Electronic Payment System and Emerging Technology and Potential Impact on Economy in Saudi Arabia

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Abstract -- E-commerce payment methods continue to surge and become a significant part of the global economy. This paper evaluates the literature on existing electronic payment system (e-wallet) payment methods. Among the methods examined include PayPal, Alipay, Microsoft Wallet, Apple Pay and Samsung Pay. The benefits and drawbacks of e-wallet technology are discussed. Finally, we review the future perspectives on Emerging technology and potential impact on economy in Saudi Arabia.

Indexed Terms: E-Commerce, Electronic payment system, digital Wallet, e-wallet, emerging technology, block chain

I. INTRODUCTION

E-commerce (also widely described as electronic commerce) has become one of the most important industries to have evolved online[1]. Mobile devices have advanced at an exponential rate, and becoming connected has swifter or easier. This means that people are able to check their emails, browse the internet, and do countless other online activities – including e-commerce – from anywhere they find themselves at any hour of the day or night[2][3]. Over the centuries, people have designed countless manners through which to exchange products and services. Once it became impossible to make direct trades within their transactions, human beings designed bartering systems, first with coins and cash, and subsequently with credit cards and checks. In our modern time, people have become more deeply involved with e-commerce, as it is both easy and secure. Retailers of the past worried about money being counterfeited, checks bouncing or being forged. With proper measures in place, electronic transactions can be worry free, providing security for the businesses and ease for consumers[4][5]. For these reasons, electronic payments have become the preferred payment method of many people. Moreover, as this system has evolved and become more widespread, businesses have begun to appreciate it even more as it can be less costly to accept payments in this manner than it is to accept traditional forms of payments[6]. Moreover, most modern businesses have become willing to and capable of accepting credit card payments through online transactions, which has provided this industry with a global market that dwarfs that of any one city or country. This paper will consider the general field of e-commerce. Then we focus on e-wallet technology and reviews existing literature, benefits, and limitations of e-wallet technology and prospects of e-wallet technology. Then specifically examine the emerging technology in terms of how it effects of e-wallets in Saudi Arabia.

II. ELECTRONIC PAYMENT SYSTEM(EPS)

a) EPS Definition:

An Electronic Payment System (EPS) is a way for a wide variety of consumers to be able to connect on financial transactions through an inter-organisational information system (IOS). It has changed the manner through which we do business. In contrast with commerce in generations past, where individual businesses often had their own systems and regulations, e-commerce has become a complex system that relies on the interconnectedness of many stakeholders. EPS systems are founded organizationally, relationally, and technologically [7][8][9]. Thus, it is essential that these stakeholders cooperate implicitly in an effort to amalgamate all facets [10].

Many researchers have tried to define the electronic payment system over the years. Adeoti and Osotimehin (2012) argue that EPS systems provide a client with a means to make payments online and, to complement this, for businesses to be able to accept online payments for the goods and services they sell[11]. Kaur and Pathak (2016) similarly suggest that electronic payment systems are a manner for

businesses and individuals to exchange money online [12].

Similarly, Kalakota and Whinston (1997) label EPS as a transaction between a retailer and a customer that involves an online transaction[13]. Likewise, Humphrey and Hancock (1997) state that the method in question defines transactions that occur, often at a distance, that are actualised as a result of electronic money exchanges[14]. EPS has also been labelled a manner through which consumers can utilize a variety of methods of payments, including electronic credits and credit card payments, to make transactions electronically instead of needing to pay via cash in person[15].

Shon and Swatman (1998) suggested that EPS involves any variety of transaction where money is exchanged through an electronic channel[16]. Gansand and Scheelings (1999) define the term as transactions that occur through electronic signals that are connected to individuals' connected credit or debit services [17]. Hord (2005) provides an even broader definition, characterizing electronic payments as all those that involve money but do not use cash or traditional cheques [18].

b) EPS Methods:

A vast amount of electronic payment methods have arisen to serve a variety of needs in countries around the world. As such, many organizations have developed electronic payment methods with the aim of providing a solution for the abundance of online purchases and the security that needs to be in place to assure them. Some of these EPS methods include secure credit card transactions, e-cash, electronic cheques, and online transfers of funds[19][20].

Some common methods include: A) Debit cards, B) Credit Cards C) Mobile payments, D) Electronic Cash, E) E-wallets [21][22].

1. Debit Cards:

In recent decades, debit cards have gained an immense amount of popularity in usage; in fact, they have become the most widely used form of cashless payment across the globe. Debit cards are a very easy system for consumers to use. However, they differ from traditional credit cards in that the funds are not transferred from some intermediary lender; rather, when consumers make a purchase, the funds come out of their accounts directly. On occasions of dispute, this may cause clients extra hassle as, unlike disputes involving credit card purchases, they are the only party within the transaction fighting for their side in an effort to resolve the matter. Nonetheless, this variety of transaction can be handy in that users need only know their account numbers; as such, they can make their purchases without even needing to carry around the physical card. This makes the method extremely popular with customers. In contrast, it makes the method difficult to deal with for merchants, especially those online. This occurs because the protocols for security for debit cards are lesser than they are for other methods of payment, and it can be especially difficult for merchants to verify international [21]. Debit cards are a popular method for micropayments because their transaction fees are often lesser than methods such as credit cards. For transactions that remain within countries, the level of security of debit card transactions is quite high because the national banks require a high level of identification before users can access their accounts.

