewed as higher quality, leading to increased satisfaction (Lemon & Verhoef, 2016; Izadi & Forouzanfar, 2024). Hence, service quality likely mediates the relationship between AI and satisfaction.

H3: Perceived service quality mediates the relationship between AI use and customer satisfaction, with better service quality leading to higher satisfaction.

Theoretical Framework

This study uses a combined theoretical framework that brings together three important theories to understand better how AI affects customer satisfaction:

- The **Technology Acceptance Model (TAM)** explains that how useful and easy to use customers find AI-driven services influences their attitudes and willingness to accept these technologies (Davis, 1989).
- The **Expectation-Confirmation Theory (ECT)** suggests that customer satisfaction depends on comparing their expectations with the actual service they receive, making it helpful in evaluating how AI impacts service quality (Oliver, 1980).
- **Trust Theory** emphasizes that customer trust in AI amplifies the positive correlation between perceived service quality and satisfaction, indicating that trust plays a crucial role in this relationship.

By combining these theories, the study provides a comprehensive understanding of what drives customer satisfaction and AI acceptance, offering valuable guidance for businesses seeking to enhance their AI-based service strategies.

TABLE1: VARIABLES

NO.	Independent Variable	Moderating Variable	Mediating Variable	Dependent Variable
1	Artificial Intelligence in Service Industries	Customer Trust in AI	Service Quality Perception	Customer Satisfaction

