People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

BADJI MOKHTAR - ANNABA UNIVERSITY

Faculty of Economics, Commerce & Management

Department: Financial Sciences

Photocopied Handouts

Electronic Banking

A Course Intended for
Master 1 students,
Specialty in Banking and Insurance Finance.

Presented by:

Dr. Bousbaa Hana

Senior Lecturer A

Academic Year

2025/2026

Table of Content

Chapter 6: Global Experiences in Electronic Banking

Introduction

Electronic banking, often referred to as e-banking, represents a transformative innovation in the delivery of banking services, fundamentally reshaping how financial institutions and customers interact. Over the past few decades, advances in Information and Communication Technology (ICT) have enabled banks to offer a wide range of services beyond traditional face-to-face methods. These services include online account management, electronic fund transfers, mobile banking, and automated teller machines (ATMs), all accessible anytime and anywhere.

The integration of digital technologies in banking processes has not only enhanced convenience and accessibility for customers but also improved operational efficiency and competitiveness for financial institutions. E-banking plays a critical role in today's financial ecosystem, providing faster transaction processing, cost reduction, and expanding the reach to underserved populations.

As financial markets become increasingly digitalized, a deep understanding of electronic banking concepts, technologies, risks, and benefits is essential for future banking professionals. This lecture series will provide Master's students specializing in finance, banking, and insurance with comprehensive knowledge and practical insights. This section offers comprehensive insights into the rapidly evolving landscape of electronic banking, enabling researchers and practitioners to address contemporary challenges and harness the potential opportunities presented by the digital financial ecosystem

To ensure the currency and relevance of this course on electronic banking, I have intentionally diversified the selection of references to align with the varied needs and academic levels of the students. The materials include foundational theoretical works, recent empirical studies, and applied research addressing technological, financial, and managerial aspects of e-banking. This comprehensive approach aims to provide students with a robust understanding of the subject matter and equip them with practical insights for their future professional careers in the fields of banking and insurance. The diversity of sources also reflects the interdisciplinary nature of electronic banking as a dynamic subject bridging finance, technology, and customer service.

Chapter 1: Evolution of Media and Communication in Banking

The banking industry has always depended on effective communication and information exchange to deliver financial services. Over the past few decades, rapid advances in media, information technology and digital innovation have completely reshaped the way banks operate. Traditional face-to-face interactions, paper records and telephone calls have been replaced or supplemented by online platforms, mobile applications and real-time data networks.

This chapter explores the historical evolution of media and communication in banking and explains how information technology and digital transformation form the backbone of today's financial services. It highlights their concepts, importance and objectives, and shows how these developments improve customer experience, streamline operations and create new opportunities. The chapter also considers the challenges and future trends that banks must address to remain competitive in an increasingly digital financial landscape.

1- Information and Communication Technology: Concept

1-1 Definition of Information and Communication Technology

The concept of information and communication technology is of great significance due to its role in harnessing knowledge to drive development. To address this, we will begin by presenting the concept of information technology, followed by an outline of its essential components, and then the notion of information itself.

a. **Technology**

In reality, technology represents the human intellect and its ability to manage life by effectively utilizing knowledge. It involves transforming theoretical understanding held in the human mind into practical applications, embodied in tools and equipment, that enhance services and improve life outcomes. (Jaafar, 2005, p. 49)

Technology, in its broad sense, encompasses all available means used to develop production or production methods in ways that align with the needs of its users. From a technical perspective, technology represents the optimal application of knowledge across various sectors, including industry, agriculture, and society. Its primary role lies in transforming specific inputs into valuable outputs, such as goods and services. Information technology, on the other hand, refers to data endowed with a degree of credibility and organized in a manner that allows users to effectively access and utilize knowledge. In the context of the banking sector, information technology has become indispensable, as it enables institutions to strengthen their competitiveness while ensuring high-quality performance. (Edan, 2024, p. 2477)

b. Information

Information refers to data that has been processed and presented in a way that makes it more useful to individuals, providing value for current or future applications and decision-making. The concept of information is closely linked to data on one side and knowledge on the other. Knowledge, in turn, is information that can be applied and utilized to achieve meaningful outcomes.

c. Information technology

Information technology delivers a wide range of benefits across all sectors of the business environment, such as enhanced speed, cost efficiency, rational decision-making, and improved quality. In this context, technology encompasses a broad array of areas, including communications, information access systems, practical applications, and more. It also serves to strengthen the connection between businesses and their customers, fostering better mutual understanding and enabling both sides to make more informed decisions. With ongoing advancements in technology, organizations now find it much easier to reach customers through various channels, including advertising, exhibitions, and diverse marketing campaigns. (Edan, 2024, p. 2477)

Information technology is a structured approach that employs organized knowledge to address both scientific and practical challenges. It represents a technical language aimed at enhancing the effectiveness, speed, and efficiency of various aspects of modern life. As such, information technology encompasses all forms of hardware, software, and related equipment used in computing, communication, and database management. Collectively, these components

support contemporary applications across organizations, including the operations of the banking sector.(Al-Araj, 2014, p. 34)

D. Information and Communication Technology

The term "Information and Communication Technology" (ICT) encompasses the convergence of written and spoken language, static and dynamic visual content, and both wired and wireless communication technologies, whether terrestrial or satellite-based. ICT further involves the systematic storage, analysis, and processing of data to ensure its availability in the desired format, at the appropriate time, and with the required speed, thereby facilitating efficient information exchange and decision-making processes. (Abdat & I.Hayoula, 2023, p. 49)

Information and Communication Technology (ICT) refers to the integration of modern tools and techniques such as computers, printers, the Internet, wireless networks, scanners, mobile devices, monitoring systems, software applications, and other advanced means used in collecting, storing, processing, distributing, and transmitting data with speed and precision. Its primary purpose is to support decision-making, problem-solving, and data analysis to achieve organizational objectives (Bramgui & Chehaoui, 2025, p. 5).

Information and Communication Technology (ICT) has emerged as one of the most influential factors shaping global economic growth patterns in the new millennium. It occupies an increasingly critical role in the information age, embodying cutting-edge technologies that have transformed both human life and business practices. A practical understanding of ICT considers it as encompassing all forms of digital technologies that enable individuals, businesses, and

organizations to effectively utilize information. Fundamentally, ICT constitutes the infrastructure and components that support modern computing systems. However, a universally accepted definition of ICT remains elusive, as the term may broadly refer to various computing technologies—including hardware, software, networking, and the Internet—or even to the professionals who develop and employ these technologies. (Tchikou & Bouklia, 2023, p. 1130).

In another perspective, ICT can be described as a system that combines multiple methods, tools, strategies, and mechanisms to process and transmit information or content to the intended audience. The process typically begins with gathering and monitoring data from the environment, followed by stages of processing that include organizing, tabulating, storing, coding, and analyzing the data in order to generate meaningful outcomes.

1.2 The Difference Between ICT and IT in banking sector

Information and Communication Technology (ICT) is a broad concept that combines both Information Technology (IT) and Communication Technology. IT refers to the use of computers, software, and other digital systems for storing, processing, and managing information. ICT expands on this by also including technologies and systems that enable electronic communication and sharing of information, such as the Internet, mobile networks, telecommunication devices, and digital media.

In the banking sector, ICT plays a pivotal role by revolutionizing how financial services are delivered. Banks use ICT not only for internal data processing and record-keeping, but also to facilitate communication with customers and other banks. Applications of ICT in banking include:

- Electronic banking (e-banking), which enables customers to access their accounts and conduct transactions over the Internet or via mobile applications.
- Automated Teller Machines (ATMs), which allow clients to withdraw cash, check balances, and perform transfers outside of traditional bank hours.
- Electronic Funds Transfer (EFT) systems, which enable quick and secure money transfers between accounts without the need for physical cash.
- Smart cards, telephone banking, and point-of-sale systems, all of which streamline customer service and improve transaction efficiency.

The integration of ICT in banking has improved service delivery, increased operational efficiency, widened access to financial products, and enhanced customer satisfaction, making banking services more accessible and reliable in the digital age.

Table 01: The Difference Between ICT and IT

Aspect	Information Technology (IT)	Information and Communication Technology (ICT)
Definition	Focuses on computer-based technology used to process, store, and manage data within banks.	Includes IT plus communication technologies enabling information transmission and connectivity.
Scope	Primarily about internal IT systems like databases, software, hardware, security, and automation in banks.	Broader scope includes IT systems plus telecommunications, internet, mobile banking, and network communication.
Main Functions	Data processing, system automation, security management, record keeping, software applications.	Customer service channels like internet banking, mobile apps, SMS alerts, online payments, and data sharing across networks.
Role in Banks	Supports internal operational efficiency, data handling, IT infrastructure, and bank management systems.	Enhances customer interaction, remote banking, service delivery, real-time communication, and market reach.

Examples in Banking	ATMs management, core banking software, data centers, internal data security systems.	Internet banking platforms, mobile banking, telecommunication for customer services, email alerts, online transaction systems.
Impact on Banking	Improves internal data accuracy, operational speed, and system reliability.	Expands banking services accessibility, enables flexible, anytime-anywhere banking, and improves customer experience.

Source: Prepared by the researcher

In summary, while IT is concerned mainly with computers and information systems, ICT covers all of IT plus communication technologies, making it fundamental to the transformation and modernization of banking services.

2. Components of (ICT) and Evolution of (IT) in Banking

2.1 Components of Information and Communication Technologies

- ✓ Human Resource Skills: These form the foundation of the entire ICT process. Although advancements in artificial intelligence have enabled programs and equipment to operate autonomously with minimal human intervention, skilled individuals remain indispensable for managing and overseeing transactions effectively.
- ✓ Databases: Serving as the essential raw material, databases connect the two primary parties—the business and the service-providing organization. They contain critical information about clients, the business

environment, organizational needs, preferences, and marketable products or services.

- ✓ Communication Networks: With continuous advancements in information technologies, communication networks have evolved to support diverse and dynamic aspects of life and business interactions.
- ✓ Hardware: This category encompasses all tangible devices utilized by customers and organizations alike, which serve purposes such as collecting data, enabling transactions and marketing processes, and managing feedback effectively.
- ✓ Software: Acting as the operational core within devices, software facilitates communication between customers and organizations, enabling the execution of various transactions and interactions. (Miclean, 2000, p. 18)

2.2 Evolution of Information Technology

Although the term "information technology" is relatively modern and closely linked with computers, its origins extend beyond recent developments to encompass earlier forms of information and communication. The evolution of information technology parallels the advancement of its industry, allowing us to outline a timeline characterized by four fundamental stages:

A) The Systems-Based Phase (1964–1981):

During this period, Grosh's Law was observed, which states that the computing power increases proportionally to the square of its cost, implying that as computer speed increased, the cost decreased significantly.

B) The Personal Computer-Based Phase (1981–1994):

This stage coincided with the emergence of Moore's Law, describing the exponential growth in computing power and operational capabilities of personal computers.

C) The Network-Based Phase (1994–2005):

During this phase, Metcalfe's Law came into effect, indicating that the value of a network grows exponentially as the number of its connected users increases, thus enhancing its reach and effectiveness.

D) The Platform-Based Phase (2005–2015):

This phase saw the introduction of the Transformation Law, which posits that the extent of industry transformation is proportional to the square of the industry's added value percentage, measured through abstract information (such as digital data) as a key driver for innovation and operational change. (Mebtouche, 2023, p. 148)

3. Importance and objectives of Information and Communication Technology (ICT) in Banking

ICT plays a vital role in modern banking by improving the quality and efficiency of services. It enables banks to transition from traditional face-to-face interactions to electronic and digital banking, increasing convenience for customers and reducing service costs. Using ICT, banks can provide real-time, anywhere-anytime access to banking services, enhancing customer satisfaction and expanding their

client base. ICT also supports competitive advantage by enabling innovation and flexibility in service delivery. It helps banks manage large volumes of data, streamline operations, and respond quickly to market changes and customer needs.

3.1 Objectives of ICT in Banking

Organizations can use these technologies to achieve the following:

- Rapidly assess costs alongside the economic and financial benefits related to production expenses, customer service, product marketing, and other operational areas.
- Ensure full transparency, minimize the likelihood of errors, and optimize the use of time.
- Offer the ability to simplify procedures by maintaining a focus on the objective or desired outcome rather than the processes themselves, despite their importance.
- Information technologies prioritize the swift transmission of data to customers at minimal cost while maximizing impact. Crucially, this data transfer occurs interactively between the organization and its customers.
- Enhance organizational excellence by increasing awareness of the organization's current status and the surrounding environment, thereby enabling more effective activation of its presence and opportunities to achieve superior performance (Al-Mayali, Al-Tamimi, Subaih, & Al-Musaidi, 2023, p. 437)

3.2 The Importance of Information and Communication Technology

The advancement and modernization of institutions, which confer a competitive edge and foster diverse business environments, are profoundly supported by information technology. Its contributions can be outlined as follows:

- ✓ It enables effective oversight of operational processes.
- ✓ It enhances communication channels across various organizational departments.
- ✓ It saves valuable time for senior management, permitting focus on strategic priorities.
- ✓ It aids in reducing the administrative workforce size.
- ✓ The evolution of contemporary organizations hinges on sophisticated information systems founded on integrated databases, necessitating a comprehensive understanding and strategic utilization of information and communication technologies for efficient knowledge management
- ✓ It facilitates the acquisition of critical information required to execute tasks accurately and distinctively.
- ✓ It generates new employment prospects.
- ✓ It leverages the advantages of contemporary communication technologies.
- ✓ It facilitates connections among individuals, institutions, or entities irrespective of temporal or spatial constraints.
- ✓ It minimizes time and distance barriers, optimizes resources, and eliminates spatial limitations.