2. Credit cards:

Credit cards, which have been a popular manner for making local payments for decades, have likewise become the most frequently used method for payments for online transactions. Although security concerns existed when the trend towards global transactions began, the credit card companies have since rectified any concerns in this area. Currently, they provide security for every individual transaction. Moreover, large credit card companies are recognized across the globe. Thus, both clients and merchants can have confidence that the method will be utilized and accepted. However, credit cards come with rather large transaction fees, which makes them less feasibly used for micro-transactions[21]. A key reason why credit card transactions have gained such popularity for electronic payments is that credit card companies have implemented a vast infrastructure that enables their transactions to be performed across the world in mere moments. In addition, most merchants already have methods to accept credit card payments, so they are not required to purchase additional software. In order to authenticate a

purchase, the business must only acquire the purchaser's name, number and the card's expiry date. Credit card companies have also enabled users to create their own unique passwords in an extra effort to authenticate purchases online. Moreover, the large companies have implemented even stronger security. Visa has implemented its Verified system, while MasterCard has similarly come up with Secure Code.

3. Mobile Payments

Mobile devices have begun to be increasingly used to make online purchases. First, most people have smartphones or other such devices, and they keep these devices on hand much of the time. Moreover, according to [23], this type of transaction offers clients with lower fees and greater security. Businesses appreciate this style of payment as they have been able to use it to gain information about their clients. Paunov and Vickory [21] suggest that this type of payment has seen such exponential growth because of the fact that smart phones and other devices have become so ubiquitous. Moreover, it is possible for clients to use their phones to process micropayments and to make purchases online. Because of this large potential base of clients, who appreciate its convenience and security, this style of payment is becoming quite attractive to many businesses [23]. However, in order to further grow this system, these companies must find a way to overcome the challenge of reconciling payments across national borders and providing users with a greater level of privacy and, thus, greater peace of mind.

4. Electronic Cash

Electronic cash has the potential to be a widespread system that is appreciated by users and merchants. However, it has had difficulty achieving its potential. Systems such as CyberCash and DigiCash failed to gain traction with clients and businesses. These electronic cash systems are based on smart cards, which have achieved success in smaller scales and with lesser amounts of money. A difficulty of expanding such systems is that they require businesses to have appropriate card readers as well as the hardware necessary for consumers to make transactions. In an effort to stray away from the concept of smart cards, other e-cash systems have been implemented, including Clic-e and Virtual BBVA. Such devices present a system of tokens or other prepaid materials that people can use in the place of cash [21][18].

5. E- Wallets (mobile wallet)

Doan (2014) suggests that the "mobile wallet is formed when you're smart phone functions as a leather wallet: it can have digital coupons, digital money (transactions), digital cards, and digital receipts"[24]. In this mode of payment, clients download apps on their mobile devices. In turn, the deploy them when they want to make transactions, both online and offline. This form of EPS is assumed to continue to offer greater levels of convenience as new technologies aim to connect mobile devices with the real world through QR codes, NFC (Near Field Communication), cloud-based solutions, and technologies not yet even imagined. [25].

III. EXISTING ELECTRONIC PAYMENT SYSTEM(E-WALLET)

E-wallets provide easy solutions for the transactions process. In recent years, multiple products have been designed in this realm, including Google Wallet PayPal, and Apple Pay. Such services can be linked directly with people's individual bank accounts, presenting the opportunity for these services to seem like an extension of something people already use. Within this system, people are able to store their personal data and identifications directly on their mobile devices[26]. By 2020, global credit card company Visa suggests that this form of payment is going to be widely accepted.

E-wallets enable users to handle all of their online transactions in one location. These services contain their payment information, mailing addresses, usernames, passwords and more. In turn, users are able to quickly and conveniently make purchases from a wide variety of merchants across the world [27]. Such services have not quite gained prevalence in the Western world. However, these "wallet mobiles" are widely used in Japan [28]. Moreover, Mobile wallets have grown very quickly in China[29]. Electronic wallets aim to become a substitute for physical wallets entirely. Rather than having to carry around cards, bills, and even change,

people can simply bring with them an object that is already on their person. This makes the system simple and convenient, and electronic wallets have also shown to be quite secure. People are able to use them to make payments directly from their personal bank accounts or through their credit cards [27].

In the Asian markets in which they have gained great prevalence, e-wallets swiftly became utilized by large numbers of consumers. Athey (2016) asserts that this occurred because e-wallets are able to increase the speed of transactions by making them simple for consumers and for merchants [30].

