# The Impact of Artificial Intelligence on Service Quality Management and Customer Satisfaction in the Banking Sector: An Industry 5.0 Perspective

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## Abstract

**Purpose** Artificial Intelligence is transforming the banking industry through improved service quality, operational efficiency, fraud detection and customer engagement. This study will examine the impact of Artificial Intelligence on service quality management and customer satisfaction.

**Design/Methodology/Approach** the study adopts a descriptive research design using primary data collected through a structured questionnaire from 130 customers from the three branches of SBI from Tinsukia Town (District), Assam and secondary data from books, journals, annual reports and different online sources. For analysis Weighted Mean and the One-Way ANOVA are used as statistical tools.

**Findings** Artificial Intelligence positively influences the service quality dimensions which consequently enhancing the customer satisfaction.

**Research limitations/implications** Integrating AI with Industry 5.0 can promote secure, personalised, sustainable and customer centric banking which strengthen the trust and long-term competitiveness.

**Originality/Value** Despite existing literature on AI enabled service quality and customer satisfaction in various fields still limited studies examine their impact on sustainable, human centric banking from an Industry 5.0 perspective.

**Keywords** Artificial Intelligence, Industry 5.0, Service Quality Management, Customer Satisfaction, Banking Sector, Sustainability.

**Paper Type** Research Paper.

## Introduction

Artificial Intelligence (AI) is restructuring the banking industry by simplifying the workflows and uplifting the customer interactions (Haddad, 2021; Al-Araj et al., 2022; Aldasoro et al., 2024). As banks require to meet the growing demand for digital experiences this technology strengthens the customer service supports, fraud detection and optimizes financial management which is making it a very important tool for banking industries (Milana & Ashta, 2021; Aldasoro et al., 2024). It rationalizes the data management, improves the credit rating processes and detect the potential fraud which ensures that banks can operate more efficiently at the time of delivering the top-notch services to their customers (Irfan et al., 2023; Sah &Padma,2024).

### *An industry 5.0 perspective*

By moving beyond the automation focused approach of industry 4.0, the next stage of the industrial development is marked to the industry 5.0 (Nahavandi, 2019; Yan et al., 2025). The concept of industry 5.0 emphasizes the collaboration between humans and intelligent technologies instead of replacing the same with machine (Bozic, 2024; Chander et al., 2022). It is required to create a more human centric, sustainable and resilient working environment in the industry (Nahavandi, 2019; Yan et al., 2025). By performing repetitive tasks, analysing large volumes of data and by providing the more faster and accurate insights AI is used to support human capabilities in this new paradigm (Aldasoro et al., 2024; Irfan et al., 2023). It is human who contribute their creativity, critical thinking, ethical judgement, emotional intelligence and the ability to make decisions in the complex situations also where artificial intelligence may not perform effectively (Varsha, 2023; Yan et al., 2025). Hence, the Industry 5.0 focus is on building effective human and AI collaboration which will improve productivity, innovation, service quality employee well-being and long-term sustainability etc (Nahavandi, 2019; Mehdiabadi et al., 2022; Yan et al., 2025).

### *Service Quality*

Quality is a key factor for any organization's success, but it's more complex than it seems. Service quality compares customer expectations with actual performance, defined as the manner in which a service is delivered and its impact on customer satisfaction (Zeithaml et al., 1990).

### *Service Quality Dimensions*

Rater concept in service marketing is the best-known model to specify the quality dimensions of the service (Zeithaml et al., 1990). It is also referred to as the service quality star which was created by Parasuraman et. al., (1990) published in their book, "Delivering Quality Service. **RATER** stands for: Reliability, Assurance, Tangibility, Empathy, and Responsiveness (Zeithaml et al., 1990; Pakurar et al., 2019).

***Customer Satisfaction***

Customer satisfaction is most widely used in the business and commerce industry. It depends on some factors such as service features, customer emotions, service success/failure, perception about fairness, and role and perception of other customers (Pakurar et al., 2019; Al-Araj et al., 2022).

Customer Satisfaction may be defined as "Customer's evaluation of a service in terms of whether that service has met their needs and Expectations" (Singh Parampal & Kaur Ramneek, 2013). It can be represented as:

| | |
|---|---|
| Customer Satisfaction= | Performance |
| | Customer Expectations |

**Literature Review**

In this literature review part, the researchers examine the key studies on the integration of AI and the industry 5.0 in the banking sector by covering the research published between the period from 2021 to 2026.

