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# IT Operations of Banks

## Review Team

**Md. Shihab Uddin Khan**
*Associate Professor & Director (RD&C), BIBM*

**Md. Mahbubur Rahman Alam**
*Associate Professor, BIBM*

**Kaniz Rabbi**
*Associate Professor, BIBM*

**Md. Foysal Hasan**
*Assistant Professor, BIBM*

**Kazi Azizur Rahman**
*DMD & Chief Information Officer, City Bank PLC*

**Bangladesh Institute of Bank Management (BIBM)**
Mirpur, Dhaka-1216, Bangladesh

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**Editorial Advisor** : **Md. Akhtaruzzaman, *Ph.D.***
*Director General, BIBM*

**Editor** : **Md. Alamgir, *CIPA, CSAA***
*Associate Professor & Director (Training & Certification Program), BIBM*

**Review Team** : **Md. Shihab Uddin Khan**
*Associate Professor & Director (RD&C), BIBM*
: **Md. Mahbubur Rahman Alam**
*Associate Professor, BIBM*
: **Kaniz Rabbi**
*Associate Professor, BIBM*
: **Md. Foysal Hasan**
*Assistant Professor, BIBM*
: **Kazi Azizur Rahman**
*DMD & Chief Information Officer, City Bank PLC*

**Support Team** : **Md. Al-Mamun Khan**
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*Computer Operator & Program Associate (Certification Program), BIBM*
**Sumona Moqutadar Happy**
*Office Assistant & Program Associate (Certification Program), BIBM*
**Md. Morshadur Rahman**
*Proof Reader, BIBM*

**Graphics & Illustration** : **Azizur Rahman,** *Computer Operator, BIBM*



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# List of Abbreviation

| | |
|---|---|
| 2FA | Two Factor Authentication |
| ACHS | Automated Clearing House System |
| ADC | Alternative Delivery Channel |
| AI | Artificial Intelligence |
| ATM | Automated Teller Machine |
| BACH | Bangladesh Automated Clearing House |
| BACPS | Bangladesh Automated Cheque Processing System |
| BB | Bangladesh Bank |
| BCA | Bank Company Act |
| BEFTN | Bangladesh Electronic Funds Transfer Network |
| BFIU | Bangladesh Financial Intelligence Unit |
| BI | Business Intelligence |
| BIBM | Bangladesh Institute of Bank Management |
| CBS | Core Banking Solution |
| CDCDP | Certified Data Centre Design Professional |
| CDM | Cash Deposit Machine |
| CDPR | Central Data Protection Regulation |
| CEH | Certified Ethical Hacker |
| CIB | Credit Information Bureau |
| CIRT | Computer Incident Response Team |
| CRM | Cash Recycling Machine |
| DC | Data Center |
| DDoS | Distributed Denial of Service |
| DMS | Document Management Systems |
| EFT | Electronic Fund Transfer |
| e-KYC | Electronic Know Your Customer |
| FCB | Foreign Commercial Bank |
| FDC | Far Data Center |
| FinTech | Financial Technology |
| IB | Internet Banking |
| IBFT | Internet Banking Fund Transfer |
| ICT | Information and Communication Technology |
| IDTP | Interoperable Digital Transaction Platform |
| IS | Information System |
| ISMS | Information Security Management System |
| ISITRM | Information Security and IT Risk Management |
| IT | Information Technology |
| MFA | Multifactor Authentication |
| MFS | Mobile Financial Services |
| MIS | Management Information Systems |
| NDC | Near Data Center |

| | |
|---|---|
| NFC | Near Field Communication |
| NGFW | Next Generation Firewall |
| NPSB | National Payment Switch Bangladesh |
| PCB | Private Commercial Bank |
| PCIDSS | Payment Card Industry Data Security Standard |
| POS | Point of Sale |
| POST | Point of Sale Terminal |
| PSP | Payment Service Provider |
| QMS | Quality Management System |
| RBA | Risk-Based Authentication |
| RHCE | Red Hat Certified Engineer |
| RPA | Robotic Process Automation |
| RTGS | Real Time Gross Settlement |
| SDB | Specialized Bank |
| SDN | Software-Defined Networking |
| SIEM | Security Information and Event Management |
| SOCB | State-Owned Commercial Bank |
| SOC | Security Operations Center |
| VM | Virtual Machine |

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# IT Operations of Banks

## 1.0 Background of the Study

In today's world, information and communication technology (ICT) has emerged as the cornerstone of the banking sector, which, in turn, serves as the foundation of a robust economy. ICT has not only created a new infrastructure that enables the global economy to thrive, but it has also provided users of new technologies with a competitive edge over their competitors. The advent of electronic banking systems has ushered in a technological revolution in conducting financial transactions. As a result of substantial investments by banks in telecommunication and electronic systems, users have recognized and embraced electronic banking as a valuable and user-friendly tool. In a matter of seconds, transactions worth billions of dollars can now take place across the globe, simply by pressing a single button.

The IT revolution has created an environment where financial activity is flourishing worldwide like never before. Technological advancements and the establishment of global networks have significantly reduced the costs associated with global funds transfer. Information technology plays a vital role in meeting the high expectations of customers, who are now more demanding and technologically savvy compared to their counterparts in the past. They expect instant, anytime, and anywhere banking facilities. ICT has provided solutions to banks to manage their accounting and back-office requirements.

In Bangladesh, ICT has become the heart of the banking sector. The banking industry serves as the backbone of a strong economy, and ICT is instrumental in enhancing the efficiency and effectiveness of banking services, improving business processes, facilitating managerial decision-making, and promoting collaboration within workgroups. These factors strengthen the competitive positions of banks in rapidly changing and emerging economies.

Technology is and will continue to be fundamental to the future of banking. It offers banks numerous and constantly evolving channels to communicate with customers and analyse their behaviours. This enables the creation of smoother, more convenient, and accessible channels for customers while capturing more data to continually improve their offerings. Technology also leads to improvements in banks' internal systems and processes, resulting in greater efficiency and ultimately more profitability.

Technology has always played a central role in banking, particularly since the advent of the internet. Now, we can confidently say that technology and banking are inseparable and will remain so in the foreseeable future. The emergence of fintech companies further emphasizes this integration, as all banks have the opportunity to leverage cutting-edge technology. Only those banks that embrace new technology will lead in the evolving banking world.

In Bangladesh, all banks have made significant investments in ICT platforms and information systems, establishing multiple distribution channels to provide online financial services to customers. Overall, banks have been successful in developing state-of-the-art product features, reducing operating costs, enhancing customer service, and mitigating inherent risks.

In the country, banks have established extensive ATM and POS networks to offer 24-hour access to customers. They provide services such as electronic payment services through virtual cash and e-cards, ATM/POS, mobile banking, internet banking, and apps banking. Many banks have installed POS terminals in major shops, hotels, and sales centers across the country. Some technology-driven banks offer internet banking with a range of customer-friendly features, allowing customers to conduct banking transactions from anywhere in Bangladesh at any time.

Bank management is now focusing on reducing administrative and operating costs to maximize profits. They aim to achieve this through initiatives like optimizing the utilization of IT/IS resources, reducing cash/paper-based transactions, promoting virtual cash and digital payments, and facilitating online internal communications among employees and stakeholders through intranet and extranet platforms. To increase cashless transactions, banks are introducing innovative digital services such as mobile apps, QR code payments, and digital wallets.

As many financial products and services directly or indirectly rely on ICT, banks must efficiently utilize IT resources and introduce innovative digital financial technology to reduce costs, improve employee efficiency and productivity, ensure secure and reliable internal IT operations, and provide better services to tech-savvy customers. Failure to do so may expose banks to serious IT and business risks in the competitive and digital age.

Given this context, it is beneficial to review the overall activities of the ICT division of banks for the year 2022. Such a review helps detect changes and developments

in e-banking services and operations in recent times and allows for comparisons with previous years. The study aims to capture and evaluate the use of ICT in banking, identify gaps, and address associated problems in technology-driven banking operations.

## 1.1 Objectives of the Study

The detailed objectives of the study are: one, to discuss the IT based products and services in the banking sector of Bangladesh; two, to analyse the activities of IT departments of banks in 2022; three, to examine the comparative status of IT operations of banks for last few years; and four, to detect the challenges and recommend future courses of actions for better and secured IT operations of banks.

## 1.2 Methodology and Data

The study used both primary and secondary data to accomplish the objectives. Secondary data were collected from various publications of BB and BIBM, research articles, and websites of Bangladeshi banks. A total of 37 banks (Appendix-1) responded to the questionnaire (Appendix-2) survey of the study. The survey questionnaire was sent to the IT departments of 61 banks in Bangladesh (Table-1).

**Table-1: List of Banks Provided data**

| Category of Banks | No. of Banks |
|---|---|
| State-Owned Commercial Banks (SOCBs) | 5 |
| Specialized Banks (SDBs) | 1 |
| Private Commercial Banks (PCBs) | 28 |
| Foreign Commercial Banks (FCBs) | 3 |
| **Total** | **37** |

## 1.3 Organization of the Review Report

The paper is organized into five sections. After an introductory section with objectives and methodology, Section-2 discusses the IT based products and online services in banking sector. Section-3 reviews and analyses the activities of IT departments of banks in 2022 and its comparison with previous years. Section-4 identified some challenges of IT operations in banks and role of BB to overcome these challenges. Section-5 puts forward concluding remarks and some recommendations.

## 2.0 Various Systems being adopted by Banks to bring Efficiency

Banks have adopted various systems to enhance efficiency in their operations. One such system is the Automated Clearing House System (ACHS). According to the guidelines published by Bangladesh Bank, all scheduled banks participating in the Bangladesh Automated Clearing House (BACH) must adhere to the Bangladesh Automated Cheque Processing System (BACPS) Operating Rules and Procedures Ver 2.0 for their clearing and settlement operations.

Another system implemented by banks is the Electronic Fund Transfer (EFT) through the Bangladesh Electronic Funds Transfer Network (BEFTN). This network serves as a processing and delivery center for electronic credit and debit instruments among all participating banks in Bangladesh. BEFTN has proved to be highly efficient and cost-effective, enabling the transfer of funds between multiple accounts in different banks, such as cash dividend transfers and salary transfers.

National Payment Switch Bangladesh (NPSB) has aimed to promote interoperability among participating banks for their account and card-based transactions. Currently, NPSB facilitates interbank transactions for Automated Teller Machines (ATM), Point of Sale (POS), and Internet Banking Fund Transfer (IBFT). A total of 56 banks are interconnected through NPSB for ATM transactions, allowing customers to perform various transactions such as cash withdrawal, balance inquiry, fund transfer, and mini statements. 55 banks are interoperable for POS transactions, while 41 banks are interconnected for IBFT transactions.

To ensure safe and efficient interbank payment systems, Bangladesh Bank introduced the Real Time Gross Settlement (RTGS) system in 2015. This system enables real-time and gross basis transfer of funds between bank accounts, facilitating high-value local and domestic foreign currency transactions. Over 10810 online branches of almost all scheduled banks of Bangladesh are currently connected to this system.

Online Credit Information Bureau (CIB) systems have been implemented by banks to expedite the processing of customer information. By utilizing online CIB, banks can access borrower information more quickly and efficiently. Many banks have automated the process of obtaining borrower information centrally, eliminating the need to retrieve information from individual branches.

The Core Banking Solution (CBS) is a standardized and flexible system that allows banks to respond rapidly to changing business requirements and comply with regulations. Guidelines on CBS features and controls were published by Bangladesh Bank to streamline and standardize CBS functionalities.

Banks in Bangladesh have established extensive networks of ATMs, POSTs, Cash Deposit Machines (CDMs), and Cash Recycling Machines (CRMs) to cater to customer needs. These channels provide convenient banking services such as cash withdrawals, deposits, and various transactions. Non-bank entities are also allowed to deploy White Label ATMs and merchant acquiring services, enhancing banking and retail payment services' accessibility throughout the country.

Electronic Know Your Customer (e-KYC) guidelines were introduced by the Bangladesh Financial Intelligence Unit (BFIU) to promote financial inclusion, fintech, and regtech while ensuring cybersecurity. Banks, insurance companies, financial institutions, and other entities are required to implement e-KYC/Digital KYC procedures.

To meet the demands of tech-savvy customers, many banks offer Internet Banking (IB) facilities, allowing customers to access their accounts from mobile devices and conduct banking transactions. Mobile Financial Services (MFS) regulations were also published, promoting access to formal financial services through mobile accounts.

Agent Banking, introduced by Bangladesh Bank, simplifies banking services for the unbanked population by providing limited-scale banking services through engaged agents. Information Technology has played a crucial role in the growth of agent banking.

As the name suggests, Bangla QR is a QR-based solution that enables digital payments that can be utilized with other apps that support Bangla QR. In cooperation with banks and card network partners, SSLCOMMERZ created it. It is the most recent method of payment acceptance available to businesses in Bangladesh, allowing them to take payments from clients directly into their bank accounts. It is one of the safest digital payment methods because it is entirely contactless, which protects both the client and the merchant.

To reduce paper usage and enable efficient communication, banks have implemented Corporate Intranet Systems that provide features like circulars,

messaging, news, employee profiles, and online processing for leaves, requisitions, and cheques. Other software systems, including reconciliation systems, payroll systems, and foreign exchange return software, contribute to efficient banking operations.

Business Intelligence Software is being implemented by banks to extract the right information from various electronic systems and provide comprehensive management information systems (MIS) to top executives.

Document Management Systems (DMS) have revolutionized the way banks capture, archive, and share documents, eliminating the need for physical filing systems. DMS enables easy retrieval of documents through a searching system and promotes a paper-free communication environment within banks.

Banks have also established systems to support cross-border operations, facilitating real-time remittance transactions from overseas exchange houses and instant fund transfers to customers' accounts or other bank customers through the BEFTN network or other mechanisms.

The financial system worldwide is experiencing constant transformation due to digital innovation. Bangladesh Bank (BB) actively supports a regulatory environment that encourages innovation to enhance the strength, efficiency, and security of the financial system. Recognizing the pivotal role of digital platforms, BB acknowledges their potential to improve the delivery of financial products and services while expanding the reach of the financial system. To this end, BB published comprehensive "Guidelines to Establish a Digital Bank."

These guidelines provide a set of instructions that applicant/promoter/sponsor/shareholder must adhere to when establishing a digital bank in Bangladesh. The proposed digital banks are required to comply with these guidelines in addition to the Bank Company Act (BCA), 1991 (Act No. XIV of 1991) (as amended), and other guidelines, circulars, and circular letters issued by Bangladesh Bank periodically.

