The Effect of Artificial Intelligence on Service Quality and Customer Satisfaction in Jordanian Banking Sector

REEM AL-ARAJ
Financial and Accounting Sciences Department, Faculty of Business,
Middle East University, Amman,
JORDAN

HOSSAM HADDAD
Department of Accounting, Faculty of Business,
Zarqa University, Zarqa,
JORDAN

MAHA SHEHADEH
Finance and Banking Sciences Department, Faculty of Business,
Applied Science Private University, Amman
JORDAN

ELINA HASAN
Financial and Accounting Sciences Department, Faculty of Business,
Middle East University, Amman,
JORDAN

MOHAMMAD YOUSEF NAWAISEH
Financial and Accounting Sciences Department, Faculty of Business,
Middle East University, Amman
JORDAN

Abstract:- The study emphasizes the importance of Artificial Intelligence (AI) and its applications on the service quality provided by Jordanian banks for their customer satisfaction. This research paper thoroughly reviews the literature on the numerous emergent applications of artificial intelligence and its impact on the banking sector. A rigorous study of the available literature is conducted to examine AI's uses in banking. Artificial intelligence improves the banking experience for millions of clients and employees by providing credit score checking, system failure prediction, emergency alarm systems, fraud detection, phishing website detection, liquidity risk assessment, customer loyalty evaluation and intelligence systems by reducing the employee workload. A questionnaire gathered data from 270 consumers in Jordan's banking sector. The SPSS program used exploratory factor analysis to statistically evaluate the sample data to determine service quality and customer satisfaction. The results show that the updated SERVQUAL Model extracted five subscales instead of the eight in the original model. The extracted subscales were tangibility, assurance, reliability, responsiveness, and empathy. According to this study, artificial intelligence is statistically relevant to service quality and customer satisfaction. The updated SERVQUAL model, according to the authors, helps address customer satisfaction in the banking sector. The research findings suggest that the demand for artificial intelligence in the Jordanian banking sector is equally essential for the customers; thus, there should be an optimal balance between virtual and human agents based on the customers' requirements and preferences. Further, this study found practical implications of using AI in banking, particularly those related to Jordanian customer perception.

Keywords: - The Banking Sector, artificial intelligence, customer experience, service quality

Received: June 20, 2022. Revised: October 15, 2022. Accepted: November 11, 2022. Published: December 13, 2022.

1 Introduction

Due to globalization and increased transparency in the economy, the banking environment has been more volatile and competitive as of late, [1]. When interacting with a company's goods or services, clients expect superior treatment, or in other words, there has been more emphasis on customer happiness. The banking sector has been thriving, and client loyalty will keep rising due to cutting-edge technologies like artificial intelligence, which have been more common in businesses over the last several decades.

Robots showcase cutting-edge automation and artificial intelligence. The term "machine learning" describes a computer's capacity to learn and utilize information independently of a programmer, allowing it to be used in various contexts. In recent years, a contemporary company transformation has tended to make activities quicker and more efficient at the expense of some of their original complexity, [3]. Artificial intelligence (AI) offers a superior, cutting-edge solution that can improve problem-solving, task automation and customer service for organizations. AI may be used to automate data administration operations, improve credit rating and identify potentially fraudulent transactions, [2].

Artificial intelligence applications, like data, are crucial to almost every industry – from deposit-taking and lending to investment banking and asset management – due to the nature of the modern corporate environment. As a result, banks may greatly benefit from autonomous data management without human intervention to enhance speed, accuracy and efficiency, [4]. The several possible uses of AI in the banking sector can be grouped into four. First, there are front-office apps geared toward customers and back-office programs geared toward operations. The second concern concerns the rules and laws governing trading and portfolio management. While some banks have completely integrated new technology into their operations, most are still in the testing phase. Further, there seems to be a greater emphasis on researching AI technologies with an eye on improving customer service and streamlining business operations.

Third, online banking fraud is studied as a potential area for artificial intelligence use; with the rise of online and mobile payments, credit card fraud has quickly become one of the most common types of cybercrime. Thus, many businesses have begun using artificial intelligence (AI) algorithms to verify the legitimacy of their customers' credit card transactions in real time, comparing them to the previous ones in terms of amount and location, [5], [6].

Lastly, chatbots are another area where financial institutions are experimenting with AI technology. Chatbots are virtual assistants that may communicate with customers at a bank through text or voice and attempt to fulfil their needs without involving a human worker. Financial institutions are also experimenting with AI to display data from reports and legal documents, such as annual reports, to extract the necessary provisions, [7]. AI software may build models by analyzing data and using backtesting to learn from past errors.

As time has progressed, several pre-existing financial technology tools have also developed into precise AI solutions. For example, we may look to robot advisors that allow for complete automation in some asset management services and online financial planning tools, which assist consumers in making better consumption and savings choices. Moreover, as financial technology solutions become more sophisticated, they increasingly use methods that scan data and detect patterns automatically. 13 domestic Jordanian banks, four Islamic banks, and seven international banks make up Jordan's banking sector, [8].

The banking industry's reputation is in jeopardy due to customers' legitimate fears for the safety of their data and financial transactions, which stem from everything – from credit card fraud and unauthorized data sharing to stolen data and fraudulent purchase orders resulting from human error or hasty investment decisions. This study will raise awareness about the usefulness of AI among the decision-makers in Jordan's financial services industry by adding a case of a new use for the technology. Despite the abundant research on client-perceived banking service quality, no study has examined the impact of AI on service quality and customer satisfaction in the Jordanian banking industry. This study argues that the banking industry should anticipate an impact on its service quality and customer happiness due to the increased use of AI applications. Further, clients evaluate a service's

quality based on their satisfaction. As aforementioned, raising the bar on service quality may thus increase customer retention and revenue. The study puts forth the following research questions: (1) how has introduced AI into the banking industry affected its service quality in Jordan; and (2) how satisfied are the customers with their interactions with the financial institutions?

This study elucidates the most important quality criteria in the Jordanian banking industry – AI, which helps financial institutions formulate plans to enhance the quality of their services. This will strengthen the bank's position in the banking sector and increase the likelihood of the banks in Jordan and the surrounding area surviving in this highly competitive environment. The primary purpose of this research is to illustrate the considerable impact that AI and its applications have on service quality and customer happiness by assessing how they influence the standard of service provided by the banking sector.

The two hypotheses were developed based on the research topic and associated questions. This study's primary hypothesis (H1) is that AI has no appreciable impact on the quality of banking services provided to customers in Jordan. At the 5% significance level, the relationship between AI and service quality in Jordan's financial industry is insignificant (H1.1). The second Hypothesis (H1.2) is that no statistically significant relationship exists between AI and the monetary institution regarding client satisfaction in Jordan.

AI (Applications) is the independent variable in the Jordanian banking industry. The quality of service provided by banks in Jordan and the level of client satisfaction are the dependent variables. Computer systems that can perceive the world around them, understand what they hear and say, make decisions and translate languages are the focus of Artificial Intelligence research and development. Customer satisfaction can be defined as "a person's emotion of joy or disappointment that comes from evaluating the perceived performance or outcome of a product versus their expectations", [9], [10]. A customer's opinion of the service quality, along with the aspects of dependability, responsiveness, assurance, empathy and tangibles, constitutes a "targeted evaluation" of service quality. Businesses can swiftly fix issues, gauge how they are doing in the eyes of their clients and make adjustments based on the feedback about the quality of services supplied.

2 Literature Review

2.1 Artificial Intelligence

Artificial intelligence (AI) is a set of theories and algorithms that enables computers to perform tasks that typically require human intelligence (such as visual perception, voice recognition or the interpretation of a text, taking its context into account) and that, in some cases, augments these abilities. Machine learning is a subfield of AI that has recently been widely used.