***Artificial Intelligence (AI)***

Haddad, H. (2021) found that AI positively influences Accounting Information System (AIS) excellence in Jordanian banks by improving operational efficiency through expert systems, knowledge representation, inference mechanisms and machine learning.

Ortiz Berger, D. (2022) highlighted that disruptive technologies improve service quality, operational efficiency and cost reduction for consumers, banks and financial institutions by transforming the traditional systems. The study emphasised that the successful mobile banking adoption particularly in the context of rapid advancements in internet and mobile technologies requires user friendly, valuable and secure services which can be achieved through product differentiation, customer assistance and trust building strategies.

Al Araj, R. & et. al. (2022) found a significant positive relationship between Artificial Intelligence and service quality in Jordanian banks particularly in tangibility,

dependability, responsiveness and assurance. Although AI positively influenced customer satisfaction but its effect was not statistically significant which highlight the scope for improvement. Hence, the study recommended continued AI adoption to enhance service quality and better meet customer needs.

Sah, J. & Padma, S. (2024) highlighted that AI, blockchain, robotics, cloud technology and mobile technology are transforming the banking industry by improving the transaction speed, security, operational efficiency, digital payments and financial inclusion. The study has also emphasised that addressing regulatory challenges and cybersecurity risks is essential for maintaining the consumer trust and satisfaction and ensuring sustainable growth in the fintech sector.

Saxena, A. & Rastogi, M. (2026) found that it is AI which significantly improves the banking service quality, service delivery, operational efficiency and the customer satisfaction. AI enabled banking services deliver better results than traditional services in several aspects which highlights the need for continuous improvements in AI to meet evolving customer expectations and enhance customer experience.

***Industry 5.0***

Mehdiabadi, A. & et. al. (2022) highlighted that the successful adoption of Industry 5.0 in the banking sector. The study emphasized human AI collaboration. Intelligent process automation, process redesign, ethical AI governance and human resource optimisation to enhance customer centric services, operational efficiency, innovation and long-term sustainable development.

Gangaraju, P. K. & et. al. (2023) studied the impact of agile supply chain practices on the financial performance and competitiveness of Indian manufacturing companies in the context of Industry 4.0. Based on responses from 329 manufacturing industry officials, it has highlighted how customer involvement, continuous improvement, integration, modularity, management style and supplier involvement contribute to supply chain agility and improved financial outcomes. The findings suggested that agile supply chains enable firms to respond quickly to changing market demands, reduce lead times, improve product quality and customer satisfaction and enhance revenue, profitability and sustainable growth.

Bozic, V. (2024) described industry 5.0 as a shift towards a human centric, sustainable and resilient industrial model where collaboration between humans and intelligent technologies enhances productivity, innovation and worker well-being. The study has identified AI, IoT and big data analytics as key enablers while emphasising the need to

address technological barriers, workforce reskilling, cultural resistance, investment constraints and the ethical AI governance through collaboration among governments, industries and educational institutions.

The previous review of literature highlights AI's role in improving banking service quality, operational efficiency, digital services and customer satisfaction (Haddad, 2021; Ortiz Berger, 2022; Al Araj et al. 2022; Sah & Padma, 2024; Saxena & Rastogi, 2026). Similarly, the studies on Industry 5.0 emphasise human-centricity, sustainability, resilience and human AI collaboration (Mehdiabadi et al., 2022; Bozic, 2024), while Gangaraju et al. (2023) examined agile supply chain practices and financial performance in Industry 4.0 manufacturing firms. However, limited empirical research integrates AI and Industry 5.0 principles to examine service quality management and customer satisfaction in the Indian banking sector. In particular, research using SERVQUAL dimensions remains limited. Hence, the present study addresses this gap by examining AI enabled banking services from an Industry 5.0 perspective.

**Main Objectives of the Study**

1. To examine customers' perceptions of Artificial Intelligence-enabled service quality in the banking sector from an Industry 5.0 perspective.
2. To evaluate the influence of AI-enabled service quality dimensions (reliability, assurance, tangibility, empathy, and responsiveness) on customer satisfaction in the banking sector.

**Methodology of the Study**

The present study adopts a descriptive and quantitative research design to examine the impact of Artificial Intelligence (AI) on service quality management and customer satisfaction in the banking sector from an Industry 5.0 perspective. In this research the researchers investigate how AI enabled banking services contribute in the improvement of service quality and in the enhancement of customer satisfaction for supporting the sustainable organisational development.