- ✓ It empowers organizations to attain significant outcomes, including market expansion and enhanced quality.
- ✓ It improves the management efficiency of human resources and customer relations.
- ✓ Information technology comprises the physical hardware of computers, accompanying software, and applications, alongside the processes of processing, storing, displaying, transmitting, and retrieving information with requisite efficiency, speed, and precision. This enables users to effectively leverage these technologies to satisfy diverse organizational and business needs, while also improving feedback mechanisms between the interacting parties.(Abdullah, 2007, p. 70).

The significance of information technology in organizational life lies in its contribution to the sustainable production of knowledge. Information technology stands as a crucial driver of economic growth, making it difficult to envision a structured modern existence without these technologies and the presence of computers. The digital realm and information have become fundamental elements in contemporary life. (Mebtouche, 2023, p. 145)

4. From traditional banking to digital transformation

4-1 Core Banking Functions (Traditional Banking)

- Banks fulfill several critical roles in supporting economic activities and serving clients:
- A) Savings and Deposits: Banks mobilize surplus funds from individuals through various deposit schemes.
- B) Funds Management: Banks allocate deposited funds to investments, purchases, and insurance activities to generate returns that cover operational costs and depositor interests.
- C) Lending and Financing: Banks provide essential credit and financing to businesses and individuals lacking sufficient capital for economic, commercial, and industrial operations.
- D) Advisory Services: Banks offer consulting services, including project feasibility analyses to support financing and insurance decisions.
- E) Commercial Intermediation: Banks act as intermediaries by financing business transactions or offering insurance solutions, which enhance clients' financial positions. (Mushraf, 2024)

4.2 Concept of Digital Transformation

The term "digitalization" is more commonly used today than the older expression "digital transformation." Digitalization typically refers to a specific and well-defined scope, such as a particular process or task. In contrast, digital transformation encompasses a broader and more systematic change within organizations—such as businesses, governments, or societies—where the transformation is profound. This transformation involves adopting a new

paradigm that challenges existing beliefs, organizational structures, and practices (Bouacheria & Salhi, 2022)

a. Digitalization:

Digitalization refers to the process of converting an object, tool, process, or task into a digital code to replace it and enhance its performance. The term "digital" originates from the Latin word "digitus," meaning "related to the fingers." Initially, the term "electronic" was more commonly used to describe new internet-related services, such as e-business, e-agency, and e-travel. However, with the introduction of the first iPhone in 2007, daily life began to shift significantly toward digital technologies. The rise of mobile applications marked a new phase for the web.

b. Digital transformation:

The concept of "digital transformation" or "digitalization" entails a shift from a physical to a virtual state. Contrary to initial perceptions, this process is not always a radical digital revolution; rather, in many cases, it represents a transition or evolution of tasks. Based on these definitions, digital transformation can be understood as a comprehensive process that entirely replaces traditional manual tasks with advanced digital alternatives. This reinvention encompasses all activities within a business. (Mebtouche, 2023)

4.3 Reasons of digitalizing the banking sector

The digital transformation of the banking sector was driven by social, economic, and technological factors that integrated digital tools into daily banking activities.

a. Evolving Customer Expectations

The widespread use of the internet and advanced mobile devices has significantly changed consumer habits. Customers have become more connected and increasingly prefer remote banking services such as online and mobile banking. As a result, customer expectations have risen; they demand quick service to avoid wasting time. These new habits reflect lifestyle changes fueled by technological advancements. Customers appreciate the convenience of accessing goods and products with a single click online. The COVID-19 pandemic further accelerated the shift towards digital banking. This transformation affected both banks and customers, as communication shifted from a one-way business-to-customer model to an interactive, two-way exchange. Today's customers are well-informed through abundant online information and expect efficient, personalized service with prompt responses to their inquiries (Amin, 2023).

b. **Online Banks as New Competitors**

Online banks emerged in the 2000s alongside the digital revolution, offering services similar to traditional banks, including account opening, money transfers, withdrawals, and loans. They attracted many customers by offering lower costs and time savings compared to

conventional banks. Their always-on accessibility through a simple click adds convenience to customers' daily lives (Lecigne, 2013).

c. **The Rise of FinTech**

FinTech, a combination of "finance" and "technology," refers to innovative startups . FinTech companies have disrupted the traditional banking monopoly by providing services tailored to digital-era customers, lowering barriers to access, offering financing through venture capital, and operating under more flexible regulations that benefit consumers (Bouacheria & Salhi, 2022).

The banking sector itself comprises diverse systems, including commercial and Islamic banking, aiming to fulfill multiple goals such as financing, deposits, trading, insurance, and credit. Banks strive to reach customers by expanding branch networks to maximize geographic coverage. By financing a wide range of economic activities—education, health, industry, real estate, and more—the banking sector stimulates the economy, creates jobs, and promotes economic growth (Mushraf, 2024).

4.4 The necessity of digital transformation of banks:

Based on the review of (Boukrouh, 2022, p. 484), the key reasons driving the necessity of digital transformation in banks can be summarized in the following table:

Table 02: Key Drivers for the Digital Transformation of Bank

Reason	Description
Changing Behavioral Patterns of Consumers	The widespread use of new technologies, internet, and mobile devices has transformed consumer behavior. Consumers now prefer digital interactions in many aspects of life, especially in financial services.
Legacy IT Systems	Consumers expect instant access to products and services. Banks have realized that their existing IT infrastructure is often inadequate to keep pace with rapid front-end business changes.
Emergence of New Competitive Fields	Although no single fintech threatens traditional banks alone, the banking industry faces pressure from a growing fintech sector. Venture capital investment in fintech increased by 120% to $40 billion in 2018, intensifying competition.

Source: Prepared by the researcher depending on (Boukrouh, 2022, p. 484)

5- Problems of ICT in banking

Several key problems affect mobile banking users, based on existing research:

- Security and Risk: Mobile customers are vulnerable to scammers who send fraudulent emails or SMS messages pretending to be from banks, requesting personal banking details. Stolen devices put customers at even greater risk, especially since many users save personal information directly on their phones, increasing exposure to fraud. Concerns over hacking and theft discourage some users from adopting mobile banking
- Compatibility: While banks offer mobile services to all customers, some are limited by the compatibility of their devices, restricting access to certain banking services.
- Cost: In addition to needing compatible devices, customers may face costs related to data usage, SMS fees, and software required for mobile banking.
- Scalability and Reliability: Banks must ensure that mobile banking services work seamlessly anytime and anywhere. A failure to maintain reliable services risks losing customer confidence.

Application Distribution: Customers expect banks to regularly update and upgrade mobile banking applications. However, ensuring smooth updates, upgrades, and downloads presents technical challenges (Cavus & Chingoka, 2015, pp. 64-65)

Chapter 2: General Framework of Electronic Banking

The rapid advancement of information and communication technologies (ICT) has profoundly transformed the banking industry, giving rise to electronic banking (e-banking) as a new paradigm for delivering financial services. E-banking allows customers to access banking products and services remotely through various electronic devices, including computers, smartphones, and tablets. This technological shift has revolutionized the traditional banking model by enhancing convenience, accessibility, and efficiency for both banks and their customers.

The adoption of electronic banking is driven by competitive pressures and evolving customer expectations in an increasingly digital world. This chapter provides a comprehensive overview of the conceptual underpinnings, key components, and operational mechanisms of e-banking. It also explores the benefits, challenges, and factors influencing the acceptance and usage of electronic banking systems.

Understanding the general framework of electronic banking is essential for grasping how financial institutions can leverage technology to improve service delivery, increase customer satisfaction, and maintain competitiveness in a dynamic market environment.

1- Electronic Banking: concept

1.1 Definition of electronic banking (e-banking)

Based on the review of definitions in the literature, the various conceptualizations of electronic banking are summarized in the table below:

Table 03: Definitions of Electronic Banking from Various Sources

Definition	Reference
E-banking is the provision of information and services by a bank to customers, establishing an electronic connection to manage financial transactions.	General banking concept
At its simplest, e-banking involves providing information about banks and services through a website. More advanced services include accessing accounts, transferring funds, making payments, and applying for loans via electronic channels.	General IT perspective
E-banking, also known as electronic banking or digital banking, refers to the use of electronic platforms and internet-based services for conducting banking transactions, encompassing online banking, mobile banking, ATM services, and digital payments to enable seamless financial operations without physical branch visits.	(Kumar,2024)
Electronic banking (e-banking) is defined as the automated delivery of traditional banking products and	(Al-Hamami,2023)

services through electronic communication and distribution channels, both within and outside the banking institution, aimed at improving customer service efficiency and accessibility.	

Sources: Prepared by the Researcher

1-2 The E-Banking revolution

Although various aspects of banking have been studied for decades, electronic banking (e-banking) only began to receive significant attention in information systems literature during the mid-1990s. The global economy has since become a compact "information village," accelerating research and exploration of the e-banking revolution. Importantly, e-banking functions more as a complementary channel for customer interaction rather than a replacement for traditional branches. Despite substantial investments in internet banking infrastructure, brick-and-mortar branches continue to play a vital role in retail banking.

The banking industry faces intense competition fueled by personalized, integrated financial services. E-banking success demands a radical overhaul of internal operations via seamless alignment of core functions, cutting-edge technologies, and streamlined processes. Banks prioritize innovation in service delivery channels to stand out, investing heavily in digital strategies to establish leadership in the rapidly evolving online banking ecosystem. (Guechi,2020,p8).

1.3 Characteristics of Electronic Banking Services

The Characteristics of electronic banking are summarized in the figure below:

Figure 01: The main Characteristics of electronic banking

Source: Prepared by the researcher

- ✓ **Ease of use:** Ease of use refers to designing self-service e-banking systems with intuitive interfaces and straightforward steps, enabling customers to navigate and complete tasks effortlessly without frustration—often termed usability in digital contexts .
- ✓ **Usefulness:** Usefulness describes the degree to which users believe a system enhances their performance, such as faster transactions in e-banking .
- ✓ **Cost saved:** Automated e-banking reduces customer costs in time and money through self-service innovations, positively influencing perceived service value by minimizing negative cost factors. (Magotra,2019, p9)

2- Benefits of Electronic Banking Services

2.1 From the Bank's Perspective:

- E-banking strengthens brand positioning as an innovative leader, enhancing market agility and responsiveness.
- Lowers operational expenses while reaching new customer segments through digital expansion.
- Boosts efficiency, deepens customer relationships, and elevates satisfaction levels.
- Delivers affordable, high-impact financial products and marketing opportunities like cross-selling loans and credit cards. (Shittu & Long, 2020).

2.2 From the Customer's Perspective

- Time Savings: Automation and user-friendly tools enable rapid transactions and account management, minimizing manual efforts.
- Cost Reduction: Access to services incurs lower fees by avoiding branch visits and streamlining processes.
- 24/7 Convenience: Services available anytime without physical branches, supporting flexible banking.
- Instant Access: Real-time account details and transactions from anywhere.
- Improved Cash Management: Online tools accelerate cash cycles and offer diverse digital instruments.
- Fast Transactions: Enables last-minute transfers with swift processing.

- Greater Control: Download histories for analysis before transactions, empowering informed decisions.