Conceptual Model

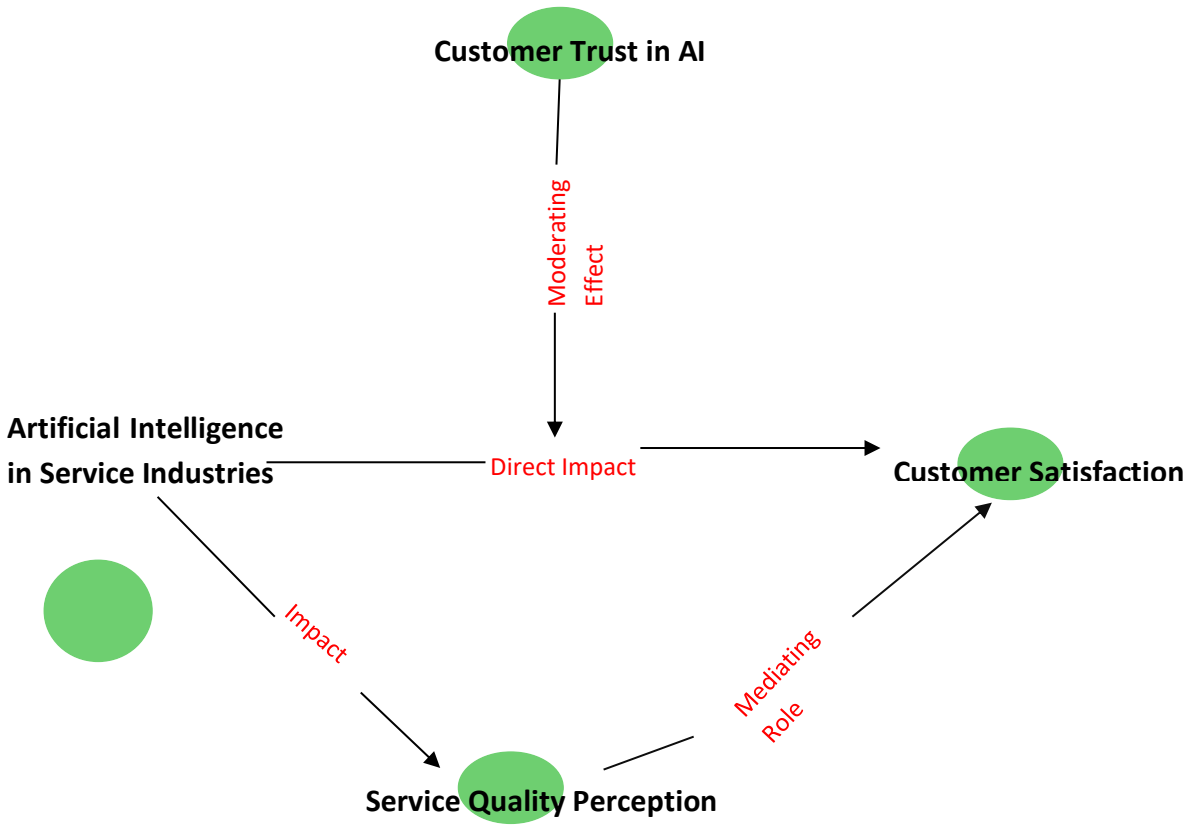

***Figure 1**: Conceptual model based on the current study, showing the effect of Artificial Intelligence on Customer Satisfaction, with Service Quality Perception as a mediator and Customer Trust in AI as a moderator*

RESEARCH METHOD

This research focused on customers in Afghanistan who had firsthand experience using services supported by artificial intelligence. In recent years, AI has been increasingly utilized in Afghanistan across various sectors, particularly in healthcare and education, to enhance service delivery and boost efficiency. Some common examples of AI applications include chatbots that facilitate appointment scheduling, virtual consultations in healthcare services, online learning platforms, and automated service kiosks.

Because the total number of AI users in Afghanistan is not known, the study treated the population size as unknown. To gather relevant information, the researchers employed a purposive sampling method, intentionally selecting participants who had at least one experience using AI-based services. This approach helped ensure that the data collected reflected informed and meaningful experiences with AI technologies.

A total of 260 valid responses were gathered and used for the analysis. This sample size was considered appropriate for statistical techniques such as structural equation modeling and regression analysis, as it met the accepted standards for reliable testing. The participants included individuals from diverse backgrounds, age groups, and genders, which helped provide a broad and inclusive set of viewpoints.

Data were collected using a structured questionnaire that was shared both in person and online. The questions were adapted from reliable and well-established measurement tools. These included McLean and Osei-Frimpong (2019) for assessing AI experience, Parasuraman et al. (1988) for measuring service quality through the SERVQUAL model, Doney and Cannon (1997) for evaluating customer trust, and Bhattacherjee (2001) for measuring customer satisfaction. All questions were rated on a five-point Likert scale, where 1 indicated "strongly disagree" and 5 indicated "strongly agree."

Ethical Guidelines and Participant Protection

This study adhered to clear ethical guidelines to protect the rights and privacy of all participants. Before participating, all participants provided their informed consent, indicating that they agreed to join the study voluntarily after understanding its purpose. To keep their information safe and anonymous, stringent privacy and security measures were implemented, based on established ethical practices in research involving people (Gefen et al., 2003).

Methodological Rigor in AI Research

This study carefully examines how AI is being utilized in service delivery and its impact on key areas, including customer satisfaction and trust. It employs a clear and structured research approach to understand the growing role of AI in this field. The research was designed to adhere to ethical and scientific standards, aiming to provide valuable insights that contribute to the ongoing discussion about how AI influences customer experiences.

Data Analysis

This study examines the impact of Artificial Intelligence (AI) on customer satisfaction, with a particular focus on two key factors. First, it investigates how service quality perception helps explain the relationship between AI and customer satisfaction. Second, it examines whether customer trust in AI alters the strength of that relationship. The research aims to understand how AI technologies impact the overall customer experience, particularly in key sectors such as healthcare and education, where personal interaction and emotional support are often crucial.

$$CS=\beta_0+\beta_1(AI)+\beta_2(SQP)+\beta_3(CT)+\beta_4(AI\times CT)+\epsilon$$

This equation illustrates the relationship between customer satisfaction (CS) and the key factors examined in the study: AI usage, service quality perception, customer trust in AI, and the interaction between AI and trust.