The researchers have conducted this empirical study in Tinsukia district which is in the state of Assam, India. Tinsukia district is a commercial hub of Assam and is characterized by increasing adoption of digitalization and AI enabled financial technologies in every

sector including banking sectors. Among all the commercial banks which are presently operating in this district it is the State bank of India (SBI) which has successfully implemented artificial intelligence-based banking applications such as internet banking, mobile banking, digital payment systems, AI powered customer assistance, automated grievance redressal mechanisms and fraud detection technologies etc.

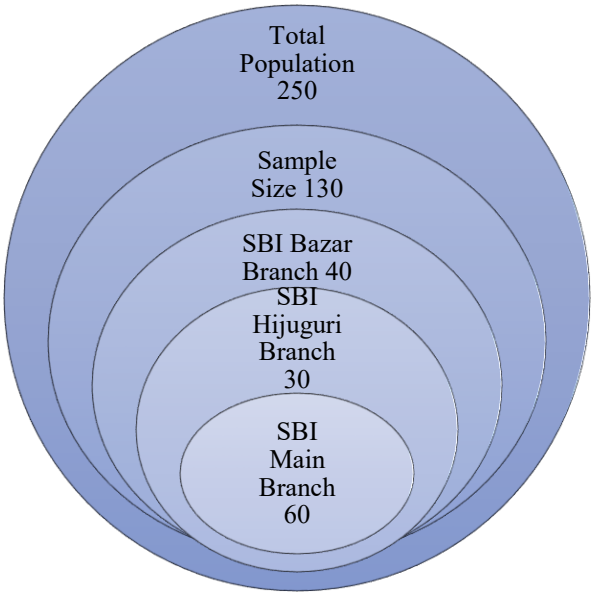
For this study the researchers have considered the three major branches of State Bank of India (SBI) which are located in the Tinsukia Town of Assam region. The names are as follows: SBI Main Branch; SBI Bazar Branch and SBI Hijuguri Branch.

***Collection of Data***

Both primary as well as secondary data are used for this study. In this study the primary data was collected by using a set of questions that were directly asked to the customers who were visiting the selected SBI branches of Tinsukia Town. The questionnaire was framed to capture the perceptions of the respondents regarding AI enabled banking services and their influence on the service quality and the customer satisfaction.

For this study the data which were already existed were analysed along with the additional sources like published books, peer reviewed journals, annual reports of banks, Reserve Bank of India publications, research articles, conference proceedings, government reports and authentic online databases etc. being used as secondary data.

The target population comprised customers of the selected SBI branches who regularly utilize AI-enabled banking services such as mobile banking, internet banking, ATM services, digital payment platforms, chatbot assistance, and other automated banking facilities. A total population of approximately 250 active customers was identified from the selected branches during the survey period. Using a convenience sampling technique, a total sample of 130 respondents was selected for the study. The branch-wise distribution of respondents is presented below.




***Banking Sector Transformation through Artificial Intelligence in the Era of Industry 5.0***

A bank is a financial institution that manages money by accepting deposits, facilitating withdrawals, and offering loans. It serves as a financial intermediary, channelling deposits into lending or investment activities. Through the adoption of Artificial Intelligence, the banking sector has transformed drastically. It enables the banks to deliver efficient, customer centric and technology driven financial services. In this era of Industry 5.0, it is the AI which is supporting the collaboration between advanced technologies and human expertise through which the operational efficiency, security, sustainability and customer satisfaction are enhanced.

**Analysis Technique**

For this study all the collected data have been duly tabulated first and further processed with the help of Weighted Mean of the responses related to the satisfaction of customers, and then they have been calculated to figure out the Average Weighted Mean with the help of the formula given below in order to synthesize and to categorically infer with justifications.

$$\text{Weighted Mean} = \frac{\sum x_1 w_1 + \ldots\ldots\ldots\ldots + x_7 w_7}{\sum w_1 + w_2 \ldots\ldots\ldots\ldots + w_7}$$

**Where,**

**Σ** denotes the sum

**X** denotes the value of a 1-7 point Likert Scale

**W** denotes the weight of occurrence of responses in each point of 7 points Likert Scale.

***Enhancing Service Quality with the adoption of artificial technology in the banks of Tinsukia District (Assam)an Industry 5.0 Perspective-***