3- Components of Electronic Banking: ATMs and POS Systems

3.1 Automated Teller Machines (ATMs): Definition, Importance, and Types

a. **Definition and importance of Automated Teller Machines (ATMs):**

Automated Teller Machines (ATMs) are electronic banking terminals that enable customers to perform financial transactions such as cash withdrawals, deposits, fund transfers, and balance inquiries without the need for direct interaction with bank staff. ATMs are connected to the bank's network and operate 24/7, providing convenient access to banking services remotely (Nguyen, 2022)

ATMs play a pivotal role in electronic banking by enhancing customer accessibility and operational efficiency. They offer significant advantages including round-the-clock service availability, reduced transaction processing time, lower operational costs for banks, and broadened geographic reach, particularly benefiting customers in remote or underserved areas (Smith & Lee, 2023). By facilitating self-service banking, ATMs contribute to the digital transformation of financial institutions and improve customer satisfaction through faster, more convenient service delivery (Brown, 2021).

b. Types of Automated Teller Machines (ATMs)

Automated Teller Machines (ATMs) have evolved significantly to meet diverse banking needs and enhance customer experience. The various types of ATMs can be classified as follows:

- **Basic Cash Dispenser ATMs**: These machines primarily enable cash withdrawals and balance inquiries, offering essential banking services without additional features. (Jain & Kumar, 2023)
- **Full-Service ATMs:** Beyond dispensing cash, these ATMs facilitate deposits, fund transfers, bill payments, and account statement printing, providing a comprehensive self-service banking experience. (Smith & Brown, 2022)
- **Recycling ATMs**: These advanced machines accept deposits and reuse the deposited cash for dispensing to other customers, which improves cash management efficiency for financial institutions. (White & Jones, 2021)
- **Interactive Teller Machines (ITMs):** Incorporating video conferencing, ITMs allow customers to interact with bank representatives in real-time for more complex transactions, blending traditional teller services with automated convenience (Williams, 2020)
- **Drive-Through ATMs:** Designed for customer convenience, these ATMs enable financial transactions from the comfort of a vehicle, commonly located in drive-through banking facilities
- **Bitcoin ATMs:** Specialized ATMs permitting the purchase and sale of cryptocurrencies, bridging conventional banking with digital assets.

- **Mobile ATMs**: Portable ATM units deployed temporarily at events or remote locations to provide banking services where permanent machines are unavailable.
- **White Label ATMs**: Operated by non-bank entities, these machines offer cash withdrawal services connected to multiple banks, typically found in retail outlets or high-traffic public areas (Kumar & Patel, 2024)

3.2 Point of Sale (POS)

a. Definition of Point of Sale (POS)

Point of Sale (POS) systems are integrated hardware and software solutions used by businesses to facilitate and manage sales transactions. They encompass devices such as card readers, barcode scanners, cash registers, and software platforms that handle inventory, customer data, and payment processing. POS systems enable efficient transaction handling, real-time sales tracking, and improved customer service in retail, hospitality, and other sectors (Laudon & Traver, 2021).

b. Types of POS Systems

- ✓ Fixed POS Systems: Stationary terminals located at checkout counters in stores, including hardware for scanning, payment acceptance, and receipt printing (King & Morris, 2020).
- ✓ Mobile POS (mPOS) Systems: Portable devices connected to smartphones or tablets, allowing sales and payments anywhere within the business premises or remotely (Nguyen & Patel, 2022).

- Cloud-Based POS Systems: Software hosted on remote servers accessible via the internet, providing flexibility and ease of updates without local infrastructure (Smith, Johnson, & Roberts, 2019)
- Self-Service Kiosks: Customer-operated POS terminals enabling independent order placement and payment, common in fast-food and transport sectors (Jones & Brown, 2023)
- Hybrid POS Systems: Combine features of traditional and cloud-based POS systems, offering local processing capabilities alongside cloud connectivity.

4- Advantages and disadvantages of internet banking

4.1 Advantages of internet banking

- Internet banking saves time and offers convenience by allowing customers to bank anytime, seven days a week, without visiting a branch (Wong, 2005)
- Transactions are executed and confirmed almost immediately.
- Security is enhanced as customers can set their own secret PINs, reducing unauthorized access.
- Customer safety is improved by minimizing the need to carry large amounts of cash. (Koskosas, 2011)
- Internet banking enables quick access to multiple services such as fund transfers, bill payments, and account monitoring.

4.2 Disadvantages of internet banking

- The cost of acquiring and maintaining suitable computer equipment or internet access can be a barrier compared to traditional banking methods (Wong, 2005)
- Depositing or withdrawing cash is not possible through internet banking, requiring visits to physical branches or ATMs .
- Security risks exist from hackers and fraudsters targeting online transactions.
- The impersonal nature of online banking may discourage users who prefer face-to-face interactions and personalized service .
- Internet banking can be challenging for first-time users due to complex navigation and extensive personal information requirements for account opening.
- Tutorials and live customer support can mitigate these difficulties but require user willingness to adapt. (Pahnila, 2006)
- Overall, despite some limitations, the advantages of internet banking generally outweigh its disadvantages, especially for institutions.

5- Risks in Electronic Banking

Risk management in online banking involves identifying, assessing, and mitigating multiple categories of risk that impact a bank's earnings, capital, reputation, and operational stability.

5.1 Types of Risks in Electronic Banking

Figure 02: Types of Risks in Electronic Banking

Source: Prepared by researcher

a. Strategic Risk

- Arises from poor business decisions, particularly by board and management, regarding technology adoption and internet banking expansion without thorough cost-benefit analysis.
- Lack of understanding on strategic and technical aspects can raise financial institution's risk exposure.

b. Operational-Transactional Risk

- Also called security or IT risk; caused by fraud, errors, negligence, or inability to maintain service levels.
- Internet banking products face high operational risk due to complexity of services and technology, needing sophisticated controls and constant availability.
- Managing customer volume and introducing non-standardized innovative services increase this risk.

c. Compliance Risk

- Risk arising from failure to adhere to laws, rules, regulations, and ethical standards in delivering internet banking services.
- Includes challenges with cross-border transactions due to conflicting laws and privacy obligations.
- Violations can lead to financial losses, reputational damage, and reduced business opportunities. (Deghnouche & Mezghiche, 2023, p. 422)

d. Reputational Risk

- Results from negative public perception linked to poor internet banking service quality, such as site downtime, security breaches, or buggy software.
- Customer trust is vital; poor experience can drive customers to competitors offering simpler, safer services.
- Customer education on transactional risks is important.

e. Information Security Risk

- Encompasses threats from hacking, viruses, data theft, and denial-of-service attacks.
- Despite perimeter security, internal security gaps and outdated systems pose risks.
- Continuous updates and safeguards are essential.

f. Credit Risk

- Linked to customers failing to meet financial obligations.
- Internet credit services face challenges verifying identity, collateral, and jurisdiction issues especially in international contexts.
- Differences in accounting standards, credit reporting, and regulatory environments complicate credit evaluations.

g. Interest Rate Risk

- Caused by fluctuations in interest rates affecting asset-sensitive or liability-sensitive banks differently.
- Interest rate changes impact the bank's net interest income. (Deghnouche & Mezghiche, 2023, p. 423)

5.2 Managing Electronic Banking Risks

Electronic banking risks, such as cybersecurity threats, operational failures, and compliance issues, can be effectively managed through structured strategies outlined in Basel Committee principles and Algerian banking studies.

- **Board Oversight**

  Senior management must establish a clear e-banking risk strategy, define risk appetite, and conduct periodic reviews of systems and controls. This includes integrating e-banking risks into the bank's overall risk framework with oversight on outsourcing arrangements (Oulad Haimouda,2018, p350)

- **Security Controls**

  Implement multi-factor authentication (MFA), end-to-end encryption (TLS), firewalls, and segregation of duties to prevent breaches. Algerian banks emphasize cybersecurity updates to counter fraud and system downtime.

- **Outsourcing Management**

  Perform ongoing due diligence on third-party providers, ensuring compliance with security and recovery standards. In Algeria, partnerships should align with Basel to avoid over-reliance.

- **Incident Response and Compliance**

  Develop business continuity and incident response plans for availability, alongside customer risk disclosures and privacy measures. Local studies highlight these for enhancing banking services (Qashi & El-Othmani, 2010, p 245).

Chapter 3: Electronic Payment Systems

In today's digital economy, electronic payment systems have emerged as a fundamental component of the modern financial landscape, revolutionizing the way monetary transactions are conducted. These systems serve as the backbone of digital finance, enabling the rapid, secure, and efficient transfer of funds across various platforms and geographical boundaries. Unlike traditional cash or check-based transactions, electronic payment systems facilitate a variety of financial operations through digital infrastructure, seamlessly connecting individuals and businesses in real time.

The evolution of electronic payment systems has been driven by technological advancements such as online banking, mobile payment applications, and point-of-sale terminals. These innovations have not only enhanced convenience for users but also provided significant advantages in terms of speed, security, accuracy, and cost-efficiency. Today, businesses and consumers alike benefit from instant transaction processing, improved record-keeping, and the ability to conduct financial activities anytime and anywhere.

As the landscape continues to evolve, understanding the inner workings, benefits, and challenges of electronic payment systems becomes crucial for banking professionals, financial managers, and policymakers. This chapter aims to offer a comprehensive overview of the core concepts, technological frameworks, and strategic implications of electronic payment systems, equipping learners with the knowledge necessary to navigate and leverage these innovative financial tools effectively.

1- Defining and Characteristics of Electronic Payment Systems

1.1 Defining the E-Payment System

An e-payment system encompasses a set of transfer mechanisms that facilitate the circulation of funds, including banking procedures and interbank money transfers. Fundamentally, a payment system acts as a third-party intermediary that enables the payer to transfer money and the payee to receive it, effectively serving as the backbone that connects both parties (Awais, Aziz, & Muhammad, 2019)

Electronic payment systems allow for the transfer of funds without geographic or temporal restrictions, leveraging various supporting technologies. These systems are generally classified into three broad categories: traditional cash transactions, credit and debit card payments, and digital currencies.

The advent of electronic payment systems has revolutionized financial transactions worldwide by providing faster, more secure, and cost-effective payment options. These systems replace traditional physical means of payment, such as cash and checks, with electronic methods that enhance convenience and security. According to Al-Taie (2010), electronic payment systems facilitate seamless and secure transactions that improve user experience and play a vital role in modern commerce.(Al-Taie, 2010)

1.2 **Characteristics of Electronic Payment Systems**

Electronic payment systems require the necessary infrastructure to facilitate secure and efficient payments over the Internet. They have become integral to the

continued growth of electronic commerce and digital business. To gain global acceptance, e-payment systems must exhibit certain essential characteristics:

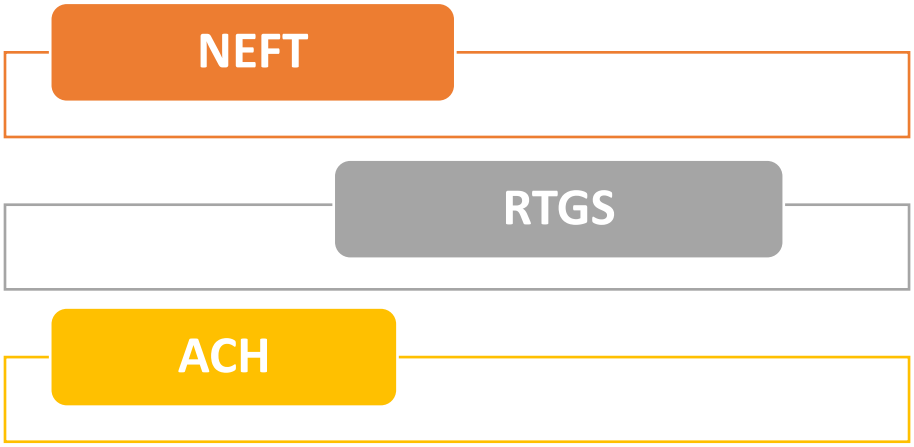
- Atomicity: Transactions must be completed fully without any loss of existing funds, ensuring the new transaction is either fully executed or not at all.
- Confidentiality: Transaction records must be securely maintained within the organization and accessible only to authorized personnel, ensuring privacy and traceability when needed.
- Security: The system must safeguard against fraud and unauthorized access throughout the transaction process.
- Availability: The system should remain operational and accessible during designated working hours to ensure continuous service.
- Cost-effectiveness: Transaction costs must adhere to regulatory guidelines and remain economically viable.
- Integration Capability: The system must be interoperable with existing payment systems that share similar properties, allowing seamless integration within a unified environment (Awais, Aziz, & Muhammad, 2019, p. 3)

2- Core Payment Systems in Modern Banking

This section presents an overview of three fundamental payment systems widely used in modern banking environments to facilitate efficient and secure electronic fund transfers: National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), and Automated Clearing House (ACH). Understanding

their characteristics, operational frameworks, and typical use cases provides valuable insight into the backbone of electronic financial transactions.

