

Adoption of Cashless Economy in the World: A Review

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Abstract:

Background: The Cashless payments has been used to make payment from one individual/company to another in all over the world. The perceived easy to use and low-cost transaction equipment has attracted vendors to shift to these payments' methods. This study examines various methods of payments, the challenges and benefits faced in cashless economy.

Materials and Methods: The study used generic review to explore various scholarly articles to examine the current situations, methods used to make non-cash payments, and to extract the benefits and problems related to digital payments.

Results: The study found that there are several methods adopted for digital payments which come up with related problems and benefits. Despite all drawbacks the world is moving towards cashless economy.

Conclusion: There is a need to counteract the challenges faced in cashless economy in order to enjoy the perceived benefits that come with it. Specifically, the study recommends the governments among others to facilitate centralized cashless payments methods to boost its adoption. Also, future studies are required to have bullet-proofed secured systems for making cashless payments methods.

Key Word: Cashless Payments; Digital Economy; Challenges and Benefits of Non-Cash; Transactions.

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I. Introduction

Technological advancement has come up with several opportunities in all sectors in the world. This includes: agriculture, education, industrial, marine, construction, and business environments. All these sectors have been ripping from the technological developments to gain competence, excellency, and efficiency in daily basis. In economic point of view there is a vast increase in usage of new Information Communication Technology (ICT) to boost business profit. The way to conduct business has changed from the type of investments and the way to make transactions. Nowadays there is no need to carry money or to stand in bank queue to pay for any bills. Online payments by using mobile devices or tablet have been used by several business to make transactions.

The purpose of this study is to review various research articles which covers cashless payments from various scholarly sources to determine the benefits and their challenges so as to suggest and give recommendations on the way forward for adoption of non-cash payments successfully.

Non-cash (Cashless) payment discussed in this study are the ones used to make payment without using cash. It includes cryptocurrency, cheques, bank cards, online payments, and mobile money. There are several drawbacks associated with usage of those methods which includes those borne by consumers, associated with vendors, and the ones imparted to the government at large.

II. Material and Methods

2.1 Research Methodology Used

This study reviewed several scholarly articles to evaluates the challenges and opportunities of cashless payments in the world. Various types of cashless payments were thoroughly discussed by using several peer reviewed articles, thesis, and e-books. It explores the adoption of cashless, perceived benefits, and challenges faced by using cashless payments methods in the world.

To extract specific knowledge on cashless payments, the study used the keywords to search in google scholar. The resulted articles were clearly reviewed to see if they meet with research objectives or not and then included in this study or discarded. The keywords used are cashless, scan-to-pay, mobile-money, banking-cards, non-cash, and digital-world. Several scholarly articles were obtained and investigated accordingly towards the research goals. The literature was searched according to tittle and found that some article with good tittle similar to this study but contains very little useful information were discarded. The total of 57 articles were scrutinized

and passed successfully to contribute towards this review. The literature was reviewed to explore situation analysis, types of cashless, and the challenges and opportunities of non-cash methods.

2.1.1 Research questions

This study was dedicated to answer the research question which was used to guide the study and their respective motivation is presented on table 1.

Table no 1: Research questions and research motivations

SN	Research Questions	Motivation
1	What are the current situations of adoption of cashless payments in the world?	To explore the extent of usage of cashless payments methods in the world
2	Which types of cashless payments are used to make payments in various countries?	To review the cashless method used nowadays
3	What are the challenges and benefits of cashless payments?	To identify the challenges faced and benefits perceived by the country/economy by going to digital economy

In this table the research questions were formulated to extract specific information regarding cashless payments. These questions have helped to narrow down the search criteria so as to come up with relevant literature.