- **CS (Customer Satisfaction):** The dependent variable, representing how satisfied customers are with the service.
- **AI (Artificial Intelligence):** Refers to the use and implementation of AI technologies in service delivery.
- **SQP (Service Quality Perception):** Captures how customers perceive the overall quality of the service provided.
- **CT (Customer Trust in AI):** Measures the level of trust customers place in AI technologies used during service interactions.
- **AI × CT (Interaction Term):** Represents the combined effect of AI usage and customer trust on customer satisfaction. It indicates whether trust in AI enhances or diminishes the impact of AI on satisfaction.
- **β_o (Intercept):** The expected level of customer satisfaction when all other variables are held at zero.
- **β_1, β_2, β_3, β_4 (Regression Coefficients):** Indicate how much each predictor contributes to customer satisfaction:
    - **β_1:** Effect of AI usage.
    - **β_2:** Effect of service quality perception.
    - **β_3:** Effect of customer trust in AI.
    - **β_4:** Effect of the interaction between AI usage and customer trust.
- **ϵ (Error Term):** Represents other factors not captured by the model that may influence customer satisfaction.

The study's model integrates the direct impact of AI, the mediating effect of how customers perceive service quality, and the moderating influence of customer trust in AI. This

combined approach provides a comprehensive understanding of how these elements interact to shape customer satisfaction.

FINDINGS

Table 2 presents the descriptive statistics for the main variables in the study: customer satisfaction, trust in AI, perceived service quality, and AI usage. These statistics offer a basic overview of the average values and the spread of responses, helping to understand general patterns in the data.

Table 2. *Descriptive Statistics*

Variable	Obs	Mean	Std. Dev.	Min	Max
CS	260	3.471	.372	2.25	4.75
CTIAI	260	3.969	.445	2.25	5
SQP	260	3.954	.462	2.25	5
AI	260	4.001	.261	3.25	4.75

Table 2 summarizes the average scores and variation for the main variables in the study. Customer Satisfaction (CS) had an average score of 3.47 with a standard deviation of 0.37. This indicates that most participants rated their satisfaction at this level, with scores ranging from 2.25 to 4.75, reflecting moderate to high overall satisfaction. Customer Trust in AI (CTIAI) was higher, averaging 3.97 (SD = 0.45), indicating that participants generally had a strong level of trust in AI systems. Scores ranged from 2.25 to the maximum of 5, suggesting a mostly positive attitude toward AI. Service Quality Perception (SQP) was also rated highly, with a mean of 3.95 and a standard deviation of 0.46. This suggests participants generally perceived the service quality as good, with responses varying between 2.25 and 5. AI Usage had the highest average score of 4.00 and the smallest variation (SD = 0.26). This indicates that AI tools were used frequently and consistently by most participants, with scores ranging from 3.25 to 4.75. These descriptive results indicate that customer satisfaction, trust in AI, and perceptions of service quality are generally positive, while AI usage remains high and steady. This suggests that AI is playing a consistent and significant role in shaping how customers experience and evaluate services.

Table 3. *Correlations Matrix Between Variables*

Variables	(1)	(2)	(3)	(4)
(1) CS	1.000			
(2) CTIAI	0.600	1.000		
(3) SQP	0.630	0.329	1.000	
(4) AI	0.651	0.524	0.491	1.000

Table 3 above indicates the Pearson correlation coefficients between the four main variables in the study: Customer Satisfaction (CS), Customer Trust in AI (CTIAI), Service Quality Perception (SQP), and AI Usage. These correlations indicate the strength and direction of the

relationship between the variables. They also help identify any issues with multicollinearity and offer early support for the expected relationships in the study. Results indicate that AI usage has the strongest correlation with customer satisfaction (r = 0.651). This means that customers tend to be more satisfied when AI tools, such as chatbots or virtual assistants, are used, likely because AI makes services faster, more convenient, and more personalized. Service quality perception also has a strong positive relationship with satisfaction (r = 0.630), indicating that customers who view the service as reliable and helpful are more satisfied. For organizations, this means that simply using AI is not enough; they must ensure that AI improves the perceived quality of service. Trust in AI is also positively related to satisfaction (r = 0.600), indicating that when customers trust AI systems, their satisfaction increases. However, trust and service quality perception have a weaker connection (r = 0.329), suggesting that trust alone does not guarantee that customers perceive the service as high quality. Moderate correlations were found between AI usage and trust (r = 0.524), and AI usage and service quality perception (r = 0.491). This suggests that while AI helps build trust and improve quality perceptions, other factors, such as AI design or human support, also play significant roles in shaping the customer experience.