Figure 03 : Core Payment Systems in Modern Banking



Source: Prepared by researcher

2.1 National Electronic Fund Transfer (NEFT)

National Electronic Fund Transfer (NEFT) is a centralized electronic funds transfer system managed by the Reserve Bank of India (RBI). It enables the transfer of money from one bank account to another in different banks across India on a deferred net settlement basis. Transactions are processed in hourly batches, making the system reliable and cost-effective for routine fund transfers such as salary credits or bill payments. NEFT supports all transaction sizes

without limits, offering accessibility via internet banking, mobile apps, ATMs, and branches with secure beneficiary validation (Reserve Bank of India, 2024)

2.2 Real Time Gross Settlement (RTGS)

Real Time Gross Settlement (RTGS) is an electronic money transfer system designed for continuous, real-time, high-value interbank settlements. Unlike NEFT, RTGS settles transactions individually and immediately, providing finality and reducing counterparty risk. It is predominantly used for urgent and large-value transactions, such as corporate payments and government disbursements. Operating hours are limited to banking hours, and it maintains minimum transaction thresholds, typically above INR 2 lakh, to separate it from retail banking transactions (Reserve Bank of India, 2024) (ICICI Bank, 2021)

2.3 Automated Clearing House (ACH) and Payment Gateways

Automated Clearing House (ACH) systems facilitate bulk transfer of electronic funds, particularly suited for recurring payments like payroll, utility bills, or vendor payments. ACH processes transactions in batches, offering efficient and cost-effective bulk payments with predictable clearing times (Awais, Aziz, & Muhammad, 2019). Payment gateways serve as technology platforms that authorize and process online payments securely by encrypting sensitive data, connecting merchants to financial institutions. They support diverse payment methods including cards, digital wallets, and net banking, essential for e-commerce and digital financial ecosystems (Al-Taie, 2010), (Razorpay, 2025)

3- Advantages and Challenges of Electronic Payment Systems

1.3 Advantages of Electronic Payment Systems

- ✓ **Speed and Efficiency**:

Electronic payment systems enable near-instantaneous financial transactions, eliminating delays commonly associated with handling physical cash or conducting in-person banking activities. This rapid processing significantly enhances operational efficiency.

- ✓ **Security and Accessibility:**

By incorporating advanced encryption protocols and multi-factor authentication, electronic payment systems offer robust protection against fraud and unauthorized access. Additionally, these systems provide users the convenience of conducting transactions from virtually anywhere using mobile devices or computers.

- ✓ **Catalyst for E-Commerce Growth:**

Serving as a fundamental component of e-commerce, electronic payment systems facilitate smooth online purchasing experiences for consumers while offering merchants secure and efficient mechanisms to process payments.

- ✓ **Cost Reduction and Process Simplification**:

By reducing reliance on cash and manual accounting tasks, electronic payment systems help businesses lower operating costs and simplify complex logistics. This streamlining of payment processes not only saves

money but also reduces errors and speeds up transactions, making everyday business operations more efficient and manageable.

- ✓ **Enhanced Financial Transparency and Recordkeeping:**

These systems automatically generate detailed transaction records, enabling precise monitoring of expenditures and supporting more effective financial management practices.

- ✓ **Diverse and Flexible Payment Methods:**

Users benefit from an extensive variety of payment options, such as credit and debit cards, digital wallets, bank transfers, and cryptocurrencies, allowing for tailored payment strategies that meet individual preferences and business needs. (Benseddik, 2025, p. 79)

3.2 **Challenges of Electronic Payment Systems**

- ✓ **Cybersecurity Risks and Data Vulnerability**:

Reliance on digital platforms for financial transactions increases exposure to cybersecurity threats, including hacking, phishing, and identity theft. Without adequate protection, sensitive financial data may be exploited by malicious actors, highlighting the critical need for robust legal frameworks and technological safeguards.

- ✓ **Rising Cybercrime Incidents**:

Sophisticated criminal enterprises increasingly target electronic payment systems through non-violent digital offenses such as fraud and network

disruptions. Addressing these threats requires stringent regulatory oversight and proactive enforcement to safeguard financial networks. (Benseddik, 2025, p. 80)

- ✓ **Technology disruptions**: Despite continuous improvements in online banking technology, business owners who rely heavily on immediate and constant access to banking services face certain challenges. One notable disadvantage is the reliance on a stable internet connection. Technology disruptions—such as power outages, server issues at the bank, or being in remote locations—can adversely affect access to online accounts. Additionally, scheduled maintenance of banking websites can temporarily suspend access, compelling users to seek alternative service channels. (Deghnouche & Mezghiche, 2023, p. 481)

Chapter 4: Electronic Payment Instruments

Electronic payment instruments constitute a vital component of modern financial systems by enabling the seamless execution of transactions without the use of physical cash. These instruments include a diverse range of tools that facilitate payments electronically, thereby enhancing the speed, convenience, and security of financial exchanges between individuals, businesses, and institutions.

As the proliferation of digital technologies accelerates, so too does the variety of electronic payment instruments available in the market. These encompass credit and debit cards, electronic fund transfers, digital wallets, virtual cards, mobile payment applications, and emerging instruments such as cryptocurrencies. Each payment instrument fulfills specific roles and caters to different user needs, reflecting the ongoing evolution of payment ecosystems worldwide.

Understanding the features, advantages, and challenges of various electronic payment instruments is essential for financial professionals operating in banking, finance, and insurance sectors. This chapter aims to provide a comprehensive overview of the main types of electronic payment instruments, their operational mechanisms, and their significance in supporting the digital transformation of payment services.

1. Evolution of electronic means of payment

An electronic means of payment can be defined as any method of transferring funds electronically, utilizing communication networks such as the Internet and telephone systems.

It is important to note that the origins of electronic payment systems trace back to the United States in the early 1950s, marked notably by the introduction of credit cards and automated teller machines (ATMs). By the 1960s, credit cards had become dominant in most developed countries, with early examples including "American Express" and "Diners Club" in North America, and the "Blue Card" in France, introduced in 1967. The 1970s witnessed a rapid expansion in electronic payment adoption spurred by advancements in information and communication technologies (ICT), which facilitated the emergence of electronic payment terminals.

However, it was the advent of the Internet in the 1990s that truly accelerated the growth of e-commerce and electronic payments on a global scale. The following table outlines the major milestones in the evolution of electronic payment methods since their inception (Mokrane & Ibeghouchene, 2024, p. 121)

Table 4: Evolution of electronic payment methods

1950-1970	1970-1990	1990-2000	2000-2010	2010-2020
- Birth of the first cardboard payment cards Diners Club American Express -Birth of the first credit cards: Franklin National Bank Cetlem, Sofinco, Eurocard	-Introduction of magnetic stripe cards. -Deployment of the first automatic teller machines (ATMs) in Belgium and Japan. - Creation of the Visa and MasterCard networks.	-Launch of smart cards for increased security. -Arrival of electronic wallets: Proton and GeldKarte.	-Birth of electronic wallets like PayPal. -Advent of contactless bank cards. -Birth of the cryptocurrency Bitcoin	-The rise of contactless mobile payment via NFC technology. -Development of mobile payment applications using QR code scanning

Source: Mokrane Ali & Ibeghouchene *Saadia;* (2024), Electronic means of payment in the world and in Algeria: investigation into the factors influencing the use of withdrawal and payment cards, forum for economic studies and research journal Volume: 08/ N°: 01,p122

- PayPal is a prominent online payment method that facilitates fund transfers between accounts identified by email addresses. Transactions are authenticated through passwords created during account registration. As of 2025, PayPal has grown to serve approximately 430 million active users worldwide, with over 28,000 new accounts created daily, underscoring its extensive global adoption.

- An electronic payment terminal (EPT), commonly known as a bank card reader, is an electronic device that enables merchants to accept payments instantly. EPTs typically connect to cash registers or business accounts and may include mobile terminals that accept payments via smartphones. To complete a transaction, customers insert a payment card and enter their personal identification number (PIN). More recently, contactless payments have become widespread; these allow transactions simply by placing the card near the terminal without entering a PIN, enabled by embedded Near Field Communication (NFC) chips in bank cards, offering a faster and more convenient payment option.

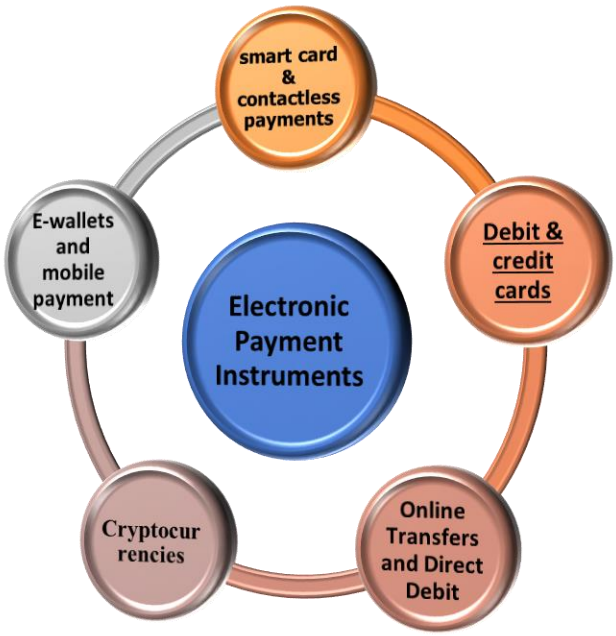
- QR code payments, short for "Quick Response Code," represent another form of contactless payment. This method allows users to complete transactions by scanning a QR code using their smartphones, providing a simple and efficient payment experience that continues to gain popularity globally. (Mokrane & Ibeghouchene, 2024, p. 122)

2. Types of electronic payment Instruments

Electronic payment encompasses a diverse range of instruments and technologies that facilitate the transfer of funds and completion of transactions through digital means. These systems have revolutionized the financial sector by providing alternatives to traditional cash and paper-based payments, increasing convenience, security, and efficiency for both consumers and businesses.

The following diagram summarizes the primary types of electronic payment currently in widespread use, highlighting the key categories shaping the modern payment landscape.

Figure 4: Types of electronic payment Instruments



Source: Prepared by the researcher

2.1 Debit and Credit Cards: Definitions and Key Differences

a. Debit and credit cards: Definitions

A **debit card** is a payment card issued by a financial institution that enables the cardholder to access and spend funds directly from their linked bank account. It provides a convenient and secure way to make purchases, withdraw cash, and perform banking transactions without the need for physical cash or checks. Transactions made with a debit card are typically authenticated through a personal identification number (PIN) or signature, ensuring security. Unlike credit cards, debit cards deduct money immediately from the user's account, limiting spending to the available balance and helping users manage their finances effectively (Kim, 2010).

A **credit card** is defined as a small plastic card issued to its owner by a financial institution or issuer as a system of payment. It permits the owner to purchase goods and services based on the owner's promise to pay for these goods and services at a later date. The issuer generates an account for the cardholder and grants a credit line that allows borrowing money to complete transactions with merchants. Credit cards function not only as a convenient payment method but also as a financing instrument embodying the "buy now, pay later" concept .

The term "credit" comes from the Latin word meaning trust, emphasizing the reliance on the creditworthiness of the cardholder. Credit cards also contribute to building credit history and offer benefits like rewards, cash backs, interest-free periods, and fraud protection features such as chip-and-pin or two-factor authentication (Kundan, 2023)

This academic understanding is supported by empirical research showing that credit card users are typically wealthier, better educated, and seek convenience and rewards in their payment tools. The literature also highlights issues such as complexity of credit card contracts, behavioral biases affecting repayments, and the impact of credit limits on borrowing behavior (Lee & Kwon, 2002)

b. Difference between Debit and credit cards

The table 5 outlines the Difference between Debit and credit cards.

Table 5: Difference between Debit and credit cards

Aspect	Debit Card	Credit Card
Definition	A payment card linked directly to the holder's bank account. When used, payment is deducted immediately from the account balance.	A payment card that allows the holder to borrow funds up to a predetermined credit limit to make purchases or withdraw cash.
Source of Funds	Uses existing funds in the bank account.	Extends credit by borrowing money from the issuer, to be paid back later either in full or installments with interest.
Payment Method	Immediate deduction of funds upon transaction.	Payment is deferred and settled monthly with possible

		interest charges on outstanding balances.
Credit Impact	Does not build credit history as spending is limited to own funds.	Helps build credit rating when payments are made responsibly.
Fees and Interests	Usually no interest charges, but may have low fees.	Interest charged on balances not paid in full; potential fees for late payment or exceeding credit limit.
Fraud Protection	Limited protection; funds withdrawn immediately during fraud, possible difficulty reversing transactions.	Enhanced security and consumer protection including the ability to dispute charges before payment.
Usage Flexibility	Limited to available account balance.	Offers higher spending power with credit limits, and often includes rewards and benefits.

Source: Prepared by the researcher depending on (Narayan, 2020)

2.2 Smart cards and contactless payments

a. Definition of Smart Cards and Contactless Payments

A smart card is a physical card embedded with a microprocessor chip capable of securely storing and processing data, often used for electronic payments, identification, and access control. (CIPP, 2020).

Contactless payments involve transactions made by simply tapping or waving a payment device (card, phone) near a terminal using near-field communication (NFC) technology.

