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Changing dimensions of electronic payments

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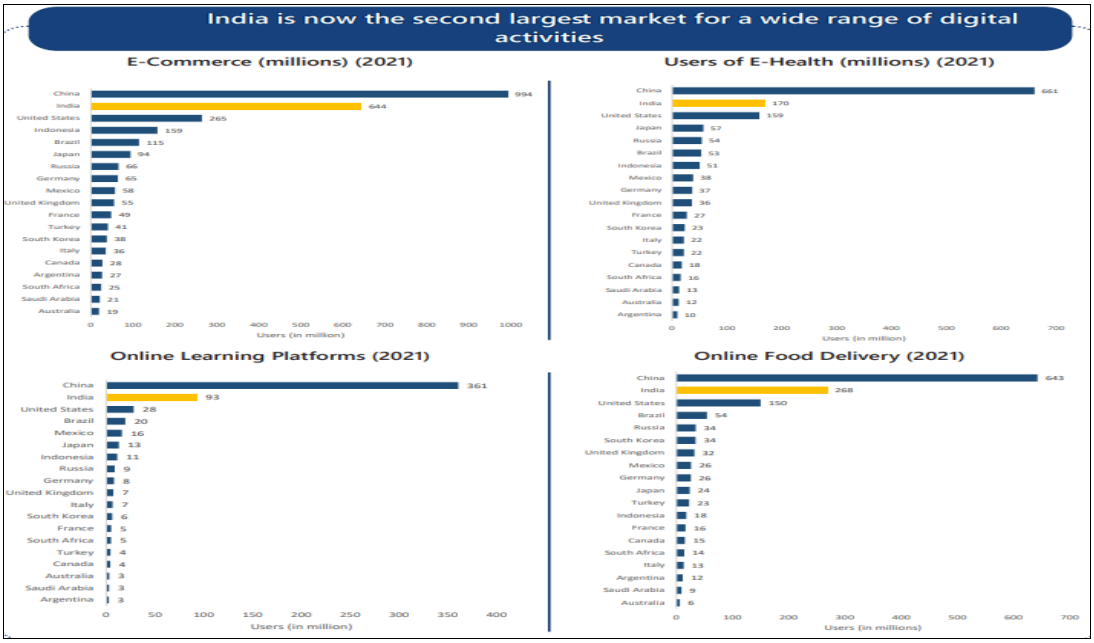
Abstract
In E-commerce, transactions involving products and services occur through computers and laptops, while M-commerce sees customers utilizing mobile phones for similar purposes. India is currently in the midst of an E-commerce and M-commerce revolution, with the introduction of M-commerce further expanding the boundaries of virtual commerce. Just as electronic payment systems (e-payment) are fundamental to E-commerce, mobile payment systems (m-payment) play a pivotal role in M-commerce. The proliferation of ICT (information, communication, and technology) and the 5G internet has transformed payment systems from cash-based to electronic and mobile-based transactions.
The Information Technology Act of 2000 legalized E-commerce, online transactions, and digital signatures in India. These digital transactions are anticipated to replace conventional forms of commerce and services eventually. The surge in mobile payments stems from various factors such as governmental initiatives promoting digital literacy, events like demonetization, the launch of UPI, the growth of telecom through 5G adoption, affordable internet accessibility, economical mobile devices, the expansion of M-commerce, and new players entering the M-payment industry.
This study delves into an extensive literature survey to enhance understanding of the evolution of payment systems from E-commerce to M-commerce. It aims to concisely synthesize past studies on the success factors of both e-payments and m-payments, offering an overview of payment systems employed in E-commerce and M-commerce.