Through the wide-encompassing system, electronic wallets enable people to make electronic purchases quickly through verifying payment information to merchants. Moreover, people are able to generate new passwords with peace of mind, as they will be able to access their mobile devices and e-wallets through other mobile security; as such, it is virtually impossible to forget one's password and be locked out of the system [31]. As people increasingly make all of their purchases utilizing this method, it can give corporations valuable data in terms of people's buying habits. With this knowledge, companies can provide more direct advertising to these clients. Although this is a definite benefit for the merchants, it can lead to people worrying about privacy issues, and it can make them feel like they are always being watched by corporations [31].

E-wallets are beneficial for multiple facets of the global economy. One notable value is that they place everyone on an equal playing field. As such, people in developing nations are more capable of making international transactions. Although people are able to connect their personal bank accounts directly to their digital wallets, they are under no requirement to do so. As such, people in developing countries or even simply people in rural areas of developed countries are able to make transactions much more easily. This provides the ability of people to make payments to or accept them from friends and family members, as well as to or from people on the other side of the world [31].

Unlike some bank accounts, electronic wallets do not have minimum balances. As they are digital, and not physical, they are simple to create and easy to maintain. One of the world's best recognized electronic wallets is PayPal, a system that can hold funds but one that can also draw funds from other accounts when transactions are made. Other large monetary firms have entered the field in recent years, with MasterCard developing its Master Pass system and Visa developing. V. me[32]. In addition, giant corporations such as Google and Amazon have also decided to enter the fray.

a) PayPal:

PayPal, an e-commerce service that began in the USA and that has spread across the world, allows companies and individuals make monetary transactions without necessitating that they share financial details. People are able to connect their PayPal accounts with their bank accounts or credit cards in order to send or receive money. This enables clients to quickly pay for their purchases and it gives merchants the ability to ask for and receive payments swiftly.

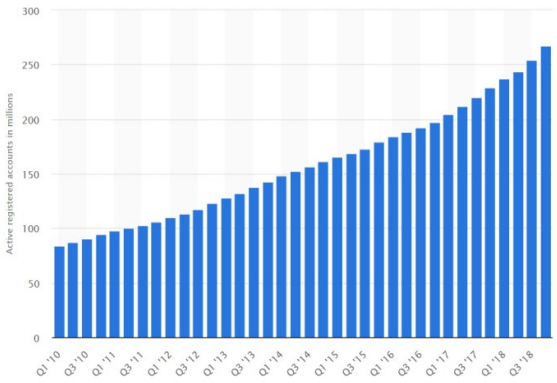

Fig. 1: Number of PayPal's total active registered user accounts from 1st quarter 2010 to 4th quarter 2018 (in millions) [33].

Although it began as an individual company, PayPal was purchased by the popular online auction site eBay in 2002. Since that time, it has gained a substantial amount of visibility and credibility. Originally used predominantly to resolve eBay's action sales, it diverged into many other areas as well. In fact, many people consider PayPal to be the preeminent system in the electronic transaction market. As such, it has attracted physical retailers including Home Depot and BestBuy as well as digital

companies such as Valve and Humble Bundle. Such retailers enable their clients to make in-store and online purchases using PayPal.

In order to make a profit, digital wallet services such as PayPal charge retailers transaction fees. This method has proven to be quite a good model. In recent years, PayPal has seen an increasing amount of transactions occurring through its system; in turn, it has seen increasing profits. Fig.1. shows the active growth of PayPal over an eight-year span. With 267 million PayPal accounts throughout the world, the company has enjoyed a 17% growth over the span of the most recent calendar year [33].

PayPal first achieved success by filling a gap to address the needs of merchants and clients making micropayments. Big banks did not see the benefit in providing a vast amount of attention to small businesses and their online transactions. Thus, by working with small businesses and promoting their online payment service to customers worldwide, PayPal was able to fill a niche. Over less than two decades, this niche has grown substantially and they are now filling the needs of a great many clients. Through their methods, PayPal helped launch many small businesses and lead them to profitability through their online services. Moreover, by working with different banks to enable users to connect their accounts, the system has enabled these same small businesses to reach out to clients of many varieties [32].

b) Google Pay:

Google has been in the online payment market for some years. However, in an effort to streamline their services, the company amalgamated Google Wallet with Android Pay at the beginning of 2018. This new service enables the company to leverage the fact that many people already have Google accounts for Gmail or other services. Using these accounts, clients can purchase products through YouTube and Chrome Android along with other merchants that enable people to pay through NFC[31].

c) Amazon Payment:

Giant e-commerce firm Amazon entered the e-payment foray in 2007 when it introduced Amazon Payment. With so many transactions occurring through the company, it seemed wise to set up a payment platform so that users did were not required to leave the website when they were paying for their purchases. This system has become known for being swift and easy [34].

d) AliPay:

The AliPay system is very similar to all the other e-wallet systems. In 2013, the system put out by the Alibaba Group managed to overtake PayPal to become the biggest system of its kind. Currently, one in twenty people in the world use AliPay for their online purchases. These purchases occur predominantly from Asian buyers, as the company was launched in China in 2004. Managed by Ant Financial of China, the service strives to be more than simply a way for people to pay for their online purchases; rather, it aims to be a lifestyle "super app" [35].

e) Wechat Wallet:

Wechat is the largest and most common online payment method in China. People are able to download the company's app on their smart phones or other mobile devices and then link their debit cards to these accounts. From there, they have plenty of options to use the system to pay for their purchases, including having in-person businesses scan the customers' QR codes and enabling consumers to make online payments for products that vendors promote using the app both through web-based systems and through in-app payments. Being the most popular system in the world's fourth largest country means that Wechat does great volumes of business [36].