In recent years, Cloud Computing has brought numerous benefits in terms of scalability, flexible resource allocation, organizational agility, and operational resilience. This technology has enabled banks and other financial institutions to quickly meet customer demands for products and experiences. The trust placed in a reliable financial system is crucial for the smooth functioning of the economy.

Consequently, Cloud Computing has gained significant popularity as banks, non-bank financial institutions, mobile financial service providers, payment service providers, payment system operators, and other financial service providers aim to access new technologies easily and achieve immediate cost efficiencies. However, it is essential to effectively manage Cloud Computing to identify potential risks and monitor industry concentration to mitigate any risks to the overall financial stability of the economy. In this regard, Bangladesh Bank has issued guidelines on cloud computing on March 16, 2023.

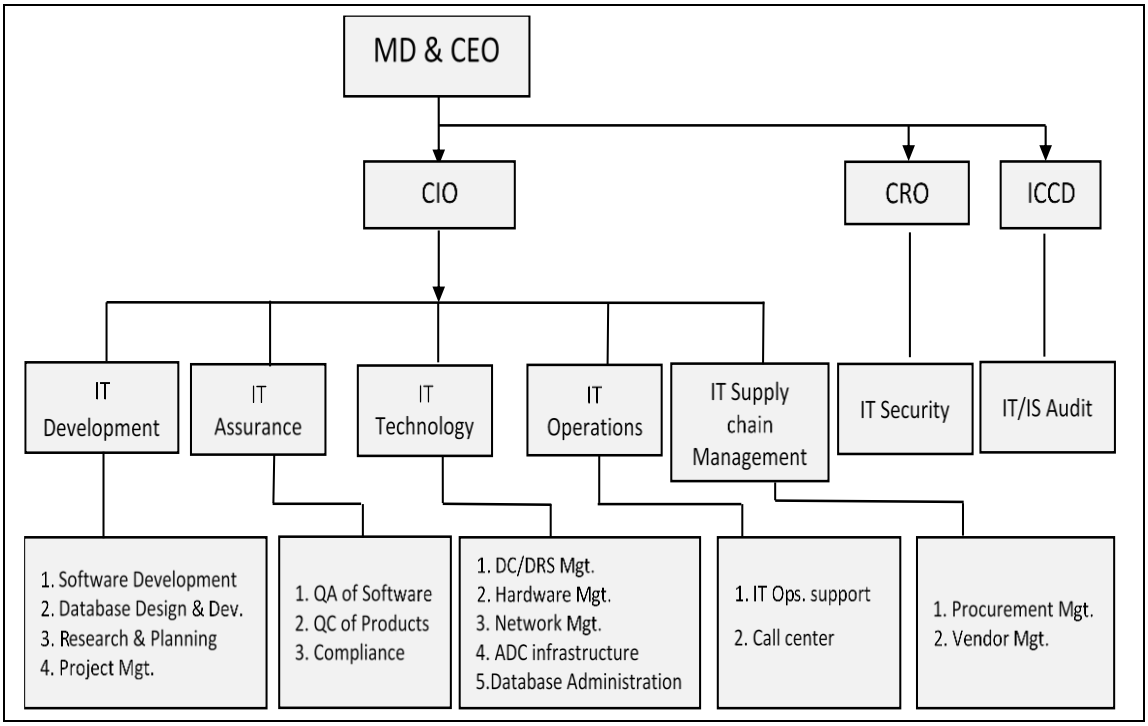
## 2.1 Typical Activities Performed by the IT Department in Banks

The IT department in banks performs a range of activities organized into functional units such as Hardware Maintenance, Network and Communication, IT Security Management, Database Management System, Software Development, DC/DR Operation, IT Help Desk, IT Audit, Delivery Channel Management, CBS Management, System Administration, and Storage Management. These units work together to ensure smooth IT operations and support the overall functioning of the bank.

## 2.2 Standard Organogram of the IT Department of a Bank

An effective IT organizational structure plays an important role in improving the efficiency, reliability and security of e-banking services. The following figure shows a standard organizational structure for the IT department of a bank.

**Figure-1: A Typical Organizational Structure of the IT Department of Bank**



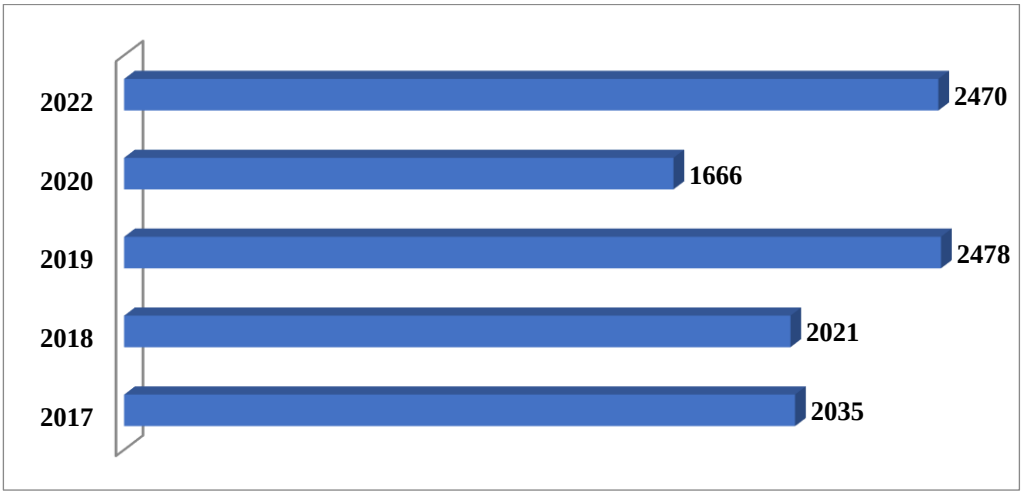

***Source:*** *Authors' Survey*

# 3. Data Analysis and Findings

## 3.0 IT Investment and Sector-wise IT Budget

All banks together invested Tk. 2470 crore in IT Systems in the banking sector in 2022 (Figure-2). In 2017, Tk. 2035 crore was invested in IT operations in the banking sector. The total investment in IT operations in the banking sector up to 2022 was estimated at Tk. 48,782 crore since 1968, considering the first installation of a computer at Agrani Bank in 1968. In 2020, around Tk. 1666 crore was invested in IT systems in the banking sector, which represents a decrease of 39.37 percent compared to the investment in 2019. The adverse impact of the COVID-19 pandemic on local and global business, especially the banking sector, is mentioned as one of the possible reasons for the decrease in IT investment in 2020.

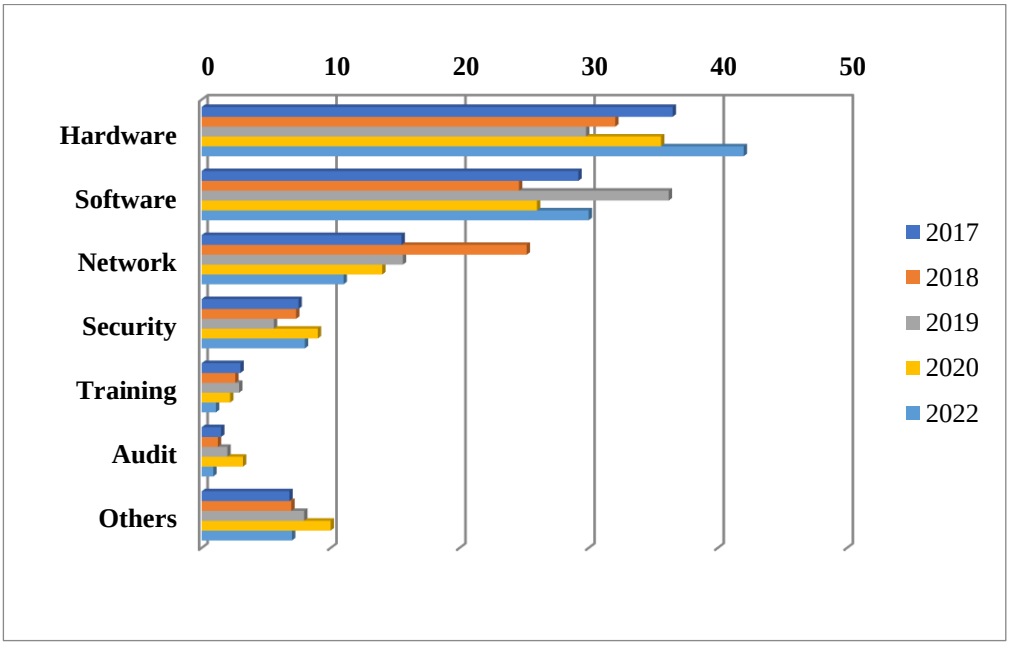
**Figure-2: IT Investment in Banks (In Crore BDT)**




***Source:*** *Survey Information*

From Figure-3, it is seen that hardware consistently had the highest budget allocation in each year, ranging from 29.8% to 42.0%. Software had varying budget allocations, with the highest being 36.2% in 2019. Network and security budgets had relatively lower allocations compared to hardware and software, ranging from 11.0% to 25.2% for network and from 5.6% to 9.0% for security. Training, audit, and others category had relatively lower budget allocations compared to the main categories, ranging from 0.9% to 3.2% for audit, 1.1% to 3.0% for training, and 6.8% to 10.0% for others category. By ignoring training and audit, it is not possible to ensure better IT security for banks. The 'others' category include power management, vehicle purchase, stationary procurement, maintenance of IT equipment, etc.

**Figure-3: Distribution of IT Budget (% of Total Budget)**



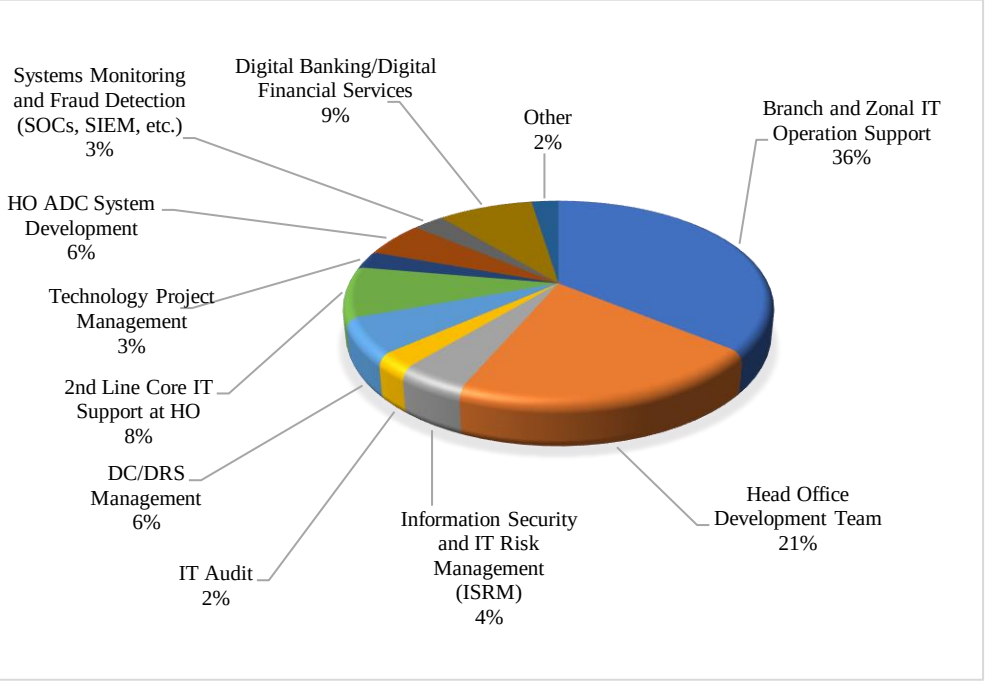

***Source:*** *Survey Information*

## 3.1 Distribution of IT Employees

Distribution of IT Employees in different sub-divisions is shown in Figure-4. It is seen that the highest number of IT employees are working in the 'Branch and Zonal IT Operation Support' department, followed by 'Head Office Development Team'. 'Branch and Zonal IT Operation Support' category has the highest percentage with 36% of the total employees. It indicates a significant focus on providing IT support and services to branch and zonal operations. 'Head Office Development Team' accounts for 21% of the employees. This suggests a substantial presence of IT professionals dedicated to developing and maintaining IT systems and applications for the organization's central operations. With 9% of the employees, 'Digital Banking/Digital Financial Services' category focus on developing and enhancing online banking platforms and related technologies. '2nd Line Core IT Support at HO' category represents 8% of the employees and indicates the presence of technical staff responsible for resolving complex IT issues and supporting critical systems. Both 'DC/DRS Management' and 'HO ADC System Development' category hold 6% of the employees. 'Information Security and IT Risk Management (ISRM) wing represents 4% of the employees and 'Systems

Monitoring and Fraud Detection (SOCs, SIEM, etc.)' section accounting for 3% of the employees, this category implies the presence of IT professionals responsible for monitoring systems and detecting fraudulent activities using technologies such as Security Operations Centers (SOCs) and Security Information and Event Management (SIEM) systems. Number of employees in IT Audit section represents 2% of the employees who are responsible for assessing the organization's IT systems, controls, and compliance with relevant standards and regulations. About 3% of the employees in the 'Technology Project Management' group indicates the presence of IT project managers responsible for overseeing and executing technology projects within the organization.