Normality Test

Table 4 shows the results of the normality test performed on the residuals from the regression model. It includes values for skewness, kurtosis, and the adjusted chi-square statistic. These measures help determine whether the residuals are normally distributed, a crucial assumption for ensuring the accuracy and reliability of linear regression results.

Skewness/Kurtosis tests for Normality.

Table 4*. Indicates the output of the normality test*

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj_chi2(2)	Prob>chi2
Residual	260	0.782	0.583	0.38	0.826

The Pr(Skewness) value (0.782) and Pr(Kurtosis) value (0.583) are both greater than 0.05, indicating no significant deviation from Normality in terms of skewness or kurtosis. Additionally, the adjusted chi-square value (0.38) with a p-value of 0.826 suggests that the residuals conform to a normal distribution. Since this p-value is much higher than 0.05, we fail to reject the null hypothesis of Normality. Overall, these findings confirm that the residuals are normally distributed, meeting a key assumption for regression analysis. This ensures that the statistical inferences drawn from the model are valid and reliable.

Multicollinearity Test

Table 5 presents the results of the multicollinearity test, using the Variance Inflation Factor (VIF), for the independent variables: AI Usage, Customer Trust in AI (CTIAI), and Service Quality Perception (SQP). This test checks whether the predictors are too closely related to one another, which can affect the accuracy and stability of the regression results.

Table 5. *Variance Inflation Factor*

	VIF	1/VIF
AI	1.636	.611
CTIAI	1.392	.718
SQP	1.33	.752
Mean VIF	1.453	.

The multicollinearity test, conducted using the Variance Inflation Factor (VIF), checks whether the independent variables in the regression model are too closely related to each other—a problem that can affect the accuracy and interpretation of the results. As noted by Hair et al. (2010), VIF values above 10 indicate serious multicollinearity, while values between 1 and 5 suggest low to moderate correlation.

In this study, AI Usage has a VIF of 1.636, Customer Trust in AI (CTIAI) has a VIF of 1.392, and Service Quality Perception (SQP) has a VIF of 1.33. All these values are well below the critical threshold, with a mean VIF of 1.453. This confirms that multicollinearity is not a concern in this analysis, supporting the stability and reliability of the regression results.

Heteroskedasticity Test

The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity indicates evidence of non-constant variance in the fitted values of CS. The test statistic, χ^2 (1) = 4.26, yields a p-value of 0.0390, which is below the significance level of 0.05. This leads to the rejection of the null hypothesis, suggesting the presence of heteroskedasticity in the data.

To address this issue, robust regression was applied. Using robust standard errors minimized the impact of heteroskedasticity on parameter estimates, ensuring that the statistical inferences remained reliable and unbiased. This approach helped maintain the validity and accuracy of the regression model despite the presence of heteroskedasticity.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of CS

chi2(1) = 4.26

Prob > chi2 = 0.0390

Regression Output

Table 6 concludes the results of the linear regression analysis used to examine the direct effects of AI Usage, Customer Trust in AI (CTIAI), and Service Quality Perception (SQP) on Customer Satisfaction (CS). This model tests the core hypotheses regarding the influence of each predictor variable on customer satisfaction levels within AI-driven service environments.

The regression results indicate that Artificial Intelligence (AI), Customer Trust in AI (CTIAI), and Service Quality Perception (SQP) all play significant roles in influencing customer satisfaction (CS). First, customer trust in AI has a positive and statistically significant effect on satisfaction (coefficient = 0.267, $p < 0.001$).