Financial service providers currently use AI technology, such as predictive analytics and speech recognition, to give banks the advantages of digitalization and to help them compete with FinTech companies, [10]. Artificial intelligence (AI) may help banks improve their customers' experiences by facilitating seamless, around-the-clock interactions with customer support representatives. However, the use of AI in banking applications goes well beyond traditional retail banking. The back and middle offices of investment banking and any other financial help might indeed profit from AI, [11].

With AI's potential to detect and prevent fraud while enhancing compliance measures, the banking industry has a bright future, [13]. When combating money laundering, an artificial intelligence program may do what would usually take hours or days within seconds. Banks may also benefit from the AI's ability to swiftly glean actionable information from enormous data sets. Artificial intelligence bots, online payment counsellors and biometric fraud detection methods contribute to higher-quality service for a wider audience, [12]. As a result, the bank revenues rise, expenses fall, and profits soar.

2.1.1 The Scope of AI Applications in the Banking Sector

1- Credit Score

Banks must acquire cash after carefully assessing the credit ratings of loan-seeking consumers. Further, the banking industry produces a profit regardless of the danger as it monitors and manages risks, [13]. Credit risk is one of the most severe hazards since it focuses on preventing complete system collapse, which could be challenging to adjust, [12]. This classification differentiates between a positive score with a low

likelihood of defaulting and a negative score with a high likelihood of default. Classification and regression tree models are created using the decision tree approach, one of the AI methods for classifying situations. This approach surpasses other tactics for examining credit ratings, such as logistic regression and discriminant analysis, in terms of profit and marketing for the bank. Loan approval is crucial as well.

2- Mobile Banking

Mobile wallets are prevalent nowadays; 65 percent of member organizations and most consumers use them, [14]. Most consumers regard online payment services favourably since they steer people away from conventional card transactions and enhance banking services by maximizing revenue generation. This user experience transformation enables the collection and analysis of user-generated data to improve service for each client, depending on the trends or insights gleaned from the data. Mobile payments support mobile banking services that clients choose because of their comfort and convenience, and financial institutions wish to preserve positive relationships with them.

3- Customer Loyalty

The relationship between bankers and customers is crucial for maintaining and expanding consumer loyalty. The client connection is crucial if banks are to satisfy their consumers' fluctuating needs and expectations. Customers' loyalty may be increased if reasonably priced, high-quality services attract them. In the banking industry, client loyalty may be predicted using an artificial neural network previously used for the same purpose in other sectors. After data collection, multiple regression should isolate the most critical factors from the available variables, thus preparing the data for future modelling, [15]. This prediction model employs the feedforward deep residual approach and the artificial neural network, [34].

4- Tracing Scams and Frauds

In this age of digital technology, there are innovative and efficient methods for identifying fraud, [16]. Due to the volume of data offered by electronic documents, contracts, emails, text messages and bank transactions, regulators must develop more sophisticated fraud detection techniques. AI and machine learning are perfect for fraud detection due to the large quantity of digital data and the simplicity with which language and data can be evaluated. The aim is to incorporate AI into operational configurations and strategic goals, which may aid administrators in completing their tasks more effectively, [17]. AI must thus be incorporated into authority instead of considered a technological toy distinct from the organization's most critical functions. Its incorporation into the everyday operations of the service aids personnel in understanding core strategies and deciding how to implement them in their particular domains.

5- Aggregating Cybersecurity Data

Applications that include capabilities like Pattern Scout and Threat Match may aid banks in boosting network visibility and monitoring internal systems for network issues in real-time, [18]. According to reports, the software solutions may assist banks in detecting and identifying cybersecurity risks in their networks, reducing long-term security expenditures and preventing data breaches, [35]. The platforms can use recognition patterns based on machine learning on businesses to assist enterprise-wide security and operational tasks. Older technologies used by the banks meant that human security professionals spent 15–60 minutes on average working on very particular events, [36]. After integrating cybersecurity systems, the personnel could evaluate the breadth of an occurrence within one to five minutes to decide whether the event required escalation. Some other relevant studies can be found in [31], [32], [33].

2.2 Service Quality

Service quality refers to how firms fulfil or exceed client expectations. It can coordinate with, meet or override customer preferences. Customer happiness rises as service quality increases, and profit increases as cost management improves. Service quality measures how an organization delivers its services compared to the expectations of its customers. Customers purchase services as a response to their specific needs. They consciously or unconsciously have certain standards and expectations for how a company's delivery of services fulfill those needs. Therefore, measuring and improving service quality can increase an organization's profits and reputation. Regardless of the industry, service quality can directly impact a company's ability to satisfy customer needs while remaining competitive and earning customer satisfaction.

To perform a complete analysis of a bank's performance, the management must compare its performance with its customers' expectations. With

the implementation of other banks in the same industry, a bank with high service quality offers services that match or exceed its customers' expectations and has better customer loyalty and higher profits. The five Dimensions of Service Quality refer to the SERVQUAL Model of five key service dimensions, implemented by Parsu Parasuraman, including Reliability, Assurance, Tangibles, Empathy and Responsiveness. It is a model for measuring the gap between what a customer wants and their judgment of the service quality. Many researchers have adopted the SERVQUAL model to examine banks' service quality and customer satisfaction. Satisfaction in the banking sector, [19], has read service quality dimensions delivered by banks to meet the needs of their customers to achieve sustainable development (through tangibles, responsiveness, empathy, assurance, reliability, access, financial aspect and employee competencies).

2.2.1 Qualitative Dimensions of Service

This research examines five factors of service quality that influence customer satisfaction (reliability, assurance, tangibles, empathy and responsiveness) to determine the possible effect of each component on the Jordanian banking industry.

2.2.2 Trustworthiness

Trustworthiness is the capacity to deliver services securely and dependably to meet consumer requirements. Reliability considerations include consistently delivering the stated job or service, demonstrating an interest in resolving customer issues, implementing service improvements for the first time and offering and delivering service at the promised time.

2.2.3 Assurance

Assurance comprises competency and the capacity of workers to instil clients with a feeling of the organization's credibility, [20]. The assurance is high if consumers feel safe interacting with the business, the staff are always courteous while interacting with the customers and the employees possess sufficient expertise to answer the customers' questions, [21].

2.2.4 Tangibility

This refers to facilities, equipment, employees and communicable commodities that are examples of physical dimensions, [22]. In other words, these criteria include sophisticated equipment, physical facilities, well-dressed employees and well-organized papers (such as booklets, ledgers, billing material, etc.).

2.2.5 Empathy

It entails engaging with consumers according to their spirit to feel like the company understands them and that they are vital to the business. The empathy aspects include the following: personal attention to customers, good business hours for all customers, workers demonstrating individual attention to customers, employees' desire for the customers' best interests and employees recognizing the specific consumer demands.

According to [37], this instrument may be used in various fields, including financial institutions, libraries, hotels, restaurants, medical centres, banks, the tourist sector, hospitals, libraries, transportation services, postal services and the insurance business. That is why factors of the SERVQUAL model were used in this study to determine the effects of the characteristics of service quality on brand personality and identification.

2.2.6 Responsiveness

Being responsive involves a willingness to collaborate and assist the consumer. The service quality component stresses responsiveness and vigilance towards client requests, inquiries and complaints. This includes instances such as employees communicating to customers about what they will do, providing immediate services to customers (in the shortest time possible), always being willing to assist customers, and always being prepared to answer customers' questions.

2.3 Customer Satisfaction

This refers to customer satisfaction with a company's goods, services and capabilities. It is one of the most critical determinants of future purchases and client loyalty. Consequently, it facilitates growth and revenue forecasting. The banking sector has reached a state of standardization where one bank may have a competitive edge over another based on its customers' experiences, even though all banks provide the same goods and services and have minimal potential for price competition. There are two ways in which banks may distinguish themselves via excellent customer service. The connection between a bank and its clients significantly affects

customer satisfaction. People want to be treated with respect, and they want their bank to try to get to know them rather than just promote a product. There are several methods for clients to connect with a bank in contemporary banking, including online and mobile banking, by using an ATM and over the phone. One of the most significant findings is that consumers seek a consistent experience across channels. Whether conveying information swiftly across channels or guaranteeing uniform deposit timings regardless of how a deposit is made, these factors are significant. To create a superior customer experience, banks must meet the expectations of their consumers across all channels.