Keywords: E-commerce, M-commerce, E-payments, M-payments, transformation

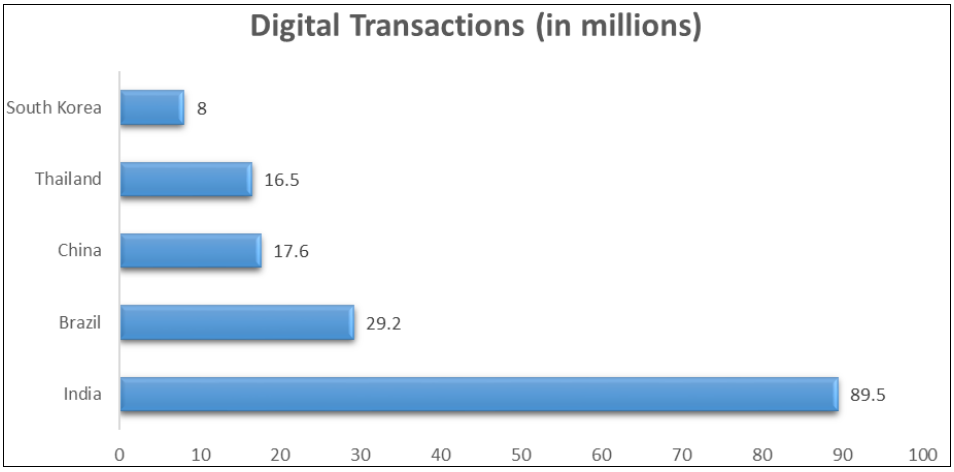
Introduction
People in ancient times exchanged products and services to get what they needed (such as clothing and tools) from others. This technique of trading compensated for the lack of cash. People now primarily utilize money to pay for products and services. Commerce is the exchange of products and services between firms, and any transaction that employs money to acquire goods or services is a part of commerce. The Internet and web technologies have transformed how people do business, particularly commerce. E-commerce has grown in popularity due to Internet technology and enhanced encryption techniques. E-commerce is the purchasing and selling of products and services through the Internet. E-commerce transactions are accessible for nearly every commodity and service, including books, music, aircraft tickets, and financial services such as online banking and stock investing. E-commerce varies from e-business in that there is no commercial transaction or exchange of value across organizational or individual borders in e-business.



Source: Statista market forecast (2021)

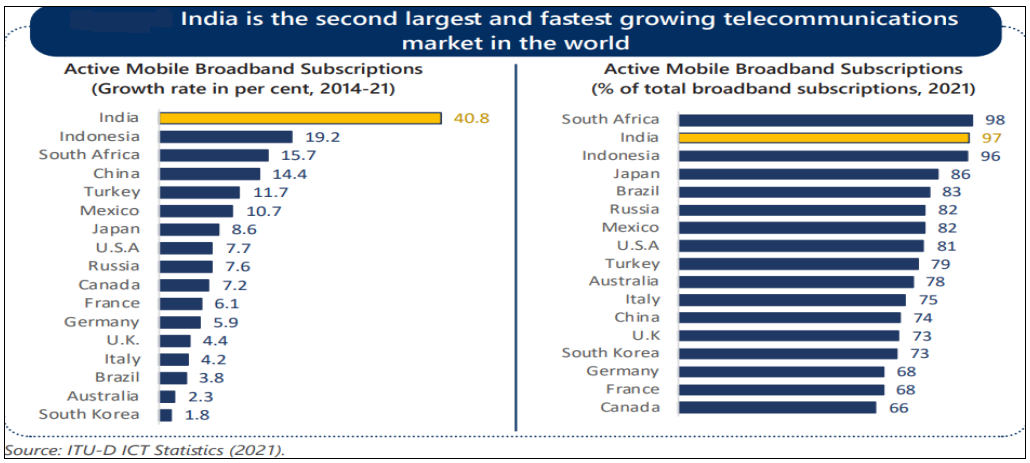
E-commerce sites use electronic payment systems, and e-payment refers to paperless monetary transactions. Electronic payments have transformed business operations by decreasing paperwork, trade, and workforce costs. Furthermore, it assists corporate organizations in expanding their market reach to a greater level. Payers, payees, E-commerce, banks, organizations, and governments benefit from using the E-payment System. Faster payments, improved tracking, transparent transactions, decreased time consumption, cost savings, and enhanced confidence between vendors and purchasers are all benefits of an efficient and reliable e-payment system. Electronic payment methods, such as ATM transactions, credit or debit card use, internet banking, and mobile banking, are increasingly widely employed. As per the data, "India in the year 2022 accounting for 46% of the global real-time payments, adding that the digital payment transactions in India are more than the other four leading countries combined".