1. Benefits and Limitations of e-Wallet:

There are several benefits of using e-wallet technology. Using e-wallet eliminates the need for intermediaries thus reducing the cost of doing business. Varsha and Thulasiram [37] assert that applications of systems such as Square can replace expensive point of sale systems which result in lower transaction cost. Business the adopt e-wallet enjoy a competitive advantage. Ryabova [38] posit that e-wallets offer a more convenient transaction processing method for consumers, giving companies that adopt them a competitive advantage in the industry. E-wallets also provide a modern mode of

payment. E-wallets have opened up entirely new payment methods that have brought disruptive changes and in the process created new business ventures. Finally, e-wallet technology is convenient for users. Buyers with an e-wallet system can get through a transaction in split seconds with a simple tap of their Smartphone, leading to a greater sense of satisfaction [39].

Despite the above benefits, e-wallet technology has several limitations. The most significant limitation is security. E-wallet providers should ensure that data breaches well protect customers' information shows that providers cannot provide 100% security guarantee [40]. Businesses also risk system outages when the payment system malfunctions or there are security breaches. Finally, e-wallet systems require a significant investment. Popli and Chauhan [41] argue that initial development of the e-wallet software and regular maintenance, updates and fixes are considerably high.

2. Future Perspective on (e-wallet) Technology and Potential Impact:

E-Wallet technology will continue to influence how payments are made. Providers are likely to pay more attention to the security features of their e-wallet. Voice technology which depends on natural speech research is taking off and is likely to provide additional security features [42]. The Internet of Things (IoT) is likely to interconnect multiple e-wallets to make it easy to move money from one e-wallet to another. Check, Huiskamp and Malinowski [43] state that merchants are aware of the changes taking place in e-wallets are preparing consumers to use connected devices to make payment in the future. Artificial intelligence (AI) will soon play a significant role in e-wallet technology by putting control back into consumers, and the brands will reap benefits in terms of profits and customer loyalty. According to Dula&Chuen[44], Amazon and Alibaba, the two largest e-commerce companies will continue to dominate commerce transactions and new development in IoT. In terms of in-store mobile payments, Samsung Pay, Android Pay, Apple Pay, and Google Wallet are expected to continue dominating. Barkay[45] estimates that in-store mobile payments will surpass credit cards by 2020.

IV. METHODOLOGY

A great deal of published literature on e-wallet technologies is available online. The first step in searching for relevant information for the literature review was to search examples of emerging technologies and Existing Electronic Payment Systems, using the Google Chrome search engine. The search for e-wallet technology led to a website that ranks the top 100 e-commerce payment methods by popularity. The most influential e-wallet technologies were selected. Moreover, to ensure global representation, the top methods in the U.S., the U.K., and Asia were selected. As the literature review also required credible and reliable sources, a search was done via Google Scholar. This is a freely accessible web search engine that indexes the full text of scholarly literature across a diverse array of publishing formats and disciplines. The key words used to locate scholarly articles included e-wallet technologies, e-commerce payment methods, benefits of e-wallet technology, limitations of e-wallet technology, future trends of e-wallet in e-commerce, and emerging technologies that effect to payment in e-commerce. The search was filtered to include only articles published since 2014. This ensured that the literature review is based on current scholarly work; this is important since technology is dynamic. Four years were judged to be reasonably current and representative of a true and fair view of e-wallet technologies. The article searches included only works published in peer-reviewed journals. This was done to ensure that the literature review used had credible sources. The information from the journal articles was collaborated with the information published on e-wallet technology providers' websites. Reading the information provided on the vendors' websites clarified some grey areas from selected articles.

V. LITERATURE REVIEW

In this section, we will present the e-wallet payment currently used, as defined in new research studies.