Moreover, customer satisfaction is a statistic that measures a company's capacity to satisfy customer requirements. It also includes enabling the evaluation of service quality. Customers may evaluate items and services by providing input on service attributes, and businesses that fail to produce high-quality goods and services will lose clients to their rivals in today's environment. As customers are becoming more demanding, their quality expectations are also increasing; thus, organizations must focus on the client, provide more value, cultivate connections and prioritize market innovation. Many modern businesses monitor their consumers' expectations, productivity, satisfaction and even the performance of their rivals. The authors in [50] confirmed that those clients had requested a better experience. As technology has progressed over the years, industries have started to embrace cutting-edge technologies such as artificial intelligence to give higher-quality service to their customers. The significance of the banking sector and its influence on the nation's growth are discussed. The contact between the bankers and customers is essential for maintaining the existing clients and fostering consumer loyalty. The client's connection to the bank is crucial if financial institutions are to satisfy their clients' fluctuating needs and expectations [15]. Also, customer loyalty may be increased if reasonably priced, high-quality services attract them. The banking business may anticipate customer loyalty using an artificial neural network used by other industries for the same reason. Using factor analysis, key variables should be extracted from all accessible variables after data collection, preparing the data for future modelling. In this prediction model, the technique employs feedforward backpropagation and an artificial neural network. K-fold cross-validation is used, where K subsets are derived from the classification of the training dataset. After evaluating the dataset, the method's performance may are determined using the efficiency coefficient and root means square error. The outcome of the artificial neural network's prediction of customer loyalty has shown that high accuracy is attainable.

2.4 Banks

Banking is essential to the contemporary economy. However, the characteristics and functions of contemporary banks have altered with time. The notion of banking has evolved with the concept of money.

The bank is an institution that deals with money by accepting deposits from customers, honouring client withdrawals against such deposits on demand, collecting customer checks and by lending or investing excess deposits until they are due for repayment. A bank is a financial institution that handles deposits, advances and other services associated with banking. It accepts deposits from individuals who want to save and loans money to those in need. It is a financial institution and financial intermediary that receives deposits and directs them into lending operations directly via lending or indirectly through capital markets. Customers with capital shortfalls and customers with capital surpluses are connected via banks. Due to their impact on the financial system and the economy, banks are heavily regulated in the majority of nations. Most banks use fractional reserve banking, which maintains a tiny reserve of deposited cash and lends out the remainder for profit. They are often subject to minimum capital requirements established on the Basel Accords, an international set of capital regulations.

2.5 Jordanian Banking Sector

Banking is a unique sector that utilizes capital to multiply wealth regardless of the risk [12]. The Jordanian financial system comprises the Jordanian Central Bank and all regulated banks operating in the Hashemite Kingdom of Jordan. All commercial, Islamic, and foreign banks are licensed to do business in Jordan. Moreover, all Jordanian banks and branches of foreign banks operating in Jordan must be licensed.

Jordanian banks provide various conventional and non-traditional services, including retail banking, personal bank loans, business financing and e-

services. In Jordanian banks, there is an immediate need to explore the relationship between service quality and client happiness.

The Jordanian Central Bank was established as a distinct legal entity whose capital was wholly controlled by the Jordanian government. The Central Bank of Jordan is responsible for regulating and overseeing all banks, manufacturing Jordanian banknotes and coins, providing needed liquidity to licensed banks, maintaining bank reserves and keeping monetary stability, among other things.

3 Methodology

This study was implemented in the Jordanian banking industry. It examined the significance of artificial intelligence in banking service quality and its impact on customer satisfaction. The study employed books, annual reports, journals, and the internet as secondary data sources to obtain information for the model and analysis. A key source of information for research on the effect of artificial intelligence on service quality and customer satisfaction in Jordanian banks was the survey. Respondents' preferences were matched with the data using traditional paper polls and an online Google Survey. Bank employees and customers assisted in the distribution and caching of questionnaires. From December 2021 to March 2022, 270 clients of Jordanian commercial banks were administered and returned questionnaires. The proper sample size was determined to represent the respondents' opinions accurately. The questionnaire consisted of three sections: a cover letter, demographic questions and measurement of independent and dependent variables. On a five-point Likert scale, the following answers were given for each variable: strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points) and severely disagree (1 point).

In the demographic analysis of data, the questionnaire offers the distribution of respondents by gender, age, occupation and educational level, among other things. The organization then does a statistical study of the research subjects. By examining the collection of factors, we comprehensively assessed the potential for further study. Then, the reliability of the scales selected from the literature was proved using the Reliability coefficient indicator and a series of questions to evaluate service quality and customer satisfaction.

Since the primary objective of our study was to determine the impact of Artificial Intelligence on the selected five dimensions of service quality and overall customer satisfaction, we first examined the correlation between Artificial Intelligence and the target variables as items that do not correlate with the target variables are irrelevant to our investigation. Following this, the internal structure of the five scales selected for the dependent variables and customer satisfaction was analyzed. Based on the literature analysis, the following operational definition illustrates the link between artificial intelligence, service quality and customer satisfaction in the Jordanian banking industry. This section explores research hypotheses and offers a conceptual framework.

A descriptive research design was used to summarise the data and describe the characteristics of the variables. The strength of the examined link between variables was assessed using a correlation model. Secondary sources such as books, annual bank reports, magazines, journals, references and the internet were used to collect the necessary data. The study served as a vital source of information for investigating the impact of artificial intelligence on service quality and customer satisfaction in Jordanian banks.

The surveys were distributed and gathered from Jordanian commercial banks in 2022. Jordan has three kinds of banks: commercial, Islamic and international. Accepted for data analysis were 270 replies from Jordanian bank customers, who were from varied areas. The proper sample size was chosen to represent the perspectives of the respondents in order to construct a qualitative and quantitative research strategy.

The developed questionnaire consisted of three pieces; the first was a cover letter describing the study's aims. In the cover letter, it was assured that their feedback would be handled with discretion. The second segment had questions regarding the demographic data. All statements that assessed research using independent and dependent variables were included in the last portion. On a five-point scale, strongly agree=5, agree=4, neutral=3, disagree=2 and severely disagree=1 were assigned to the variables. Two surveys, one for bank managers and the other for customers, were prepared in Arabic and English and were distributed in person and through the Gmail accounts.

The information of the participants was classified and recorded in an Excel database. All of the data was analyzed using the SPSS program. There were two components to the examination of the data: a) an examination of the demographic data and b) data analysis for each research issue and the evaluation of the study's premise. Due to the interviewees' ease of comprehension, the five-point Likert Scale was historically used by the majority of the studies. In the pilot project, questionnaires were completed by 41 financial managers. The respondents were then requested to provide their impressions and opinions about the impact of artificial intelligence on Jordanian banks' service quality and customer satisfaction. Similarly, surveys were provided to bank clients and were examined afterwards. Complex topics were explored in conversations with small groups of managers and consumers, and the questionnaires were finished based on those discussions. Validity describes how closely the acquired data correspond to the research area. Measure what is supposed to be measured is the definition of validity. Reliability refers to the degree to which the measurement of a phenomenon gives consistency and stability in its outcome. Testing for dependability is vital since it pertains to the uniformity of the components of a measuring instrument, [24].