India Tops World Ranking in Digital Payments



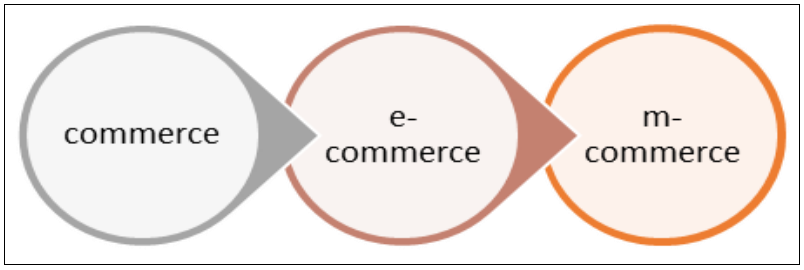
Source: MyGovIndia

Technology advancements and the explosive rise of mobile phones have made mobile internet services more widely accessible than they were at the beginning, which has fueled the expansion of m-commerce. Mobile commerce, or m-commerce, is doing internet business using wireless mobile devices such as cell phones and tablets. Due to its rising popularity, the business sector has been obliged to create a new commerce platform to reach the public. Many people are interested in mobile commerce because of its distinctive features. M-commerce is a brand-new industry created by fusing electronic commerce with ubiquitous and mobile computing.

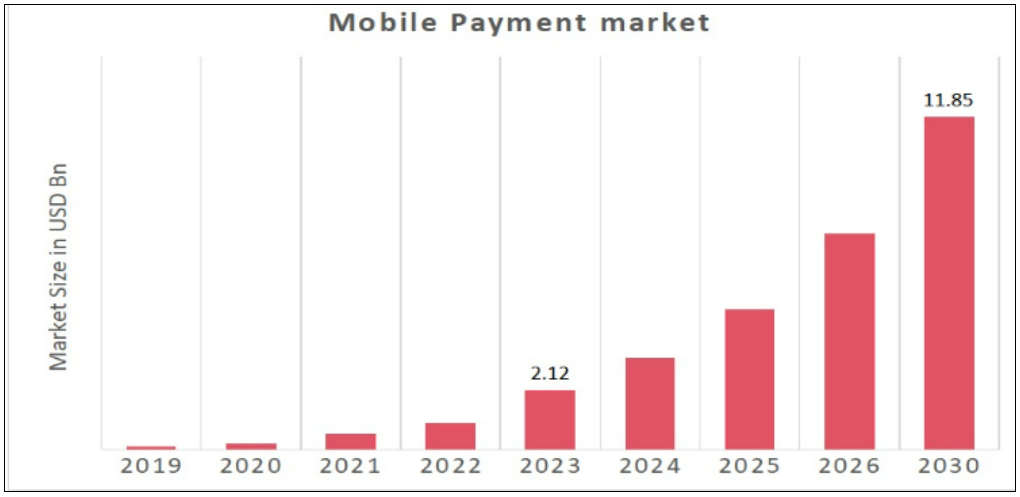


M-Commerce processes involve M-payments (Mobile Payments), described as payments made via mobile devices. M-Payments' future seems bright, given the widespread use of mobile devices, particularly smartphones. Both offline micropayments and internet transactions may be made with mobile payment systems. Due to the vast number of mobile phone users, the approach may be attractive to Internet merchants. Adopting mobile payment services lowers transaction costs overall and improves payment security (Hoofnagle *et al*., 2012, as cited in Bezovski, 2016**)** [4]**.** However, various factors, such as privacy and security concerns, have made it difficult for mobile payment systems to build a sizable customer base.

A growing number of established markets have installed infrastructure and device penetration systems to facilitate mobile purchases in-store (Bezovski,2016**)** [4]**.** However, significant security issues are associated with using mobile payments, such as privacy concerns, fraud, data theft, and device authentication. Nevertheless, mobile devices for online payments are growing in popularity due to the widespread usage of mobile phones and the numerous advantages they offer, such as cheap cost, convenience, and ease of use.