For today's businesses, e-commerce payment methods are cutting edge. The majority of e-wallet technology is used to pay for e-commerce online. According to Mukherjee and Roy (2017), PayPal is

commonly used for purchasing eBay products [46]. E-wallets were conceived to eliminate the need for consumers to carry a physical wallet. Some e-wallets even allow users to add personal data such as loyalty cards or insurance cards. For example, Adyen, a payment platform headquartered in Amsterdam, allows users to store personal and payment information [47]. Microsoft Wallet provides a secure way to store credit cards, debit cards, rewards cards, loyalty cards, and membership cards in one app; however, it can only be accessed via Windows-based smart phones. Turban, Whiteside, King, and Outland [48] assert that some e-wallets have gone the extra mile by allowing users to do recharges and money transfers to contacts, shops, and bank accounts. For example, Airtel Money, a semi-closed e-wallet, allows users to perform such transactions. Some e-wallets are designed to provide a seamless way to make and receive payments via digital wallets and smart phone devices. An example of this is Alipay, a Chinese company that offers an easy, secure way for consumers and businesses to make and receive payments online or on mobile devices [49].

Banks around the world provide e-wallets mainly through net banking. According to Safeena, Kammani, and Date [50], this system requires that users to login to their personal bank accounts using usernames and passwords. To complete the payment process, net banking redirects users to the bank's website, where a one-time password is sent to a personal contract so they can key it in. An example of this is the American Express, which offers e-wallet capabilities to perform countless payments in stores and through mobile payments for online transactions. The proliferation of smartphones has given rise to unique e-wallet solutions. Android Pay, a mobile wallet app for Android phones developed by Google, enables users to tap and pay in stores or to make in-app payments [51]. This system targets everyday Android users. As in other areas, Android and Apple are in fierce competition. Apple offers its customers ApplePay, an e-wallet that can hold credit and debit cards, which can be used to make in-app purchases using iPads and iPhones[52].

Companies that are able to pioneer e-wallet technology enjoy first mover advantage. According to Vecchiato[53], the first movers can potentially benefit from network externalities and high switching costs. For instance, PayPal completely disrupted e-commerce with one of the most significant e-commerce trends of our time: electronic payments and transfers. Other companies struggled to keep up, and PayPal maintains an advantage on most of its competitors. Today, crypto currency seems to hold the key to the future. BTCC is tapping into digital currencies such as Bit coin by providing an e-wallet to store currency that can be used to make payments to merchants that accept digital currency. Bech and Garratt [54] argue that more companies are increasingly venturing into crypto currency and the competition is set to intensify. One survival strategy is to specialize upon a specific type of crypto currency. For instance, Coinomi Wallet is solely for Bit coin and Altcoins [54]. Companies are also using their overall reputations to help popularize their e-wallet technologies. For instance, Samsung Pay developed an e-wallet that enables tap to pay for purchases at stores, and it soon became the most widely accepted mobile wallets. Lai [55] opines that despite there being numerous e-wallet technologies, none of them can provide 100% security to their customers. There remain many security issues, but e-wallet transactions are much safer than using actual money.

VI. EMERGING TECHNOLOGIES

The marketing industry has been experiencing disruptions like never before. While considerable debate about market disruption centers upon shifting consumer activities, there are also fundamental alterations occurring in terms of how consumers pay for the goods they purchase. Innovations in payment technologies have led to payments for goods and services becoming more secure, fast, and independent of government influence as a result of changes such as block chain technology. Emerging technologies such as block chain payment technology and biometric authentication payment have reinvented commerce and they have transformed what customers expect to experience while making transactions in retail outlets. Moreover, these technological payment advancements have changed the role that financial institutions play in transactions.

The success of block chain and biometric authentication technologies' relies on four primary factors: cost, convenience, speed, and reliability. However, in terms of consumers' inclinations, the vital features are lower transaction costs, greater convenience, and technological developments. Additionally, consumers expect payment systems to provide them with frictionless checkout experiences and maximum security in all their transactions [56]. As such, this paper will discuss two emerging payment technologies: biometric authentication, and block chain payment technology. We will examine their benefits, their limitations, and their impact on E-wallet.

1. Block chain Payment Technology:

Irrefutably, block chain is an ingenious creation that was developed in 2009. It allows digital information to be distributed, but it restricts the information from being copied. Block chain technology was created primarily for the bit coin crypto currency; however, it has since found other potential uses. Block chain refers to time-stamped chains of specific records of information that are managed by a cluster of computers. As such, they are not possessed by any single individual. Tapscott and Tapscott also describe blockchain as "an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value" [57]. The blocks of information are secured and attached using cryptographic principles. The blockchain network is decentralized in nature; thus, it is a democratized system that has no central authority.

Information in blockchain is available to anyone to see since it is a collective and immutable ledger. Therefore, everything built on the blockchain is transparent, and every individual is responsible for his or her actions. Passing information from one party to another requires one party to create a block that becomes verified by several computers across the internet. Once authenticated, the block gets added to a chain and it is hosted across multiple networks simultaneously, creating a distinctive record and history [58]. Storing information in various locations means that the files become public; hence, they are easily verifiable. In addition, the data cannot become corrupted by a hacker since no centralized record of the data exists.

The architecture of blockchain technology allows for both private and public options. The public option of blockchain permits every individual to join and read. However, the public blockchain can be made secure by modifying it to allow only authenticated participants to write it. In contrast, new contributors can join and read in a reserved-based blockchain proprietorship model. These two models make blockchain technology easy to apply in different industries [59] including banking, healthcare, e-commerce, agriculture, media, and entertainment, among others.