**Figure-4: Distribution of IT Employees in 2022 (% of Total IT employees)**

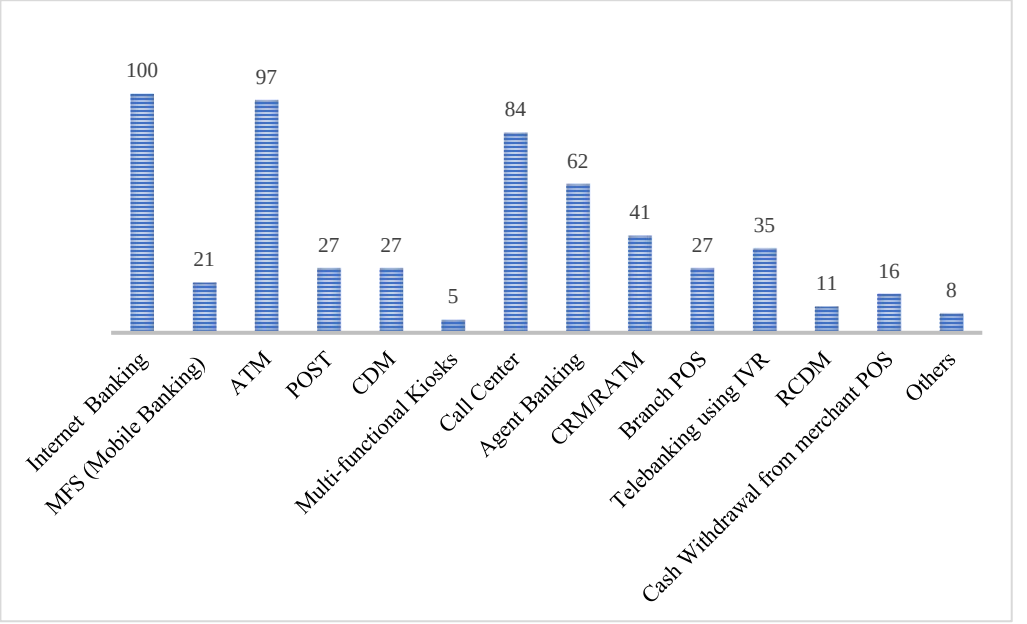



***Source:*** *Survey Information*

## 3.2 Alternative Delivery Channels (ADCs) in Banks

Alternative Delivery Channels (ADCs) enlarge the scope of services outside the traditional bank branch channel. ADCs are transformative in nature, accommodating the demand for success to financial services "anytime, anywhere, anyhow". Bangladeshi banks have already developed several ADCs to serve their customers round the clock. As found from survey data, ATM service is very popular among Bangladeshi customers and 97% banks in our country offer this service. Among other services, Internet banking, call center and agent banking facilities are provided by banks. Nevertheless, we are not habituated with some channels like Real Time CDM (RCDM) and multi-functional kiosk which are already common in developed countries.

**Figure-5: ADCs Used by Banks to Provide Online Services to Customers (% of Banks)**




***Source:*** *Survey Information*

## 3.3 Mobile Banking

In Bangladesh, two types of mobile banking service are available. USSD is a menu-based service, which runs as a real-time open session between the application and end user. USSD code can be accessed on any phone, whereas the app can only be accessed on a smartphone with a running data bundle. Since the inception of MFS,

the flow of money into the rural parts of Bangladesh has been increasing significantly and a high growth per year is observed in terms of number of customers, volume of transactions and number of transactions (Table-2).

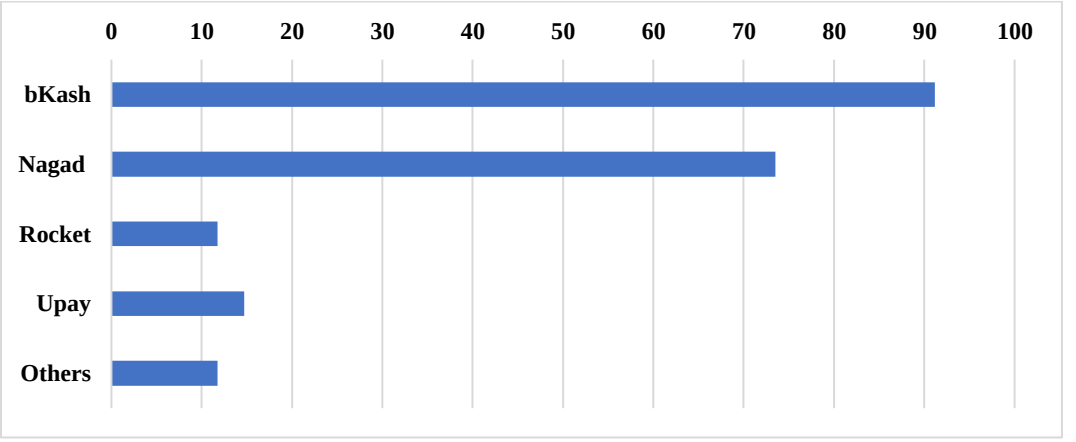
**Table-2: Growth of Mobile Banking from 2018 to 2022**

| | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| No. of Banks Offering MFS | 18 | 16 | 15 | 13 | 13 |
| No. of Agents | 886,473 | 971,620 | 1,058,897 | 1,123,113 | 1,554,637 |
| No. of Customers (in Lac) | 675.20 | 796.49 | 993.36 | 1,114.67 | 1,907.83 |
| No. of Active Customers (in Lac) | 373.13 | 347.63 | 323.27 | 410.96 | 573.74 |
| No. of Total Transaction (Millions) | 2,272.75 | 2,589.8 | 3,172.0 | 3,837.05 | 4,749.33 |
| Total Transaction Amount (Billions BDT) | 3,788.85 | 4,343.18 | 5,616.0 | 7,701.45 | 1,0163.61 |

***Source:*** *Monthly Economic Trends and Financial Stability Report, Bangladesh Bank.*

Around 90% banks have agreements with different MFS service providers to perform financial transactions. bKash holds the highest position by making agreements with 91% of those banks, followed by Nagad. Very few banks work with other MFS providers like Rocket and Upay for financial transactions.

**Figure-6: Agreements with Different MFS Service Providers (% of Banks)**



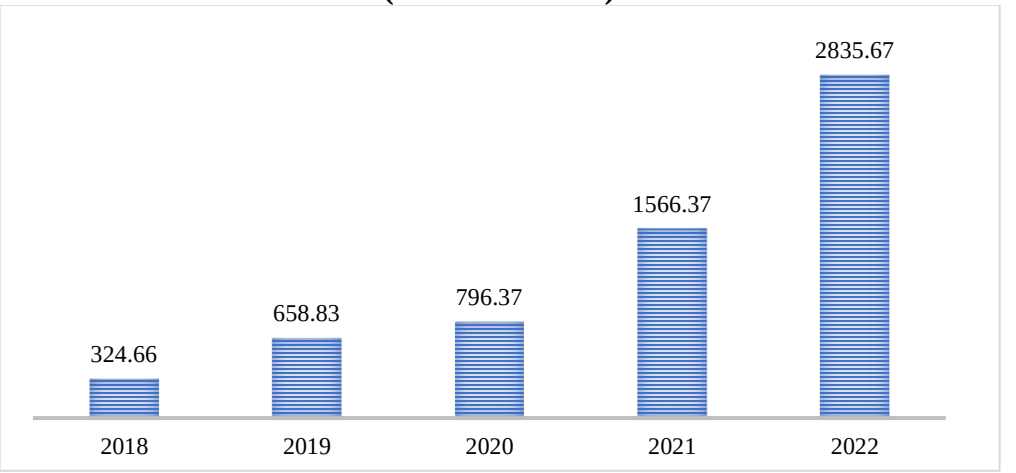

***Source:*** *Survey Information*

Binimoy, which is an Interoperable Digital Transaction Platform (IDTP), allows instant money transfers among banks, mobile financial services (MFS) operators, and payment service providers (PSPs). But only 32% banks joined this platform.

## 3.4 Internet Banking

In our banking sector, there has been a satisfactory improvement in terms of providing Internet Banking services. Though only 52 percent banks provided such services in 2015, now all banks in our country have activated either informational or transactional Internet Banking services. In 2022, the number of customers and transactions were 62,52,634 and 6,62,16,942, respectively, which were 24,72,151 and 1,45,33,694, correspondingly, in 2019. Since 2020, a significant growth in volume of transactions was seen compared to the previous years.

**Figure-7: Volume of Internet Banking Transaction from 2018 to 2022 (In Million BDT)**




***Source:*** *Monthly Economic Trends and Financial Stability Report, Bangladesh Bank*

## 3.5 POST

A point-of-sale terminal (POST) is a hardware system for processing all types of debit and credit card payments at merchandizing locations. When a card is used to pay for something, a POST first reads the data of the card to check for necessary funds to transfer to the merchant, then makes the transfer. The growth of POST in Bangladesh is shown in Table-3.

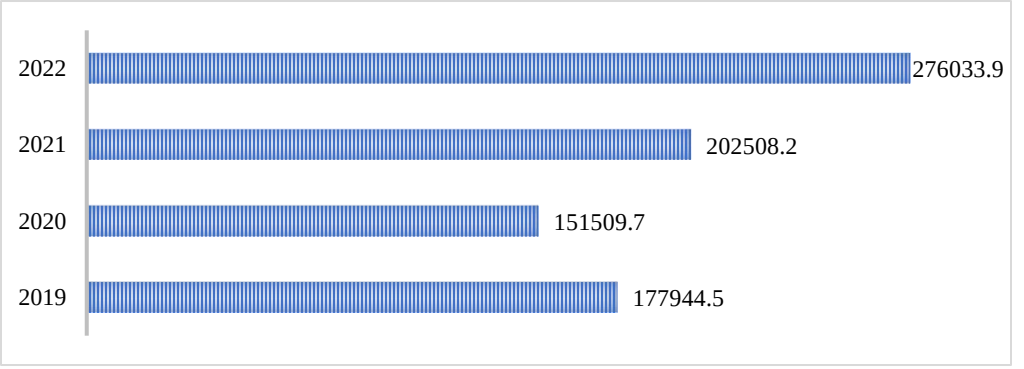
**Table-3: Number of POST**

| 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| 48228 | 58527 | 73229 | 92086 | 103055 |

***Source:*** *https://www.bb.org.bd/en/index.php/econdata/index*

Most POSTs (91.18%) are being operated in urban areas. In Bangladesh, only PCBs provide this service. In 2022, total number of POST transactions was recorded at 5.47 crore which was 3.18 crore in 2019. Volume of POST transactions from 2019 to 2022 is shown in Figure-8.

**Figure-8: Volume of Transactions using POST from 2019 to 2022 (In Million BDT)**




***Source:*** *https://www.bb.org.bd/en/index.php/econdata/index*

It is also seen that about 27% banks provided Branch POS facility at the end of 2022.

## 3.6 ATM

An automated teller machine (ATM) is a delivery channel that allows customers of banks or financial institutions to accomplish financial transactions, i.e. cash withdrawals, funds transfers, balance or account information inquiries, at any time without the direct help of bank staff. The growth of ATM in Bangladesh is shown in Table-4.

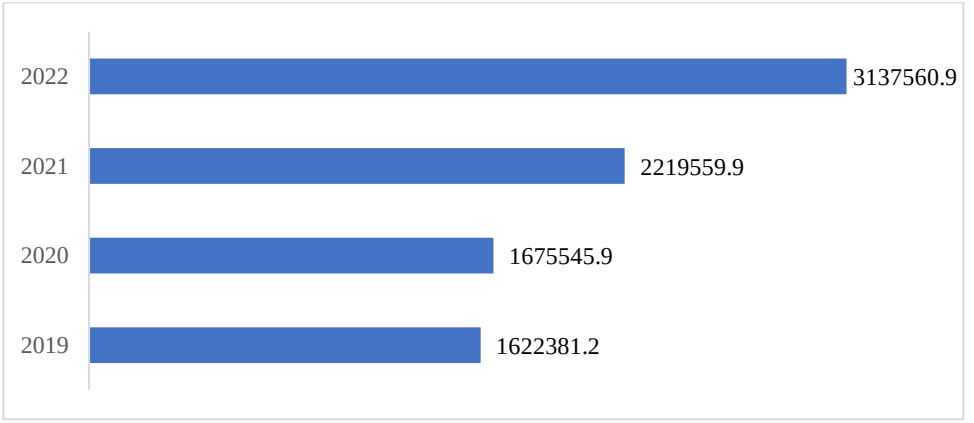
**Table-4: Number of ATMs (2018-2022)**

| 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|
| 10280 | 10924 | 11923 | 12831 | 13434 |

Source: Source: https://www.bb.org.bd/en/index.php/econdata/index

At the end of 2022, total number of ATM transaction was recorded at 31.82 crore which was 20.52 crore in 2019. In case of volume of transactions, a remarkable growth is observed from the year 2020 which is shown in Figure-9.

**Figure-9: Volume of Transactions in ATMs from 2019 to 2022 (In Million BDT)**




Source: https://www.bb.org.bd/en/index.php/econdata/index

## 3.7 Cash Recycler Machine (CRM) and Cash Deposit Machine (CDM)

A CRM receives cash, tally the notes, validate them, and credit the amount to customers' accounts on a real-time basis, helping banks do away with the manual labor needed to provide the facility. It also lets users to withdraw and transfer funds to other accounts. This technology was introduced in Bangladesh in 2017. Currently, only 41% banks in Bangladesh have CRMs and 2489 CRMs have been installed by these banks in 2022, a rise from 126 in 2018, which shows an enormous growth. Also, the rural parts of the country saw a growth in the number of CRM installed. Banks set up 159 CRMs outside big cities and towns in 2022, which was 133 units in previous year. In 2022, 648,734 million BDT was transacted through CRMs and number of transactions was 39,211,160, while in 2020, 62,317 million BDT was transacted through 9,649,175 transactions.

Using CDMs, customers can deposit money and receive real-time confirmations of the transaction via an instant message. In 2022, only 27% of banks in Bangladesh had installed CDMs, with a total of 1,094 CDMs in the market, of which only 34.18% were installed in rural areas. This represents a decrease from 1,324 CDMs in 2014, indicating a decline in the use of CDMs since then. As CRMs offer more functionality compared to CDMs, banks are now more interested in setting up CRMs instead of CDMs.

## 3.8 Digital Wallet and QR-Code Payments

A digital wallet (or e-wallet) is a software-based system that securely stores users' confidential data such as payment information and passwords for numerous payment methods and websites. By using a digital wallet, users can easily and quickly complete purchases with near-field communications technology. Digital wallets can be used in conjunction with mobile payment systems, which allow customers to pay for purchases with their smartphones. In Bangladesh, only 69% banks have started digital wallet services for their customers. Around 29% banks provide QR-Code Payment Services of which 26% banks have taken initiatives to replace all proprietary QR-Code Payment System with "Bangla QR-Code Payment System".

## 3.9 SMS Banking

About 96% banks in our country offer SMS banking for their customers. Among them, 48% use 'Push Service' and 71% use 'Push-Pull Service'. The purposes of using SMS banking by the banks are stated in Table-5.

