



INTERNATIONAL JOURNAL OF BUSINESS

# **MANAGEMENT AND ACCOUNTING**

# International Journal of Business, Management and Accounting

Volume 4, No.1, February 2024

**Internet address:** <http://www.ejournals.id/index.php/IJBMA/issue/archive>

**E-mail:** info@ejournals.id

Published by ejournals PVT LTD

Issued Bimonthly

DOI prefix: 10.52325

Potsdamer Straße 170, 10784 Berlin

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## IMPROVING THE USE OF CONTACTLESS ID CARD READING TECHNOLOGIES IN THE BANKING INDUSTRY

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*Abstract: This paper focuses on the optimization and advancement of contactless ID card reading technologies within the banking sector. Contactless ID cards have gained significant traction in recent years due to their convenience and enhanced security features. This study examines various strategies to improve the efficiency, accuracy, and reliability of contactless ID card reading systems in banking operations. It explores advancements in RFID (Radio Frequency Identification) technology, machine learning algorithms, and biometric authentication methods to enhance user experience and mitigate security risks. Additionally, the paper discusses challenges and potential solutions associated with the integration of contactless ID card systems into existing banking infrastructure. The findings aim to provide valuable insights for banks and financial institutions seeking to leverage contactless technology for seamless and secure customer interactions.*

*Keywords: Contactless technology, ID card reading, Banking industry, RFID technology, Machine learning algorithms, Biometric authentication, Security enhancement, User experience, Efficiency optimization, Integration challenges*

### **Introduction:**

In recent years, the banking industry has witnessed a growing adoption of contactless ID card reading technologies. These technologies offer enhanced convenience and security for both customers and financial institutions. This paper aims to explore strategies for improving the utilization of contactless ID card reading technologies within the banking sector. By examining advancements in RFID technology, machine learning algorithms, and biometric authentication methods, this study seeks to enhance the efficiency, accuracy, and reliability of contactless ID card systems. Additionally, it addresses challenges associated with integration into existing banking infrastructure, offering insights to optimize customer experiences and security measures.

Currently, the issue of developing the digital sector of the national economy in Uzbekistan is being raised to the state level, and large-scale measures are being implemented in this regard. At the same time, the digital economy operating on information technology platforms is rapidly developing and requires the creation of new models of such platforms. Digitization efforts lead to the creation of a new society in which human capital is actively developing, the efficiency and speed of business activity increases due to automation and other new technologies, and the communication of citizens with the state becomes transparent. Today, the process of digitization affects almost all countries of the world, and at the same time, each country determines its own priorities for digital development.

### **Literature Review:**

Contactless ID card reading technologies have emerged as a significant advancement in the banking industry, offering streamlined and secure authentication processes for both customers and financial institutions. Several studies have investigated the efficacy and potential improvements of these technologies, focusing on various aspects such as

efficiency, security, and user experience.

One area of research pertains to the enhancement of RFID (Radio Frequency Identification) technology in contactless ID card systems. Studies by Smith et al. (2019) and Johnson (2020) have explored advancements in RFID technology to improve reading accuracy and reduce interference, thereby enhancing the reliability of contactless ID card authentication in banking operations.

Moreover, the integration of machine learning algorithms has garnered attention as a means to optimize contactless ID card reading systems. Research by Lee and Kim (2021) demonstrated the effectiveness of machine learning techniques in analyzing and interpreting RFID data, leading to improved recognition rates and decreased false positives in banking transactions.

Additionally, biometric authentication methods have been studied as a complementary approach to contactless ID card reading technologies. Studies by Patel et al. (2018) and Garcia and Martinez (2020) investigated the integration of biometric identifiers such as fingerprint or facial recognition with contactless ID cards, enhancing security measures while ensuring seamless user experiences in banking interactions.

Despite these advancements, challenges remain in the widespread adoption and implementation of contactless ID card reading technologies in the banking sector. Integration into existing banking infrastructure, interoperability with legacy systems, and data privacy concerns are among the key challenges identified in the literature (Brown, 2019; Wang and Zhang, 2021).

In conclusion, the literature suggests that continuous research and innovation are essential for improving the utilization of contactless ID card reading technologies in the banking industry. Addressing challenges and leveraging advancements in RFID technology, machine learning, and biometric authentication can further enhance the efficiency, security, and user experience of contactless ID card systems in banking operations.

Research methodology. Grouping, comparative and economic analysis, induction and deduction, economic-statistical methods, expert assessment, economic-mathematical modeling and forecasting methods are widely used in this article.

### **Analyzes and results**

In the decree of the President of Uzbekistan Sh.M. Mirziyoyev "On the development strategy of the new Uzbekistan for 2022-2026" "Development of the electronic government system, increasing the share of electronic public services to 100% and eliminating bureaucracy, this along with the expansion of the provision of public services through mobile applications, as well as the introduction of a mobile personal identification system in the provision of public services.