The validity and reliability of the questionnaire, a key research instrument, are crucial for determining the dependability of the research results and conclusions. Thus, it also determines the precision and consistency of the variables' measurements and their selection. Although validity and reliability are closely connected, they represent distinct characteristics of a measuring instrument. In general, a measuring device may be accurate without being valid, but it is also likely to be accurate if it is precise. Nevertheless, dependability alone is insufficient to guarantee legitimacy. Even though a test is trustworthy, it may not correctly represent the intended behaviour or quality. Thus, the content validity of a measuring instrument is a validity study that exposes how well each item in the measuring instrument performs its intended function. A targeted study of the literature, definitions and ideas was utilized to guarantee the content validity of the questionnaire to increase the quality of the expressions in the measuring instrument and further the research objectives. This section will discuss the reliability and validity of this study. When measuring scales are used in research, the measurement scale's dependability must be established [29]. The word "reliability" refers to the capability of the measuring scale to represent the measured construct consistently. Therefore, a reliable scale should produce consistent results throughout time and geography. A certain level of dependability is necessary for a trustworthy measuring scale.

Data analysis uses a measuring scale that is both reliable and accurate. Methods for measuring the dependability of a scale include the test-retest, different forms and internal consistency techniques.

Numerous research strategies have also been used to establish dependability based on internal consistency. Cronbach's Alpha Coefficient is employed in this study since it is the most popular and extensively used approach for measuring internal consistency. Cronbach's alpha assumes values ranging between zero and one (0–1). Higher values suggest more scale dependability and vice versa. Generally, Cronbach's alpha values should be at least 0.70 to ensure dependability. However, even though a value of 0.70 or higher is often desirable, a value of 0.60 will suffice for work utilizing freshly established measures, such as those used in the present research. As demonstrated in Table 3, all alpha values were more than 0.70, indicating the dependability of artificial intelligence applications and service quality.

Development of Hypothesis

Artificial Intelligence on Service Quality

Every day, millions of consumers make repeated purchases. Customers thus create data, which is kept and managed as an expansive database. Additionally, most banking business operations need much human labour; however, AI has made it simpler for them to eliminate staff and customer manual labour. Due to the machine learning approach, this formerly complex process has been reduced to unprecedented simplicity. Moreover, the banking industry has enhanced the quality of its services by offering various practical solutions to assure safety and comfort. Technology improves every day, and it is preferable to apply these technologies to the many domains of a firm, [51]. Modern technology is required to preserve and increase the financial system's security, and banking industry sectors are also prepared to adopt it. As people want their banks to stay current in this age of digitalization, the upgradability of the technology will enhance the banks' service and security, as well as their

reputation. Internet banking and mobile banking appeal to users because of their efficiency and usability.

Table 1. Reliability of the Scale's Variables

Independent variable	Number of questions	Cronbach's alpha
Artificial Intelligence	**6**	**0.822**
Dependent variable		
Service quality	**25**	**0.950**
Tangibility	**5**	**0.888**
Reliability	**4**	**0.845**
Responsiveness	**4**	**0.842**
Assurance	**4**	**0.788**
Empathy	**4**	**0.764**
Customer satisfaction	**4**	**0.862**

Source: Authors' analysis, 2022.

Numerous studies demonstrate that various approaches strengthen customer-banking interactions and produce a win-win scenario for both parties [15]. Due to the competition from non-banking industries, banks must embrace the most cutting-edge digital technology to enhance their service quality, [23]. Nonetheless, the banking sector is more positively affected by technology. The banking sector should thus use artificial intelligence tools to make client banking transactions seamless and spontaneous. Several AI applications have enabled banks to attain their maximum efficiency, opening doors for a new dimension in financial services.

To maintain a high level of service and create a better-integrated system, it is necessary to comprehend client attitudes. Creating a method to gauge client satisfaction is crucial for providing bank services. The SERVQUAL model generally measures customer satisfaction and comprises five dimensions: tangibles, responsiveness, empathy, assurance and dependability. The SERVQUAL model may be used to develop a superior instrument for measuring customer satisfaction, [29].

The word “reliability” refers to the capability of the measuring scale to represent the measured construct consistently. Therefore, a reliable scale should produce consistent results throughout time and geography. Moreover, a certain level of dependability is necessary for a trustworthy measuring scale.

(H1.1): There is no statistically significant effect at the significance level (0.05≥α) between artificial intelligence and the service quality in the Jordanian banking sector.

Artificial Intelligence on Customer Satisfaction

Undoubtedly, Artificial Intelligence improves the banking experience for millions of clients and bank personnel. AI enables many procedures that minimize staff efforts, such as providing credit score verification, system failure prediction, emergency alert systems, fraud detection, phishing website detection, liquidity risk evaluation, customer loyalty evaluation and intelligence systems. Likewise, the consumer experience is enhanced by various apps, like mobile banking, chatbots and augmented reality. Customers are captivated by the availability of freshly introduced goods and services designed by banks to expedite banking procedures, [25]. The success of a Bank is assessed by the quality of services provided to clients, which establishes its competitive advantage.

Client happiness determines the survival and success of a company in a competitive market. It is a crucial performance indicator, particularly for retail banking, which relies on customer loyalty to generate profits by attracting new customers and retaining the current ones. Despite the banks' increased efforts, most clients are dissatisfied with their financial services. In response to the increasing competition in the banking industry, banks have made initiatives to improve their service quality following client demand and strengthening their service reliability, [30]. Today, organizations should segment their clients to provide them with the finest service based

on their diverse demands, enabling them to serve each customer properly.

Moreover, it is necessary to monitor customer behaviour to fully understand consumers, [26] and to serve them more effectively. The customer relationship management technique combines the marketing strategy with procedures; tasks conducted inside the organization and external network connections are built to retain current customers in a highly competitive market by determining and comprehending their demands. Banking organizations may effectively use customer relationship management to improve customer service provided that they concentrate on four crucial factors: 1) retention of the current clients, 2) attracting new clients, 3) encouraging the clients to work closely with the bank and 4) keeping the clients informed about the bank's new offerings, [25].

Additionally, if the banking sector treats retail depositors respectfully, it may attract more outstanding deposits [34]. [51] examined customer experiences in the age of Artificial Intelligence; the research aimed to analyze the role of AI in the shopping experience, specifically how the integration of AI improves the customer experience. In response, a model was proposed drawing on the trust-commitment theory (Morgan & Hunt, 1994) and the service quality model, [37].

This proposed model integrates trust and perceived sacrifice as mediating factors between an AI-enabled customer experience based on four elements: (a) personalization, (b) convenience, (c) AI-enabled service quality, and (d) relationship commitment. Previous studies have also highlighted the importance of trust and the sacrifices users may have to make while using AI-enabled services, [52]. However, to our knowledge, both factors are yet to be empirically tested as part of a holistic theoretical model. The study by [52] is a novel theoretical model that integrates trust and perceived sacrifice as factors mediating the effects of personalization, convenience and AI-enabled service quality on AI-enabled customer experience. It focused on the AI-enabled customer experience offered by a beauty brand, and the findings provided new insights into the customers' view of trust and perceived sacrifice. Furthermore, the results highlighted the significant role that commitment toward the relationship with the brand plays in evaluating an AI-enabled customer experience when the customers have had an initial experience with the brand.

The second hypothesis (H1.2): There is no statistically significant effect at the significance level ($0.05 \geq \alpha$) between artificial intelligence and customer satisfaction in the Jordanian banking sector.

4 Further Developments

The analysis of the data acquired via the self-administered questionnaire of the responding Sample indicated the following in terms of the Sample: gender, age, academic level, professional position, employment experience and the experience distribution for the Sample by gender. The data indicated that 51.1% of the 138 respondents in the sample research were male. In contrast, 48.9% of the second stage's 132 responders were female. The following describes the distribution of the study sample by age: 11% of the research group was between the ages of 18 and 24, 17.5% between the ages of 25 and 29 and 27.8% of respondents were between the ages of 30 and 34. Further, 19.6% of the population was between the ages of 35 and 39, 9.2% was between the ages of 40 and 44, 5.2% was between the ages of 45 and 49, and 9.6% of the respondents were between the ages 40 and 49. It was discovered that the bulk of the Sample, or 27.8% of the total respondents, were in their middle years. The academic level also determined the distribution of the research sample: 61.9% possessed a bachelor's degree, 15.9% hold a master's degree, 14.1% have received a diploma, 4.8% are in high school, and 2.8% hold a PhD.