**Table-5: Purposes of SMS Banking (% of Banks)**

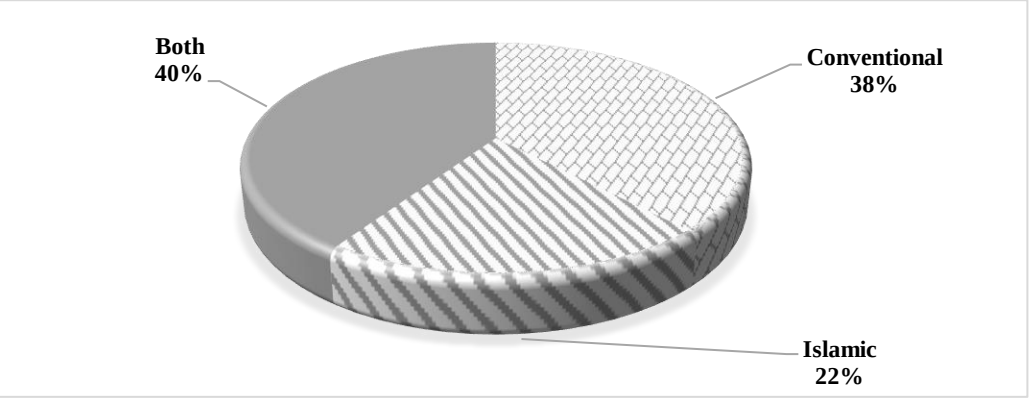
| Purposes | 2019 | 2020 | 2022 |
|---|---|---|---|
| Transaction Notification | 95 | 95 | 96 |
| OTP | 80 | 82 | 85 |
| Marketing | 70 | 71 | 75 |
| Regulatory Compliance (for ex. half-yearly account statement sent to BB) | 55 | 58 | 65 |
| Others | 5 | 5 | 7 |

***Source:*** *Survey Information*

## 3.10 Core Banking Software (CBS)

Core banking software facilitate tuning and transparency within business bodies and branches of banks. Since all branches are linked to a central server, transactions can be viewed anytime. Instantaneous projection of the transactions helps businesses to deal with inaccurate transactions or fraud. In a nutshell, it is vital for the smooth operation of online banks. Figure-10 shows the distribution of CBSs w.r.t types.

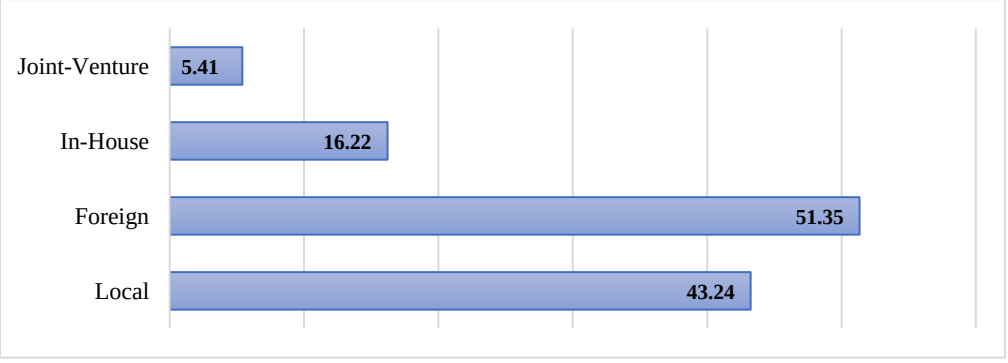
**Figure-10: Types of Core Banking Software Used by Banks**




***Source**: Survey Information*

Figure-11 depicts the CBS market's dominance status. As seen from the figure, in 2022, foreign CBSs captured more than 51% of the CBS market, which was 46% in 2021. An interesting thing is observed, now banks are reluctant to go for joint-venture CBS. In 2022, only 5.41% banks developed joint-venture CBS, which was 11% in 2021. On the other hand, banks were increasingly interested to develop in-house CBS. In 2022, more than 16% banks developed in-house CBS, which was only 7% in 2021.

**Figure-11: Percentage of Banks using Different Types of CBSs**



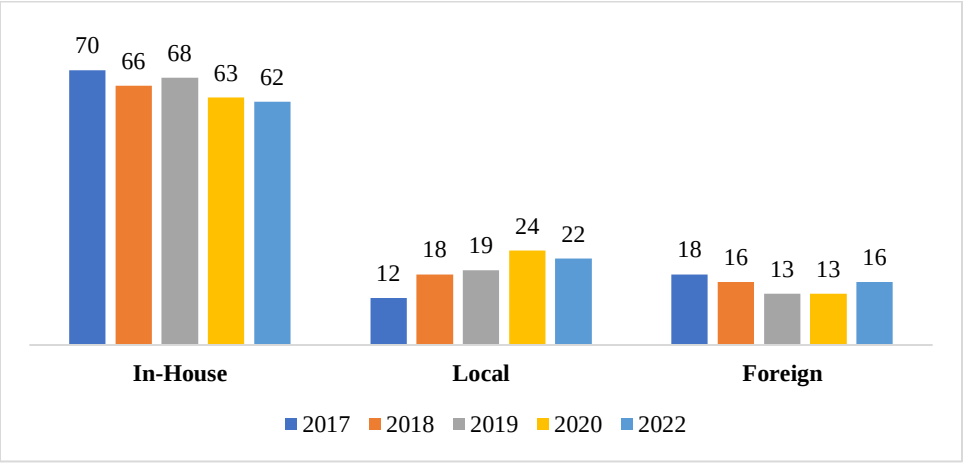

***Source:** Survey Information*

According to survey data, 33% banks have implemented all 1137 controls mentioned in 'Core Banking Solution (CBS) Features and Controls' published by Bangladesh Bank, while 67% banks have partially implemented the guideline.

## 3.11 Application Software

Apart from CBS, banks employed a plethora of application software to facilitate their routine activities. It has been observed that the average count of application software utilized by banks is 50, with a minimum of 5 and a maximum of 194 in 2022. Out of all the application software employed, 62% were developed internally by the banks themselves, 22% were domestically sourced, and the remaining were foreign software (as depicted in Figure-12). The utilization of foreign application software has witnessed an upsurge compared to 2020, while the use of in-house and local application software has experienced a decline.

**Figure-12: Distribution of Application Software from 2017-2022* (% of Software)**



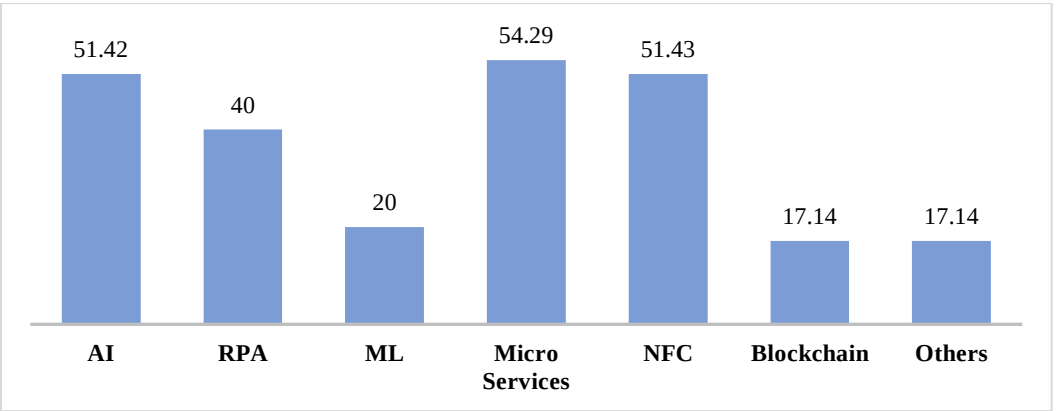

***Source:*** *Survey Information; *In 2021, IT Review was not conducted.*

## 3.12 Adoption of Advanced Technologies

The study found that 94.6 percent of banks have already taken advanced digital transformation initiatives. 3, it is evident that various advanced technologies are being embraced by banks to Based on the survey data, depicted in the Figure-1enhance their operations. The utilization of Artificial Intelligence (AI) stands out, with a significant percentage of 51.42% of banks incorporating this cutting-edge technology. This indicates the growing recognition of AI's potential in streamlining banking processes and improving customer experiences. Robotic Process Automation (RPA) follows closely, with 40% of banks implementing this technology. RPA enables the automation of repetitive tasks, allowing banks to achieve higher efficiency and reduce human error. It is clear that many banks have recognized the value of RPA in optimizing their operations. Micro Services has

been adopted by 54.29% of banks. This technology allows banks to enhance scalability, flexibility, and agility in their systems, facilitating faster development and deployment of new features. Near Field Communication (NFC), a wireless communication technology commonly used for contactless payments, has been embraced by 51.43% of the surveyed banks. NFC enables secure and convenient transactions, offering customers a seamless payment experience. Blockchain technology, known for its decentralized and tamper-resistant nature, has been implemented by 17.14% of the banks. This technology holds promise for improving security, transparency, and efficiency in various banking operations, such as cross-border transactions and identity verification. Lastly, a percentage of 17.14% is attributed to the adoption of other advanced technologies. This demonstrates that banks are exploring an assorted range of technological solutions to meet their explicit needs and challenges.

**Figure-13: Use of new Technologies (% of Banks)**




***Source**: Survey Information*

## 3.13 Information Technology (IT) Strategy and Roadmap in Banks

According to research findings, although all banks have an IT strategy in place, only 25% have a short-term technology roadmap, while 47% have a mid-term roadmap and 58% have a long-term roadmap.

## 3.14 Data Management

Having a data warehouse and BI tools enables banks to collect, store, and analyze large volumes of data, leading to data-driven decision-making and personalized customer experiences. It also supports compliance and regulatory requirements, helps identify areas for improvement, and fosters a culture of continuous

improvement. The fact that 23% of the banks in Bangladesh have a data warehouse with business intelligence (BI) and analytic tools indicates a significant adoption of data-driven decision-making within the banking sector. This demonstrates a recognition of the value that advanced analytics can bring in terms of gaining a competitive advantage, enhancing risk management practices, and improving operational efficiency.

By implementing SoD, banks can enforce separation of duties between DBAs and System Admins, which helps prevent unauthorized access, fraudulent activities, and conflicts of interest. This control mechanism ensures that no single individual has excessive privileges or control over critical systems and data. It helps in maintaining the integrity and confidentiality of sensitive information, safeguarding against unauthorized changes or manipulations, and mitigating potential security breaches. It is a crucial control mechanism in ensuring proper governance and security within organizations. The fact that 87% of the banks have implemented SoD for DBAs and System Admins indicates a strong commitment to maintaining effective internal controls and minimizing potential risks.

According to the responses provided, 59% of the banks reported that their privileged administrators use multifactor authentication (MFA) to access servers. This indicates a substantial adoption of MFA as an additional layer of security for server access within the banking sector. Implementing MFA for privileged administrators helps mitigate the risk of unauthorized access and enhances the overall security posture of the banks. By requiring multiple factors such as passwords, biometrics, or hardware tokens for authentication, MFA significantly reduces the likelihood of unauthorized access even in the event of compromised credentials.

Banks use databases for different applications including CBS. Different banks may choose their database systems based on factors such as performance, scalability, security, vendor support, and cost-effectiveness. Based on the given data, it appears that the usage of databases varies within the bank. The percentages indicate the proportion of banks that utilize specific database systems. Among the options listed, Oracle is the most widely used, with approximately 89.19% of the banks employing it. Following Oracle, MS SQL Server is utilized by 83.78% of the banks, My SQL by 81.08%, PostgreSQL by 27.03%, and DB2 by 10.81%. However, some 10.81% banks opt for alternative database systems that better suit their specific requirements. These statistics illustrate the diversity in database preferences within

the banking sector. The popularity of Oracle, MS SQL Server, My SQL, and PostgreSQL suggests that these databases have established themselves as reliable and widely adopted solutions in the industry.

The mode of database replication refers to the method or approach used to synchronize and replicate data between different database instances or locations. Based on the given percentages, it can be observed that the mode of database replication between the Data Center (DC) and the Near Data Center (Near DC) varies among the banks. The less commonly employed mode is asynchronous replication, with 37.48% of the banks using this method. Asynchronous replication allows for a time delay between the primary and secondary databases, providing flexibility and potential cost savings. Synchronous replication, which offers real-time data consistency between the primary and secondary databases, is mostly used by 48.65% of the banks. This mode ensures higher data integrity but may introduce additional latency. Hybrid replication, a combination of synchronous and asynchronous methods, is employed by 13.51% of the banks, offering a balance between data consistency and performance. The distribution of these modes demonstrates the diversity in replication strategies implemented by banks to meet their specific requirements and optimize their database infrastructure for resilience and efficiency.

Far Data Center (Far DC) specifically suggests a scenario where the disaster recovery infrastructure is located at a geographically distant location from the primary data center. This geographical separation is intended to ensure that if a disaster or major disruption occurs at the primary data center, the far DC site can take over operations and provide continued access to systems and data.

In Bangladesh 42% banks established Far DC. The mode of database replication between the Data Center (DC) and the Far DC is predominantly asynchronous, with a percentage of approximately 15.49%. On the other hand, synchronous replication, which ensures real-time data consistency between the DC and Far DC, has a reported percentage of 13.51. Hybrid replication, combining both synchronous and asynchronous methods, is used by approximately 13% of the banks.

## 3.15 Data Center (DC) and Disaster Recovery Site (DRS)

Most banks (92%) maintain data centers at Tier-2 and Tier-3 levels. In contrast, a Tier-4 data center is designed to be fully fault-tolerant, with redundancy for every component. It has an expected uptime of 99.995% (26.3 minutes of downtime

annually). But only 3% banks have Tier-4 DC which is not desirable if we want to ensure a robust banking system.

**Table-6: Status of DCs**

| Level of DC | % of Banks |
|---|---|
| Tier-1 | 5 |
| Tier-2 | 32 |
| Tier-3 | 60 |
| Tier-4 | 3 |

***Source:*** *Survey Information*

### 3.15.1 Disaster Recovery Site: Mode of Replication with DC

Active-active replication mode between DC and NDC facilitates the banks to run live operations from NDC to ensure optimum utilizations of IS resources in data center. Consequently, banks will be able to recover live operation of banking business quickly when primary data center goes down due to major natural or man-made disasters.

As shown in Table-7, in 2022, among banks with NDC, 43% adopted an active-active replication mode, while 57% opted for an active-passive replication mode. In previous year, 42% NDCs used active-active mode. In case of FDC, only 14% were in active-active and 86% in active-passive mode. Very insignificant growth is observed compared to previous years. According to the best practice, banks should maintain at least one DRS operating in active-active replication mode.

**Table-7: Mode of Replication with Primary DC**

| Mode of Replication with Primary DC (PDC) or Production Site | % of Banks | | | | | |
|---|---|---|---|---|---|---|
| | Near DRS /DC (N-DRS/N-DC) | | | Far DRS /DC (F-DRS/F-DC) | | |
| | 2019 | 2020 | 2022 | 2019 | 2020 | 2022 |
| **Active-Active** | 36 | 42 | 43 | 12 | 13 | 14 |
| **Active-Passive** | 64 | 58 | 57 | 88 | 87 | 86 |

***Source:*** *Survey Information*

### 3.15.2 Status of DRS in Banks

In 2022, only 48% NDCs were hot which was 42% in 2020. In case of FDCs, only 24% were hot. That means, rest of the banks (76%) might not be able to run business operations or critical business services immediately from FDC due to any man-made or natural disaster, like earthquake.