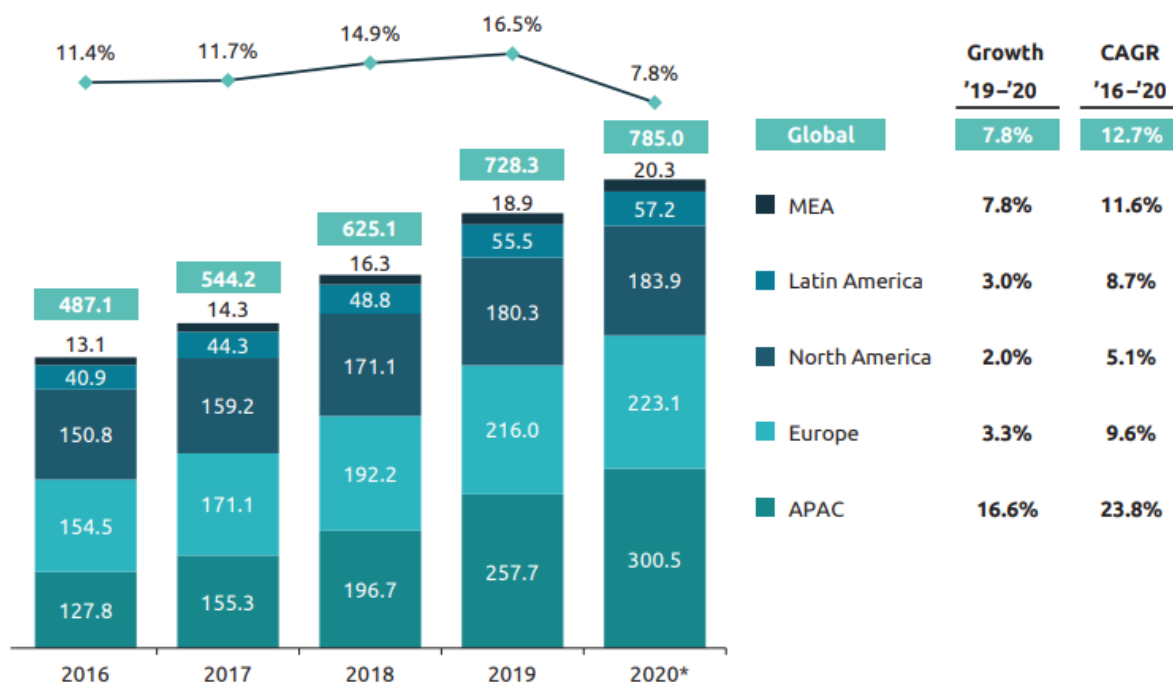
2.2 Adoption of Cashless Payments in the World

2.2.1 Situation Analysis of Cashless Payments

Technological developments have shaped almost everything in the world including communications, education, business, agriculture, health, and other activities. Apart from positive point of view, one of the unintended consequences of technological innovation is that it can promote opportunities for crime [1]. These technological innovations have changed the way business are conducted including daily payments transactions.

Nowadays, we can see a very significant change in the business world for making and receiving payments from cash to non-cash payments or cashless. A cashless society is a culture where no one uses cash to make payments, all purchases being made are by debit cards, credit cards, charge cards, cheques, pay cards, or direct transfers from one account to another account through mobile banking [2]. Despite the fact that a transition to a cashless society is already happening, there is reluctance among the high echelons of power to switch over to a complete cashless economic system as it decentralizes the power from their hands [3]. However, the analysis indicates that convenience and compatibility drive consumers' adoption whereas risks, costs and insecurity are inhibitors [4]. Despite several drawbacks that hinders the adoption of cashless payments, the number of transactions in the world increase every year as shown in figure no 1.

Figure no 1: Worldwide non-cash transactions volumes (billions), and Year-on-Year (YoY) Growth (%) 2016-2020 [5]