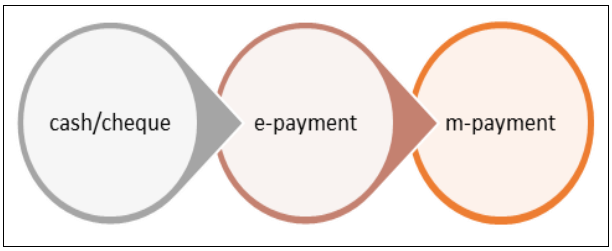
India is embarking on a significant digital revolution. Digitalizing the payment system will mark the transition to a cashless future economy. The development of a cashless economy in India depends heavily on financial literacy and consumer awareness of cashless transactions. The overall transaction value in the digital payment sector is anticipated to reach US$9.46 trillion in 2023, according to a survey by The Economic Times, which estimates that 52 percent of Indians have access to the Internet in 2022. Cashless transactions are a revolutionary mobile payment method that May replace a traditional wallet and more. "During the 2020 Covid-19 phase, the usual consumer habit of cash payments changed to digital payments. Over the past few years, wallets, UPI, plastic money, and other payment options have all progressively gained popularity. It has become essential for all businesses, from street sellers to internet brands, to accept customer digital payments. Understanding payment patterns and positioning your company to meet market demands is crucial (Gohil, 2023) [10]".



Source: Secondary Research, Primary Research, MRFR Database, Analyst Review (Future, https://www.marketresearchfuture.com/, n.d.)

According to Prospects for a Cashless Economy in India, one of the most vital concepts nowadays is the cashless transaction. The fundamental benefit of cashless transactions is that all economic transactions are recorded thanks to digital transactions. Controlling the illicit market, which frequently has a negative impact on the national economy, is practically now feasible thanks to digitalization. According to the Reserve Bank of India (RBI) and National Payments Corporation of India (NPCI), more frequent use of popular methods, including NEFT, Mobile Wallets, Mobile Banking, BHIM, Banking Cards, and Internet Banking, has led to an increase in cashless transactions. The payment system significantly influences the growth of the nation's economic and social infrastructure. The use of digital payment is growing exponentially due to rising internet usage, mobile phone adoption, and government initiatives like Digital India. The Government, NPCI, and RBI payment system initiatives have led to broader acceptability and deeper penetration of non-cash payment alternatives.

India's digital payments ecosystem has expanded considerably in recent years due to government efforts, rising internet and smartphone use, and the expansion of e-commerce. Private firms providing various digital payment services underpin the ecosystem for digital payments. With the anticipated increase in internet users and the size of the e-commerce sector, India's future for digital payments appears promising. "According to Hindustan Times, digital payment transactions totaled $1.5 trillion annually in December 2022." India's figures are higher than that if you combine the total digital transactions in the US, UK, Germany, and France," the minister stated at the Davos World Economic Forum conference. Immediate Payments Service (IPS) and Bharat Interface for Money-Unified Payments Interface (BHIM-UPI) are the most widely used digital payment methods. Users now favor UPI as their preferred method of payment (HT News Desk, 2023)".



E-Commerce and E-Payments

The idea of e-commerce has altered how people do business today. The use of electronic payments online is not the only

one. This category includes several application areas, including financial activities, publishing with electronic distribution, and sales portals encompassing sales, marketing, production, management, and distribution.

Some of the main categories of e-commerce (Niranjanamurthy *et al*., 2013 [18] and Kandula *et al*., 2019) [15]

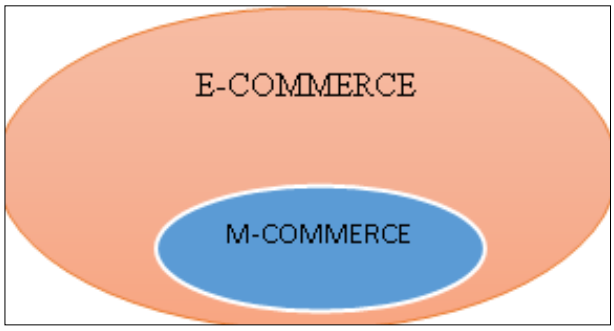
- **Business to Business -**Businesses transact with one another in a business-to-business form of the electronic commerce system. For example, a manufacturer may sell something to a wholesaler, who might then sell it to a retailer. In this case, each business—manufacturer, distributor, and retailer—runs independently.