A smart card is a payment or identification card embedded with a microprocessor or memory chip, enabling it to securely store and process data. Unlike traditional magnetic stripe cards, smart cards can perform advanced functions such as encryption and secure data exchange, which provide enhanced security and protection against fraud. These cards serve multiple purposes beyond payments, including identity verification, authentication, and data storage. Their embedded chip allows the card to interact with card readers through either physical contact or contactless communication technologies like NFC (Near Field Communication). Smart cards are widely used across various sectors, including banking, healthcare, telecommunications, and transportation, due to their robust security features and multifunctionality. The adoption of smart cards facilitates secure transactions, strengthens authentication protocols, and improves the efficiency of various service provisions (Islam, 2012); (Nouari, 2025)

b. Difference between smart card and contactless payments

The following table outlines the deference between Debit and credit cards.

Table 6: Difference smart card and contactless payment

Aspect	Smart Cards	Contactless Payments
Functionality	Can be contact (inserted into a reader) or contactless (communicating wirelessly via NFC/RFID).	Always use wireless NFC or RFID communication for fast, touch-free transactions.
Technology	Contains a microchip with storage, encryption, and processing capabilities embedded in the card.	Relies on NFC or RFID technology to exchange data wirelessly between device and terminal.
Usage Examples	Used in bank cards, ID cards, transit passes, access control cards.	Used in tap-to-pay credit/debit cards, mobile payment wallets, and transit fare systems.
Relationship	Contactless payments are a specific application of smart card technology using	Emphasizes wireless, fast payment transactions without

	contactless chips for wireless payments.	physical insertion, a mode made possible by smart card technology.

Source: Prepared by the researcher depending on : (Reserve., 2020)

2.3 E-wallets and mobile payment applications

E-wallets, or electronic wallets, are software applications that securely store the information needed for users to make payments online or at physical stores using specialized devices. This definition comprehensively captures the essence of e-wallets. Functionally, an e-wallet operates like a prepaid account that allows users to safely store multiple payment methods, including debit and credit cards, without repeatedly entering credentials. The usage and acceptance of electronic wallets are growing rapidly around the globe. (Nouari, 2025)

Mobile payment services refer to financial transactions conducted through mobile devices, enabling users to transfer funds, pay bills, or make purchases remotely through specialized applications or SMS-based technology. (Mallat, 2007)

Table 7: E-wallets and mobile payment applications

Aspect	E-wallets	Mobile Payment Applications
Definition	Digital platforms that securely store users' payment information for online transactions via various devices, including PC and mobile.	Smartphone apps that use technologies like NFC or QR codes for in-person and online payments.
Usage Scope	Used for multiple transaction types: online shopping, peer transfers, bill payments across devices.	Primarily used on mobile devices for quick, contactless transactions and peer-to-peer payments.
Accessibility	Available on any internet-enabled device.	Limited to mobile devices with specific hardware (NFC) or apps.
Technology	Hosted wallet services; often web and app accessible, storing multiple payment methods.	Mobile-specific payment apps integrating NFC, QR, Bluetooth, or biometrics.

Examples	PayPal, Skrill, Amazon Pay	Apple Pay, Google Pay, Samsung Pay

Source: Prepared by researcher depending on (Chellappan, Elanchselvan, & Abu-Samah, 2025), (Rahman, 2024)

2.4 Online transfers and direct debit systems

Direct debit is an electronic payment instrument allowing a payee to collect funds directly from a payer's bank account with prior authorization, facilitating automated and recurring payments without manual intervention..

Table 8: Comparison of Online Transfers and Direct Debit Systems

Aspect	Online Transfers	Direct Debit Systems
Initiation	Initiated and controlled by the payer	Initiated by the payee based on payer's prior authorization
Authorization	Payer authorizes each transaction	Payer provides a mandate authorizing the payee for debits
Use Case	One-time or scheduled payments directed by the payer	Recurring or one-off automated payments by payee

Control over Payment	High control by payer	Limited control during processing; governed by mandate terms
Payment Method	Bank-to-bank fund transfer	Automated withdrawal from payer's account
Security Measures	Payer-authenticated transactions	Mandate-based authorization with possibility for dispute
Examples	Wire transfers, online bill pay	Utility bill payments, subscriptions, membership fees

Source: Prepared by the researcher depending on (Thimpress., 2025), (Bundesbank, 2021)

2.5 Cryptocurrencies as Alternative Payment Instruments: Concepts and Types

a. Cryptocurrencies: concept

Cryptocurrencies originated from early research in cryptographic electronic cash during the 1980s, but the first successful decentralized cryptocurrency, Bitcoin, was introduced in 2009 by an anonymous entity known as Satoshi Nakamoto. Bitcoin innovated by implementing blockchain technology, a distributed ledger system that enables secure, peer-to-peer transactions without the need for central intermediaries. Since then, the cryptocurrency ecosystem has expanded significantly, with numerous alternative coins ("altcoins") developed to enhance transaction speed, privacy, and utility. This evolution is characterized by growing market capitalization, increased institutional adoption, and heightened regulatory scrutiny worldwide. (Marian, 2024)

" Cryptocurrencies are digital tokens that allow individuals to make payments directly to one another via an online decentralized system without intermediaries, using blockchain technology to record transactions securely and transparently". (Australia, 2018)

Additionally, cryptocurrency is an intangible digital asset recorded on a distributed ledger known as the blockchain, serving as a medium of exchange that facilitates peer-to-peer transactions outside traditional banking systems ." (ACCA, 2025)

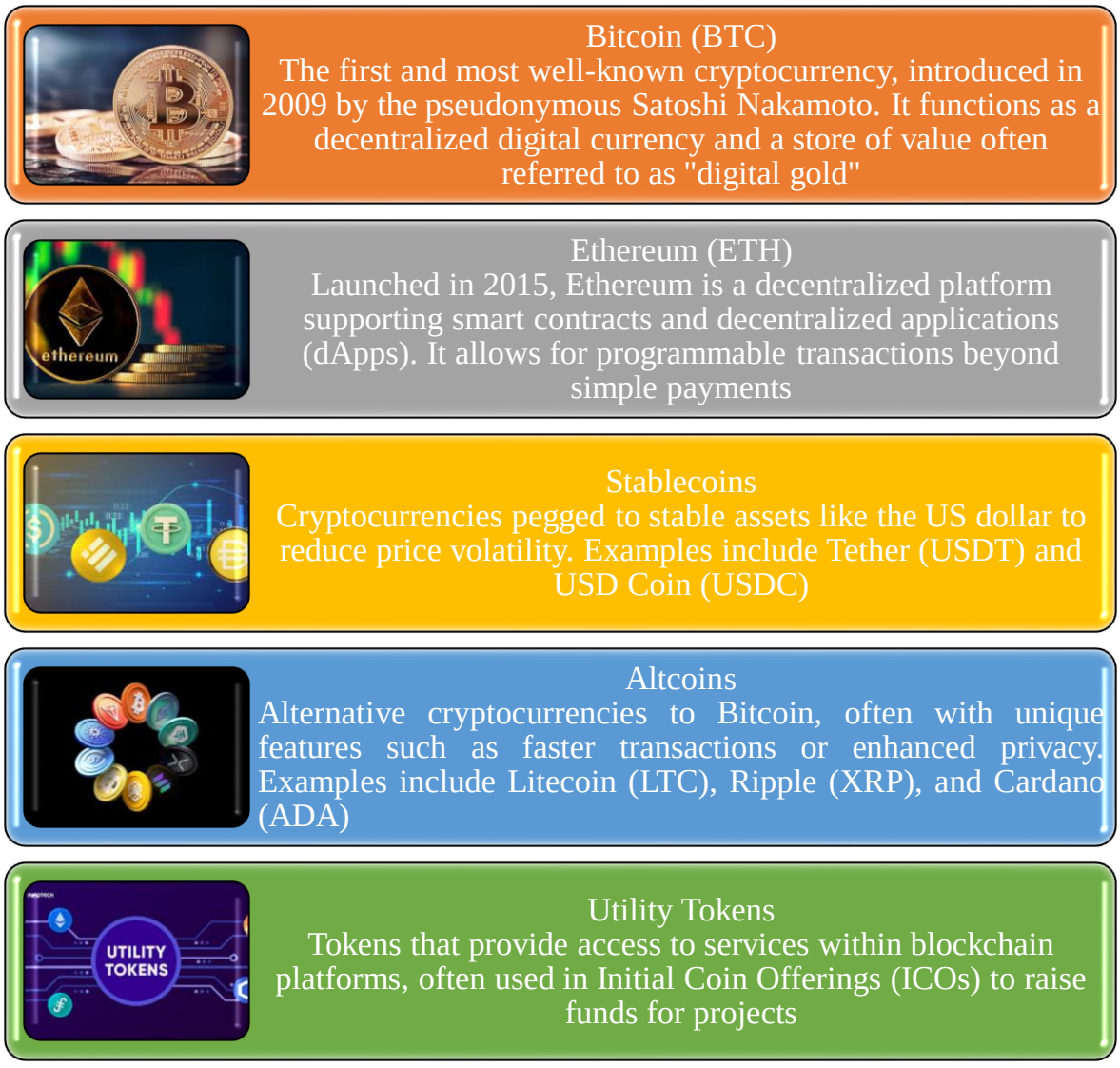
Moreover, cryptocurrencies function as alternative payment instruments facilitating decentralized financial exchanges without intermediaries, offering benefits such as faster cross-border transactions and enhanced

security, although regulatory and adoption challenges remain" (Settlements, 2025)

a. Main Types of Cryptocurrencies

Cryptocurrencies can be broadly categorized into several main types based on their characteristics and use cases in this bellow figure:

Figure 5: Main Types of Cryptocurrencies



Source: Prepared by the researcher

b. Key Differences Between Cryptocurrencies and Stablecoins

The following table highlights the key differences between cryptocurrencies and stablecoins. While both are digital assets operating on blockchain technology, they serve distinct purposes within the digital economy. Cryptocurrencies are highly volatile digital currencies used primarily as speculative assets or alternative forms of money, whereas stablecoins are designed to maintain a stable value by pegging to fiat currencies or other assets, making them more suitable for everyday transactions and payments.

Table 9: Cryptocurrencies and Stablecoins

Aspect	Cryptocurrencies	Stablecoins
Definition	Digital currencies that operate on decentralized blockchain networks with high price volatility.	Digital currencies pegged to stable assets (e.g., USD) to reduce volatility.
Stability	Highly volatile prices due to market speculation and demand.	Designed to maintain a stable value relative to the pegged asset.
Regulation	Regulatory frameworks vary widely and are still developing globally.	Often subject to increasing regulatory scrutiny to ensure backing and stability.

Use Case	Used for payments, investments, and speculative trading.	Primarily used as a stable medium of exchange and store of value in crypto ecosystems.
Examples	Bitcoin (BTC), Ethereum (ETH), Litecoin (LTC).	Tether (USDT), USD Coin (USDC), Binance USD (BUSD).
Advantages	Decentralization, transparency, and potential for high returns.	Stability, lower risk, better suitability for daily transactions and settlements.
Risks	High price volatility, regulatory uncertainty, potential security issues.	Risk of de-pegging, reliance on reserves and issuer credibility.

Source: Prepared by the researcher depending on (Al-Tahat, 2025); (Menon, 2022)

2.6 Other Electronic Payment Instruments

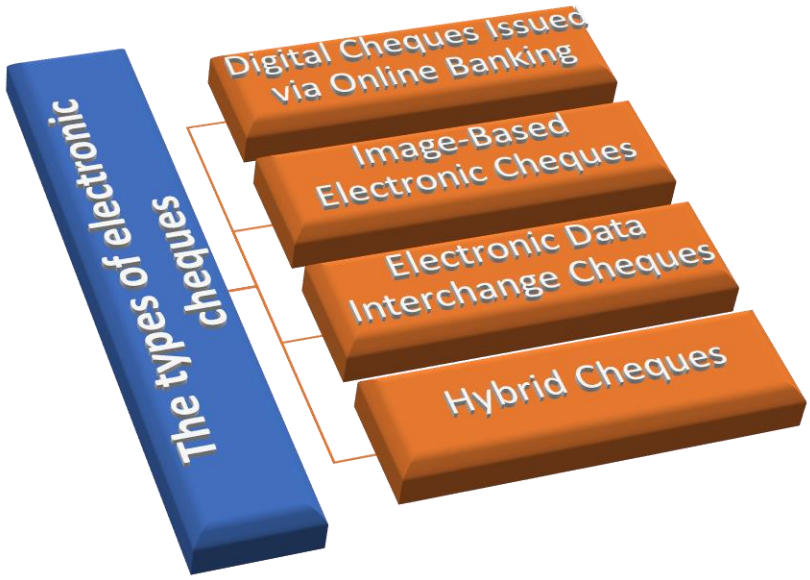
Electronic cheques

Electronic cheques (e-cheques) are digital equivalents of traditional paper cheques, allowing individuals or businesses to make payments electronically through secure online banking platforms or payment systems. E-cheques capture the essential elements of a conventional cheque—such as payer, payee, amount, and authorization—but are transmitted, processed, and cleared electronically, enhancing transaction speed, security, and convenience (Mohan & Singh, 2021)

Types of Electronic Cheques

The following figure illustrates types of electronic cheques.