Note: MEA-Middle East and Africa, and APAC-Asia Pacific Countries

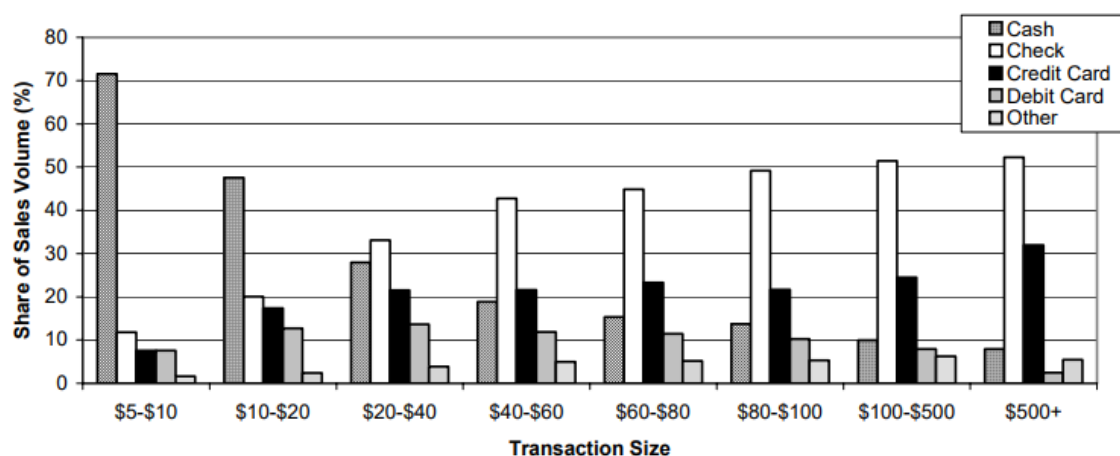
This report shows the pace of increase in transactions per year has slowed down in year 2019/2020 as compared to previous financial years due to covid-19 pandemics. The pandemic caused the economic activities to slow down specifically reduced consumer spending due to lock down. However cashless payments by volume in Tanzania have increased by 20.8% in 2019/2020 compared to 2018/2019 financial year due to the special efforts made by Bank of Tanzania (BoT) to foster the use of non-cash payments to lessen the impact of covid-19 pandemic [6].

2.2.2 Types of Cashless Payment Methods

Various modes of digital payments are available including: Banking Card, Unstructured Supplementary Service Data (USSD), Aadhaar Enabled Payment System (AEPS), Unified Payments Interface (UPI), Mobile Wallet, Banks Pre-Paid Cards, Cheque, Cryptocurrency, WeChat, Alipay, Internet Banking, and Micro ATM [7], [8].

2.2.2.1 Banking Card (DEBIT / CREDIT / CASH / TRAVEL / OTHERS)

By using Artificial Intelligence (AI) Banking cards offer consumers more security, convenience, and control than any other payment method [9]. There are two types of bank cards: un-embossed bank cards, such as most debit cards which usually use printed characters, and embossed bank cards, such as most credit cards which mainly use raised characters [10]. The later has several advantages which makes it reliable for most users as compared to un-embossed cards. Recently there is growth in banking cards market in terms of the number of cards users and the number of transactions made [11]. This growth has been contributed by several reasons such as high credit limit, ease of use, promotions by financial institutions, better customer services, existence of e-banking or m-banking services attached to the card, and presence of interoperability between banking services [12]. In developed countries credit cards hold much of the transactions in terms of total volumes compared to other cards, for instance in figure:2 shows total share of sales volumes in USA for different payments methods.

Figure no 2: The usage of different payment methods in USA [13]

The figure no 2 above shows that, the customers normally choose the payment methods depending on the amount to pay, as the amount increase, they prefer non-cash payment as compared to cash.

2.2.2.2 Unstructured Supplementary Service Data (USSD)

USSD is a GSM service that allows high-speed interactive communication between the subscribers and applications across a GSM Network [14]. It is adopted by banks for financial transactions due to its ease of operation [15]. This innovative payment services works on USSD channel which allows mobile banking transactions using basic features of mobile phones of which there is no need to have mobile internet data facility for using USSD based mobile banking [16]. This type of method act like a substitute for those without access to banking cards which act as envisioned to provides financial services extension and inclusion of underbanked society in the mainstream banking services [17]. The USSD is used to reach low-end customers without smartphones as alternative banking methods offering various financial services, includes cash withdrawal, transfers, deposits, to paying for various bills [18].