Blockchain payment technology has various benefits over traditional payment systems that may prove to be useful in multiple industries. First, unlike traditional financial systems such as banks, it is decentralized. This gives it the upper hand as it allows value flow without the need for intermediaries [60]. Therefore, different parties can perform financial transactions that can be verified and cleared without a trusted third party sitting between the participants. Consequently, the absence of intermediaries helps to reduce the complexity and costs of blockchain, as there are no transactional costs accrued. Additionally, the lack of a third party makes verification fast and efficient. Moreover, being decentralized ensures that there is no government interference. Therefore, the cryptocurrency's value will not be affected in any way due to government activities.

Second, blockchain technology utilizes a distributed ledger. That is to say that all participants in the system share the same records system instead of each maintaining his or her own personal proprietary view of it. This computer-generated shared ledger ensures that there is consensus, provenance, immutability, and finality for transactions such as asset transfers of payments [61]. Due to this approach, there is no need for reconciliations in blockchain transactions.

Third, blockchain has a distributed database at its core. This means that the exchange of data and information is synchronous and uniform [62]. Additionally, it allows blockchain to be updated

continuously, which provides almost-instant clearing and settlement. This minimizes risk in the financial system and. therefore, it decreases the capital necessities of the market participants.

Fourth, blockchains are actually more secure than traditional financial institutions. Blockchains use a cryptographic hash function in their security and privacy protocols. Thus, each block of transactions in the chain can be recognized by its hash key. This prevents "double spending" digital currencies such as bitcoin [63]. The crypto hash function in blockchain is very complex and it cannot get hacked. Therefore, it minimizes the blockchain's susceptibility to fraud. Moreover, as blockchain is decentralized, it has additional security [61]. Data is not stored in a single location like in banks, so it is difficult for hackers to target it.

Nonetheless, blockchain technology also has several disadvantages. First, the digital currencies based on blockchain technology can be exposed to great instability. The prices of digital currencies such as lite coin and bitcoin fluctuate daily since they are still new in the financial market [64]. Therefore, when organizations, governments, and investors embrace them or do not embrace them, it will significantly disturb their volatility.

Second, blockchain offers great anonymity due to its decentralization; as such, it has attracted and provided a haven for fraudulent and illegal transactions [65]. Thus, it has been used as a refuge for stolen and laundered money money, which use digital black markets such as the "Silk Road."

Third, blockchain is very complex and it requires more resources than typical currency does; thus, it can provide difficulty for individuals who are not tech savvy. Therefore, people who are unable to thrive with technology may face a challenge in trying to store virtual currencies or in creating Bitcoin or Ethereum wallets and making transactions with them [64]. Pilkington [66] asserts that such individuals can lose their money easily, and that this can result in huge losses. Additionally, blockchain networks require massive resources to facilitate the nodes that run them and to take care of their security measures.

2. Biometric Authentication:

Another emerging payment technology is biometric authentication, which is a type of payment security that uses parts of an individual's body to approve or deny payments. The technology now exists on numerous mobile gadgets, often taking the form of fingerprint scanners and face recognition. Biometric authentication technology can be enhanced by new innovations and improvements in processor speeds [67]. Biometric technology is being applied by various companies such as Apple, which uses it in its iPhone X facial recognition features. This latest version of the phone allows users to authenticate phone access and payments utilizing the organization's face ID feature. Therefore, as users are not required to type in their passwords to make payments, they can make faster payments by simply looking at their phones. The technology is so highly developed that it takes into account facial hair and other personal variables.

There are various benefits of using the biometric authentication payment system. The technology eliminates the need for people to carry cash, check books, and credit cards; hence, it reduces the risk of theft and fraud [68]. With this system, the chances of having one's credit cards details stolen are diminished. Frequently, unscrupulous store attendees steal credit card information and use that information to defraud people; this is eliminated with this new technology [69]. Additionally, making transactions utilizing this technology is cheaper since its transactional costs are lower than those of credit cards.

3. Impacts of Both Biometric Authentication and Block chain Technologies on E-Wallet:

An E-wallet is an electronic card that has similar utility as a credit or debit card. It is used to carry out online transactions via a computer or a mobile phone. E-wallet stores an individual's data and it affords safety through the encryption of the information. Singla [70] explains that E-wallets store information such as debit and credit card details, shipping address, name, and payment method. While shopping online, the E-wallet automatically fills in the consumer's data in the proper areas of the payment form. Examples of E-wallets include Venmo, Apple Pay, Samsung Pay, and Alipay. Notably, since this

system is centralized, it can be targeted by hackers who may aim to steal a person's data and use it to commit fraud [37]. Luckily, the developments of block chain and biometric payment technologies have had positive impacts on E-wallets. The two innovations have helped to enhance the security of E-wallets and, thus, to reduce theft [71]. Using block chain's decentralization can make it harder for hackers to gain access to a person's information. Additionally, the use of biometric authentication will make it extremely difficult for one to use another person's E-wallet even when someone gains access to the E-wallet.