Figure 6: The types of electronic cheques



Source: Prepared by the researcher

- Digital Cheques Issued via Online Banking: Cheques generated and transmitted electronically using an online banking interface, replacing physical cheque issuance.
- Image-Based Electronic Cheques: Scanned images of paper cheques transmitted electronically for processing under Image Replacement Document (IRD) standards
- Electronic Data Interchange (EDI) Cheques: Structured electronic payments conforming to EDI protocols, commonly used in business-to-business transactions.
- Hybrid Cheques: Transactions initiated by paper cheques but processed electronically after scanning and data capture. (Rana & Thakur, 2020)

Chapter 5: Electronic Banking Operations

Electronic banking, often referred to as e-banking or online banking, represents the digital delivery of traditional and innovative banking products and services through electronic channels. This mode of banking enables customers to conduct financial transactions and access personalized banking services anytime and anywhere, without the need to visit physical bank branches. Electronic banking transactions include fund transfers, bill payments, account inquiries, deposits, and loan management, all performed over the internet or via automated systems such as ATMs and mobile applications

Electronic banking, often referred to as e-banking or online banking, represents the digital delivery of traditional and innovative banking products and services through electronic channels. This mode of banking enables customers to conduct financial transactions and access personalized banking services anytime and anywhere, without the need to visit physical bank branches. Electronic banking transactions include fund transfers, bill payments, account inquiries, deposits, and loan management, all performed over the internet or via automated systems such as ATMs and mobile applications.

1. Electronic Banking Operations: concept

Electronic Banking Operations refer to the comprehensive array of processes, systems, and activities that financial institutions deploy to deliver banking services through sophisticated electronic channels and digital platforms, fundamentally revolutionizing customer interactions with financial services.

These operations enable customers to independently execute a wide spectrum of financial transactions—including account inquiries, balance transfers, bill payments, loan applications, investment management, and international remittances—remotely and securely at any time, leveraging cutting-edge technologies such as comprehensive internet banking portals with multi-layered dashboards, advanced mobile banking applications featuring biometric authentication and AI-driven personalization, automated teller machines (ATMs) [as detailed in Chapter 2], point-of-sale (POS) payment terminals integrated with contactless NFC capabilities, emerging digital wallets with QR code scanning, and even blockchain-enabled smart contracts for decentralized finance (DeFi) applications.

This expansive digital ecosystem not only dramatically enhances operational efficiency through real-time processing and automation but also delivers unparalleled customer convenience via 24/7 accessibility, seamless omnichannel integration across devices, and proactive services like instant notifications, predictive analytics for spending patterns, and tailored financial advisory powered by machine learning algorithms.

2. Components of electronic banking operations

Key components of electronic banking operations include:

2.1 Account Management: Viewing balances, transaction history, and managing account settings online, the Key Features of Account Management are in following figure:

Figure 7: Key components of electronic banking operations

Source: Prepared by the researcher

- **Account Overview**: Customers can view real-time account balances, transaction history, and recent activity logs. This feature provides transparency and helps users monitor their financial status effectively. (Tan & Teo, 2000)

- **Statement Access**: Electronic statements can be downloaded or viewed online, eliminating the need for paper copies. These statements typically include detailed information on deposits, withdrawals, fees, and interest earned.
- **Account Settings**: Users can update personal information such as addresses, contact details, and communication preferences directly through the platform.
- **Alerts and Notifications**: Customers can set up alerts for specific triggers like low balances, large transactions, or upcoming payments, enhancing security and financial management (Pikkarainen, Pikkarainen, Karjaluoto, & Pahnila, 2004)
- **Funds Management**: Options to freeze or close accounts, request checkbooks, or apply for new accounts are often included.
- **Integration with Other Services**: Account management interfaces may integrate with budgeting tools, investment profiles, and loan accounts to provide a comprehensive financial picture.

Benefits

- Convenience: Allows 24/7 access from any location with internet connectivity, saving time and reducing reliance on physical branches.
- Control: Empowers customers with immediate information and operational control over their finances.
- Security: Enhanced security protocols such as two-factor authentication protect sensitive information during account management activities. (Sathye, 1999)

2.2 Funds Transfer

Transferring money between accounts within the same bank or across different banks, including real-time payments.

Funds Transfer in electronic banking refers to the digital process of moving money from one account to another, either within the same bank or between different financial institutions. This key function enables individuals, businesses, and governments to conduct timely and secure money transfers without the need for physical cash or paper-based instruments.

Types of Funds Transfer

- **Internal Transfer**: Movement of funds between accounts held by the same customer within the same bank.
- **Interbank Transfer**: Transfers between accounts in different banks, commonly processed through clearinghouses or payment networks.
- **Wire Transfer**: Real-time electronic transfer of funds typically used for high-value or urgent payments, often internationally.
- **Automated Clearing House (ACH) Transfer**: Batch-processed electronic funds transfer often used for payroll, bill payments, or other recurring transactions.
- **Person-to-Person (P2P) Payments**: Direct electronic transfers between individuals using mobile apps or online platforms.
- **Real-Time Payments (RTP):** Instantaneous fund transfers available 24/7, enhancing liquidity and convenience. (Tang & Zhang, 2023)

Benefits

- Speed and Convenience: Provides fast, often instant, transfer capabilities accessible anytime and from anywhere.
- Security: Utilizes encryption and authentication protocols to safeguard transactions.
- Cost Efficiency: Reduces the need for physical paperwork and cash handling, lowering operational costs.
- Traceability: Electronic records enable easy tracking and auditing of transactions. (Arner, Barberis, & Buckley, 2016)

2.3 Bill Payments:

Bill Payments in electronic banking refer to the process of settling utility bills, credit card dues, taxes, or other invoices electronically through banking platforms. This service allows customers to pay their bills conveniently from their accounts without the need to physically visit payment centers.

Key Features of Bill Payments

- Ease of Use: Customers can schedule payments, set up automatic recurring payments, and pay multiple bills from a single platform.

- Security: Payments are protected by encryption and secure authentication measures to prevent fraud and unauthorized access.
- Speed: Transactions are processed rapidly, often instantly or within a few hours, reducing delays associated with traditional payment methods.
- Transaction Tracking: Customers can view payment history, receipts, and status updates online for record-keeping and reconciliation. (Kim & Kim, 2021)

Benefits

- Convenience: Eliminates the need for physical visits to payment locations.
- Time Saving: Payments can be made anytime, anywhere.
- Record Management: Electronic confirmation and receipts streamline record-keeping and dispute resolution.
- Improved Cash Flow Management: Scheduled payments help prevent late fees and ensure timely settlements. (Jansson & Lundgren, 2019)

2.4 Loan Services in electronic banking

Loan Services in electronic banking refer to the digital processes and platforms that enable customers to apply for, manage, and repay loans without the need to visit a physical bank branch. These services leverage online and mobile channels to provide faster, more convenient access to various loan products.

Key Features of Electronic Loan Services

- Loan Application: Customers can apply for personal, auto, home, or business loans online by submitting required documentation electronically.
- Loan Approval and Disbursement: Automated systems enable quick evaluation of loan applications, credit checks, and instant or scheduled disbursement of funds. (Nguyen & Mutum, 2019)
- Repayment Management: Borrowers can view outstanding balances, due dates, and make repayments through online banking or mobile apps.
- Loan Status Tracking: Transparent updates allow customers to monitor the approval process and repayment progress in real time.
- Loan Calculator Tools: Many platforms provide calculators to help users estimate monthly payments, interest rates, and total repayment amounts.

- **Benefits**

- Reduced Processing Time: Digitized workflows eliminate much of the paperwork and manual intervention.

- Convenience: Access to loan services 24/7 from any location.
- Improved Accuracy: Automated systems reduce errors and ensure timely communication.
- Enhanced Customer Experience: Faster approvals and easy management increase customer satisfaction. (Kumar & Arora, 2021)

Credit evaluation in the digital context

involves leveraging big data analytics, artificial intelligence, and machine learning models to assess the risk of lending. Compared to traditional methods that rely on static credit scores and historical financial documents, digital credit evaluation uses dynamic, real-time data to provide a deeper, continuous insight into the borrower's creditworthiness. Technologies such as blockchain add transparency and security, while predictive analytics enhance decision accuracy and speed, enabling faster loan approvals and improved risk management. (L. Yun, 2025)

These sources provide comprehensive insights on how digital loan processing and credit evaluation transform traditional lending processes by integrating cutting-edge technologies for efficiency, inclusivity, and enhanced risk assessment.

Here is a comparison of digital versus traditional credit scoring methods in a clear table format:

Table 10: comparison of digital versus traditional credit scoring methods

Aspect	Traditional Credit Scoring	Digital Credit Scoring
Data Sources	Credit bureau reports, income, repayment history	Traditional data plus mobile usage, social media, utility payments, e-commerce behavior
Technology	Manual evaluation or basic statistical models	Advanced AI, machine learning, big data analytics
Decision Speed	Days to weeks	Minutes to seconds
Inclusivity	Limited to individuals with formal credit history	Includes unbanked and underbanked populations
Adaptability	Static, periodic updates	Real-time, dynamic updates
Accuracy	Moderate predictive power	Higher predictive accuracy

Source: Prepared by the researcher depending on (Nguyen & Turner, 2023), (Makuhn, 2023)

Chapter 6: Global Experiences in Electronic Banking

Electronic banking, also known as e-banking or online banking, refers to the automated delivery of banking services to customers via electronic channels, including the internet, mobile devices, and other digital platforms. It allows individuals and businesses to access their accounts, perform financial transactions, and obtain banking information conveniently without the need for physical branch visits

Globally, the adoption of electronic banking varies widely due to differences in technological infrastructure, regulatory environments, cultural factors, and consumer readiness. Developed countries often exhibit high penetration rates, while developing nations continue to work on expanding access and improving digital literacy.

1- Asian leadership in mobile banking and fintech (Examples)

1.1 Singapore - A Regional Fintech and Digital Banking

Singapore has positioned itself as a leading center for digital banking in Asia through proactive government policies and a strong regulatory environment. The Monetary Authority of Singapore (MAS) supports open banking initiatives, regulatory sandboxes, and the licensing of digital banks, enabling a robust ecosystem for fintech innovation. Singaporean digital banks focus on user experience, leveraging technologies such as AI, big data analytics, and APIs for seamless integration with third-party services.

The result is enhanced financial inclusion, efficient digital payment systems, and broad adoption of digital financial products .

1-2 China - Scale and Technological Innovation in Digital Banking

China exemplifies rapid digital banking growth driven by large-scale adoption of mobile payment platforms and digital-only banks like WeBank and MYBank. These institutions heavily utilize AI, blockchain, and cloud computing to offer personalized services to both urban and rural populations. China's state-backed initiatives, including the Digital Yuan pilot, further position the country at the forefront of central bank digital currencies (CBDCs). The country's approach emphasizes financial inclusion by targeting underserved customer segments through mobile-first digital banking .

2. Digital Transformation in Egypt's Banking Sector

The "**Mans**" electronic payment platform represents a significant advancement in Egypt's journey toward a fully digital financial ecosystem. Launched as a government-backed initiative, Mans was designed to promote digitization of transactions and enhance financial inclusion by providing a secure, accessible, and interoperable electronic payment solution for individuals, businesses, and government entities.

The platform's genesis lies in Egypt's strategic vision to reduce reliance on cash and streamline payment processes across sectors. Since its launch, Mans has integrated a wide range of payment services, including utility bill payments, government fees, commercial transactions, and peer-to-peer transfers, accessible via mobile and web interfaces. Key features include real-time payment processing, multi-channel access, and robust security protocols aligned with international standards. (El-Gohary & El-Masry, 2022)

Since inception, Mans has witnessed rapid adoption, supported by extensive awareness campaigns and partnerships with banks, telecom operators, and merchants. Its interoperable design allows users to link multiple bank accounts and digital wallets, fostering a unified payment environment. The Central Bank of Egypt's regulatory support and continual upgrades have aimed to accommodate emerging fintech innovations and maintain platform reliability. (Kassem & Farouk, 2020)

Academic studies highlight Mans as a catalyst in Egypt's digital payment transformation, noting its role in increasing transaction transparency, reducing costs, and enabling broader access for underserved demographics (Hassan & Abdel Hamid, 2023). Challenges identified include ensuring digital literacy and overcoming infrastructure constraints in rural areas, which are being addressed through government initiatives.

Overall, Mans exemplifies Egypt's proactive approach to fostering a cashless society and promoting economic digitization, reflecting broader trends in emerging markets adapting financial technologies to local contexts.