Apart from banking services, USSD is used to provide mobile money services. Mobile money/ mobile financial services/mobile payment is a term connoting the services that allow electronic money transaction without internet connectivity over a mobile phone such as mobile phones or tablet [19]. This payment method is common in developing countries as it takes advantages of not requiring any dedicated point of sale services or bank branch to perform business transactions. There are several benefits of using mobile money services including end to end quick transactions at anytime and anywhere, easy to use, low initial cost to open the point of sale, and reduces the risks of cash handling such as loss or theft. Despite those advantages, mobile money services` usage is hindered by the absence of two-factor authentication services to confirm transaction, fears of security such as fraud or theft, illiteracy for some users, high transaction cost, and low daily transactions limit.

2.2.2.3 Aadhaar Enabled Payment System (AEPS)

AEPS is a bank led models which allows online interoperable financial transactions at Point of Sale or Micro ATM through the Business Correspondents of any bank by using the Aadhaar biometric authentication methods [20]. This system of getting money neither requires customer`s signature, banking card nor visit to bank branch to make transactions. However, it uses only the Aadhaar number, Bank Name or Issuer Identification Number (IIN) and Fingerprint to access your bank account [21]. This method is very useful in remote areas where the bank branches are very far and the customers can still use his bank services through AEPS systems.

2.2.2.4 Unified Payments Interface (UPI)

UPI is a system that powers multiple banks accounts into a single mobile application merging several banking features, seamless fund routing and merchant payments into one hood [22]. This payment method facilitates the instant fund transfer between two banks accounts on the mobile platform. This method built over Immediate Payment Service (IMPS) for transferring funds using Virtual Payment Address provided by any vendors like banks cards, mobile wallet, AEPS, or any other registered payment systems [23]. This method promotes the cashless payments by acting like a middleman to connect several financial institutions into one service of which one can get required financial services regardless of their vendor.

2.2.2.5 Mobile Wallet

A mobile wallet is a way to carry cash in digital format by using mobile devices like phones, or tablets of which you can link your credit cards or debit cards information in mobile device to mobile wallet application or you can transfer money online to mobile wallet [24]. This payment method has become dominant in developed countries because it is very easy to use, low perceived risks and accessible anywhere by using mobile devices [25].

Apart from traditional wallet we have Google Wallet, which is very similar in function as PayPal to facilitate payments and money transfers online [26]. It also has some features with high securities that has not been cracked by anyone to date. The ability to send payments as attachments via email address allows an easier way to make payments to anyone with a Gmail address.

2.2.2.6 Point of Sale (PoS)

PoS or Point of Purchase (PoP) is the place where sales are made which includes, a mall, a market or a city. It can be taken as the area where the customers complete their transactions, such as a checkout counter. PoS has several benefits which boost its usage among society. It is dominant for customer transactions services to provide quick transactions, create invoices, and low transaction cost, and secured payments. Due to these benefits central banks of some countries promotes the point-of-sale services by providing facilities to initiate PoS centers to serve the customers [5].

2.2.2.7 Internet Banking (IB)

Internet banking/online banking/e-banking/virtual banking, is an electronic payment system that enables customers of a given bank or any financial institution to conduct a range of financial transactions through the financial institution's website. IB also allows bank customers to engage in a vast array of financial services such as paying bills, checking account information, transferring funds, and utilizing investment and check services through bank websites [27]. Internet Banking can be categorized further into several types which include: National Electronic Fund Transfer (NEFT), Real Time Gross Settlement (RTGS), Electronic Clearing System (ECS), and Immediate Payment Service (IMPS) [28].

2.2.2.8 Mobile Banking (MB)

Similar to other method of mobile wallet, MB is a service provided by a bank or any financial institutions that allow their customers to conducts different types of financial transactions remotely by using a mobile device [24]. It deploys software normally called an app, provided by the banks or financial institutions for the purpose of accessing their accounts for making payments or any other transactions. Mobile banking has brought the banking services to mobile devices that makes possible to make transactions anywhere at any time without bank visit. This method of payment has become subjective to crime related activities such as phishing, fraud, and theft.

2.2.2.9 Micro ATM (MA)

Micro ATM meant to be a device that is used by a million Business Correspondents (BC) to deliver basic banking service [29]. The micro-ATMs platform are connected to banks across the country which enables a person to instantly deposit or withdraw funds regardless of the customer's bank [30]. In Tanzania the Micro ATMs have been adopted by several banks including CRDB, NMB, Equity bank and DTB bank of which they use a Swap-to-Pay techniques to perform transactions. MA has been useful in several business environment due to its portability, reliability, and security, and its ability to perform quick transactions, also reduces the need of having expensive bank branches to provide financial services.