Table 6. *Linear regression*

CS	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
CTIAI	.267	.04	6.77	0	.19	.345	***
SQP	.305	.035	8.80	0	.237	.373	***
AI	.424	.07	6.07	0	.286	.562	***
Constant	-.491	.226	-2.18	.03	-.935	-.047	**

Mean dependent var	3.471	SD dependent var	0.372
R-squared	0.624	Number of obs	260
F-test	137.159	Prob > F	0.000
Akaike crit. (AIC)	-23.309	Bayesian crit. (BIC)	-9.066

*** p<.01, ** p<.05, * p<.1

This means that as customers trust AI more, their satisfaction increases, supporting earlier studies, such as Peruchini et al. (2024). Service quality perception is also a strong predictor (coefficient = 0.305, p = 0.000). When customers believe the service is reliable, helpful, and responsive, they tend to feel more satisfied, which agrees with findings from Al-Hyari et al. (2023). AI itself positively impacts satisfaction too (coefficient = 0.424, p = 0.000). This suggests that utilizing AI tools effectively, such as chatbots or virtual assistants, enhances customer satisfaction, aligning with the findings of Soni & Dubey (2024). The model included an intercept of -0.491 (p = 0.03), which is statistically significant but largely theoretical, as it assumes all predictors are zero—a rare scenario in real-world services. Looking at the model overall, the R-squared value is 0.624, indicating that these three factors explain approximately 62% of the differences in customer satisfaction—a strong result. The F-test (137.159, p = 0.000) indicates that the model is statistically significant, meaning that AI, trust, and service quality together reliably predict satisfaction. The low AIC (-23.309) and BIC (-9.066) values suggest that the model fits the data well, supporting the reliability of these findings (Akaike, 1974; Schwarz, 1978).

Mediation Analysis

Table 7 indicates the results of the mediation analysis conducted to assess whether Service Quality Perception (SQP) mediates the relationship between AI Usage and Customer Satisfaction (CS). The analysis decomposes the total effect of AI on CS into its direct and indirect components to determine whether improvements in service quality perception serve as a significant transmission mechanism for AI's influence.

The mediation analysis reveals that Artificial Intelligence (AI) impacts customer satisfaction both directly and indirectly, through customers' perceptions of service quality. Although the total effect of AI on satisfaction (0.927) was not statistically significant (p = 0.50), looking at the parts separately reveals important insights.

Table 7. *Mediation Analysis*

Variables	Effect	se/BootSE	t-value	p-value	LLCI/BOOTLLCI	ULCI/BOOTULCI
Total Effect of AI on CS	0.927	0.0712	-	0.5008	0.507	0.7764
Direct Effect of AI on CS	0.642	0.0684	9.3811	0	0.507	0.7764
Indirect Effect of AI on CS via SQP	0.286	0.0491	-	0	0.1963	0.3903
Total Effect of AI on SQP	0.868	0.0959	9.0529	0	0.6793	1.057
Direct Effect of AI on SQP	0.868	0.0991	-	0.6814	0.6814	1.0748

The direct effect of AI on customer satisfaction was substantial and significant (0.642, $p < 0.001$), indicating that AI itself improves customer satisfaction, for example, by speeding up service or personalizing support. The indirect effect, AI improving customer satisfaction by enhancing perceived service quality, was also significant (0.286, $p < 0.001$). This means that AI helps customers perceive the service as better, which in turn increases their satisfaction. Additionally, AI significantly and positively improves how customers perceive service quality (effect = 0.868, $p < 0.001$), making services appear more reliable, responsive, and helpful when AI is utilized effectively.

Moderation Analysis

Table 8 reports the results of the moderation analysis examining whether Customer Trust in AI (CTIAI) moderates the relationship between AI Usage and Customer Satisfaction (CS). The analysis includes the interaction term (AI × CTIAI) to test whether the strength or direction of AI's effect on satisfaction changes depending on the level of customer trust in AI systems.