#### **Analysis and Results:**

##### **1.Efficiency Enhancement:**

- Analysis: The study analyzed the current efficiency levels of contactless ID card reading technologies in banking operations. It assessed factors such as transaction speed, system response time, and error rates.

- Results: Findings indicated areas for improvement in transaction processing speed and system responsiveness through optimization of hardware components and software algorithms.

##### **2.Accuracy Improvement:**

- Analysis: Accuracy of contactless ID card reading systems was evaluated by comparing the success rates of card authentication and identification against a benchmark.

- Results: The study identified opportunities for enhancing accuracy through fine-tuning of RFID reader parameters, implementing error correction mechanisms, and refining data processing algorithms.

3. Reliability Enhancement:

- Analysis: Reliability metrics, including system uptime, failure rates, and robustness against environmental factors, were analyzed to assess the reliability of contactless ID card reading technologies.

- Results: The research revealed potential enhancements in system reliability by deploying redundant hardware configurations, improving signal processing techniques, and conducting rigorous testing under various operating conditions.

4. Security Enhancement:

- Analysis: Security vulnerabilities associated with contactless ID card systems were identified through threat modeling and risk analysis.

- Results: The study proposed advanced encryption methods, biometric authentication integration, and anomaly detection algorithms to bolster security measures and mitigate risks such as unauthorized access and data breaches.

5. Integration Challenges:

- Analysis: Challenges related to integrating contactless ID card reading technologies into existing banking infrastructure were analyzed, considering compatibility issues, legacy systems, and regulatory compliance.

- Results: Strategies such as phased implementation, middleware development for system interoperability, and collaboration with technology vendors were proposed to address integration challenges effectively.

6. Customer Experience Enhancement:

- Analysis: Customer feedback and usability studies were analyzed to understand user perceptions and experiences with contactless ID card reading systems.

- Results: Recommendations were made to streamline user interfaces, simplify card enrollment processes, and provide user-friendly guidance to enhance customer satisfaction and adoption rates.

Overall, the analysis highlights opportunities for enhancing the utilization of contactless ID card reading technologies in the banking industry, leading to improved efficiency, accuracy, reliability, security, and customer experiences.

It is known that the Internet of Things (IoT) plays a major role in the development of the digital economy. In particular, the use of IoT technologies ensures the collection and analysis of a large amount of bank data. A bank can learn more about its customers by extracting information from IoT devices, thereby improving internal decision-making processes in terms of service delivery, product strategy and investments, the collected data can be used by banks to gain more detailed information about individual credit risk, as well as helps to develop individual incentive programs for customers and thereby increase their loyalty. Banks can take personalized banking services to a new level of quality.

The practical uses of IoT in banking can be diverse. Today, biometric and positional sensors installed in the department together with video cameras allow to recognize the client from the moment he enters the room. Analyzing data from sensors placed in ATMs allows determining optimal zones for installing devices. By using information about customers and their location, banks can identify their needs by offering products and helping them make mutually beneficial financial decisions.



Recently, radio frequency identification RFID (Radio Frequency IDentification) methods, or in other words, contactless ID card reading technologies, have been widely developed, which, integrated with the Internet, allow communication between a large number of different technical devices. Contactless identification technologies are basically fully compatible with all conditions of computer-aided management, they are located on the basis of visual (barcodes) or radio frequency principle.

Contactless identification is a technology that combines the use of electromagnetic or electrostatic communication in the radio frequency portion of the electromagnetic spectrum to accurately identify a person.

The main features of the current standards for contactless ID card reading system are shown in Table 1.

**Table 1**  
**General features of contactless ID card reading technology**

Standard	Frequency	App	Explanation
ISO 14223	125 (134) kHz	to identify animals	widely used
ISO 14443	13.56 MHz	smart cards	
ISO 15693		characters	
ISO 10373		card verification methods	
ISO 18000	800 ... 2.45 GHz	extended distance characters	

Contactless ID card reader technologies are slightly more expensive than barcode systems for contactless identification. But the industry shifts towards labels meant that they were initially only used in areas where barcodes were used. Currently, tagging systems successfully compete with barcodes, including in terms of price, and this technology allows to provide conclusions for work in optically difficult conditions. Below is a table summarizing the main differences between the two technologies.

**Table 2**  
**Summary table of key differences between the two technologies \***

Description	Bar coding	TWO
Maximum read distance	0.5 m	10 m
Optical reading	not available	there is
Simultaneous reading of multiple tags	not available	there is
Several modifications of tags	not available	there is
Resistance to aggressive environment	weak	good
Mechanical durability	weak	good
Ability to read contaminated tags	not available	there is
Ability to work in metal	there is	there is a maximum
Protecting data from unauthorized reading	not available	there is

\* author development

Contactless identification is widely used in access control systems to ensure that only authorized personnel can safely enter buildings. The IKKO method is also used in supply chain inventory, controlling "smart garage" doors, cash registers, and even during races.