Moreover, incorporating biometric authentication and block chain technology in E-wallets provides for instant and safe peer-to-peer transactions. Block chain technology ensures that the data of individual consumers remains safe since users have control over their own information; thus, they can determine how much info to share [72]. Wachal[73] suggests that including block chain technology in E-wallets will prevent leakages and hacking of personal data while making online transactions. In addition, both payment technologies afford faster and more secure verification of transactions; thus, they make E-wallets productive and efficient.

In conclusion, block chain and biometric payment systems are significant in contemporary e-commerce. They play essential roles such as providing safety to individuals, streamlining transactions, and processing transactions instantly. Their advanced technologies prevent hacking; thus, they protect consumers from incurring huge losses by safeguarding their data. Additionally, they are also inexpensive compared to traditional payment systems since they lack intermediaries and, thus, they have minimal transactional costs.

VII. TECHNOLOGY IMPACTS ON SAUDI ARABIA (ANALYSIS)

In many countries throughout the world, B2C e-commerce has been on the rise in recent years. Kingdom of Saudi Arabia has enjoyed growth in this area as well. There are many reasons for this recent stimulation, including consumers making more purchases online than they ever have before as well as improvements on the part of the merchants, in terms of offering a greater number of products and being able to deliver them to consumers in a quick and efficient manner. In 2016, the KSA saw a staggering 29.7 billion SAR in online transactions[74]. This places the KSA near the top of all nations in the MENA region, which spans the Middle East and North Africa. As consumers continue to become more familiar with these online retailers and with the manners through which they can make online transactions, this form of transaction is forecasted to grow exponentially in upcoming years, far faster than is in-person spending at stores in communities.

His continued escalation is propelled by the deep penetration of internet in homes and businesses as well as mobile devices in the hands of consumers. In the second quarter of 2017, online saturation in the country was 76%[33], a figure that was significantly higher than the general mean of the region (middle east), which was only at 59% [34]. Moreover, when compared with the worldwide mean of 51% [35], this figure becomes even more impressive [36]. Saudi Arabia, in recent years, has enjoyed vast improvements in its telecommunication infrastructure. As technologies continue to develop throughout the world, the youthful population of the nation continues to be drawn towards these services. Currently, over a quarter of Saudi Arabia's population is comprised of millennials (more than 26% of the population is aged between 20 and 34 years)[75].

UNCTAD recently did research to determine how prepared the people of countries were to participate in the online global economy [76]. To derive data, the researchers considered factors such as banking penetration, the security of servers in the country, the dependability of delivery services, and internet penetration. They chose these factors as they are all important metrics that reflect the potential for e-commerce to thrive and grow. Out of the 144 nations that were surveyed, Saudi Arabia was deemed to be in 46th place – in the top third of all countries (see Fig.2.). This puts the KSA on par with countries such as of Russia and Italy. Moreover, the nation ranks ahead of the large economies of China and India. Notably, the KSA soared of the rankings over the

span of a year. As the KSA continues to gain greater traction in terms of credit card usage and banking penetration, it is quite possible that the overall ranking could continue to rise.

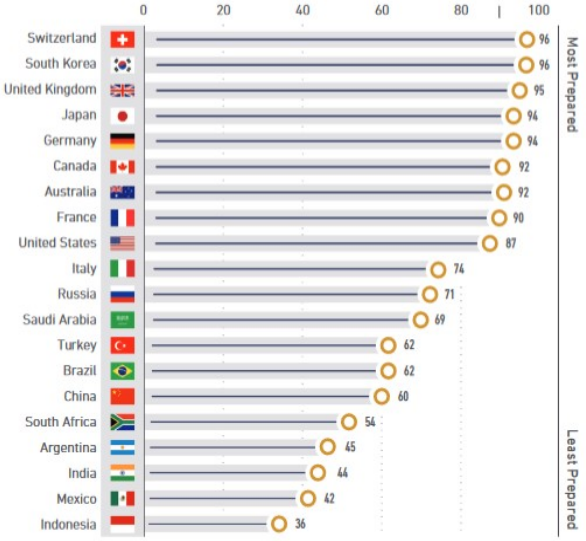

Fig. 2: Comparison of UNCTAD E-commerce Readiness Score

In Saudi Arabia, many consumers have steered towards cash-on-delivery options to pay for their purchases. This has occurred because some consumers are apprehensive about providing their personal financial information on the internet. However, credit card payments are gaining some traction. Moreover, currently consumers rarely utilize the SADAD online payment system. This is the case because many consumers are not aware of it and others who are aware may perceive it as being difficult to use[74].