2.2.2.10 Bank Cheques

Bank cheque is the earliest non-cash payment method adopted in the world as the safest method of transaction from one account to another or from one business to another. This method has been used for various transactions such as salary payments, bills payments, subscription services, and other transactions from one bank to another. This involves two factor authentication systems of which the bank asks for the confirmation from the account owner before execute any transaction to the cheque beneficiary. This ensures the security of the transaction and hence avoid any fraud from vandalism and phishing. In figure 2 above the transactions performed by checks increases as the amount to be paid increases, this reflects that companies are more perceived to have secured to pay large amount of money by using cheques than any other payment method.

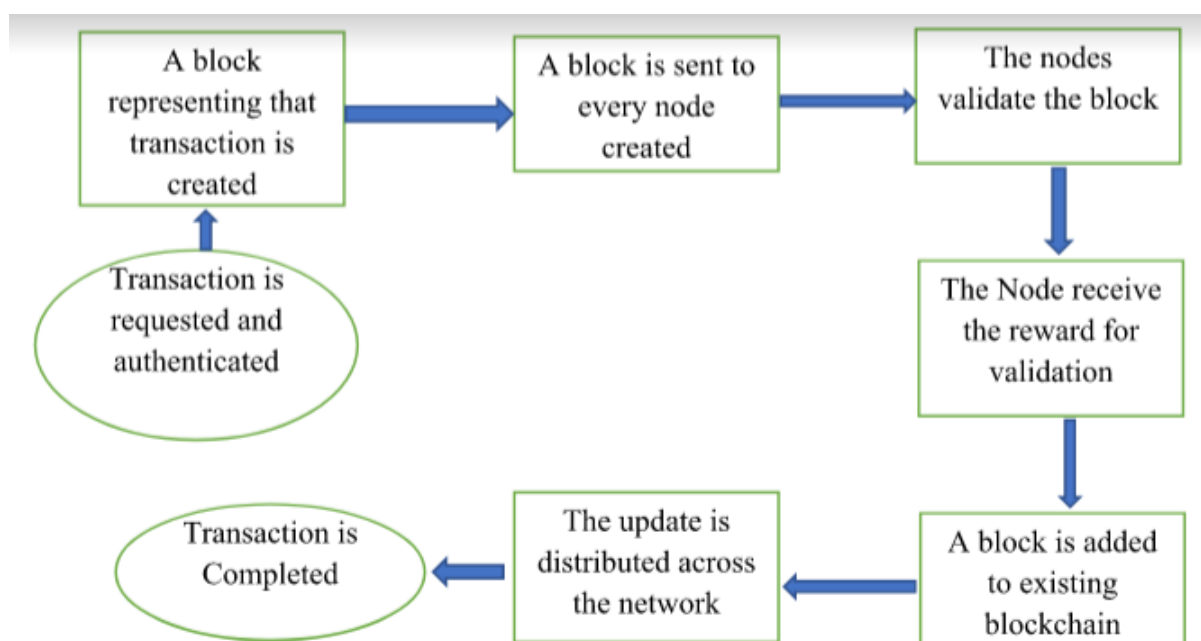
Nowadays the companies have adopted e-cheques which takes the advantages of internet and online services to speed up the payment process. E-cheques is taken as one example of Electronic Data Interchange (EDI) adopted by several financial organization in the world. [31]. This electronic cheque performs the same

way as paper-based-cheque except it is transmitted to the destination address by electronics means such as emails, special software systems, apps, or any other electronics data transfer method.