Banks are an integral part of economic development and in the everyday financial transactions. It also plays a vital role in providing the financial services. Several commercial banks such as State Bank of India, Central Bank of India, HDFC Bank, ICICI Bank are offering a wide range of banking services through their branch networks and digital banking channels in the Tinsukia Town under Tinsukia District of Assam. Now a days with the huge adoption of artificial intelligence the banking sector has significantly transformed its service delivery by growing the operational efficiency, ensuring secure transactions and providing faster, more personalised customer services. From an Industry 5.0 perspective it is AI which supports a human centric approach by enhancing the capabilities of employees and improving the service quality across various banking operations. Accordingly, the banking services which are AI enabled have contributed to enhancing the customer satisfaction through improvement in the key service quality dimensions of reliability, assurance, tangibility, empathy and responsiveness. The perception of the customers for AI enabled service quality across all the selected SBI branches of Tinsukia Town under Tinsukia District of Assam are shown in Table 1.

**Table 1**

**The perception of the customers for AI enabled service quality across all the selected SBI branches of Tinsukia Town under Tinsukia District of Assam**

| Determinants of Service Quality | SBI Bazar Branch (n = 40) | SBI Hijuguri Branch (n = 30) | SBI Main Branch (n = 60) |
|---|---|---|---|
| Reliability | **6.09** | **6.07** | **6.11** |
| Assurance | **6.00** | **6.18** | **6.27** |
| Tangibility | **6.13** | **6.16** | **6.23** |
| Empathy | **5.98** | **6.11** | **6.18** |
| Responsiveness | **6.19** | **6.34** | **6.36** |

| | | | |
|---|---|---|---|
| **Total Weighted Mean** | **30.39** | **30.86** | **31.15** |
| **Average Weighted Mean** | **6.08** | **6.17** | **6.23** |

**Source- Calculated from the processed data collected from Field Survey**

Table-1 is representing the Weighted Mean Score of customers perception for the AI enabled service quality dimensions across all the three selected branches of the SBI in Tinsukia Town under the Tinsukia District of Assam. The finding reveal that artificial intelligence has positive influence on the quality of banking services by enhancing the SERVQUAL dimensions. Across all five dimensions, the relatively high weighted mean score found which suggest that customers perceive the AI enabled banking services as reliable, efficient, responsive, secure and capable of meeting their service expectations.

It has been observed that among the three branches, it is the SBI main branch which has recorded the highest average weighted mean score i.e., (6.23), followed by SBI Hijuguri Branch (6.17) and SBI Bazar Branch (6.08). It has been also observed that the higher score of SBI Main Branch, in comparison to others may be attributed to the larger number of respondents and the greater adoption and utilisation of AI enabled banking services at the branch. Accordingly, the results indicate that the customers across all the three branches hold favourable perceptions of AI enabled service quality, showing the positive contribution of AI to the service quality management and the customer experience in the banking sector.

To determine whether the observed variations in customers' perceptions of AI-enabled service quality across the three selected SBI branches are statistically significant, a One-Way Analysis of Variance (ANOVA) was performed. The ANOVA test compares the mean scores of the three branches to examine whether any significant differences exist in customers' perceptions of AI-enabled service quality among the selected SBI branches. Steps followed for the Calculation of One-Way ANOVA Test for the Study are:

a. State the Hypotheses i.e., Null Hypothesis ($H_0$): There is no significant difference in the mean scores of customers' perceptions of AI-enabled service quality among the three selected SBI branches and the Alternative Hypothesis ($H_1$): There is a

significant difference in the mean scores of customers' perceptions of AI-enabled service quality among the three selected SBI branches.

b. Input the Data.

c. Perform the ANOVA.

d. Interpret the Results.

**Analysis and Findings**

Based on the One-Way ANOVA procedure adopted for the study, the weighted mean scores of customers' perceptions regarding the five AI-enabled service quality dimensions, namely Reliability, Assurance, Tangibility, Empathy, and Responsiveness, across the three selected SBI branches have been considered for statistical analysis. From an Industry 5.0 perspective, the analysis aims to examine whether significant differences exist in customers' perceptions of AI-enabled service quality among the selected branches and to determine the corresponding p-value for interpreting the influence of AI-enabled service quality on customer satisfaction in the banking sector and are presented in Table 2.