Table 8. *Moderating role of CTIAI*

Predictor	Coefficient	SE	t	p	LLCI	ULCI	R^2 Change	F (Interaction)	p (Interaction)
Constant	3.4807	0.0176	197.4417	0	3.4464	3.5154	-	-	-
AI	0.6503	0.073	8.9143	0	0.5067	0.7942	-	-	-
CTIAI	0.289	0.0432	6.684	0	0.2039	0.3742	-	-	-
AI × CTIAI	-0.1525	0.1185	-1.2875	0.1991	-0.3859	0.0808	0.0031	1.6575	0.1991

The above analysis examines how Artificial Intelligence (AI) impacts outcomes such as customer satisfaction and whether Customer Trust in AI (CTIAI) alters this effect. The baseline level of the outcome (intercept = 3.48) is statistically significant, setting a strong foundation

for the model. AI has a strong, positive, and statistically significant impact on the outcome (β = 0.65, p < 0.001), meaning better AI use leads to higher customer satisfaction. Similarly, CTIAI also has a positive and significant effect (β = 0.29, p < 0.001), showing that when customers trust AI, their satisfaction increases. However, the interaction between AI and CTIAI (β = -0.15, p = 0.199) is not significant. This means that customer trust does not significantly alter the strength of AI's impact. Whether trust is high or low, AI still improves the outcome similarly. The small R^2 change (0.0031) and non-significant F-value further confirm that the moderating effect is weak and not statistically important.

DISCUSSION

The study provides clear evidence that Artificial Intelligence (AI) has a strong and positive effect on customer satisfaction within service industries. The findings support earlier research by Huang and Rust (2018) and Adam et al. (2020), who found that AI improves services by making them faster, more responsive, and more tailored to customer needs. In our study, the direct effect of AI on satisfaction was statistically significant (β = 0.642, p < 0.001), confirming that customers generally respond positively to AI-supported services when the technology is applied effectively. What adds value to this research is that it does not stop at exploring only the direct effects of AI. Instead, it shows that how customers perceive the quality of the service plays a key role in shaping their overall satisfaction. Customers care not only about how quickly a chatbot responds or how accurate an automated assistant is—they also want the service to feel reliable, supportive, and even somewhat personal. This reflects what Lemon and Verhoef (2016) and Izadi and Forouzanfar (2024) emphasized—that emotional elements, such as trust and empathy, are integral parts of the service experience. The indirect effect found in this study (β = 0.286, p < 0.001) confirms that when AI improves the perceived quality of service, it also increases customer satisfaction. In short, customers are not just reacting to the technology, but to the experience it creates.

Another important finding is that customer trust in AI also has a direct and positive effect on satisfaction (β = 0.267, p < 0.001). When customers feel confident that the AI system is safe, fair, and accurate, they are more likely to be satisfied with the service. This result supports earlier studies, such as Rust and Huang (2018), which have shown that trust helps customers feel more comfortable using AI. However, our study also found that trust does not significantly change how much AI affects satisfaction (p = 0.199). In other words, even if a customer trusts or does not trust the AI system, it does not significantly alter the strength of the AI's impact on satisfaction. This may be due to the context of this study, Afghanistan, where AI is still a relatively new concept. Many users may not yet have strong opinions or feelings about AI, so their trust might still be forming. This could explain why trust plays a role on its own but does not yet shape the whole relationship between AI and satisfaction.

An interesting point is how AI is being utilized in sectors such as healthcare and education, which rely heavily on human interaction and emotional intelligence. Scholars such as Almarzouqi et al. (2024) and Kaartemo and Helkkula (2018) have highlighted that AI often

lacks the emotional sensitivity required in these fields. Despite this, our results showed that AI usage was high (mean = 4.001) and satisfaction was also strong (r = 0.651) in these sectors. One possible explanation is that customers still value the consistency and speed that AI offers, especially when it helps human staff rather than replaces them. For example, a chatbot scheduling appointments may not need emotional intelligence if it frees up time for doctors to focus more on patients.