Additionally, 0.40 percent possess a professional qualification. The findings revealed that the majority of the Sample subjects had a bachelor's degree, indicating that most Jordanian bank customers are well-educated. The distribution of the research sample by experience revealed that for 3.3% of the research sample, the number of years of experience was less than one year, 9.6% had 1–4 years of experience, 31.9% had 5–9 years, 31.5% had 10–15 years, and 23.7% had more than 15 years of experience. A significant number of responders had 5–9 years of experience (31.9%), indicating that consumers are dedicated to the banks for the long haul. According to the table, 14.9% of the Sample consisted of top management with 40 respondents, 18.1% of middle management with 49 respondents, 27.8% of supervisors with 75 respondents, and 39.2% of non-managers with 106 respondents. This

conclusion reveals that Jordanian commercial banks have a multi-tiered organizational structure.

The authors in [27] describe the correlation coefficient analysis as a quantitative index indicating the degree and direction of the relationship between two variables. According to [52], it estimates all regression relationships using the correlation coefficient. The strength of the linear connection between the dependent and independent variables may be determined (r). A correlation coefficient is a numerical measure or indicator of the degree of relationship between two sets of scores. It reaches a maximum of +1 and a low of -1.00. The plus sign represents a positive correlation, which indicates that as the scores of one variable increase, so do the scores of the other variable. A "-" sign shows a negative correlation, indicating that while one variable score rises, the scores on the other variable decrease, [27]. A correlation of 1.00 indicates an optimum relationship between the two variables. In other words, a scattergram of the two variables will demonstrate that each point corresponds precisely to a straight line. A correlation of -.5 shows a significantly unfavourable relationship between the two variables.

This research employed correlation analysis to examine the correlations between artificial intelligence (independent variable) and service quality and customer satisfaction (dependent variables). Analyses of the relationship between artificial intelligence (independent variable) and service quality and customer satisfaction (dependent variables) were conducted. These experiments were also used to evaluate various regression assumptions.

According to research, different models are developed to strengthen the customer-banking connection and produce a win-win scenario for both parties, [15]. Due to the competition from non-banking industries, banks must embrace the most cutting-edge digital technology to enhance their service quality, [23]. As the banking sector is more positively affected by technology, they should use artificial intelligence tools to make client banking transactions seamless and spontaneous. Several AI applications have enabled banks to attain their maximum efficiency, opening doors for new dimensions in financial services.

To maintain a high level of service and create a better-integrated system, it is necessary to comprehend client attitudes. Creating a method to gauge client satisfaction is crucial for banking services. The SERVQUAL model generally measures customer satisfaction, comprising five dimensions: tangibles, responsiveness, empathy, assurance and dependability. The SERVQUAL model may be used to develop a superior instrument for measuring customer satisfaction.

Affirmed, [29]. The word “reliability” refers to the capability of the measuring scale to represent the measured construct consistently. Therefore, a reliable scale should produce consistent results regardless of time and place. A certain level of dependability is necessary for a trustworthy measuring scale.

According to the descriptive analysis presented in Table 2, it can be noted that the standard deviation of the EPS is (0.40 due to the existence of a difference. It can be noted that the standard deviation of the AAI is (0.71266) and the Standard deviation error mean reached (0.04337), with that considered as the lowest ratio as shown in Table 4, while the highest ratio was for the Standard deviation ACS, which reached (1.00108) for standard error mean (0.06092).

According to Table 3, the T-test result shows the highest ratio of 95% Confidence Interval.

The difference for both the Lower and Upper is ARES; the ratio was for the lower (3.9085) and for the upper (4.0896), while for the lower both lower and Upper 95% Confidence Interval, the Difference is AEMP; for the lower, the ratio was (3.3470) and the Upper(3.5289). The AI correlated strongly with all the independent variables. Tangibility at r= (.753) at $p<0.01$) also correlated at r= (.753) at ($p<0.01$ and $p<0.05$) with artificial intelligence. Tangibility correlated at r= (.753) $p<0.01$, reliability correlated at r= (.710) $p<0.01$, responsiveness correlated at r= (.722), $p<0.01$, assurance correlated at r= (.607) $p<0.01$, and empathy correlated at r= (.594), $p<0.01$. It can be seen from the above table that all independent variables have significant and positive relationships with artificial intelligence

Customer satisfaction correlated strongly with artificial intelligence at r= (.538) at $p<0.01$. Service quality also correlated at r= (.753) at ($p<0.01$ and $p<0.05$) with artificial intelligence; tangibility correlated at r= (.753) $p<0.01$, reliability correlated at r= (.710) $p<0.01$, responsiveness correlated at r= (.722) $p<0.01$, assurance correlated at r= (.607) $p<0.01$, and empathy correlated at r= (.594), $p<0.01$. It can be seen from the above table that all independent variable factors have a significant and

positive relationship with artificial intelligence. The table below proves this statement.

Table 2. Relevant study variables and calculated measures

	N	Mean	Std. Deviation	Std. Error Mean
AAI	270	3.8988	.71266	.04337
ATAN	270	3.8207	.86888	.05288
AREL	270	3.8259	.83197	.05063
ARES	270	3.9991	.75586	.04600
AASSU	270	3.7731	.74342	.04524
AEMP	270	3.4380	.75914	.04620
ASERVQUAL	270	3.7714	.69302	.04218
ACS	270	3.4870	1.00108	.06092

Table 3. Direct relationship among the different variables

Variables	T-Test					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
AAI	89.893	269	.000	3.89877	3.8134	3.9842
ATAN	72.255	269	.000	3.82074	3.7166	3.9248
AREL	75.564	269	.000	3.82593	3.7262	3.9256
ARES	86.936	269	.000	3.99907	3.9085	4.0896
AASSU	83.398	269	.000	3.77315	3.6841	3.8622
AEMP	74.415	269	.000	3.43796	3.3470	3.5289
ASERVQUAL	89.420	269	.000	3.77137	3.6883	3.8544
ACS	57.236	269	.000	3.48704	3.3671	3.6070

Table 4. The correlation between Average Artificial Intelligence and Service Quality Dimensions

Correlations						
	AAI	ATAN	AREL	ARES	AASSU	AEMP
AAI	1					
ATAN	.753**	1				
AREL	.710**	.822**	1			
ARES	.722**	.805**	.770**	1		
NASSAU	.607**	.672**	.670**	.785**	1	
AMP	.594**	.641**	.655**	.623**	.600**	1

Table 5. The correlation between Average Artificial Intelligence and Customer satisfaction

Correlations					
	AAI	CS1	CS2	CS3	CS4
AAI	1				
CS1	.433**	1			
CS2	.439**	.674**	1		
CS3	.508**	.660**	.752**	1	
CS4	.440**	.471**	.535**	.570**	1

	N	Mean	Std. Deviation	Std. Error Mean
AAI	270	3.8988	.71266	.04337
ATAN	270	3.8207	.86888	.05288
AREL	270	3.8259	.83197	.05063
ARES	270	3.9991	.75586	.04600
AASSU	270	3.7731	.74342	.04524
AEMP	270	3.4380	.75914	.04620
ASERVQUAL	270	3.7714	.69302	.04218
ACS	270	3.4870	1.00108	.06092

Variables	T-Test					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
AAI	89.893	269	.000	3.89877	3.8134	3.9842
ATAN	72.255	269	.000	3.82074	3.7166	3.9248
AREL	75.564	269	.000	3.82593	3.7262	3.9256
ARES	86.936	269	.000	3.99907	3.9085	4.0896
AASSU	83.398	269	.000	3.77315	3.6841	3.8622
AEMP	74.415	269	.000	3.43796	3.3470	3.5289
ASERVQUAL	89.420	269	.000	3.77137	3.6883	3.8544
ACS	57.236	269	.000	3.48704	3.3671	3.6070

Table 6. The correlation between Average Artificial Intelligence with Service Quality and Customer satisfaction