**Table 2**

**Weighted Mean Scores of AI-Enabled Service Quality Dimensions for One-Way ANOVA Analysis across Selected SBI Branches in Tinsukia District**

| Determinants | SBI Bazar Branch | SBI Hijuguri Branch | SBI Main Branch |
|---|---|---|---|
| **Reliability** | **6.09** | **6.07** | **6.11** |
| **Assurance** | **6.00** | **6.18** | **6.27** |
| **Tangibility** | **6.13** | **6.16** | **6.23** |
| **Empathy** | **5.98** | **6.11** | **6.18** |
| **Responsiveness** | **6.19** | **6.34** | **6.36** |

**Source: Calculated from the processed data collected from Field Survey.**

The table 2 represents the Weighted Mean Scores of AI-Enabled Service Quality Dimensions for One-Way ANOVA Analysis across the selected SBI branches in Tinsukia District. With the help of these weighted mean scores, the p-value is calculated to examine the second objective of the study and to determine the impact of Artificial Intelligence, from an Industry 5.0 perspective, on Service Quality Management and

Customer Satisfaction in the banking sector. The following steps are adopted for the calculation:

- **Number of groups (k) = 3 (Branches i.e., Bazar, Hijuguri, Main)**
- **Total number of observations (N) = 5 determinants per branch × 3 branches = 15**
- **Total observations in each group = 5**

**Step 1: Calculation of Group Means for all the three bank branches**:

a. **Mean of SBI Bazar Branch:**

$\bar{X}_1 = \frac{6.09+6.00+6.13+5.98+6.19}{5} = 6.08$

b. **Mean of SBI Hijuguri Branch:**

$\bar{X}_1 = \frac{6.07+6.18+6.16+6.11+6.34}{5} = 6.17$

c. **Mean of SBI Main Branch:**

$\bar{X}_1 = \frac{6.11+6.27+6.23+6.18+6.36}{5} = 6.23$

**Step 2: Calculation of Overall Mean ($\bar{X}$) for all the three bank branches**:

$\bar{X} = \frac{30.39+30.86+31.15}{15} = 6.16$

**Step 3: Calculation of Sum of Squares Between Groups (SSB) for all the three bank branches**:

**SSB=** $\sum \boldsymbol{n_i}\ (\bar{\boldsymbol{X}}_{\boldsymbol{i}} - \bar{\boldsymbol{X}})^2$

Where $n_i$ is the number of observations in each group, and $\bar{X}_i$ is the mean of each group.

- **Calculation of Sum of Squares Between Groups (SSB) for SBI Bazar Branch:**

  $\boldsymbol{n_i}(\bar{\boldsymbol{X}}_{\boldsymbol{i}} - \bar{\boldsymbol{X}})^2 = 5(6.08\text{-}6.16)^2 = 5\ (0.08^2) = 0.032$

- **Calculation of Sum of Squares Between Groups (SSB) for SBI Hijuguri Branch:**

  $\boldsymbol{n_i}(\bar{\boldsymbol{X}}_{\boldsymbol{i}} - \bar{\boldsymbol{X}})^2 = 5(6.17\text{-}6.16)^2 = 5\ (0.01^2) = 0.0005$

- **Calculation of Sum of Squares Between Groups (SSB) for SBI Main Branch:**

  $n_i(\bar{X}_i - \bar{X})^2 = 5(6.23\text{-}6.16)^2 = 5\ (0.07^2) = 0.0245$

  **Therefore,**

  **Total SSB = 0.032+0.0005+0.0245 = 0.057**

**Step 4: Calculation of Sum of Squares Within Groups (SSW) for all the three bank branches**:

**SSW=** $\sum(X_{ij} - \bar{X}_i)^2$

**This is calculated by summing the squared differences of each individual observation from its group mean for all the three bank branches**:

- **Calculation of Sum of Squares Within Groups (SSW) for SBI Bazar Branch:**

  $\sum(X_{ij} - \bar{X}_i)^2 = (6.09\text{-}6.08)^2 + (6.00\text{-}6.08)^2 + (6.13\text{-}6.08)^2 + (5.98\text{-}6.08)^2 + (6.19\text{-}6.08)^2$

  $$= 0.0001 + 0.0064 + 0.0025 + 0.0064 + 0.0121 = 0.0275$$

- **Calculation of Sum of Squares Within Groups (SSW) for SBI Hijuguri Branch:**

  $\sum(X_{ij} - \bar{X}_i)^2 = (6.07\text{-}6.17)^2 + (6.18\text{-}6.17)^2 + (6.16\text{-}6.17)^2 + (6.11\text{-}6.17)^2 + (6.34\text{-}6.17)^2$