**Table-8: Status of Hot, Warm and Cold DRS in Banks**

| Type of DRS | % of Banks | | | |
|---|---|---|---|---|
| | Near DRS /DC (N-DRS/N-DC) | | Far DRS /DC (F-DRS/F-DC) | |
| | 2020 | 2022 | 2020 | 2022 |
| **Hot** | 42 | 48 | 12 | 24 |
| **Warm** | 40 | 38 | 53 | 44 |
| **Cold** | 18 | 14 | 35 | 32 |

***Source:*** *Survey Information*

### 3.15.3 Live Testing of Business Operations from DR Site

Regular and periodic testing of live business operations from DR site is a very significant issue for the centralized online banking system. Because this practice will increase the level of confidence and expertise of recovering data and business operation in case of any IT disaster.

According to Table-9, in 2022, 70% and 22% banks have tested live business operation from N-DRS and F-DRS, respectively. Among the banks that tested the live operation of business in 2022, about 70% and 46% banks did the test from N-DRS in holidays and working days, respectively. Only few banks (22%) performed live test from F-DRS. Another important finding is that most of the local banks (90% banks) did not perform live test of whole business operations from DRS; they performed it partially (some limited applications or services). Considering the best practice, banks should run 24 hours live business operations of whole e-banking functionalities from DRS at least once a month on working days.

**Table-9: Live Test of Business Operation from DRS in 2022**

| Testing | % of Banks | |
|---|---|---|
| | Near DRS /DC (N-DRS/N-DC) | Far DRS /DC (F-DRS/F-DC) |
| Live Test of business operation from NDRS or FDRS | 70 | 22 |
| Live Test of business operation in holiday | 70 | 22 |
| Live Test of business operation in Open day/Office hour | 46 | 16 |

***Source:*** *Survey Information*

## 3.16 Advancement of Network Technologies in Banks

The survey data presented in Table-10 sheds light on the adoption of various technologies by banks. The findings indicate that banks are leveraging advanced technologies to bolster their network infrastructure, enhance security, and optimize their operations. Software-Defined Networking (SDN) emerges as a popular choice, with 29.73% of banks incorporated this technology. SDN offers centralized control and management of network resources, enabling banks to improve scalability, flexibility, and overall network performance. Next Generation Firewall (NGFW) stands out as a widely adopted technology, with an impressive 94.59% of banks implemented it. NGFW combines traditional firewall capabilities with advanced features such as intrusion detection and prevention, deep packet inspection, and application-level control. This robust security solution enables banks to safeguard their network infrastructure and protect against evolving cyber threats. Application Monitoring Tools are employed by 56.76% of the banks. These tools provide real-time visibility into application performance, allowing banks to proactively identify and resolve issues, optimize resource allocation, and ensure a seamless user experience. Load Balancers are implemented by a significant majority of banks, with 83.78% leveraging this technology. Load balancing distributes network traffic across multiple servers, ensuring efficient resource utilization, minimizing downtime, and enhancing overall system performance. Anti DDoS (Distributed Denial of Service) solutions are adopted by 67.57% of the surveyed banks. These solutions mitigate the risk of DDoS attacks by detecting and blocking malicious traffic, ensuring uninterrupted service availability and protecting the bank's digital infrastructure. Additionally, the survey data reveals

that 24.32% of banks have adopted other technologies (not specified). This suggests that banks are exploring a diverse range of technological solutions to address their unique requirements and challenges.

**Table-10: Advancement of Network Technologies in Banks**

| Technologies | % of Bank |
|---|---|
| SDN | 29.73 |
| SDWAN | 8.11 |
| Next Generation Firewall | 94.59 |
| Application Monitoring Tool | 56.76 |
| Load Balancer | 83.78 |
| Anti DDoS | 67.57 |
| Others | 24.32 |

***Source:*** *Survey Information*

## 3.17 Adoption of Cyber Security Solutions in Banks

Almost all banks stated that they have dedicated Computer Incident Response Team (CIRT). 97% banks mentioned that they follow the policies while security/OS patching and among them, 40% and 60% banks follow Current Stable Version (N) and Prior Current Stable Version (N-1), respectively. The following table (Table-11) depicts the status of using different types of security solutions by the banks. We observed a weak scenario in case of using SOC, API Security, SOAR, IAM and DAM.

**Table-11: Cyber/IT Security Solutions Used by Banks**

| Types of Security Services / Solutions | % of Banks |
|---|---|
| SOC | 54 |
| SIEM | 75 |
| API Security | 43 |
| PAM | 60 |
| SOAR | 27 |
| IAM | 5 |
| DAM | 24 |

***Source:*** *Survey Information*

## 3.18 Cybersecurity Regulations, Frameworks and Compliance Standards for Banks

Although cybersecurity regulations are subject to change at any time to adopt the changing threat landscape, compliance standards are common across most industries to regulate data handling, customer privacy, and cyber-attack prevention measures. In addition, cybersecurity frameworks provide a roadmap for organizations to follow better protection of data. Table-12 shows that 35% of banks achieved PCI DSS certificate to ensure data security for e-card transactions, 67% banks have been awarded ISO 27001:2013 certification for their Information Security Management System (ISMS), 13% are ISO 9001 certified for meeting the requirements of a Quality Management System (QMS), and only 10% have Tier certification for their data centers. The purpose of the CMMI model is to assess the maturity of an organization's processes and to provide guidance on improving processes, with a goal of improved products. Surprisingly no bank complies with this certification.

**Table-12: Global Certifications Achieved by the Banks**

| Type of Global Certifications | % of Banks |
|---|---|
| PCI DSS | 35 |
| ISO 27001 | 67 |
| CMMI | 0 |
| ISO 9001 | 13 |
| DC Certification | 10 |

***Source:*** *Survey Information*

## 3.19 Use of 2FA and 3D Security by Banks in E-commerce

According to our survey, 91% banks use two factor authentications (2FA) for doing E-commerce transactions like Online Merchant Payment, Utility Bill payment, etc. Among them, 67% banks use 3DS version 2.0 for E-commerce transactions and rest of the 33% banks do not use it.

## 3.20 Cost Minimization for IT System and IT Operation in Banks

The survey found that about 97 % of banks have IT cost minimization plan which was 92% in year 2020. Table-13 shows various factors that are considered by banks to reduce cost of IT operations in Banks. Banks mostly use Virtual Meeting, and Virtual Training program to reduce IT costs. However, banks have many other scopes to reduce cost. They can focus on cloud and process simplification to achieve their cost minimization strategy.

**Table-13: Factors that are considered to Reduce the Cost of IT Operation in Banks**

| Factors | % of Banks | | | |
|---|---|---|---|---|
| | 2018 | 2019 | 2020 | 2022 |
| Hosting Services | 14 | 15 | 18 | 31 |
| Private Clouding | 14 | 27 | 28 | 39 |
| Public Clouding | 10 | 20 | 20 | 17 |
| Mail Server | 52 | 56 | 56 | 58 |
| Outsourcing/Sharing | 29 | 33 | 35 | 31 |
| Open source for Desktop OS and Office software | 10 | 27 | 27 | 19 |
| Process Simplification | - | 53 | 54 | 53 |
| Change of Depreciation Method | - | 7 | 7 | 22 |
| Virtual Training Program | - | 80 | 80 | 95 |
| Virtual Official Meeting | - | 80 | 80 | 95 |

***Source:*** *Survey Information*

## 3.21 Virtualization and Clouding in Banks

Almost all banks of Bangladesh use some sort of virtualizations. Table-14 represents the adoption of virtualization across various areas in banks. Virtualization is the practice of creating virtual versions of physical and logical resources, such as operating systems, applications, desktops, hardware, network components, and storage systems.

In 2018, 37% of the surveyed banks implemented virtualization of their operating systems (OS). This percentage increased steadily over the years, reached 89% in 2022. This suggests a growing recognition of the benefits of virtualization among banks like improved resource utilization, increased efficiency, and easier management. Hardware virtualization involves abstracting physical hardware resources to create virtual machines (VMs), allowing for better resource allocation, scalability, and ease of maintenance. Regarding hardware virtualization, a high percentage of banks (67%) reported their success.

The adoption of virtualization in network infrastructure experienced a gradual increase. In 2018, only 8% of banks reported virtualizing their networks, but this figure rose to 27% in 2022. Network virtualization enables banks to create virtual networks, improving network efficiency, simplifying network management, and enhancing security. Storage virtualization, which involves pooling physical storage resources and creating virtualized storage volumes, witnessed significant growth

over the years. In 2018, 20% of banks reported storage virtualization, and this figure increased to 43% in 2022. Virtualizing storage provides banks with centralized management, improved data protection, and scalability.

**Table-14: Areas of Virtualization**

| Areas of Virtualization | % of Banks | | | |
|---|---|---|---|---|
| | 2018 | 2019 | 2020 | 2022 |
| OS | 37 | 71 | 71 | 89 |
| Application | 16 | 19 | 20 | 32 |
| Desktop | 4 | 4 | 6 | 8 |
| Hardware | 62 | 62 | 62 | 67 |
| Network | 8 | 14 | 18 | 27 |
| Storage | 20 | 24 | 26 | 43 |

***Source:*** *Survey Information*

### 3.21.1 Virtualization Technology

Table-15 presents survey data on the utilization of virtualization technologies in various banks. The focus is on three specific technologies: Hypervisor, Containers, and VMware.

In 2018, 46% of the surveyed banks reported the use of Hypervisor technology, which is a software or firmware that creates and runs virtual machines (VMs). This percentage increased to 52% in 2019. However, by 2022, there was a notable rise in the adoption of Hypervisor, with 64% of banks utilizing this technology. Hypervisors enable the creation and management of multiple VMs on a single physical server, allowing for efficient resource allocation and consolidation.

Containers, a lightweight form of virtualization that enables the packaging and isolation of applications and their dependencies, were adopted by only 4% of banks in 2018. This percentage remained constant at 4% in 2019, but slightly increased to 5% in 2020. However, by 2022, the adoption of container technology significantly increased to 21%. Containers provide a more efficient and scalable way to deploy and manage applications, allowing for faster application development and deployment.

VMware, a leading provider of virtualization solutions, had a high adoption rate in the surveyed banks. In 2018, 80% of banks were using VMware, and this percentage remained consistently high throughout the subsequent years. By 2022, 81% of banks were utilizing VMware. VMware offers a comprehensive suite of

virtualization products and technologies, enabling organizations to virtualize their infrastructure, optimize resource utilization, and streamline IT operations.

**Table-15: Kinds of Virtualization Technology Used**

| Virtualization Technology Used | % of Banks | | | |
|---|---|---|---|---|
| | 2018 | 2019 | 2020 | 2022 |
| Hypervisor | 46 | 52 | 53 | 64 |
| Containers | 4 | 4 | 5 | 21 |
| VMware | 80 | 80 | 81 | 81 |

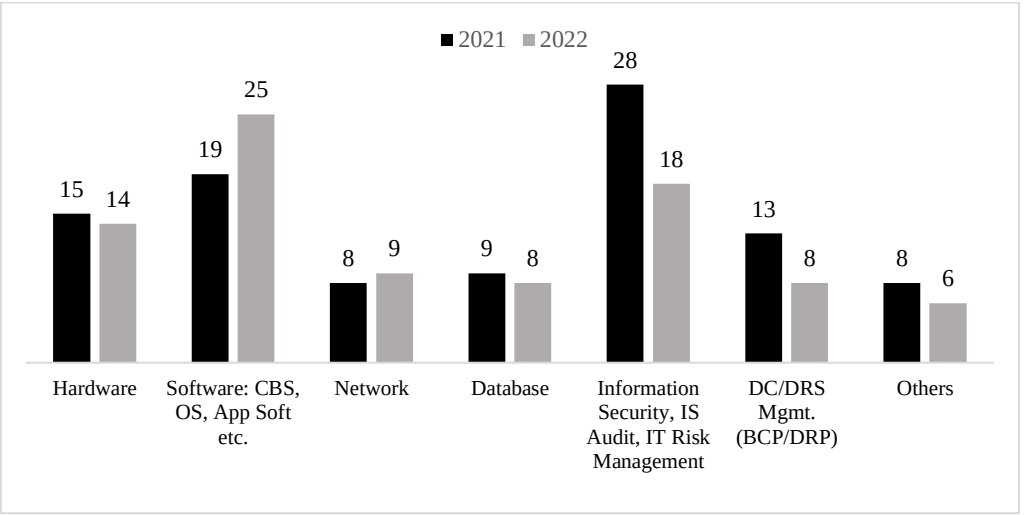
***Source:*** *Survey Information*

The study reveals that 29.73% of banks have cloud infrastructure. A total of 81.82 percent of banks with cloud infrastructure utilize private clouds, 27.27 percent use public clouds, and 18.18 percent use hybrid clouds.

## 3.22 Training

IT training can help bank workforce be more self-confident and contented using IT. This can lead to several benefits to industry, including improved efficiency, greater competence, better bottom line and faster embracing of new tools. But, due to the costs involved, training of user is greatly seen as added expenses in banking industry. Percentage of IT employees who received training in different IT areas in the year 2021 and 2022 are shown in Figure-14. It was found that in 2022, banks were inclined to give training on 'Software' (CBS, OS, Application Software etc.). 25% of IT employees received training on that particular sector. As seen from the figure, number of trainees on 'Hardware', 'Database', 'Information Security, IS Audit and IT Risk Management' and 'DC/DRS Management (BCP/DRP)' declined from the previous year.