Correlations						
	AAI	ATAN	AREL	ARES	AASSU	AEMP
AAI	1					
ATAN	.753**	1				
AREL	.710**	.822**	1			
ARES	.722**	.805**	.770**	1		
NASSAU	.607**	.672**	.670**	.785**	1	
AMP	.594**	.641**	.655**	.623**	.600**	1
ACS	.538**	.579**	.577**	.540**	.532**	.677**

Table 7. Correlation between Average Artificial Intelligence with Service Quality and Customer satisfaction

Correlations			
	AAI	ASERVQUAL	ACS
AAI	1		
ASERVQUAL	.777**	1	
ACS	.538**	.664**	1

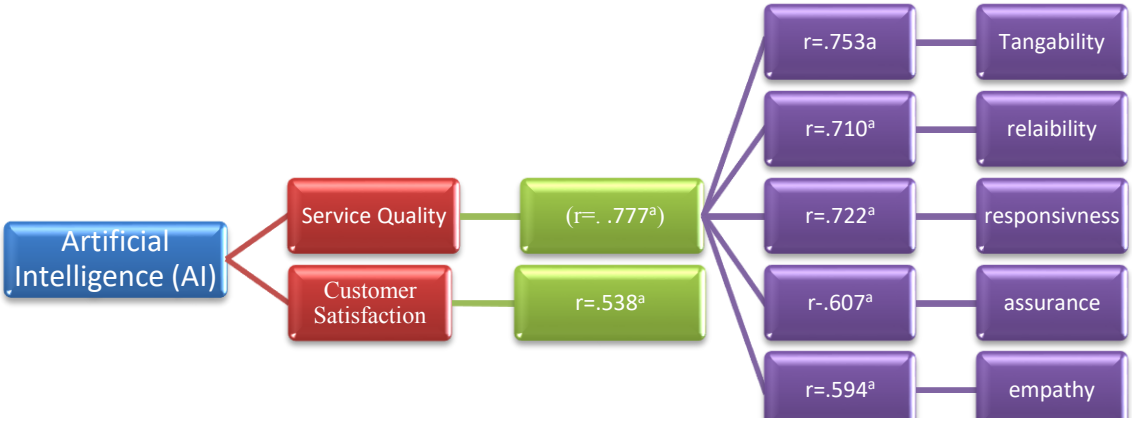

Fig. 1: Artificial Intelligence on service quality and customer satisfaction with correlation values.
Source: Authors' analysis, 2022.

Additionally, it is evident from the above results that the highest correlation was between Artificial Intelligence and service quality and customer satisfaction (r=0.777). Furthermore, the results reveal no perfect correlation among the independent variables higher than (0.90), which is a good initial indicator that there will be no collinearity diagnostic among the independent variables. The correlation matrix for the variables from Artificial Intelligence on service quality and customer satisfaction is initially analyzed for possible inclusion in Factor Analysis.

Figure 1 indicates a positive and significant relationship between AI and SQ with (r= 0.777). Moreover, there is a significant correlation value of service quality dimensions (tangibility with (r= 0.753), empathy with (r=0.594), assurance with (r=0.607), reliability with (r=0.710) and responsiveness with (r=0.722). Lastly, customer satisfaction has been correlated positively with (r=0.538). Moreover, two tests are applied to the resultant correlation matrix to test whether the relationship between the variables is significant. First, Bartlett's test of sphericity is used to test whether the correlation matrix was an identity matrix (Table 18), i.e., all the diagonal terms in the matrix are one, and the off-diagonal terms in the matrix are zero. The calculated test value is 1494.379 (approximate chi-square). It shows that the correlation matrix is not an identity matrix, i.e., a correlation exists between the variables. Another test of the Kaiser-Meyer Olkin (KMO) measure was used to experiment with sampling adequacy. This test is based on the correlation and partial correlation of the variables. If the KMO measure is closer to 1, it is superior to use factor analysis. If the KMO measure is closer to 0, the factor analysis is not ideal for the variables and the data. The value of the test statistics is 0.910, meaning that the factor analysis for the selected variables is appropriate for the data. Table 6 shows that all the hypotheses are accepted.

Table 8. Regression model summary for all hypothesis

Dimension	Beta	t	sig	Decision
Service Quality	0.756	20.210	0.000	Accept
Tangibility	0.918	18.724	0.000	Accept
Responsiveness	0.766	17.090	0.000	Accept
Empathy	0.633	12.084	0.000	Accept
Assurance	0.633	12.504	0.000	Accept
Reliability	0.829	16.494	0.000	Accept
Customer Satisfaction	0.755	10.440	0.000	Accept

5 Discussion

The primary objective of this study is to examine the effect of artificial intelligence on service quality in the Jordanian banking sector. The results from testing hypotheses demonstrated that artificial Intelligence has a statistically significant influence on service quality; this also corroborated the findings of past research concerning the statistically significant impact of Artificial Intelligence on service quality [39], [40], [38], [41], [42], [43], [44], [45], [46], [47], [48], [49].

The conclusion indicated a significant association between Artificial Intelligence and the tangibility of the service quality factor. Thus, there is a correlation between banks in Jordan using AI in their processes and the fact that their services are current, as evidenced by the existence of physical facilities, an interactive website and an application, as well as the need for bank employees to be proficient in IT.

The results also demonstrated a favourable association between artificial intelligence and the dependability of the service quality component about the banks' capacity to satisfy customer expectations and maintain openness and timeliness with their consumers.

The findings indicate a statistically significant association between Artificial Intelligence and the responsiveness of the service quality dimension based on the workers' willingness to assist and inform consumers about when their services will be completed.

The assurance component has a favourable correlation with artificial intelligence, and bank workers must provide courteous, discreet and professional service to consumers.

When it comes to the connection between AI and empathy, the findings demonstrate that banks can provide personalized services to consumers throughout their business hours by recognizing each customer's unique requirements.

Last but not least, there is a favourable association between AI and customer satisfaction, with the findings indicating that consumers are satisfied with their banks when banks almost meet their expectations.

The findings indicate that Artificial Intelligence has a favourable but little impact on consumer satisfaction. The outcome suggests that Jordanian banks have endeavoured to foster a solid connection with their clients to increase and cultivate their loyalty. The findings also show that Jordanian banks have provided clients with more information, yet customer satisfaction is not yet complete.

In terms of the explanations behind the outcomes, this study's conclusion varies from past empirical investigations in some ways. Starting with service quality, there is a positive relationship between AI and service quality, which will allow banks to identify customer needs and desires and enable the banking sector to identify market gaps and changes in the external environment. As a result, banks can generate new, contemporary strategies to meet these changes, empower customers and ultimately contribute to achieving organizational goals. In addition, the impact of Artificial Intelligence on customer satisfaction will impact Jordanian banks' corporate culture and profitability.

6 Conclusions & Recommendations

The primary objective of this study was to examine the influence of artificial intelligence on service quality in the Jordanian banking sector. The testing hypotheses showed that Artificial Intelligence has a statistically significant influence on service quality; this result corroborated the findings of past research about the substantial impacts of Artificial Intelligence on service quality, [27]. The conclusion indicated that there is a significant association between Artificial intelligence and the tangibility of the service quality factor; the commercial banks in Jordan that prioritize the use of AI in their processes have demonstrated a correlation between the bank services being current and the existence of physical facilities, an interactive website and applications, as well as the need for bank employees to be familiar with IT applications. The research examined the positive association between Artificial Intelligence and service quality dimension dependability in terms of whether or not banks fulfil customer expectations. It assures consumers that banks delivering services on time would maintain customer transparency. The findings demonstrate a statistically significant association between AI and service quality dimension responsiveness as measured by the staff's willingness to assist clients and notify them when their services will be completed. The assurance component correlates well with AI since the bank's staff provides courteous, confidential and professional client service. To demonstrate the link

between Artificial Intelligence and empathy, the findings show that banks provide personalized service to consumers during business hours by recognizing their unique requirements.