  $$= 0.01 + 0.0001 + 0.0001 + 0.0036 + 0.0289 = 0.0427$$

- **Calculation of Sum of Squares Within Groups (SSW) for SBI Main Branch:**

  $\sum(X_{ij} - \bar{X}_i)^2 = (6.11\text{-}6.23)^2 + (6.27\text{-}6.23)^2 + (6.23\text{-}6.23)^2 + (6.18\text{-}6.23)^2 + (6.36\text{-}6.23)^2$

  $$= 0.014 + 0.0016 + 0.0 + 0.0025 + 0.0169 = 0.035$$

**Therefore,**

**Total SSW = 0.0275+0.0427+0.035 = 0.1052**

**Step 5: Calculation of Degree of Freedom**:

Degrees of freedom between groups: k-1= 3-1=2

Degrees of freedom within groups: N-k= 15-3=12

**Step 6: Calculation of Mean Squares**:

- Mean Square Between Groups (MSB):

  MSB= $\frac{SSB}{df_{between}}$= $\frac{0.057}{2}$= 0.0285
- Mean Square Within Groups (MSW):

  MSW= $\frac{SSW}{df_{within}}$= $\frac{0.1052}{12}$= 0.0088

**Step 7: Calculation of F Statistics**:

F= $\frac{MSB}{MSW}$ = $\frac{0.0285}{0.0088}$ = 3.24

**Step 8: Determination of P value**:

From the above calculation, it is found that the F-statistic of 3.24 is less than the critical F-value of 3.89 at the 0.05 significance level. Therefore, the p-value is slightly above 0.05. It is also found from the calculation using statistical software that the exact p-value is approximately 0.067, which is slightly higher than the common significance threshold of 0.05. This indicates that there is insufficient evidence to reject the null hypothesis.

From the above analysis, it is found that, at the 5% significance level, there is no statistically significant difference in customers' perceptions of AI-enabled service quality among the three selected SBI branches based on the five service quality dimensions, namely Reliability, Assurance, Tangibility, Empathy, and Responsiveness.

Also, from Industry 5.0 perspective and based on the above finding this study reveals that the implementation of AI enabled banking services has contributed to maintaining a uniform standard of service quality across all the three selected branches of SBI in Tinsukia town under Tinsukia district of Assam which supports the customer satisfaction.

However, depending on the business context and managerial decision-making point, it has been observed that since p-value is close to 0.05, the differences which has been observed may still be considered as marginally relevant.

Hence, the null hypothesis is not rejected, which indicates that the customers' perceptions towards AI enabled service quality along with the customer satisfaction can be considered as similar across all the three selected SBI branches of Tinsukia Town at Tinsukia District of Assam.

**Conclusion**

The conclusion extracted from the study that AI significantly contributes to service quality management and customer satisfaction in the banking sector from an Industry 5.0 perspective. By complementing human expertise, AI facilitates personalised services, operational efficiency, stronger customer relationships and sustainable banking practices. It positively influences all five service quality dimensions i.e., reliability, assurance, tangibility, empathy and responsiveness which reflect the Industry 5.0 principles of human centricity, resilience, sustainability and innovation.

Further, the weighted average mean analysis indicates favourable customer perceptions of AI enabled service quality across the selected SBI branches in Tinsukia Town, Assam. The One-Way-ANOVA reveals no statistically significant differences in customer perceptions across these branches which indicates the consistency in AI supported service quality. Although Industry 5.0 remains developmental, its principles are increasingly evident in banking operations.

The findings extracted from this study verify that artificial intelligence play a very important role in improving the service quality management and with that it can effectively meet the expectations of the customers and also can strengthen their satisfaction. Consequently, the study concludes that there is a positive relationship between the artificial intelligence and the satisfaction of the customers from an Industry 5.0 perspective.

**Future Scope of the Study**

From an Industry 5.0 perspective, the present study provides a foundation for understanding the impact of Artificial Intelligence (AI) on service quality management

and customer satisfaction in the banking sector. Future research may include larger samples of public, private and foreign banks across diverse geographical regions to improve the generalisability of the findings.

Further studies may explore emerging Industry 5.0 technologies, including Generative AI, blockchain, machine learning, the Internet of Things (IoT) and Robotic Process Automation (RPA), to examine their contributions to service quality, customer satisfaction, trust, employee performance, cybersecurity and sustainable banking practices. Additionally, longitudinal and comparative studies could provide deeper insights in to the evolving role of AI in developing human centric, resilient and sustainable banking systems.

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