**Figure-14: ICT Training Provided by Banks (% of IT Employees)**

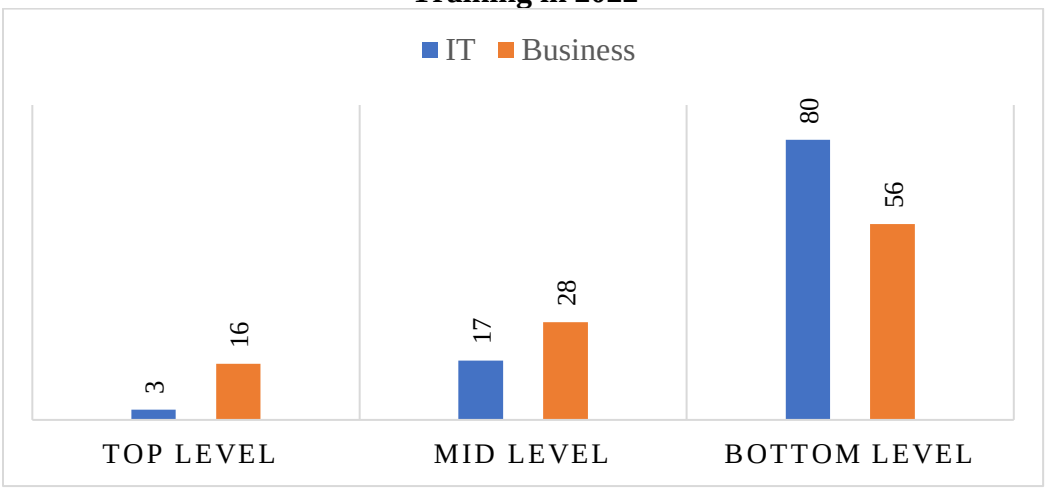



***Source:*** *Survey Information*

It is seen that in 2021 virtual training got enormous acceptance in banking industry. In that year, more than 70% training was conducted virtually, while in 2022, when the COVID pandemic is almost declined, 45% training was conducted through virtual medium. 'Zoom' was the most popular tools for virtual training. Nearly 84% banks organized virtual training for their officials using 'Zoom'. Other popular programs used by banks were 'Microsoft Team' and 'Webex'.

Though the total number of IT employees who received training in 2022 were slightly increased from the previous year, compared to business employees the picture is unsatisfying. From the following figure, it is clearly evident that the significance of IT Employees' training was seriously ignored by bank management. In 2022, total 41,110 employees (both business and IT) received training. Among them only 5% belongs to IT personnel, whereas 95% employees from business department got the opportunity (Figure-15).

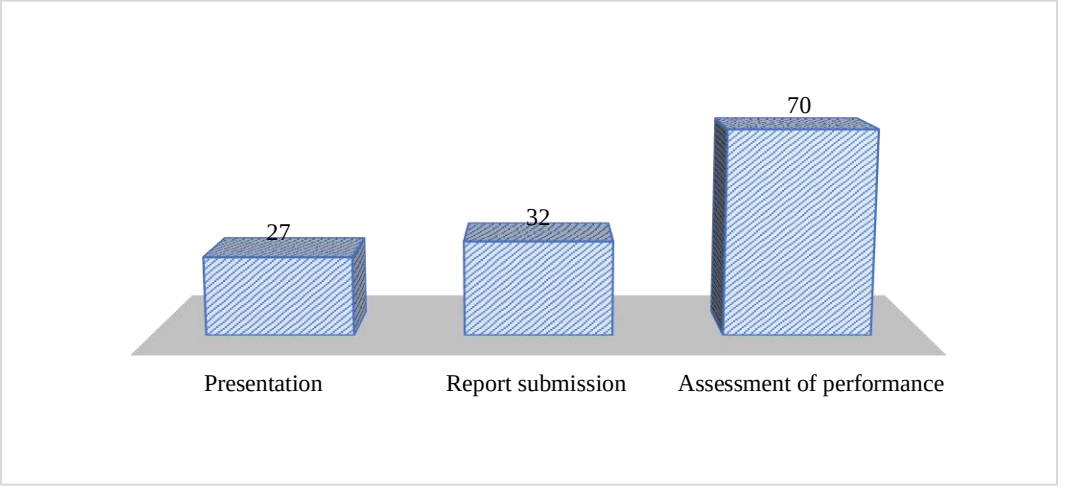
**Figure-15: Percentage of Different Level of Employees Received Training in 2022**




***Source:*** *Survey Information*

Post-training assessments enable bank management to determine whether learners or employees have achieved a specific level of understanding or skill regarding a particular topic by the end of the training. It has been found that only 54% of Bangladeshi banks have a post-training assessment mechanism for trainees. Among these, 32% of banks require employees to submit a report based on their learning from the courses or workshops they attended.

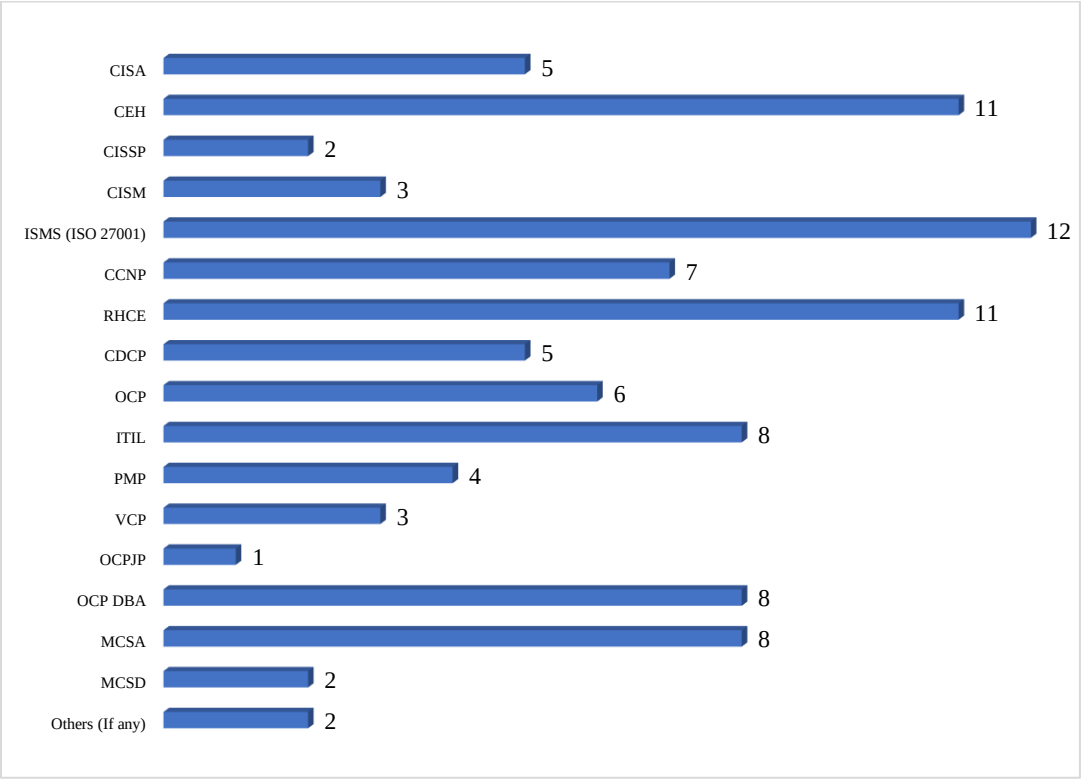
**Figure-16: Actions/Initiatives Taken by Banks after Obtaining Training (In %)**




Source: Survey Information

IT certifications offer numerous benefits for professionals, including the ability to stand out from the competition, securing better-paying promotions more quickly, and maintaining job stability. Survey data reveals that the CEH (Certified Ethical Hacker) and RHCE (Red Hat Certified Engineer) are the two most popular certifications among IT professionals, followed by the ISMS (ISO 27001) certification. Notably, 12% of IT employees have achieved ISMS certification (Figure 17).

**Figure-17: Status of IT Certifications of IT Employees in Bangladeshi Banks (% of Employees)**




***Source:*** *Survey Information*

## 3.23 Challenges Banks Face in Transitioning to a Cashless Society

Table-16 summarizes the perspectives of IT Heads on the challenges banks face in transitioning to a cashless society.

**Table-16: Challenges Banks Face in Transitioning to a Cashless Society**

| Sl. No. | Challenges | % of Banks |
|---|---|---|
| 1. | **Awareness and Education:** In Bangladesh, there is a lack of familiarity and hesitancy among many people regarding digital payments, which poses a barrier to the adoption and usage of cashless payment systems. It is crucial for banks to take the initiative in educating their customers about the advantages of going cashless and how to safely and securely utilize digital payment systems. Providing education and training is essential to ensure that individuals are well-informed about the effective use of digital payment systems. This includes understanding safety measures, secure practices, and troubleshooting connectivity issues. It is particularly challenging to promote digital literacy and educate individuals who may have limited knowledge or experience with digital technologies, especially among the elderly and those from low-income groups. | 64% |
| 2. | **Financial Inclusion and Financial Literacy:** Significant portion of people in Bangladesh remains unbanked, especially large amount of low-income people do not have bank or MFS account. Another significant challenge is limited financial literacy among the population. Many people in Bangladesh do not understand how to handle finance and use digital payment systems. | 80% |
| 3. | **Infrastructure**: One of the primary challenges that Bangladesh faces in moving towards a cashless society is the lack of infrastructure. To move towards the cashless society, a robust and reliable digital infrastructure is required, which include high speed Internet connectivity, secure networks, and sufficient power supply. Banks need to invest in this infrastructure to ensure that their customers always have access to digital payment and service. In rural areas of Bangladesh, there may be limited access to reliable internet connectivity and infrastructure to support digital payments. This may hinder the adoption and usage of cashless payment systems in these areas. For a cashless society to be successful, a wide range of merchants, including small businesses and local vendors, need to accept digital payments. Swipe machines are expensive and only viable for the few merchants only. The QR payment has not been deployed nationwide. Huge budgetary allocation for adoption of cashless technologies and security issues is also a big concern. | 86% |

| | | |
|---|---|---|
| 4. | **Privacy, Security and Trust:** Digital payment methods may be vulnerable to cyber-attacks, fraud, and data breaches. This could result in financial losses, identity theft, and other security risks. As more financial transactions are conducted digitally, the risk of cybersecurity threats such as hacking and identity theft increases and the security of electronic payment systems is critical. The country needs to establish robust security measures to protect against fraud and hacking. Digital payment systems are vulnerable to system failures and downtime, which can cause significant disruptions to financial transactions. A cashless society relies heavily on technology, which can be subject to failures and disruptions. This could result in inconvenience, financial losses, and other challenges. It is necessary to have backup systems in place to minimize the impact of such outages. | 80% |
| 5. | **Interoperability:** To achieve a cashless society, payment systems must be interoperable, meaning they can communicate and work seamlessly with each other. Bank must work together to ensure that their payment systems are compatible and can be used by all consumers, regardless of which bank they belong to. | 62% |
| 6. | **Regulatory and Policy Frameworks:** The regulatory framework around digital payments is still evolving in Bangladesh. Bangladesh will need to develop and implement regulatory and policy frameworks to govern cashless payments, money laundering, terrorist financing and protect consumers' rights. This will require collaboration between government agencies, financial institutions, and other stakeholders. | 85% |
| 7. | **Dependence on Cash and Resistant to Change:** Cash has been a dominant payment method in Bangladesh till now. And there is a strong cultural preference and strong customer demand for using cash. People may feel more comfortable with physical money as it has been a part of their lives for a long time. Some people, mainly illiterate and senior citizens, are resistant to change and prefer the familiarity and convenience of cash transactions. | 76% |

***Source:*** *Survey Information*

# 4.0 Challenges of IT Operations in Banks and Role of the Central Bank (BB)

## 4.1 Challenges Related to IT Operations in Banks

Executives of IT division face different challenges or difficulties to manage IT system proficiently. The list of challenges (given by HoITs of sampled banks) are summarized in Table–17.

**Table–17: Views of Heads of ITD of Different Banks**

| Sl. No. | Views of HoIT | % of Banks |
|---|---|---|
| 1. | Banks should make the network and overall IT infrastructure more secure and well-organized by deploying latest technologies like, encryption, DLP, MFA, NGFW, IDS, IPS, PAM, NAC, cloud, zero trust security models, blockchain technology, SIEM, SOC etc. | 85% |
| 2. | Banks need to ensure that third party vendors meet the same security and data privacy standards as the bank itself. Besides banks should regularly assess vendor security practices and their adherence to standards. | 70% |
| 3. | Banks should regularly review and update policies and procedures to ensure that they are aligned with regulatory requirements. Also, more detailed policy from central bank on IT related issues is necessary. | 84% |
| 4. | Banks should emphasis on leading industry level certification and regulatory standards like Payment Card Industry Data Security Standard (PCIDSS), Central Data Protection Regulation (CDPR), etc. | 63% |
| 5. | Banks should build strong organogram with proper segregation of duties. | 56% |
| 7. | Regular VAPT of banks can be carried out by regulatory body like Bangladesh Bank. Also, periodic audit and risk assessment needs to be conducted. | 87% |
| 8. | Collaboration between cybersecurity institutions/other financial institutions and banks is necessary for sharing information and resource buildup. | 40% |
| 9. | By employing artificial intelligence and machine learning banks can detect and prevent fraud in real time. These technologies can also help banks to optimize their operation by automating repetitive tasks and also minimize operational cost. | 87% |
| 10. | Banks should have robust DRP and BCP in place to ensure that critical IT operations can continue in the event of a disaster/outage. Also, banks should regularly update and test these plans. Similarly, post-incident analysis is necessary to identify lessons learned and improve processes. | 45% |
| 11. | Banks should ensure availability of skilled and redundant manpower. To ensure this, banks have to conduct regular awareness training for employees. Also, motivation of employees with timely rewards based on their achievements and performance will help banks to retain skilled workforce. | 88% |
| 12. | Banks should conduct regular awareness development program for consumers to ensure safety in digital platforms. | 78% |
| 13. | Uninterrupted network link connectivity and power supply may be ensured by concerned authorities especially in rural areas. | 52% |

***Source:*** *Survey Information*

## 4.2 Role of Bangladesh Bank for Maintaining better IT Operations in Banks

As a regulatory body, the contribution of the Central Bank in developing the automation process of banking system is undeniable. Through the formulation and circulation of proper ICT related policy and guidelines, BB helps our banking system in maintaining a robust IT system with a view to maintain reliable and secured IT operations in banks. Besides, due to rapid growth of digital and IT innovation in the area of banking products and services,

the banking community expects more realistic and effective steps from BB. Opinions and expectations of banks regarding the role of the Central Bank are summarized and presented in Table-18.