In conclusion, there is a favourable association between Artificial Intelligence and customer satisfaction; the findings suggested that customers were satisfied with their banks when they almost met their expectations. The findings indicate that Artificial Intelligence has a favourable but not statistically significant impact on consumer satisfaction. Moreover, they suggest that Jordanian banks have endeavoured to foster a solid connection with their clients to increase and cultivate their loyalty. The data also reflect that Jordanian banks have shared more information with their clients, yet consumer satisfaction is still not optimal. In terms of the explanations behind the outcomes, this study's conclusion varies from past empirical investigations in some manner. Starting with service quality, there is a positive relationship between artificial intelligence and service quality that enables banks to identify customer the needs and wants of their customers, enabling the banking sector to recognize market gaps and changes in the external environment; this will help banks generate new contemporary strategies to meet these changes, empower customers and ultimately contribute to the achievement of organizational objectives.

Moreover, the impact of Artificial Intelligence on customer satisfaction will affect the corporate culture and profitability of Jordanian banks. AI has made it simpler for them to eliminate staff and customer manual labour. Due to the machine learning approach, formerly complex processes have been reduced to unprecedented simplicity. Numerous studies demonstrate that various approaches strengthen customer-banking interactions and generate a win-win scenario. The banking sector should thus use artificial intelligence tools to make client banking transactions seamless and spontaneous. Several AI applications have enabled banks to attain their maximum efficiency, opening doors for new dimensions in financial services. As a result of the research conducted in the Jordanian banking industry, we recommend evaluating the relationship between artificial intelligence and assurance; Jordanian banks should be aware of the needs of their customers in order to make them feel more valued and make it possible for them to conduct transactions at any time and place. The Jordanian banking industry must thus enhance its service quality by offering various solutions to assure safety and comfort. In this digital age, clients want their banks to be current and have their demands and best interests at heart in exchange for their loyalty and acceptance. Further, the upgradability of technology will enhance service and security and enhance the banks' reputation for sustainability. Consequently, Jordanian banks should pay greater attention to customer satisfaction by introducing artificial intelligence applications and by increasing the customers' awareness of banking services through publications and advertising campaigns to reach the largest possible customer segment and achieve general satisfaction.

Analysis of correlation coefficients is a numerical measure that represents the degree and direction of the relationship between the two variables, according to [28]. According to [52], it is used to estimate all regression relationships. Using the correlation coefficient, the strength of the linear connection between the dependent and independent variables may be determined (r). A correlation coefficient is a numerical measure or indicator of the degree of relationship between two sets of scores. It reaches a maximum of +1 and a low of -1.00. The plus sign represents a positive correlation, which indicates that as the scores of one variable increase, so do the scores of the other variable. A "-" sign indicates a negative correlation, which indicates that while the scores on one variable rise, the scores on the other variable decrease, [28]. A correlation of 1.00 indicates an optimum relationship between the two variables. In other words, a scattergram of the two variables will demonstrate that each point corresponds precisely to a straight line. The scattergram's data points are arranged in a curve if the value exceeds zero. If the value is less than zero, the scattergram's data points are structured arbitrarily along any straight line drawn over the data. A correlation of -.5 between the two variables suggests a significantly negative relationship.

This research employed correlation analysis to examine the correlations between artificial intelligence (independent variable) and service quality and customer satisfaction (dependent variable). Analyses of the relationships between artificial intelligence (independent variable) and service quality and customer satisfaction (dependent variables) were conducted. These experiments were also used to evaluate various regression assumptions.

According to research, different models were developed to strengthen the customer-banking connection and to produce a win-win scenario for both parties, [15]. The SERVQUAL model generally measures customer satisfaction, comprising five dimensions: tangibles, responsiveness, empathy, assurance and dependability. The SERVQUAL model may be used to develop a superior instrument for measuring customer satisfaction, [29]. The word "reliability" refers to the capability of the measuring scale to represent the measured construct consistently. Therefore, a reliable scale should produce consistent results throughout time and geography. A certain level of dependability is necessary for a trustworthy measuring scale. In the current business environment, communication and technology have been enhanced, and the tools of Industry 4.0 have been implemented, such as Blockchain, the Internet of Things, cryptocurrencies, the cloud and big data, which can be investigated in. Further research will determine their impact on the quality of service in the Jordanian banking sector.

References:

[1] Chen, L., & Deng, Y. (2018). A new failure mode and effects analysis model using Dempster–Shafer evidence theory and grey relational projection method. *Engineering Applications of Artificial Intelligence, 76*, 13–20.

[2] Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data–evolution, challenges and research *agenda. International Journal of Information Management*, *48*, 63–71.

[3] Filieri, R., Lin, Z., Pino, G., Alguezaui, S., & Inversini, A. (2021). The role of visual cues in eWOM on consumers' behavioural intention and decisions. *Journal of Business Research*, *135*, 663–675.

[4] Ballestar, M. T., Grau-Carles, P., & Sainz, J. (2019). Predicting customer quality in e-commerce social networks: a machine learning approach. *Review of Managerial Science*, *13*(3), 589–603.

[5] Hu, H. F., & Krishen, A. S. (2019). When is enough, Investigating product reviews and information overload from a consumer empowerment perspective. *Journal of Business Research*, *100*, 27–37.

[6] Hughes, L., Dwivedi, Y. K., Misra, S. K., Rana, N. P., Raghavan, V., & Akella, V. (2019). Blockchain research, practice and policy: Applications, benefits, limitations, emerging research themes and research agenda. *International Journal of Information Management*, *49*, 114–129.

[7] Lumberton, C., & Stephen, A. T. (2016). A thematic exploration of digital, social media, and mobile marketing: Research evolution from 2000 to 2015 and an agenda for future inquiry. *Journal of Marketing, 80*(6), 146–172.

[8] Haddad, H. (2021). The Effect of Artificial Intelligence on the AIS Excellence in Jordanian Banks. *Montenegrin Journal of Economics*, *17*(4), 155–166.

[9] Kotler, Philip, Kevin Lane Keller, Swee Hoon Ang, Chin Tiong Tan, and Siew Meng Leong. *Marketing management: an Asian Perspective.* (Harlow: Pearson, 2018).

[10] Ortiz-Berger, D. Is Banking the next Blockbuster? An Empirical Study of the Impact of Disruptive Technology in Banking.

[11] Moro Visconti, R. (2016). The impact of quantitative easing (QE) on the cost of debt in project finance investments. *Public Money & Management*, *36*(2), 129–135.

[12] Ghodselahi, A., & Amirmadhi, A. (2011). Application of artificial intelligence techniques for credit risk evaluation. *International Journal of Modeling and Optimization*, *1*(3), 243.

[13] Ince, H., & Aktan, B. (2009). A comparison of data mining techniques for credit scoring in banking: A managerial perspective. *Journal of Business Economics and Management*, *10*(3), 233–240.

[14] Payne, "et al.". (2018). Mobile banking and AI-enabled mobile banking: The differential effects of technological and non-technological factors on digital natives' perceptions and behavior. *Journal of Research in Interactive Marketing.*

[15] Kishada, Z. M., Wahab, N. A., & Mustapha, A. (2016). Customer Loyalty Assesment in Malaysian Islamic Banking Using Artificial Intelligence. *Journal of Theoretical & Applied Information Technology*, *87*(1).

[16] Ortiz, J., Marin, A., & Gualdron, O. (2016). Implementation of a banking system security in

embedded systems using artificial intelligence. *Advances in Natural and Applied Sciences*, *10*(17), 95–102.

[17] Singh, M., Singh, R., Pandey, A., & Kasture, P. (2018). Chat-Bot for Banking Industry. In *International Conference on Communication, Security and Optimization of Decision Support Systems* (ICCSOD 2018) (pp. 247–249).