- **Business to Consumer:** In this form, the business offers its goods, services, or products directly to the customer online. The consumer may examine what they wish to buy and place their order here. The business, such as Amazon, Flipkart, etc., would process the order after receiving the order data before sending the items straight to the client.

- **Consumer-to-consumer:** (C2C) refers to business between customers or private persons. Even if there isn't a clear middleman, the parties need the platform given by an online market maker like eBay to conduct the transactions. This business strategy is used by social networking and e-commerce websites, including OLX, Quickr, and e-Bay.

- **Business-to-Government:** Business-to-government (B2G), often called business-to-administration (B2A), is the exchange of products and services between the private sector and a government body. Government bodies may place orders with external third-party contractors for products or services to clean and upkeep public areas like parks.

- **Mobile commerce (m-commerce):** M-commerce refers to exchanging products and services using wireless portable devices like smartphones and tablets. A kind of e-commerce known as m-commerce allows customers to access online purchasing platforms without a desktop computer. E-commerce's apparent successor is mobile commerce. (Mahil, 2008 & Au, 2007 as cited in Agarwal & Bhatawal,2015) [1d]



E-payments: Business transactions continue moving away from cash-based transactions and towards electronic-based transactions due to the Information and Communication Technology (ICT) Era and digital innovation.

The electronic payment system was developed as an improvement over cash, not to replace it completely. The use of electronic payment systems is crucial to e-commerce. A payment made electronically is transferred from the payer to the receiver through an electronic payment system. E-payment generally refers to an electronic amount made during an online transaction that takes place over the Internet (S Fatonah *et al.* 2018) [8].

The electronic payment system can be broadly divided into below general types: (Bezovski, 2016 [4]; Manickam *et al*., 2019) [16]

- **Electronic payment cards (debit, credit, and smart cards):** Most banks now use card payments, which can be made with various cards, including debit cards, credit cards, green cards, and prepaid banking cards. The benefits of card payments include convenience, ease of use, and the ability to avoid carrying cash. Some of the most reputable and well-known card payment systems include Visa, Rupay, and MasterCard.

- **E-wallets:** The next cashless payment option is an e-wallet. From groceries to plane tickets, you may buy anything using an e-wallet. The client and the merchant need a smartphone with an active internet connection to utilize e-wallets. A mobile wallet is a symbol representing the advantages of a virtual wallet, which can be used simply by downloading an app. (book pdf). Using a mobile wallet indicates the benefits of virtual wallets, which may be accessed by downloading an app. Mobile wallets and cloud-based solutions are expected to provide users with more simple payment options in the future by using cutting-edge smartphone connectivity technologies, including Near Field Communication (NFC), sound waves, and QR codes. (Husson, 2015 as cited in Bezhovski, 2016).

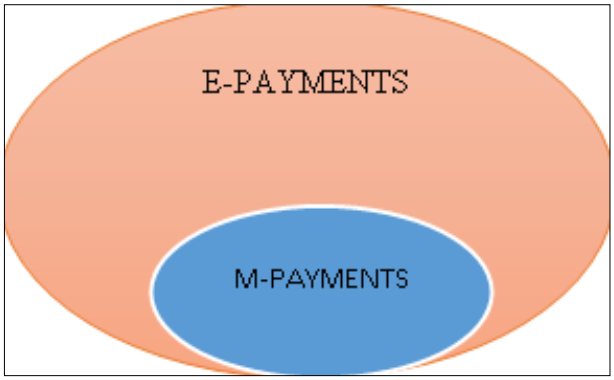
- **Electronic cash (E-cash):** Electronic currency systems in the form of DigiCash or CyberCash were proposed in the early phases of introducing online payment systems. Meanwhile, these systems were not well received and quickly vanished. Many companies employ innovative card-based methods more frequently to accept modest payments.