Moreover, the Fintech industry can have an immense effect upon the global economy. In addition, Micro-, Small- and Medium- Enterprises (MSMEs) also add up and have a large impact upon the economy of nations. In Saudi Arabia, there are well over a million MSMEs and they contribute one 20 percent of the nation's GDP (SMEA, 2017). With technology quickly advancing, Saudi Arabia is well placed to continue to thrive. Saudi's Vision 2030 effort to transform the nation into an appealing nation in which to invest is well known. In 2018, the nation conducted a scheduled assessment of the Sustainable Development Goals (SDGs) of this initiative. The consensus was that technology will continue to be extremely important. In fact, it will be one of the main drivers that will help the Kingdom of Saudi Arabia reach its 2030 aims [74]. Rather than overly relying on a non-renewable resource, oil, the initiative will help the KSA to focus on knowledge. Part of the manner through which Saudi Arabia will be able to reach this goal is by sparking the MSMEs to provide an even greater portion of the economy. The aim of Vision 2030 is for them to achieve 35% of the GDP, up from the current 20%.

By integrating Fintech along with Emerging Technology, it will be possible to invest in these MSMEs, expanding their markets worldwide. Naturally, this would benefit the individual businesses and the general area. However, most notably, this would provide an enormous boost to the overall economy. In order to achieve this aim, and in order for these MSMEs to take advantage of this opportunity, it is necessary for them to adopt systems such as E-Wallets to bolster their e-commerce potential.

In order to consider the multitude of variables upon the Saudi Arabian economy, further empirical analysis is required [74]. This will enable the nation to make educated decisions on areas to invest. Potential areas could include payment systems, distribution channels, and supply chains. This could instigate new jobs in diverse areas, including in the financial sector. Moreover, if a large e-commerce infrastructure is implemented, it could also lead to greater prospects for self-employment [74].

The Communications and Information Technology Commission (CITC) produced a report that indicated that modern SMEs allow their customers to select from multiple choices of payments. Typically, consumers select to pay via bank transfers, through credit card payments, and even cash on delivery (COD) in some cases. The most popular of these options is bank transfers (see Fig.3.). Consumers have stated that they select this system because they feel it is the most secure. When consumers select to pay via credit card, they typically use credit cards that are based in the KSA, again because they feel this is secure. Currently, only a handful of Saudi Arabian

merchants offer the possibility of e-wallet payments through SADAD. As biometric and block chain payment systems advance and become more widely known as being secure, it should naturally lead to a greater number of consumers using these systems to make the online transactions [74].

Thus, in my opinion, it would be in Saudi Arabia's best interest to expand the network of block chain and biometric payment systems so that small and medium businesses would have greater potential to thrive. This innovation would greatly aid Saudi Arabia in achieving its 2030 goals.

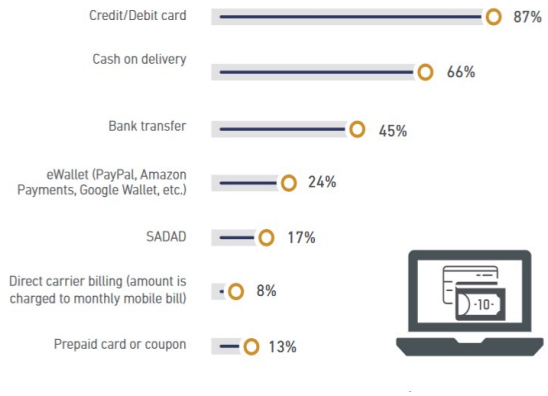

Fig. 3: Payments Methods Used for Online Purchases

The president of Microsoft International, Jean-Philippe Courtois, said. "Technology enables evolution. This can take shape in several forms: New online services, better education, creating ideas that are more creative, and opportunities for businesses, and a broader digital market to sell products and services. Anyone can start their own business now without worrying about IT infrastructure costs and deployment time. Anyone can create their own online store to sell their products" [77]. Subsequently, he elaborated that "Saudi Arabia is a very important market for technology companies. The advanced IT infrastructure, wide geographical distribution, e-government initiatives, electronic banking, electronic-based education and many other factors make it a ripe technology market. Many nationals have the entrepreneur mindset, and technology helps them achieve their goals." The KSA's strong level of online penetration is continuing to expand. Moreover, the nation is 16th in the world in terms of smart phone penetration. This provides the foundation of the KSA to dive fully into the online realm, as the proper expansion of technology can provide the impetus for increased e-commerce and, in turn, enable the nation to achieve its lofty long-term goals.

VIII. CONCLUSIONS

This work provided a picture of modern payment system, which is naturally evolving online. A main finding of this research is that the e-wallet is evolving rapidly, and it is on the verge of becoming an extremely influential element in the world of e-commerce. Emerging technologies will have a vast effect upon online transactions. Saudi Arabia finds itself in a position of power, in that it has many elements that reflect the continuing acceptance and growth of technology general and e-commerce specifically. Thus, as modern technology continues to advance, Saudi Arabia can help put its merchants at the forefront of the e-commerce market. In turn, this will have an overwhelmingly positive effect on the economy of the KSA, enabling the nation to achieve the long-term goals outlined in Vision 2030.

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