[18] Kaya, O., Schildbach, J., AG, D. B., & Schneider, S. (2019). Artificial intelligence in banking. *Artificial Intelligence.*

[19] Pakurár, M., Haddad, H., Nagy, J., Popp, J., & Oláh, J. (2019). The service quality dimensions that affect customer satisfaction in the Jordanian banking sector. *Sustainability*, *11*(4), 1113.

[20] Genieys, W., Ballart, X., & Valarié, P. (2004). From 'great leaders to building networks: the emergence of new urban leadership in Southern Europe? *International Journal of Urban and Regional Research*, *28*(1), 183–199.

[21] Moerke, M. J., Banks, M. L., Cheng, K., Rice, K. C., & Negus, S. S. (2017). Maintenance on naltrexone+ amphetamine decreases cocaine-vs.-food choice in male rhesus monkeys. *Drug and Alcohol Dependence*, *181*, 85–93.

[22] Kasiri, L. A., Cheng, K. T. G., Sambasivan, M., & Sidin, S. M. (2017). Integration of standardization and customization impacts service quality, customer satisfaction, and loyalty. *Journal of Retailing and Consumer Services*, *35*, 91–97.

[23] Turk Ariss, R. (2008). Financial liberalization and bank efficiency: evidence from post-war Lebanon. *Applied Financial Economics*, *18*(11), 931–946.

[24] Zerfass, A., & Huck, S. (2007). Innovation, communication, and leadership: New developments in strategic communication. *International Journal of Strategic Communication*, *1*(2), 107–122.

[25] Laketa, Marko, et al. (2015). Customer relationship management: concept and importance for banking sector. *UTMS Journal of Economics*, *6*(2), 241–254.

[26] Satheesh, M. K., Samala, N., & Rodriguez, R. V. (2020). Role Of Ai-induced Chatbot in Enhancing Customer Relationship Management in the Banking Industry. *ICTACT Journal on Management Studies, 6*(4), 1320–1323.

[27] Haddad, H. (2021). The Effect of Artificial Intelligence on the AIS Excellence in Jordanian Banks. *Montenegrin Journal of Economics*, *17*(4), 155–166.

[28] Norris, G., Qureshi, F., Howitt, D., & Cramer, D. (2014). *Introduction to statistics with SPSS for social science*. Routledge.

[29] Pallant, J. F., & Bailey, C. M. (2005). Assessment of the structure of the Hospital Anxiety and Depression Scale in musculoskeletal patients. *Health and Quality of Life Outcomes*, *3*(1), 1–9.

[30] Abed, I. A., Hussin, N., Haddad, H., Al-Ramahi, N. M., & Ali, M. A. (2022). The Moderating Effects of Corporate Social Responsibility on the Relationship between Creative Accounting Determinants and Financial Reporting Quality. *Sustainability*, *14*(3), 1195.

[31] Pakurár, M., Haddad, H., Popp, J., Khan, T., & Oláh, J. (2019). Supply chain integration, organizational performance and balanced scorecard: An empirical study of the banking sector in Jordan. *Journal of International Studies*, *12*(2).

[32] Haddad, H. (2017). Corporate social responsibility (CSR) practices of Islamic banks in Jordan a case study on Jordan Islamic Bank. The Annals of the University of Oradea. *Economic Sciences*, *26*(1), 609–619.

[33] Zulfiqar, S., Haddad, H., Al-Shehhi, Y., & MATE, D. (2016). Financial performance of Islamic Bank in the United Arab Emirates, Pakistan and Jordan: a case comparative study with DuPont approach. *Annals of the University of Oradea: Economic Science*, *25*(2), 403–410.

[34] Puri, M., & Rocholl, J. (2008). On the importance of retail banking relationships. *Journal of Financial Economics*, *89*(2), 253–267.

[35] Soni, V. D. (2019). Role of Artificial Intelligence in Combating Cyber Threats in Banking. *International Engineering Journal For Research & Development*, 4(1), 7–7.

[36] Vieira, A., & Sehgal, A. (2018). How banks can better serve their customers through artificial techniques. In *Digital marketplaces*

unleashed (pp. 311-326). Springer, Berlin, Heidelberg.

[37] Parasuraman, A., Berry, L. L., & Zeithaml, V. A. (1991). Understanding customer expectations of service. *Sloan management review*, *32*(3), 39–48.

[38] Naumov, N. (2019). The impact of robots, artificial intelligence, and service automation on service quality and service experience in hospitality. In *Robots, artificial intelligence, and service automation in travel, tourism and hospitality*. Emerald Publishing Limited.

[39] Haddad, H., Alkhodari, D., Al-Araj, R., Aburumman, N., & Fraij, J. (2021). Review of the Corporate Governance and Its Effects on the Disruptive Technology Environment. Wseas Trans. Environ. Dev, 17, 1001–1020.

[40] Pakurár, M., Haddad, H., Nagy, J., Popp, J., & Oláh, J. (2019). The service quality dimensions that affect customer satisfaction in the Jordanian banking sector. *Sustainability*, *11*(4), 1113.

[41] Qasaimeh, G., Al-Gasaymeh, A., Kaddumi, T., & Kilani, Q. (2022, February). Expert Systems and Neural Networks and their Impact on the Relevance of Financial Information in the Jordanian Commercial Banks. In *2022 International Conference on Business Analytics for Technology and Security (ICBATS)* (pp. 1–7). IEEE.

[42] AL-KHOURY, A. B. E. E. R., HADDAD, H., AL-BAWAB, A. T. E. F., OTHMAN, M., & KHAZALEH, A. Financial Performance for Arab Bank using DuPont Analysis 2000-2021.

[43] Qasaimeh, G., Yousef, R., Al-Gasaymeh, A., & Alnaimi, A. (2022, February). The Effect of Artificial Intelligence Using Neural Network in Estimating on An Efficient Accounting Information System: Evidence from Jordanian Commercial Banks. In *2022 International Conference on Business Analytics for Technology and Security (ICBATS)* (pp. 1-5). IEEE.

[44] Ali, M. A., Hussin, N., Haddad, H., Al-Ramahi, N. M., Almubaydeen, T. H., & Abed, I. A. (2022). The Impact of Intellectual Capital on Dynamic Innovation Performance: An Overview of Research Methodology. *Journal of Risk and Financial Management*, *15*(10), 456.

[45] El Helow, K. R., & Salem, A. B. M. (2020). Are Artificial Intelligence (AI) and Machine Learning (ML) Having an Effective Role in Helping Humanity Address the New Coronavirus Pandemic?. WSEAS Transactions on Biology and Biomedicine, 17, 119–124.

[46] De Oliveira, A. P., & Braga, H. F. T. (2020). Artificial Intelligence: Learning and Limitations. wseas transactions on advances in engineering education, 80–86.

[47] YFANTIS, V., NTALIANIS, K., & NTALIANIS, F. Exploring the Implementation of Artificial Intelligence in the Public Sector: Welcome to the Clerkless Public Offices. *Applications in Education.*

[48] HADDAD, H., AL-QUDAH, L. U. M. A., ALMANSOUR, B. Y., & RUMMAN, N. A. (2022). Bank Specific and Macroeconomic Determinants of Commercial Bank Profitability: in Jordan from 2009-2019. ELIT–Economic Laboratory for Transition Research Dz. Washingtona 4/5, 18(4), 155-166.

[49] Sivacoumare, A., Satheesh, S., Athul, T., Manikandan, V., & Vinopraba, T. (2021, October). AI Quadruped Robot Assistant for the Visually Impaired. In *IECON 2021–47th Annual Conference of the IEEE Industrial Electronics Society* (pp. 1–5). IEEE.

[50] Peltier & Barger, (2018). Mobile banking and AI-enabled mobile banking: The differential effects of technological and non-technological factors on digital natives' perceptions and behavior. *Journal of Research in Interactive Marketing*.

[51] Ameen, Tarhini, Reppel. (2020). Customer Experiences in the Age of Artificial Intelligence, School of Business and Management, Royal Holloway, University of London, United Kingdom.

[52] Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. Journal of the Academy of Marketing Science, 48(1), 24-42.