- **UPI:** The UPI (Unified Payment Interface) app may be downloaded on Android or iOS platforms. Users must register a mobile number for their bank account and connect their bank account with the IFSC code. Based on this software, we can transfer money between banks and between banks and individuals around the clock every day of the year. Installing and using this program are free of charge.

- **Online banking:** Direct bank account payments allow customers to simply make transactions. The customer still has to register with their bank for a net banking facility even if they do not need a debit card to utilise this e-commerce payment method. The consumer simply requires their net banking ID and PIN to conduct a transaction.

- **Mobile payments:** Payments done using wireless devices like mobile phones and smartphones are considered more convenient, less expensive per

transaction, and have higher security levels than wired equipment payments. (Hoofnagle, *et al*. 2012 as cited in Bezhovski, 2016). (Karnouskos and Fokus, 2004 as cited in Sonal, 2021) [26] mobile payments are a game-changing way to accelerate both e-commerce and m-commerce in addition to e-payments. Any payment that needs a mobile device to initiate, activate, or authorize it is called a "m-payment" in their definition.



Critical success factors of the e-commerce payment system (Sumanjeet, 2009) [27]

- **Integrity:** Transaction data is sent and received in original, intended form.
- **Non-Repudiation:** Transactions have the same reliability as receipts or unarguable proof.
- **Authentication:** At a certain acceptable degree of risk, the identities and characteristics of parties participating in trade are established.
- **Authorization:** People authorized to receive, send, or view transactions have been established and recognized.
- **Confidentiality:** Without the proper authorization, transactions might be hidden from view.
- **Reliability:** The likelihood of failure for the transmit, receive, and acknowledge transaction is minimal.

Other features of operation include cost effectiveness, personalization, interoperability, and privacy.

1. M-Commerce and M-Payments

Mobile commerce, often known as electronic commerce on mobile devices, is the act of purchasing products or services while utilizing a wireless network (Deshmukh & Naware, 2014) [7]. Mobile devices' portability provides extra advantages like mobility and convenience. As a result, m-commerce is expected to replace e-commerce in several nations worldwide. (Zhang *et al*., 2002, as cited in Pandey & Chawla, 2018) [21].

The greater perceived risk levels might result in lower adoption rates for mobile commerce. When customers utilize mobile applications for services like shopping, banking, and payments, they risk having their personal or financial information exploited due to wireless network hacking. (Thakur and Srivastava, 2014; Chopdar *et al*., 2018, as cited in Pandey & Chawla, 2018) [21]. Investment in m-commerce infrastructure, technology, and services is at the top priority of commercial enterprises globally due to the enormous potential to supply personalized services through e-commerce platforms. The seamless availability of 5G and other high-speed data technologies, the rise in popularity of smartphones and tablets, the falling cost of internet connection, and the accessibility of mobile apps have given m-commerce a fresh boost and turned it into a global commercial phenomenon. (Pandey & Chawla, 2018) [21].

Areas / Uses of m-commerce

Due to its excellence and adaptability, m-commerce has proven to benefit industries, including telecommunications, retail, information, and finance. (Singh, 2016) [25]. M-commerce is becoming more prevalent as a mode of business and commerce in various industries, in addition to being generally acknowledged. (Golden and Regi, 2013) [11]

- **Finance sector- The financial industry heavily uses mobile commerce, including:** All significant banks, stock exchanges, and brokerage firms. Using mobile commerce features, users may transact, transfer, or pay bills using money from their bank account. The user may use their mobile device to get stock market quotations and stay current with the status of existing trades while in the stock market. The share broker delivers market trends and trading advice on their clients' mobile devices.
- **Information sector:** Mobile commerce has been extensively employed in information technology to transmit financial news, stock updates, sports scores, traffic updates, and many more onto a portable device.
- **Telecommunication sector:** Mobile's adaptability and excellence have greatly influenced communication technology. Any mobile device needs a software platform to work, and this device has revolutionized communication since it acts as a little computer.
- **Service/Retail sector:** Retail and service industries are also among the top sectors that have benefited the most from mobile commerce. Numerous commercial transactions are completed via a mobile device, no matter how big or small. A customer might place an order through a mobile device, use a carrier's services, and, most importantly, pay any associated fees.