## Table-18: Possible Roles of Central Bank

| Sl. No. | Possible Roles of the Central Bank | % of Banks |
|---|---|---|
| 1. | The central bank may establish a regular threat intelligence sharing program to keep banks informed about emerging threats. | 73% |
| 2. | The central bank might organize bi-annual ICT conferences and quarterly knowledge-sharing sessions with key stakeholders. | 78% |
| 3. | The central bank may develop policy guidelines and offer incentives for investments in digital banking and cybersecurity. | 75% |
| 4. | The central bank might conduct regular audits and publish reports on IT governance and the efficiency of banks' Internal Control and Compliance Departments (ICCD). | 83% |
| 5. | The central bank may issue comprehensive guidelines for adopting innovative technologies and facilitate the formation of consortiums for community cloud and blockchain platforms. | 77% |
| 6. | The central bank might develop and implement policies that support automation and outsourcing to enhance service delivery and customer satisfaction. | 61% |
| 7. | The central bank may set up a Central Financial SOC to monitor transactions and ensure cyber safety across all financial institutions. | 88% |
| 8. | The central bank might facilitate the creation of forums and working groups to promote IT security collaboration and information-sharing among banks. | 87% |
| 9. | The central bank may collaborate with relevant stakeholders to develop and enforce IT standards and best practices. | 76% |
| 10. | The central bank might organize regular cybersecurity drills and exercises to enhance banks' IT resilience and response capabilities. | 68% |
| 11. | The central bank may introduce a system of financial incentives or penalties to encourage banks to improve their IT security posture. | 61% |
| 12. | The central bank might implement policies to ensure job segregation and conduct root cause analysis of IT incidents, while also enhancing employee motivation and facilities. | 65% |
| 13. | The central bank may collaborate with BIBM to arrange certification programs, advanced training, and annual ICT conferences. It might also establish a specialized institute for research, training, and consultancy in banking technology and cybersecurity like IDRBT of India. | **87%** |

***Source:*** *Survey Information*

## 5.0 Summary of Observations and Recommendations

**One, IT Investment and Budget:** All banks together invested Tk. 2470 crore in IT Systems in the banking sector in 2022. It is seen that IT investment in 2020 is less compared to 2019 and 2022. One of the reasons for less investment in this year might be the adverse impact of the COVID-19 pandemic on local and global business, especially the banking business. Lack of long-term vision, proper planning and initiatives, shortage of manpower, poor IT budget, weakness of business process reengineering, delay in procurement process and lack of appropriate and advanced training are major challenges of banks to improve their IT infrastructure. Banks may allocate certain portion of their annual profit to overcome these problems and boost up the existing IT infrastructure. Through proper training and skills development program, leadership quality and efficiency of IT project implementation team may be developed for successful design and implementation of banking automation projects.

**Two, Using ADCs and Augmenting the Setup of CRM in Rural Areas:** Bangladeshi banks have already enacted several types of ADCs to serve their customers round the clock. From the survey data, we found that only 13 banks are active in providing MFSs. If more banks could commence their mobile banking service then it would be very beneficial for our rural people. Though transaction cost is the lowest for Internet banking and it is possible to offer most of the banking services through this channel, but market share of this channel is not satisfactory till now. Also, at present all banks in our country provide this service, but majority offer transactional services in a limited way.

The benefits of providing CRM service is already recognized. But in Bangladesh only 41% banks installed CRMs and 2489 CRMs has been set up by these banks in 2022, which were 126 in 2018. Though in recent years, the number of CRM is increasing in rural areas, but still 79% CRMs are in urban areas which means that people of rural and semi-urban areas are not getting the full benefit of this channel. So, bank administration should think about this and take measures to rise the number of this ADC particularly in rural areas.

**Three, Core Banking Software:** When a bank purchases or develops a CBS, they want enhanced productivity, improved security, 24/7 access to banking services and lower operational costs. To achieve these goals both conventional and Islamic CBS were used by 40% banks. 22% banks used Islamic CBS only, which indicates that this genre of CBS is gaining acceptance in banking field. It is notable that foreign software vendors have a comparatively robust position in Bangladeshi market over

the years. Foreign CBS controls more than 51% of the CBS market, which was 46% in 2021. If this tendency continues, it is no wonder that in future, foreign CBSs will replace other type of CBSs, thereby harming the local software market and national economy. Now banks are reluctant to go for joint-venture CBS. In 2022, only 5.41% banks used joint-venture CBS, which was 11% in 2021. On the other hand, banks were increasingly using in-house CBS. In 2022, more than 16% banks used in-house CBS, which was only 7% in 2021. According to survey data, 33% banks have implemented all 1137 controls mentioned in 'Core Banking Solution (CBS) Features and Controls' published by Bangladesh Bank, while 67% banks have partially implemented the guideline.

**Four, Use of FinTech to Accelerate the Operational Capacity of Bank:** Based on the findings of the study, it is evident that digital transformation initiatives have gained significant momentum in the banking industry, with 94.6% of banks have already embraced these initiatives. However, there are varying levels of progress, with 41.18% of banks classified as advanced and the remainder at the initial stage. The study highlights the widespread adoption of several key technologies by banks to enhance their operations. Artificial Intelligence (AI) emerges as a standout technology, with 51.42% of banks incorporating it. This indicates a growing recognition of AI's potential in streamlining banking processes and improving customer experiences. Robotic Process Automation (RPA) closely follows, with 40% of banks implementing this technology. Micro Services has been adopted by 54.29% of banks, offering benefits such as enhanced scalability, flexibility, and agility in systems. Near Field Communication (NFC), used for contactless payments, has been embraced by 51.43% of surveyed banks. Blockchain technology, implemented by 17.14% of banks, holds promise for improving security, transparency, and efficiency in various banking operations.

Based on these findings, it is recommended that banks may continue investing in digital transformation initiatives. Specifically, they may prioritize the adoption of AI, RPA, Micro Services, NFC, and Blockchain technologies, as these have demonstrated their potential to enhance operational efficiency, improve customer experiences, and strengthen security measures. By leveraging these technologies effectively, banks can position themselves as leaders in the digital era, offering innovative and customer-centric financial services while maintaining a competitive edge in the market.

**Five, DRS Management for Uninterrupted IT Operations in Banks: W**e have found that 52% NDCs and 76% FDCs are not hot; they are operating in either warm or cold mode. In that case, banks might not be able to run business operations or critical services immediately if any disaster occurs.

Banks should take immediate actions to set up Hot DRS at separate seismic zones. Both Govt. and BB may take initiatives to provide robust infrastructure and support services for maintaining reliable operations from DRS. Using proper scientific plan (virtualization of server/storage, KVM switch, smart rack and other standard solutions) banks can ensure optimum utilization of space and reduce the area of DC/DRS to minimize the operating cost. For effective management of DC/DRS operations, international certification is a vital issue. Very few banks (3%) achieved Tier-4 DC certification. Banks should achieve global certification of Tier 3 or Tier 4 DC for ensuring fully fault-tolerant and uninterrupted e-banking operations and employ sufficient Certified Data Centre Design Professionals (CDCDPs) to handle the DC management properly.

**Six, Replication Mode and Live Testing of Business Operation from DRS:** Mode of replication of NDC with DC should be in synchronous mode so that banks can run live operations from NDC to ensure optimum utilization of IT resources/assets. Accordingly, banks will be able to restart the live operation of banking business quickly if real disaster occurs. Only 48.65% and 13.51% banks support synchronous replication mode with NDC and FDC, respectively. According to best practice banks should maintain at least one DRS (NDC or FDC) operating in synchronous replication mode. Banks should have proper policy and guidelines of business continuity and disaster recovery management. Bank authority should have proper support and close monitoring to ensure effectiveness of the policy related to ITDRP.

Regular and periodic testing of business operation from DRS is an important and crucial issue for a centralized online bank. This type of testing increases confidence and expertise of recovering data and business operation in case of any disaster. 54% banks hesitate to test business operation from N-DC during working hours. Another important observation is that most of the local banks (90% banks) do not perform live tests of whole business operations from DRS, they perform it partially. To reduce risk, banks should run live operations of the whole business function from DRS at least once a month on working days for the whole day (24 hours).

**Seven, Cost Minimization Strategy to Reduce IT Cost in Banks:** Information Technology (IT) helps banks reducing operational costs, but it is also important to reduce the cost of IT. As IT products and services are expensive and most of the IT-based products and services are being outsourced and imported from abroad. The study reveals that 97 percent of banks have IT cost minimization plan which was 92% in year 2020. The findings indicate a consistent and growing trend of banks adopting virtualization, cloud solutions, communication tools, process simplification, and virtual meeting/training programs. The shift towards more efficient and technologically advanced practices reflects the industry's ongoing digital transformation efforts.

The bank management should give full attention to incorporate virtualization technologies and clouding services in full scale of operations.

**Eight, Developing and Implementing Technology Roadmap in Banks:** Though all banks have developed IT strategy, but very limited number of banks have effective Technology Roadmap. It is a strategic document that guides bank's long-term IT strategy to be aligned with the business strategy and goals. Technology driven business organizations like Banks/FIs should have a clear and well-defined technology roadmap for digital transformation planning and success and to navigate the complexities of the industry in the age of highly-competitiveness. By developing and successfully implementing a technology roadmap, banks can effectively leverage technology to drive their business objectives, stay ahead of the competition, and embrace digital transformation. For this purpose, banks should produce skilled manpower and recruit experienced professionals.

**Nine, Use of 3D Secure 2.0 to Enhance Security in Online Card Payments:** 3D Secure 2.0 (updated version of 3D Secure 1) is a powerful authentication protocol that aims to reduce fraud and enhance security in online card payments. Visa created 3DS1 for use on computers, so it relied on pop-up windows which forced customers to enter a code or password to authenticate the transaction. 3DS2 works on all devices and allows shoppers to send data to banks without opening additional windows or entering any passwords.

3DS2 provides several benefits for merchants and consumers. Better user experience and increased security are among the most prevalent advantages, along with other benefits like Enhanced user experience across devices and in-app, enables issuers to perform Risk-Based Authentication (RBA), Reduces the risk of

fraud and Chargeback liability shift. With rising online frauds in e-commerce, both banks and PSPs (payment gateways) should take proper initiatives to facilitate 3DS 2.0 to protect both consumers and merchants from the attack/crime of e-card payment services.

**Ten, Effective Cyber Security Solutions for Reliable e-banking Operations:** Banks should have proper policy and follow Current Stable Version (N) during security/OS patching to take the added advantages of higher level of security, compatibility with new systems, new features, expert technicians and system administrators for better support services. Beside this, banks must establish a robust SOC to ensure continuous network monitoring and threat prevention, centralized visibility, Effective Incident Response, and better Organization-wide Collaboration specially for the IT teams, Reduction in Cyber security costs, and Compliance Management. Banks may also consider SOC as a Service (SOCaaS) instead of In-house SOC.

For open banking to function, APIs are critical as they help create connectivity between different stakeholders for the transfer of financial data. Banks and financial institutions give third-party service providers/ fintech companies access to customers' personal and financial data to develop innovative services and products. Despite the regulatory frameworks and compliance requirements, using APIs widens the attack surface and increases security risks. That's why, banks must ensure high-grade API security.

**Eleven, Achievement of Global Compliance to Build up Robust e-banking system:** We find very weak status in respect of achieving global certifications with a view to make our e-banking system more robust, secure, faster and reliable. Bank management should have insight and take rigorous & prompt initiatives to get global compliance certificates to reduce cyber risk, boost business reputations, take competitive advantages, and maintain smooth and reliable e-banking operations.

**Twelve, Training and Skill Development**: As found from the survey data, about 1.1% of total IT budget was allocated for training in 2022, which was not satisfactory at all. Bank management should increase the budget for training, which will be beneficial for them in long run. It was also found that the importance of IT peoples' training was unheeded by bank management. Also, in 2022 number of trainees on 'Hardware', 'Database', 'Information Security, IS Audit and IT Risk Management' and 'DC/DRS Management (BCP/DRP)' were declined from the

previous year. So, bank authority should give attention in such important area and providing suitable and quality training to their manpower for talent improvement.

**Thirteen, Developing a Cashless Society**: To develop a cashless society, several future directions can be pursued. 64% banks opined that increasing awareness and education about digital payment options should be a priority. Governments, financial institutions, and technology companies can collaborate to launch widespread campaigns, training programs, and workshops to familiarize people with the benefits and processes of cashless transactions. 80% banks think that enhancing financial inclusion and literacy is essential. Efforts should be made to provide access to digital financial services for underserved communities and improve financial education programs to empower individuals with the knowledge and skills required for digital payments. 86% banks agreed that infrastructure development should continue with a focus on expanding internet connectivity, mobile networks, and payment systems, especially in rural areas. This will ensure that all segments of society can participate in the cashless ecosystem. Privacy, security, and trust should be safeguarded by implementing robust cybersecurity measures, data protection laws, and consumer rights regulations according to the opinion of 80% banks. Collaboration between stakeholders is crucial to establish industry standards and best practices. Fostering interoperability among different digital payment platforms and creating a unified ecosystem will enhance convenience and ease of use for consumers. Governments can play a role in setting interoperability standards and encouraging collaboration among industry players.

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# Appendix-1: List of Respondent Banks

| | | | |
|---|---|---|---|
| 1. | AB Bank PLC | 2. | Janata Bank PLC |
| 3. | ONE Bank PLC | 4. | BRAC Bank PLC |
| 5. | Sonali Bank PLC | 6. | Eastern Bank PLC |
| 7. | National Bank Limited | 8. | Dutch-Bangla Bank PLC |
| 9. | Islami Bank Bangladesh PLC | 10. | NCC Bank PLC |
| 11. | Trust Bank Limited | 12. | Export Import Bank of Bangladesh PLC |
| 13. | Global Islami Bank PLC | 14. | Pubali Bank PLC |
| 15. | United Commercial Bank PLC | 16. | Mutual Trust Bank PLC |
| 17. | Bangladesh Development Bank PLC | 18. | Bank Asia PLC |
| 19. | Padma Bank PLC | 20. | Standard Chartered Bangladesh |
| 21. | Bangladesh Krishi Bank | 22. | First Security Islami Bank PLC |
| 23. | NRB Bank Limited | 24. | Woori Bank Bangladesh |
| 25. | HSBC Bangladesh | 26. | BASIC Bank Limited |
| 27. | Agrani Bank PLC | 28. | Prime Bank PLC |
| 29. | Meghna Bank PLC | 30. | Al Arafah Islami Bank PLC |
| 31. | City Bank PLC | 32. | Shimanto Bank PLC |
| 33. | Southeast Bank PLC | 34. | Merchantile Bank PLC |
| 35. | Union Bank PLC | 36. | IFIC Bank PLC |
| 37. | Community Bank Bangladesh PLC | | |

**Appendix-2: Questionnaire**

BANGLADESH INSTITUTE OF BANK MANAGEMENT

**Mirpur, Dhaka.**

Review Workshop
On
# IT Operations of Banks

## QUESTIONNAIRE


## Research Team:

1. Md. Shihab Uddin Khan, Associate Professor & Director (RD&C), BIBM
2. Md. Mahbubur Rahman Alam, Associate Professor, BIBM
3. Kaniz Rabbi, Associate Professor, BIBM
4. Md. Foysal Hasan, Assistant Professor, BIBM
5. Bank Executive

**Contact Numbers & E-mail Addresses:**

Md. Shihab Uddin Khan – 01710991890 / 01556354558
msukhan@bibm.org.bd

Mahbubur Rahman Alam – 01556323244
alam_mr@bibm.org.bd

Kaniz Rabbi – 01319311917
kaniz_r@bibm.org.bd

Md. Foysal Hasan – 01914604323
foysal@bibm.org.bd

About Bank/Respondent [s]-

| | |
|---|---|
| Name of the Bank: | |
| Address and Contact Number of Head Office: | |
| Name of the Respondent: | |
| Designation: | |
| Division/Department: | |
| Address and Telephone No: | |
| E-mail: | |
| Date of Submission | April 26, 2023 |

## Note:

1. In case of **'Others'** option in any question, please write down your answer if applicable.
2. Please use additional pages if required for providing details information for answering any question and also attach it with questionnaire.
3. If you require soft copy of this questionnaire, please contact us or send request to our e-mail addresses.