3. Lessons learned from global best practices

Key Lessons from Global Best Practices in Electronic Banking:

- Prioritize customer-centric design with user-friendly interfaces to boost adoption and satisfaction.
- Implement robust regulatory frameworks balancing innovation and consumer protection to build trust.
- Ensure technology integration and interoperability across platforms for seamless transactions. (Kumar & Kumar, 2021)
- Employ advanced cybersecurity measures including encryption and fraud detection to secure user data and funds.
- Focus on financial inclusion by extending services to underserved populations through mobile banking and agent networks (Jack & Suri, 2014)

- Foster public-private partnerships to drive innovation and expand infrastructure
- Design systems for continuous innovation and scalability to adapt to emerging technology and growing user demands (Bátiz-Lazo & Wood, 2021)
- Conduct awareness and education campaigns to enhance consumer understanding, trust, and informed adoption (Adjei, 2018)

4- The reality of E- banking in Algeria

The journey of electronic payment systems in Algeria began with the establishment of foundational infrastructure that laid the groundwork for modern cashless transactions. Key institutions such as the Automatic Cash and Interbank Relations Company, responsible for managing the interbank cash processing center, played a pivotal role in this evolution. Complementing this was the formation of the Algerian Company for Electronic Banking Services alongside the Automatic Cash Consortium. Together, these entities oversee and regulate electronic payment systems, ensuring that Algeria's digital financial landscape keeps pace with global advancements. Their efforts are bolstered by an evolving legislative framework aimed at safeguarding transactions and fostering trust.

Before exploring the current realities and regulatory environment surrounding electronic payments in Algeria, it is important to clarify the concept itself.

The rise of e-commerce has been a major catalyst in this transformation. Much like its effect on traditional financial practices, e-

commerce has created new demands for payment systems that traditional methods struggle to meet.

The 21st century has witnessed a critical shift from a tangible to an intangible economy and society, fundamentally altering the way financial transactions are performed.

In light of these developments, Algeria continues to adapt its electronic payment systems not only to meet domestic financial needs but also to align with global digital finance trends, reflecting a broader transition toward a cashless and technology-driven economy.

4-1 Company for the Automation of Interbank Transactions and Electronic Payment Systems

Established in 1995 at the initiative of the banking community, (Société d'Automatisation des Transactions Interbancaires et de Monétique) (SATIM) is a subsidiary of seven Algerian banks:

- BADR,
- BDL,
- BEA,
- BNA,
- CPA,
- CNEP,
- ALBARAKA
- The insurance institution CNMA.

SATIM serves as the main interbank electronic payment operator in Algeria, managing domestic and international card transactions. It plays

a crucial role in supporting the banking sector's development and modernization programs, particularly in promoting card-based payment methods.

Today, SATIM has a network of 19 members, including 18 banks (seven public and eleven private) plus Algeria Post. The platform has experienced significant growth in recent years, with over 1,350 ATMs and 51,000 electronic payment terminals connected to its servers. Additionally, SATIM supports more than 500 active merchant websites on its platform. This rapid expansion is largely attributed to the impact of the CIB card on Algerian consumers' purchasing habits.

SATIM's mission involves developing and operating secure electronic payment systems, ensuring full interoperability among network participants, and contributing to interbank management rules for electronic payment products. It continuously works to modernize payment. (SATIM, 2024).

- **The Function of SATIM**

SATIM works to develop and promote the use of electronic payment methods in Algeria. It establishes and manages the technical and organizational platform that ensures full interoperability among all participants in Algeria's electronic payment network.

The company participates actively in setting interbank rules for managing electronic payment products and supports banks in launching and developing these products.

SATIM personalizes checks and both payment and cash withdrawal cards. It implements all activities governing the operation of the electronic payment system, including technology mastery, procedure automation, transaction speed, and optimization of financial flows.

SATIM manages the connectivity and operation of ATMs (DAB/GAB), personalizes interbank withdrawal cards for banks, and establishes switches for members with their own authorization systems.

The network includes 19 members—18 banks (7 public and 11 private), Algeria Post, and other financial institutions like Société Générale Algeria, BNP Paribas El Djazair, HSBC, and others.

Currently, users of various financial institutions can withdraw cash from 1,380 ATMs nationwide. Cardholders of the domestic CIB card can also make purchases at affiliated merchants with POS terminals. (SATIM, 2025)

Monetary electronic payments are still at an early stage in Algeria's financial inclusion path, but upcoming innovations—such as the integration of mobile banking and banking cards—are expected to expand product offerings widely and enhance banking profitability

- **The Members of SATIM**

SATIM also represents an extensive interbank electronic payment network with 19 members, including six public banks, twelve private banks, and Algeria Post. This broad network strengthens electronic payment infrastructure, supporting both local and international card transactions, and contributing significantly to the digitization of Algeria's financial ecosystem.

Figure 8: Members of the Automatic Cash and Interbank Relations company

Source : www.satim.dz/images/articles/rmimap.png 19/03/2025

4.2 Algeria Electronic Banking Services (AEBS)

AEBS was established in January 2004 as a strategic initiative to modernize Algeria's banking infrastructure and enhance electronic payment systems. The company emerged from a partnership between the French technology firm DIAGRAM EDI—specialized in electronic banking software and financial data security—and three Algerian partners: MAGACT MULTIMEDIA, SOFT ENGINEERING, and the Research Center in Scientific and Technical Information (CERIST).

AEBS functions as a mixed institution dedicated to the development of secure, high-quality remote banking services. Its mission extends beyond digital modernization to encompass the technical management of financial data exchange among Algerian banks and financial institutions. Through its advanced electronic platforms, AEBS supports online transactions, remote account management, and interbank communications with a strong emphasis on cybersecurity and confidentiality.

By bridging international expertise with national innovation, AEBS has become a cornerstone of Algeria's efforts to strengthen trust and efficiency in electronic payments, ensuring greater reliability and convenience for both consumers and financial entities. (Harkat & Benghida, 2020)

4.3 The Interbank Cash Processing Center, RMI

RMI manage by SATIM, plays a central role in Algeria's electronic banking network. It ensures the connection between cash distribution centers and the various financial institutions participating in ATM withdrawal services.

In practical terms, this center acts as the operational core linking ATMs to the service provider through secure communication lines across the national network. It also incorporates a system for detecting and intercepting lost or counterfeit cards, thereby maintaining the integrity and safety of transactions. When a client initiates a withdrawal, the request is routed through the agency's authorization center, which verifies the client's secret code, available limit, and transaction eligibility. Once authorized, all operations conducted during the day are processed collectively at the close of business ("zero hour").

At that stage, the Interbank Cash Processing Center consolidates transactions, classifies them by bank, and records each operation within the network. The subsequent interbank clearing takes place through the postal check center, which manages the settlement of all bank accounts. This system ensures both operational efficiency and financial transparency in Algeria's interbank payment infrastructure (Harkat & Benghida, 2020, p. 68)

4.4 The Real-Time Gross Settlement System (RTGS):

Algeria Real Time Settlements (ARTS)," this system was established by the Bank of Algeria to facilitate the interbank settlement of high-value and urgent payments via bank or postal transfers. Participants in this system can initiate transactions that are processed in real time, ensuring prompt settlement of large transactions.

4.5 the Electronic Clearing System:

Operated by the Bank of Algeria under the name "Algérie Télé-Compensation Inter-bancaire (ATCI)," this system handles the electronic clearing of checks, bonds, transfers, and automatic deductions, as well as withdrawals and payments using bank cards.

The ATCI system processes transfers with a nominal value of less than one million dinars; transactions exceeding this threshold must be routed through the RTGS to handle large amounts and urgent payments efficiently. The management of the ATCI system is entrusted to the Pre-Bank Clearing Center, a stock company and subsidiary of the Bank of Algeria. (Hadj Ali, Bencheikh, & Ahmed, 2024, pp. 53-54)

Conclusion

In conclusion, this handbook on electronic banking emphasizes that digital transformation has become a cornerstone of modern financial systems. It is no longer a matter of choice but a strategic necessity for achieving efficiency, competitiveness, transparency, and customer satisfaction. Throughout the chapters, we explored the fundamentals of e-banking, including its technological foundations, various electronic payment instruments, risk management strategies, and legal frameworks that support its safe implementation.

Comprehensive Guidance for Electronic Banking Students

- Develop a deep understanding of digital banking concepts, including the architecture of online banking systems, mobile banking platforms, and fintech innovations that are reshaping the financial landscape.
- Stay continuously informed about emerging technologies, such as blockchain, artificial intelligence, biometric authentication, and cloud computing, as they play a crucial role in enhancing service delivery and security.
- Acquire practical experience through simulation software, online banking systems, or internships in financial institutions to translate theoretical knowledge into real-world skills.

- Strengthen your ability to analyze digital risks, including fraud, data breaches, and cyberattacks, and learn the international security standards (like ISO 27001 and PCI DSS) governing financial technology.
- Study the legal, ethical, and regulatory frameworks guiding electronic transactions, focusing on consumer protection, privacy laws, anti-money laundering regulations, and electronic signature legislation.
- Sharpen your data analysis and decision-making skills; understanding customer analytics and transaction data is key to improving service efficiency and developing targeted financial products.
- Focus on innovation and entrepreneurship—students in electronic banking should think creatively about how technology can improve financial inclusion, reduce transaction costs, and promote sustainability.
- Appreciate the human and social dimensions of banking: even with digital transformation, trust, transparency, and customer relationship management remain the foundation of successful banking operations.

By mastering these elements, students of electronic banking can become future leaders who shape the digital finance ecosystem. Their understanding of technology, combined with ethical awareness and analytical competence, will enable them to contribute to building a secure, inclusive, and innovative financial environment that meets the demands of the digital age.

Bibliography

1/ BOOKS

1. Abdullah, F. A. (2007). Information technology and its role in traditional and electronic marketing. Itrak for Printing and Publishing.Egypt.
2. CIPP, C. I. (2020). Smart card technology and applications. CIPP Publications,United Kingdom.
3. Jaafar, A.-J. (2005). Information technology. Osama House for Publishing and Distribution. Jordan.
4. McLean, E. R., & Turban, E. (2000). Information technology for management: Making connections for strategic advantage (2nd ed.). John Wiley & Sons.United States.
5. McLean, E. R., & Turban, E. (2000). Information technology for management: Making connections for strategic advantage (2nd ed.). United States.

2/ ARTICLES

1. Abdat, M., & I.Hayoula. (2023). Information and Communication Technology ICT: Present reality and future. Revue d'Economie & de Gestion Vol 07, N 01, pp. 47-64

2. Adjei, M. T. (2018). Impact of financial literacy on digital banking adoption: Evidence from developing countries. International Journal of Bank Marketing, 36(7) , 1400-1417.

3. Al-Araj, H. A. (2014). The role of technology in developing Islamic banking. Arab Banking Bulletin. Union of Arab Banks, 45-65.

4. Al-Hamami, M. A. (2023). E-banking system benefits, challenges and security. Al-Qanatir: International Journal of Islamic Economics and Finance, 30(2), 1–15.
5. Al-Mayali, H. N., Al-Tamimi, H. Z., Subaih, M., & Al-Musaidi, M. (2023). Information technologies and their impact on the quality of banking service: A survey study of the opinions of workers in the Trade Bank of Iraq (TBI). Warith Scientific Journal, 5(5), 1–20.
6. Al-Tahat, M. D. (2025). Stablecoins: Bridging traditional finance and cryptocurrencies. . Journal of Financial Innovation, 11(2) , 89-102.

7. Al-Taie, M. A. (2010). Electronic Payment Systems: Concepts and Applications. Financial Technology Journal, 12(1), 175-190.

8. Aniekwu, A., & Ogbeide, F. (2002). : InformationTechnology and Technological Development in Africa. . Journal of Engineering Science andApplications (JESA). ,AAU, Ekpoma. 3 (2), 81-105.

9. Arner, D. W., Barberis, J., & Buckley, R. P. (2016). The Evolution of Fintech: A New Post-Crisis Paradigm? Georgetown Journal of International Law, 47, 1271-1319.

10. Awais Ahmed, A. Aziz, & M. Muneeb. (2019). Electronic payment system: A complete guide. Journal of Multidisciplinary Sciences, 1(2), 1–17

11. Bátiz-Lazo, B., & Wood, D. (2021). The evolution of digital banking and the role of innovation and scalability. Journal of Banking Regulation, 22(2), 109-129.

12. Benseddik, Z. (2025). Electronic Payment Systems in Algeria. Academic Journal of Legal and Political Researchs, Vol : 09 No : 01, 74 – 89.

13. Bouacheria, K. i., & Salhi, T. (2022). The Algerian public banks in the era of the digital transformation. International journal of economic performance Volume:05 Issue:02 , 92-112.

14. Bouacheria, K. I., & Salhi, T. (2022). The Algerian public banks in the era of the digital transformation . ,International journal of economic performance ,Volume:05 Issue:02 .

15. Boukrouh, B. (2022). E-payment adoption in the era of digital transformation: the case of Algerian. Journal of Contemporary Economic Studies,Volume: 07 / N°: 02 , 481-496.