M-commerce types

The term "m-commerce" refers to a wide range of transactions, including "m-brokerage," "m-information," "m-education," "m-auction," "m-purchase," and "m-ticketing," all of which fall into one of three categories: (Padmavathy *et al*., 2021) [20]

1. **Mobile banking:** A safe, specialized app from a financial institution is often used for mobile banking. This service uses SMS, chatbots, and other conversational app platforms to deliver notifications and keep track of account activity. Banks and other financial organizations employ mobile commerce to provide their clients access to account information and to enable them to conduct transactions, such as buying stocks, transferring money between accounts, or accessing credit card information.

2. **Mobile shopping:** Allows users to purchase goods using a mobile device and app, such as those from Amazon, Flipkart, or online. Most of this is akin to e-commerce and is available through an iPhone or Android device. It is now feasible to shop on mobile thanks to optimized websites, shopping applications, and even social media platforms.

3. **Mobile payments:** Are an alternative to standard payment options, including cash, checks, credit cards, and debit cards. They allow customers to use a mobile device to purchase goods in person. The same function is served by and is available through prominent mobile payment applications like Google Pay, Paytm, and BHIM. Users may send money straight to a recipient's bank account or cell phone number via mobile payments.

M-Payments

M-payment acceptance has increased exponentially as a result of ongoing technological advancements, accessible smartphones alongside affordable internet access, a preference for purchasing via mobile, and government assistance. M-payment was previously controlled by a small number of third-party payment providers; however, since the announcement of UPI 19 by NPCI in 2016, the diversification of m-payment operators began in India. The government joined in by releasing its own payment app, called BHIM. According to a 2019 KPMG analysis, UPI payment has overtaken cards as the value of cards and mobile payments in 2019 exceeded the value of ATM withdrawals. M-payment in India has a broad ecosystem of companies. In India, mobile payment services are offered by banks, large e-commerce companies, third parties, and the government. (Padmavathy *et al*., 2021) [20]

Below are a few common methods for using mobile payment systems:

1. **Mobile browser-based payments:** These are forms of payment that are carried out using a mobile browser like Chrome, Safari, etc.; upon inputting credit card information or clicking on links, money is transferred to the payee. With mobile browser-based payments, customers may make card-not-present (CNP) purchases using a smartphone, tablet, credit, debit, gift card, or even banking information (ACH). Customers can access a website using a mobile device, add goods or services to a shopping cart, and then use their phone or tablet to fill out the payment information in the website's checkout form to make a transaction.

2. **Wireless credit card readers:** Businesses may use smartphones or tablets as mobile point-of-sale systems to process credit cards on the go instead of just relying on stationary credit card terminals. You can spend money on extra credit card readers that connect to the mobile device or slide into existing headphone ports to achieve this. Thanks to these mobile readers, businesses can swipe, dip, or touch credit cards and take payments right away.

3. **Mobile wallets:** Are virtual wallets that carry out the payment procedure using sophisticated and secure technology. A mobile app often loaded on a smartphone allows users to add money by entering their bank or credit card information. Mobile wallets are not just for in-person purchases. Customers may use a mobile wallet to complete an online purchase anywhere their chosen app is accepted.

4. **In-app mobile payments:** Users gain from various in-app mobile stores and enterprises that enable them to purchase particular goods and services inside restricted ecosystems. You need to enter your credit, debit, or account information once, after which you may easily buy something, download a book or song, buy a coffee, or pay a bill.

5. **SMS payments:** According to this payment technique (Crowe *et al*., 2010 as cited in Sonal 2021), a text message including the necessary payment information is delivered to a designated USSD code. The user has a distinct MMID and MPIN, and the number that is that is used for sending text messages is connected to the bank account. Money is credited from one's account and put into the target account when the security PIN is verified.

6. **QR codes:** The acronym QR stands for quick response. A square of various sizes that can be scanned from any angle is used to encode a substantial quantity of alphanumeric data. In addition, QR codes are simple to create, error-free, and useful for a variety of purposes. (Codes-qr.com, 2016 as cited in Sonal, 2021) [26].