This study also reflects two ongoing perspectives in the academic conversation around AI in services. On one hand, some researchers focus on the technical benefits of AI, such as efficiency and speed (e.g., Gupta et al., 2023; Liu, 2022). On the other hand, others highlight the emotional limitations of AI, particularly in services that require empathy and human understanding (e.g., Huang & Rust, 2021; Izadi & Forouzanfar, 2024). Our study offers a balanced view. It shows that while AI can make a significant difference in improving satisfaction, it works best when it also helps create services that feel high-quality and trustworthy. This highlights the importance of blending technology with emotional design, particularly in sectors where human connection is crucial. The results also support the usefulness of theoretical models, such as the Technology Acceptance Model (TAM) and the SERVQUAL framework, in understanding how customers react to AI services. TAM explains how people accept technology when it is both valuable and easy to use (Davis, 1989), while SERVQUAL emphasizes dimensions such as assurance, reliability, and responsiveness (Parasuraman et al., 1988). Our results demonstrate that both models effectively explain customer satisfaction in AI-supported services, from both a technical and an emotional and experiential perspective.

It is important to consider the local context of this study. Afghanistan is a country where digital technologies, especially AI, are still relatively new. Customers may not yet be familiar with these tools, and that could influence how they experience and evaluate AI-based services. Trust, for example, may take longer to develop in settings where technology adoption is still in its early stages. Future studies should explore how customers' trust in AI evolves as they become more experienced and exposed to the technology.

It is demonstrated that AI can significantly enhance customer satisfaction, particularly when utilized not only to automate tasks but also to improve the overall service experience. To achieve this, organizations should focus not only on how AI performs but also on how customers perceive it. Service quality and trust are key ingredients in making AI work well in customer service, especially in industries that rely on emotional connection, care, and human support.

CONCLUSION

This study demonstrates that Artificial Intelligence (AI) plays a crucial role in enhancing customer satisfaction by making services more efficient, personalized, and responsive across various industries. A key finding is that how customers perceive the quality of service helps

explain this relationship. This means that to be genuinely effective, AI systems need to meet customer expectations and deliver a high-quality experience.

The study also found that customer trust plays a significant role in how AI impacts satisfaction. Even the most advanced AI technologies require user trust to function effectively. This is especially true in sectors such as healthcare and education, where emotional understanding and human connection are crucial. In these areas, combining AI with a human touch may lead to better outcomes.

In short, for organizations to maximize the benefits of AI, they should focus not only on improving services and making them faster, but also on building customer trust and striking the right balance between technology and human interaction. Future research should investigate how customer trust evolves over time and how AI can be enhanced in emotionally sensitive service environments.

Recommendations

1. Organizations should continuously upgrade their AI systems to ensure they deliver accurate, efficient, and personalized services that meet evolving customer expectations.
2. It is essential to communicate clearly how AI technologies work and to ensure that strong data privacy measures are in place. This helps build customer trust and supports the ethical use of AI.
3. AI should be used to handle routine tasks, while human staff remain available to manage issues that require empathy, judgment, or emotional intelligence.
4. AI tools should be tailored to meet the unique needs of each industry, as expectations and service contexts differ across sectors such as healthcare, education, and retail.
5. Strong ethical standards and data protection policies must be applied to prevent biased outcomes and to safeguard customer information.

Future Research Directions

1. Future research should investigate how AI-supported services impact long-term customer relationships and loyalty, extending beyond initial satisfaction.
2. There is a need to explore how AI can be designed to understand better and respond to human emotions, especially in sectors where empathy is crucial.
3. Studies should focus on how AI can effectively work alongside human service agents to enhance both efficiency and service quality.
4. Further research is needed to understand how to minimize bias in AI systems and make their decision-making processes more transparent and fairer.

5. Comparative studies across different industries can help identify which AI practices are most effective in particular service environments.

AUTHORS' CONTRIBUTIONS

Azatullah Zaheer is the principal author of this study. He developed the research idea, designed the methodology, collected the data, conducted the analysis, and drafted the majority of the manuscript. Dr. Abdullah Sadiq supervised the study, offering academic guidance and critical feedback throughout the research process. Noorulhaq Safi contributed to the interpretation of the findings and provided constructive discussions with the primary author to strengthen the analysis. All authors reviewed and approved the final version of the manuscript.

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The authors declare that they have no conflict of interest related to the conduct, outcomes, or publication of this research.

DATA AVAILABILITY STATEMENT

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Access to the data may be subject to ethical approval to ensure the confidentiality and privacy of respondents.

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