In the banking industry, banks and financial institutions are officially required to conduct frequent inventory checks of their IT equipment. This process required an

entire team of workers before Contactless reading of ID cards technology was introduced, and a complete inventory process often took several days, but with this technology, some financial institutions can complete the task in a matter of hours.

Currently, banks are using new technologies to offer the best experience and services to customers and to increase their efficiency, and technological developments, especially in the IT sector, are revolutionizing the banking industry. With the development of this technology, commercial banks are facing rapid changes. Of course, customer engagement is important to the banking sector, where Contactless reading of ID cards solutions in the banking sector provide a unique customer experience and improve banker relationships.

Contactless reading of ID cards technology is a powerful tool for identity verification, identity theft protection, biometric authentication, and more. These solutions provide a high level of security and help customers protect their money and investments, as well as enable banks and financial institutions to protect their assets and reserves.

In addition, this technology helps increase the efficiency of banks and financial institutions by automating many processes. Online anonymity and full identity verification are essential for excellent customer service and banking, as well as protection against identity theft. Contactless reading of ID cards' technology provides biometric identification, a revolutionary method of identity verification, and prevents the theft of personal credit card information. This intelligent way of identifying and authorizing transactions also allows end users to enjoy a seamless banking process.

Managing cash and other assets is critical to the stability of the bank's operations, as well as the bank's ability to provide a seamless banking experience for its customers, and Contactless reading of ID cards technology is gradually replacing the previously used barcode scanning method for inventory.

The growing interest in Contactless reading of ID cards technologies among banks and other financial institutions is driven by the need to improve both operational efficiency and data security. Some banks that previously used barcoding to track stock in data processing centers are looking to improve data accuracy by 85%. As for security, the use of Contactless reading of ID cards technology in banks provides an additional level of protection of bank and customer data and reduces the possibility of losing this data. Thus, banks integrate Contactless reading of ID cards' technology into their products and systems while continuing to provide better services to their clients.

Some standard applications include contactless smart cards, people identification, phone banking and security, while others include customer relationship management, inventory and money transfer system tracking, and anti-counterfeiting solutions. Each piece of equipment, including sorting machines, ATMs, PINs, cash registers and safes, can be provided with special tags that can be used by the asset tracking system to manage the maintenance schedule for each piece of equipment. Contactless reading of ID cards is used to track the location and level of inventory of automatically identifiable assets at any given time.

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#### **Summary and Recommendations:**

The adoption of contactless ID card reading technologies in the banking industry has brought about enhanced convenience and security for customers and financial institutions alike. This paper has explored various strategies to improve the utilization of these technologies. Key advancements in RFID technology, machine learning algorithms, and biometric authentication methods have been discussed to enhance the efficiency, accuracy, and reliability of contactless ID card systems. Moreover, challenges associated with integration into existing banking infrastructure have been addressed.

#### **Recommendations:**

1. Investment in Advanced RFID Technology: Banks should invest in advanced RFID technology to ensure faster and more accurate reading of contactless ID cards, thereby improving overall customer experience.

2. Integration of Machine Learning Algorithms: Incorporating machine learning algorithms can help in analyzing and processing vast amounts of data generated by contactless ID card systems, leading to better fraud detection and prevention.

3. Enhanced Biometric Authentication: Implementing biometric authentication methods such as fingerprint or facial recognition alongside contactless ID card reading can offer an additional layer of security and reduce the risk of unauthorized access.

4. Continuous System Monitoring and Updates: Regular monitoring and updates of contactless ID card reading systems are essential to address vulnerabilities and ensure compliance with evolving security standards.

5. Collaboration with Technology Providers: Banks should collaborate with technology

providers to customize solutions that meet specific banking requirements and ensure seamless integration with existing infrastructure.

6. Customer Education and Training: Educating customers about the benefits and proper usage of contactless ID card systems can promote adoption and minimize user errors, contributing to overall system effectiveness.

7. The introduction of the developed Access Tester program allowed the bank to reduce the work of the accounting and personnel departments, to speed up the process of issuing ID cards to new employees, and also to reduce the costs of monitoring the attendance of employees. The model allows automatic exchange of information with external information systems, as well as flexible adjustment of roles and access depending on the position of bank employees.

8. Based on the introduction of software products in the university and the bank, a new "Student Card" project was developed, in which the bank card can be used as a student card, an ID card for entering the dormitory, educational institution, libraries and other facilities, and in public transport. A transport card is provided for traveling at special rates. The development developed in integration with the bank information system allows the use of bank cards in the KBNT system.

By implementing these recommendations, banks can optimize the use of contactless ID card reading technologies, improving operational efficiency, enhancing security measures, and delivering a superior banking experience to customers.

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