Critical Success Factors in Mobile Payment System (Antovski & Gusev, 2003) [3]

- **Ease of use:** The first setup process depends on how the system is built overall and how the mobile phone fits into it, not on the technology itself. There may not be any installation steps beyond the straightforward acceptance of the downloaded concrete program.

- **Security:** party's servers, databases, and network connections must be secured, including the Merchant, Payment Service Providers, and Financial Service Providers. Data must be sent across all interfaces of the system securely.

- **Comprehensiveness:** system must be compatible with all devices from any company if it is to be broadly adopted. A mobile payment system must be entirely independent of the phone for maximum dispersion.

- **Expenses:** The Mobile Payment System end users must not be charged any fees. Additionally, there cannot be any direct transaction costs. If indirect costs like SMS transmission are maintained to an absolute minimum, they could be acceptable.

- **Technical acceptability:** the system to be as global as feasible, it must be network and bearer independent. It doesn't really matter to the end user whether the financial service provider is a bank or a mobile operator; what matters is that the system can settle payments from all end users. To do this, all banks or mobile operators must enable settlement.

E-Commerce vs m-commerce

(Niranjanamurthy *et al*., Bhasin, 2005 [5, 18], Omonedo & Bocij, 2014)

Ubiquity: While m-commerce uses wireless devices to enable users to get information and perform transactions anywhere, e-commerce relies on "wired" networks.

Accessibility: With a mobile device, the user may be reached almost anywhere and at any time. The user also has the option to restrict who or when they are accessible. In contrast to mobile commerce, which has no time constraints, e-commerce is location-specific.

Convenience: M-Commerce makes it incredibly convenient to do a lot from a little device. You can already conduct financial transactions, download music files, and purchase on your smartphone or tablet from virtually anywhere. It just takes a few clicks. Therefore, mobile commerce is much more practical than online commerce due to the mobility aspect of the wireless gadget.

Personalization: Mobile device is typically personal and devoted to a single user. Your mobile device may be used however you choose, with customized information that reflects user preferences, along with payment methods that enable the storage of personal data to do away with the having to input credit card information each time a transaction is made.

Security: Compared to e-commerce, a smartphone provides intrinsic safety based on the unique end-user device.

Flexibility: E-commerce platforms are built using a client-server model. Mobile agents are portable software applications that can roam across the Internet to carry out specified operations autonomously in m-commerce.

Easy to use: Compared to e-commerce, m-commerce is significantly simpler. Mobile devices may connect and conduct business transactions, from mobile to mobile and even from mobile to other devices, depending on the network signal—no need to set up a modem or Wifi connection.

Conclusion

After reviewing the literature, it is evident that m-commerce is not fundamentally different from e-commerce. Instead, we may claim that m-commerce, though young, is a critical subset of e-commerce. The revolutionary 5g technology, rising mobile phone users, low cost for data connectivity, and plenty of m-commerce benefits have made it more popular in the new era of the commerce world today. Wireless connectivity, mobility and flexibility, transaction ease, personalization, and many more advantages distinguish M-commerce from older technologies e-commerce. Similarly, the payment system has undergone several modifications from ancient times, with barter systems, currency, and checks being more prominent in earlier days of history.

However, as technology advanced and the world became more computerized, electronic payment systems became the center of attention, as most transactions were conducted online. Most electronic payments were made via credit/debit cards, ATMs, internet banking, etc. However, with time, consumers realized the advantages of making all of their payments from the comfort of their homes through mobile phones, and m-payments have grown in popularity since then.

There was a requirement for an M-payment system to reduce the use of credit/debit cards. Furthermore, the government's, RBI's, and NPCI's ongoing efforts have made it clear that mobile payments will become the trend for cashless digital India shortly. Following the advent of UPI by NPCI and other popular applications such as BHIM, Google Pay, and Paytm, it is now feasible for any bank, financial institution, or even small business to take mobile payments from their consumers. People demand convenience since their lives are so hectic. M-commerce appears as a convenient option in such circumstances. Paying for anything with a mobile phone has become convenient and hassle-free for individuals. It is also feasible that new inventive and creative methods of making payments and conducting business will emerge, as change is the only constant in today's society.

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