16. Bramgui, R., & Chehaoui, L. (2025). The role of information and communication technology in improving the level of the employees' performance of the Algeria Foreign Bank. The Journal of Research and Scientific Studies, 19(1), 283–302

17. Brown, A. (2021). Digital transformation in banking: The impact of automated teller machines. Financial Services Review, 29(4), 304-319.

18. Cavus, N., & Chingoka, D. N. (2015). Information technology in the banking sector: Review of mobile banking. . Global Journal of Information Technology. 5(2), 62-70.

19. Chellappan, K., Elanchselvan, T., & Abu-Samah, A. (2025). E-wallet Technology Architecture Adoption: A Review. Jurnal Kejuruteraan, 37(1), 219-232.

20. Deghnouche, L., & Mezghiche, D. (2023). E-Banking Risks Management. afak for sciences journal, Volume 8, Numéro 3, , 417-428.

21. Djelfat, A., Ferhane, F., & Salah, E. (2017). Essential capabilities for the success of digital transformation in companies: An exploratory study on 94 Algerian companies. Economic Sciences Review, 13(15), 40–70

22. Djelfat, A., Ferhane, F., & Salah, E. (2017). Essential capabilities for the success of digital transformation in companies: An exploratory study on 94 Algerian companies. Economic Sciences Review, 13(15), 40–70

23. Edan, F. M. (2024). The role of information technology in enhancing the banking sector . International Journal of Economic Perspectives,18(11), 2475–2487.

24. El-Gohary, H., & El-Masry, A. (2022). The development of electronic banking in Egypt and its impact on financial inclusion. Journal of Emerging Market Banking, 11(3), 205-220.

25. Guechi, M. D. (2020). The future of the banking industry in the era of digital transformation. Economic and Social Review, 8(3), 1–15.

26. Gupta, B. B., & Narayan, S. (2020). A survey on contactless smart cards and payment system: Technologies, policies, attacks and countermeasures. Journal of Global Information Management, 28(4), 135–159.

27. Hadj Ali, A., Bencheikh, & Ahmed, l. h. (2024). Electronic Payment and Consumer: Benefits and Risks with a Focus on the Situation in Algeria. Economics Financial Banking & Management Journal, 45-65.

28. Haider Nasser Hussein Al-Mayali, H. N., Al-Tamimi, H. Z., Subaih, M., & Al-Musaidi, M. (2023). Information technologies and their impact on the quality of banking service: A survey study of the opinions of workers in the Trade Bank of Iraq (TBI). Warith Scientific Journal, 5(5), 1–20.

29. Harkat, S., & Benghida, S. (2020). The infrastructure for electronic transactions in Algerian banks: Reality and challenges. Journal of Economic and Financial Research , 07 (01), , 63-79.

30. Hassan, M., & Abdel Hamid, I. (2023). Regulatory challenges and innovation in Egypt's electronic banking sector. Middle East Journal of Finance and Economics, 28(2), 150-165.

31. Islam, M. K. (2012). Effective use of smart cards. International Journal of Computer Applications, 5(2), 1–5.

32. Jain, A. K., & Kumar, P. (2023). Evolution and classification of Automated Teller Machines in modern banking. . International Journal of Finance and Banking Research, 12(4), 215- 230.

33. Jansson, P., & Lundgren, M. (2019). Customer Behavior in Digital Bill Payments. International Journal of Bank Marketing, 37(4), 937-956.

34. Jones, A., & Brown, E. (2023). Enhancing customer autonomy: The rise of self-service kiosks. . Service Industry Journal, 42(4), 332-345.

35. Kassem, N., & Farouk, H. (2020). Mobile banking adoption in Egypt: An analysis of user perceptions and behavior. Journal of Digital Banking, 5(4), 320-334.

36. Kim, D., & Kim, M. (2021). Digital Payment and E-Service Adoption: Focus on Bill Payment. Journal of Financial Services Marketing, 26(2), 175-187.

37. Kim, Y. S. (2010). A model of debit card as a means of payment. Journal of Banking and Finance, 34(6) , 1354-1363.

38. Koskosas, I. (2011). The Pros and Cons of Internet Banking: A Short Review. . Business Excellence and Management, 1(1) , 50-58.

39. Kumar, N., & Kumar, S. (2021). Enhancing cybersecurity in digital banking: Challenges and future directions. Journal of Financial Crime, 28(1),, 285-303.

40. Kumar, R., & Arora, A. (2021). Digitalization of loan processes: Impact on banking efficiency. International Journal of Bank Marketing, 39(4),, 587-605.

41. Kumar, S., & Patel, N. (2024). Mobile ATMs and financial inclusion: Opportunities and challenges. Journal of Banking and Finance Technology, 5(2),, 99-110.

42. Kundan, A. (2023). A Study of Variables Affecting Users Perspectives Towards Credit Card Acceptance. . Journal of International Business Research, 22(1), 1-13.

43. L. Yun, M. (2025). Analyzing credit risk management in the digital age: Challenges and technologies. Emerging Markets Journal, 13(2),, 1-20.

44. Lecigne, P. (2013). Retail banks with their backs to the wall. L'Expansion Management Review, 4(151), 86–96.

45. Lee, J., & Kwon, K. (2002). Consumers' use of credit cards: store credit card usage as an alternative payment and financing medium. Journal of Consumer Affairs, 36(2), 239-262.

46. Magotra, I., Majeed, N., & Farooq, A. (2019). Adoption of self-service technologies among banking customers: An empirical investigation. International Journal of Applied Management and Technology, 18(1), 1–17.

47. Makuhn, F. (2023). The role of credit reports in digital lending. Financial Innovation Journal, 7(1), 45 -59 .

48. Mallat, N. (2007). Exploring Consumer Adoption of Mobile Payments – A Qualitative Study. The Journal of Strategic Information Systems, 16(4), 413-432.

49. Mebtouche, E. (2023). The effectiveness of information technology in digital transformation within government institutions The case of El wancharissi University. Economy and Environment Review, 06 (02), 142-162.

50. Menon, R. (2022). Making sense of crypto: Opportunities and risks. Finance & Development, 59(3) , 20-25.

51. Mohan, R., & Singh, P. (2021). Electronic cheques: Adoption and impact on banking efficiency. International Journal of Banking and Finance, 14(2), 89-103.

52. Mokrane, A., & Ibeghouchene, S. (2024). Electronic means of payment in the world and in Algeria: investigation into the factors influencing the use of withdrawal and payment cards, . forum for economic studies and research journal Volume: 08/ N°: 01, 119-136.

53. Mushraf, F. E. (2024). The role of information technology in enhancing the banking sector. International Journal of Economic Perspectives, 18(11), 2475–2487.

54. Nguyen, T. H. (2022). The role of automated teller machines in modern banking. Journal of Banking Technology, 15(2), 120-135.

55. Nguyen, T. H., & Turner, J. (2023). Digital credit scoring and household consumption. Journal of Financial Technology, 14(2),, 123-139.

56. Nguyen, T. T., & Mutum, D. S. (2019). E-loan adoption in banking: A customer-centric approach. Journal of Financial Services Marketing, 24(2) , 89-101.

57. Nouari, K. (2025). The Reality Of Electronic Payment Methods In Commercial Banks In Algeria, A Case Study Cnep Bank . journal of legal and economic research, Volume: 8(1) , 972 – 986.

58. Oulad Haimouda, A. L., Shnini, A., & Alami, A. (2018). Management of electronic banking risks and their impact on electronic banking services:

A case study of a sample of banking agencies in Oum El Bouaghi (CPA, BNA, BEA). Journal of Humanities Sciences, 342-360.

59. Pahnila, S., Pikkarainen, K., Karjaluoto, H., & Pikkarainen, T. (2004). Consumer acceptance of online banking: An extension of the technology acceptance model. Internet Research, 14(3), 224–238.

60. Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. Computers & Education, 37(2), 163–178.

61. Qashi, K., & El-Othmani, M. (2010). Strategy for managing electronic banking risks. New Economy Journal, (02), 239-256.

62. Rahman, D. S. (2024). Driving developing country consumers' mobile wallet use: An empirical study. . International Journal of Business and Management, 39(4), , 112-128.

63. Rana, V., & Thakur, S. (2020). Image-based cheque clearing systems and legal frameworks. . Journal of Digital Payment Systems, 6(1), 45-59. Kumar, S. (2024). The evolution of E-banking services: Trends, challenges, and opportunities. Journal of Emerging Technologies and Innovative Research (JETIR), 11(3), l376–l380.

64. Sathye, M. (1999). Adoption of internet banking by Australian consumers: an empirical investigation. International Journal of Bank Marketing, 17(7), 324-334.

65. Shittu, O., & Long, C. (2020). Electronic banking: Benefits and services. International Journal of Advanced Research in Management and Social Sciences, 9(1), 1–12.

66. Shittu, O., & Long, C. (2020). Electronic banking: Benefits and services. International Journal of Advanced Research in Management and Social Sciences, 9(1), 1–12.

67. Smith, J., & Lee, K. (2023). Enhancing financial inclusion through ATM technology. . International Journal of Electronic Banking, 9(1), 45-60.

68. Smith, J., Johnson, L., & Roberts, M. (2019). Cloud POS systems: Benefits and security considerations. . Information Systems Journal, 29(1), 95-113.

69. Smith, L. M., & Brown, T. A. (2022). Enhancing customer experience through Interactive Teller Machines (ITMs). Journal of Digital Banking, 8(1) , 33-48.

70. Tan, M., & Teo, T. S. (2000). Factors influencing the adoption of internet banking. Journal of the Association for Information Systems, 1(5), 1-42.

71. Tang, H., & Zhang, H. (2023). Enhancing Security in Digital Funds Transfer Systems. IEEE Transactions on Information Forensics and Security, 18(4), 2045-2057.

72. Tchikou, A., & Bouklia, M. (2023). The importance of the successful use of information technology as a tool for improving organizational performance in the Bank of Agriculture and Rural Development. Journal of Economics, Finance and Business (JEFB), 8(1), 1127–1140.

73. White, R., & Jones, S. (2021). The impact of cryptocurrency ATMs on traditional banking models. Finance and Technology Review, 14(3),, 112-126.

74. Williams, J. P. (2020). Cash recycling ATMs: Innovation in cash management. Banking Operations Journal, 9(2), 78-89.

75. Wong, S. (2005). Advantages and disadvantages of internet banking. Journal of Internet Banking and Commerce, 10(3), 1–10.

3/ Webpages

1. ACCA.(2025,May 12). Cryptocurrencies.

https://www.accaglobal.com/gb/en/student/exam-support-resources/professional-exams-study-resources/strategic-business-reporting/technical-articles/cryptocurrencies.html

2. Amin, R. (2023, November 6). Le marketing face à l'évolution du comportement du consommateur

. https://www.journaldunet.com/ebusiness/crmmarketing/1176493-le-marketing-face-a-evolution-du-comportement-duconsommateur/

3. Australia, R. B. (2018,April 3). Digital currencies explainer.

https://www.rba.gov.au/education/resources/explainers/cryptocurrencies.html

4. Bundesbank, D. (2021, April 22). Credit transfers and direct debits. https://www.bundesbank.de/en/tasks/payment-systems/oversight/credit-transfers-and-direct-debits-626504

5. ICICI Bank. (2021,April 1). Understanding RTGS: Real time gross settlement system. https://www.icicibank.com/blogs/internet-banking/features-and-benefits-of-neft

6. Marian, O. (2024,June,10). Making sense of bitcoin, cryptocurrency and blockchain. PwC Financial Services. https://www.pwc.com/us/en/industries/financial-services/fintech/bitcoin-blockchain-cryptocurrency.html

7. Razorpay. (2025,June 2). What is NEFT: Full form, time, limits, charges & how it works. https://razorpay.com/learn/neft

8. Reserve Bank of India. (2024, May 15). National Electronic Funds Transfer (NEFT) system. https://www.rbi.org.in/commonman/English/scripts/FAQs.aspx?Id=274

9. SATIM. (2024, May 15). Qui sommes-nous. https://www.satim.dz/index.php/fr/satim/qui-sommes-nous

10. SATIM. (2025, May 20). Nos missions. https://www.satim.dz/index.php/fr/satim/nos-missions

11. Thimpress. (2025). How direct bank transfers are changing how we pay online(2025.may.10). https://thimpress.com/how-direct-bank-transfers-changes-how-we-pay-online/

4/ Reports

1. Philadelphia Fed. (2020, August 11). Contactless payment cards: Trends and barriers to adoption in the U.S. (Discussion Paper No. 20-03). https://www.philadelphiafed.org/-/media/frbp/assets/consumer-finance/discussion-papers/dp20-03.pdf

2. Bank for International Settlements. (2025). Cryptocurrencies and decentralized finance: Functions and risks. https://www.bis.org/publ/bppdf/bispap156.pdf