# Research Questionnaire

## Information Technology Strategies in Banks

| | | | | |
|---|---|---|---|---|
| 1. | Does your bank have any information technology (IT) strategy in place? | □ Yes | | □ No |
| 2. | If yes, what is your technology Roadmap as depicted in the strategy? | □ Short Term | □ Mid Term | □ Long Term |

## Information Technology Investment in Banks

| | | |
|---|---|---|
| 3. | What was the total IT Investment of your bank in 2022 (In crore BDT)? | |
| 4. | What was the sector wise approximate IT investment (In crore BDT) of your bank in 2022? | |
| | Hardware | |
| | Software | |
| | Network | |
| | Information Security | |
| | Training on ICT | |
| | Others (Please specify) | |
| | **Total IT Investment** | |
| | **Note:** The above lists of IT investment sectors may vary with the IT policy of Banks. You are requested to put the above values according to your own IT budget allocation policy. | |

| | | | | |
|---|---|---|---|---|
| 5. | Please mention the number of IT employees according to following table. | | | |
| | **Name of Sub-Division/Section/Department** | | | **Year 2022** |
| | Branch and Zonal IT Operation Support | | | |
| | Head Office Development Team (MIS/Infrastructure/CBS & Allied Systems) | | | |
| | Information Security and IT Risk Management (ISRM) | | | |
| | IT Audit team belongs to | □ ITD | □ ICCD | - |
| | Number of Employees in IT Audit | | | |
| | DC/DRS Management | | | |
| | 2nd Line Core IT Support at HO | | | |

| | | |
|---|---|---|
| | Technology Project Management | |
| | HO ADC System Development | |
| | Systems Monitoring and Fraud Detection (SOCs, SIEM, etc.) | |
| | Digital Banking/Digital Financial Services | |
| | Others (Please Specify) …… | |
| | **Note:** Bank may submit the above data/information as per its own IT organogram and IT manpower allocation policy. | |

## Digital Banking

| | | | |
|---|---|---|---|
| 6. | Does your bank have any digital transformation initiative? | □ Yes | □ No |
| 7. | If yes, what is the level of the initiative? | □ Initial | □ Advanced |
| 8. | Which of the following advanced technologies did your bank adopt? | | |
| | □ AI | □ RPA | □ ML |
| | □ Micro Services | □ NFC | □ Blockchain |
| | □ Others | | |

## Alternate Delivery Channels (ADCs) in Banks

| | | | | |
|---|---|---|---|---|
| 9. | Which of the following ADCs are being used by your bank to provide online services to customers? | | | |
| | □ Internet Banking | □ MFS (Mobile Banking) | □ ATM | □ POST |
| | □ CDM | □ Multi-functional Kiosks | □ Call Center | □ Agent Banking |
| | □ CRM/RATM | □ Branch POS | □ Telebanking using IVR | □ Others (if any) |
| | □ RCDM | □ Cash Withdraw from Marchant POS | □ Social Media | □ |

***** CDM – Cash Deposit Machine, CRM – Cash Recycle (ATM) Machine, Real-time CDM (RCDM), Recycle ATM (RATM)

## E-Commerce Banking

| | | | |
|---|---|---|---|
| 10. | Do all E-commerce transactions of your bank have two factor authentications (2FA)? [E-commerce Transactions include Online Marchant Payment, Utility Bill payment etc.) | □ Yes | □ No |
| 11. | Are all E-commerce transactions of your bank under 3DS version 2? | □ Yes | □ No |

## Mobile Banking/Mobile Financial Service (MFS)/Digital Wallet

| | | | |
|---|---|---|---|
| 12. | Does your bank have any agreement to perform transactional activities with the MFS providers.? | □ Yes | □ No |
| | If Yes, Please Tick/Select the following MFS providers having agreement with your bank? | □ bKash<br>□ Nagad<br>□ Rocket<br>□ Upay<br>□ Others (if any) | |
| 13. | Does your bank have Mobile App and Digital wallet-based e-banking service? | □ Yes | □ No |
| | If Yes, please mention the name of the App and Digital wallet of your bank. | | |
| 13. | Does your bank provide QR-Code Payment Service? | □ Yes | □ No |
| | Have You taken any initiative to replace all your proprietary QR with "Bangla QR"? [PSD Circular No 1, Dated on February 8, 2023) | □ Yes | □ No |
| 14. | Does your bank have connectivity with Binimoy? | □ Yes | □ No |

**Note: Binimoy**, is an Interoperable Digital Transaction Platform (IDTP), will allow instant money transfers between banks, mobile financial services (MFS) operators, and payment service providers (PSPs).

## SMS Banking

| | | | |
|---|---|---|---|
| 15. | Does your bank have SMS banking services? | □ Yes | □ No |
| | If yes, please select the service type. | □ Push Service | □ Push-Pull Service |
| 16. | What are the purposes of using SMS banking by your bank? | | |
| | Transaction notification | Marketing | |
| | Regulatory compliance related notifications | OTP | |
| | Others (If any) …. | | |

## Cyber Security and Certifications

| | | | |
|---|---|---|---|
| 17. | What kind of security solutions/services does your bank implement? | | |
| | □SIEM | □SOC | □DAM |
| | □SOAR | □AIM | □Anti-Malware |
| | □VAPT | □API Security | □PAM |
| 18. | Does your bank have any dedicated Computer Incident Response Team (CIRT)? | Yes | □ No |
| 19. | What policy does your bank follow during security/OS patching? | Current Stable Version (N) | □Prior Current Stable Version (N-1) |
| 20. | Which of the following certifications does your bank completed? | | |
| | □ PCI DSS | □ ISO 27001 | □ ISO 9001 |
| | □ CMMi | □ Tier Certification | □ Others |

## Core Banking System (CBS)

| | | | | |
|---|---|---|---|---|
| 21. | What type of Core Banking does your bank use? | □ Conventional | □ Islamic | □ Both |
| 22. | Select the level of implementation status of BB Guidelines on **Core Banking Solution (CBS) Features and Controls**: | | □ Fully | □ Partially |
| 23. | Please Select the Origin of CBS of your bank. | | Local<br>Foreign<br>In-House<br>Joint-Venture | |

## Application Software and Office Automation

| | | |
|---|---|---|
| 24. | Please mention the status of Application Software (other than CBS) that are being used in your bank. | |
| | **Types of Application Software** | **Number of Application Software** |
| | Developed In-house | |
| | Developed by Local Vendor | |
| | Developed by Foreign Vendor | |
| | **Total number of Application Software** | |
| 25. | Does your bank develop any AI based solution? | |
| | If yes, please mention the name of the solution(s) | |

| | | |
|---|---|---|
| 26. | Does your bank develop any RPA based solution? | |
| | If yes, please mention the name of the solution(s) | |

*AI- Artificial Intelligence, RPA- Robotic Process Automation.

## Data Management

| | | | | |
|---|---|---|---|---|
| 27. | Does your bank have any data warehouse with BI and analytic tools? | | Yes | No |
| 28. | Do you have Segregation of Duty (SoD) for DBA and System Admin? | | Yes | No |
| 29. | Does your privileged administrator use multifactor authentication (MFA) to access Server? | | Yes | No |
| 30. | Which of the following databases do you use in your bank? | | | |
| | Oracle | DB2 | My SQL | |
| | MS SQL | PostgreSQL | Others.... | |
| 31. | Please mention the mode of database replication. | | | |
| | DC and Near DC | | DC and Far DC | |
| | Synchronous<br>Asynchronous<br>Hybrid | | Synchronous<br>Asynchronous<br>Hybrid | |

## IT Service Management and Operational Efficiency:

| | | | | |
|---|---|---|---|---|
| 32. | Which of the following technologies does your bank use? | | | |
| | SDN | SDWAN | Next Generation Firewall | |
| | Application Monitoring Tool | Load Balancer | Anti DDoS | |
| | Others | | | |
| 33. | Does your bank have any test bed to simulate fixes/patch before release in LIVE environment? | | □ Yes | □ No |
| 34. | Does your bank have any IT cost minimization plan? | | □ Yes | □ No |
| | If yes, which factors do you consider to reduce the cost of IT operation? | | | |
| | Virtualization | Hosting services | Private Clouding | |
| | Public Clouding | Open source for Desktop OS and Office software | Mail Server | |
| | Outsourcing/Sharing Augmented Resource Hiring | Process Simplification<br>Virtual Training Program<br>Virtual Official Meeting | Change of Depreciation Method<br><br>Others (Specify)….. | |

## Date Center & Disaster Recovery Site (DC & DRS)

| | | | | | |
|---|---|---|---|---|---|
| 35. | What level of data center does your bank have? | □ Tier-1 | □ Tier-2 | □ Tier-3 | □ Tier-4 |

| 36. | Please provide the following information regarding Disaster Recovery Site (DRS) in your bank (where applicable). | | |
|---|---|---|---|
| | **Characteristics** | **Near DRS (NDRS)** | **Far DRS (FDRS)** |
| | Mode of Replication with DC | □ Active-Active<br>□ Active-Passive | □ Active-Active<br>□ Active-Passive |
| | Type | □ Hot<br>□ Worm<br>□ Cold | □ Hot<br>□ Worm<br>□ Cold |
| | Do you perform Live Test of business operation from NDRS or FDRS? | □ Yes<br>□ No | □ Yes<br>□ No |
| | Does your bank perform Live Test of business operation in holiday? | □ Yes<br>□ No | □ Yes<br>□ No |
| | Does your bank perform Live Test of business operation in Open day/Office hour? | □ Yes<br>□ No | □ Yes<br>□ No |

## Virtualization and Cloud Computing in Banks

| | | | | |
|---|---|---|---|---|
| 37. | Which of the following types of virtualizations are used by your bank? | | | |
| | □ OS | □ Application | □ Desktop | |
| | □ Hardware | □ Network | □ Storage | |
| 38. | What kind of virtualization technology do you use? | | | |
| | □ Hypervisor | □ Containers | □ VMware | |
| | Others (if any) …… | | | |
| 39. | Does your bank have cloud infrastructure? | | □ Yes | □ No |
| | If yes, please select the type. | | | |
| | □ Private | □ Public | □ Hybrid | □ Others |

## Training and Skill Development

41. How many employees of IT Division(s) participated in training program on current issues of the following fields?

| Field | Number of IT Employees | |
|---|---|---|
| | Year 2021 | Year 2022 |
| Hardware | | |
| Software: CBS, OS, App Soft etc. | | |
| Network | | |
| Database | | |
| Information Security, IS Audit and IT Risk Management | | |
| DC/DRS Management (BCP/DRP) | | |
| Others (Specify)… | | |
| **Total Employees** | | |

42. Status of Providing Virtual and Physical Training in Banks.

| Types of Training Provided | Total Number of Training Courses | |
|---|---|---|
| | 2021 | 2022 |
| Physical | | |
| Virtual | | |
| Tools used for Virtual Training | Zoom<br>What's App<br>Facebook Live<br>Messenger<br>Webex<br>Microsoft Team<br>Google Meet<br>Others (Specify)… | Zoom<br>What's App<br>Facebook Live<br>Messenger<br>Webex<br>Microsoft Team<br>Google Meet<br>Others (Specify)… |

43.Number of Employees at different levels participated in the ICT related Training/Workshop/Open Discussion Program.

| Level of Employees/Officials/Executives | Number of Employees/Executives | |
|---|---|---|
| | 2021 | 2022 |
| Employees from Business<br>[Junior officer to Executive Officer/SPO] | | |
| Middle Management<br>[AVP/AGM to SEVP/GM] | | |
| Senior /Executive Management<br>[DMD, AMD and MD/CEO] | | |
| Top Management/Authority<br>[Members of BoDs] | | |
| Employees from ICT wing/departments | | |

45. Which of the following actions / initiatives do you take after an employee obtaining training?

- ☐ Presentation by the trainee about the participated training courses/workshops in their respective department
- ☐ Report submission based on learning from the participated training course/ workshop
- ☐ Assessment of performance/skill development of trainees

46 Do you have any post training assessment mechanism for the trainees (participated employees)? ☐ Yes ☐ No

If yes, please specify the assessment mechanism of the trainee.

| |
|---|
| |

47. Status of IT Certifications of IT employees of your bank.

| Sl No. | Name of the Certifications | Number of Employees |
|---|---|---|
| a) | CISA | |
| b) | CEH | |
| c) | CISSP | |
| d) | CISM | |
| e) | ISMS (ISO 27001) | |
| f) | CCNP | |
| g) | RHCE | |
| h) | CDCP | |
| i) | OCP | |
| j) | ITIL | |
| k) | PMP | |
| l) | VCP | |
| m) | OCPJP | |
| n) | OCP DBA | |
| o) | MCSA | |
| p) | MCSD | |
| q) | Others (If any) | |

48. As Bangladesh is moving towards cashless society what are the challenges are you facing to move in cashless society?

49. Do you have any special comments/suggestions to run IT operations of banks ensuring safety, security and efficiency? Please mention. Use extra page if required**.**

50. What types of role the central bank can play for ensuring better IT operations in banks? **Please put your valuable comments/suggestions.**

**Bangladesh Institute of Bank Management**

Plot No.-4 MainRoad No.-1(South), Section No. - 2, Mirpur, Dhaka - 1216

Tel: 48032091-4; 48032097-8; 48032104; email: office@bibm.org.bd; Website: www.bibm.org.bd