2.2.2.11 Cryptocurrency (Blockchain Technology)

Cryptocurrency is an electronic currency that depends on cryptography scheme [32]. Cryptocurrency involves funds transfers from one person to another through decentralized encrypted network that eliminates the requirement for any intermediaries to validate and verify the transactions [33]. This currency is very safe and provide latest alternative to the government owned cash. Nowadays there are several types of Cryptocurrencies including: Ethereum, Litecoin, Cardano, Polkadot , Bitcoin Cash, and Stellar. These digital currencies operate on the same principles of blockchain technology. It has several advantages as compared to government owned cash such as absence of daily transaction limit, secured transactions, peer-to-peer payments and absence of intermediaries, maintain privacy, low-cost transactions, and the currency is not volatiles as compared to traditional currency. The figure no 3 shows the transaction process of Blockchain-based-cryptocurrency (Bitcoin).

Figure no 3: Transaction process of Bitcoin [34]



Bitcoin and other cryptocurrencies have pushed forward the concept of decentralization, providing means for reliable interactions between mutually distrusting parties on an open network [2]. Blockchain technology in general can be used in other types of transaction apart from cryptocurrency. The presence of data integrity, anonymity, and security, and absence of middleman in the transaction makes it to be attractive for all transactions to cope the technology [35]. The cryptocurrency has very slow authentication process (proof of work) which is called mining process. This slow process act like the drawbacks towards adoption of the technology by other sectors.

2.2.1.12 WeChat Payment

WeChat payment is the mobile payment method innovation product jointly launched by Tencent's social communication software-WeChat and third-party cashless payment platform called TenPay [36]. TenPay is the largest payment method in China along with Alipay. Alipay has been popular as banking card e-wallet of which the customer details like card number, name, and expire date is kept on the Alipay systems to facilitate quick payments. WeChat uses the technology of Scan-to-Pay to make payments by using QR-code. Nowadays in China you can pay anything, anywhere, at any time by using cashless methods like WeChat or Alipay. Despite of perceived risk in using mobile payment method, WeChat has been used by more than one billion people in China, it combines the functionalities of various applications such as WhatsApp, Facebook, Twitter, Instagram into one powerful app [37].

2.2.3 Challenges and Benefits of Cashless Payments

2.2.3.1 Benefits of Non-Cash Payments Methods

Cashless methods have been emerging as payment alternative with several advantages which leads to digital world economy. The adoption of cashless systems allows the reduction of costs related to delivery & storage of cash by all entities within the economy [38]. Cashless economy drives the pace of money distribution to reach almost every one and everywhere at almost any time. The cashless society actually drives financial inclusion by providing more efficient transaction options and greater reach. This minimizes security related issues of carrying and storing cash money such as bank robbery, theft, fraud, and loss of hard cash. Cashless payment also helps to trace the transactions and increase government revenue from tax collections from all transactions made in the country. Moreover, the gross income of any organizations/company/individual can be traced back from all transactions made by the respective institutions/individual to collect related revenue accordingly [39]. The central banks don't have to worry about the number of cash notes or coins in the circulation to manage the inflation rates in the market but rather has to deal with regulating vendors to make sure everyone receive the services whenever required.

Cashless economy makes very easy for bills payments which can be accomplished successfully at customer premises without standing in a long bank queue. Also, it is very easy to locate cashless payments services for account top-up or withdrawal as it doesn't need expensive equipment to deliver the services [40]. This service can be very useful in remote areas or in developing countries with poor infrastructure because it just needs a mobile device or PoS to make transaction.

Government has the advantages of controlling money related crimes such as money laundering, and controlling the black market in the country. Also, the Cashless will make exchange rates of a given country to remain constant as the monetary authorities don't have to monitor volatility of their currencies in the market as the availability of cash will not drive the daily rates [41].

2.2.3.2 Challenges of Cashless Payments

Despite having several advantages of cashless payments and market trends shown in figure 1 and figure 2 depicting the increase in transactions by volume year-on-year basis there are some drawbacks which hinder its adoption. There are dramatic increases in malicious application targeting online payments in the past few years which discourages its usage. Also, phishing, pharming, worms, Trojans, denial of service attack, viruses, spoofing, man-in the middle, and transaction poisoning are the most common threats found in any electronic payment systems [26]. To avoid these threat multiple layers of authentication are required to minimize the number of victims in the network. The payment systems must also include at least one of the following methods of authentication: two-factor-authentication, cryptographic key, digital signature, biometrics, and other security software to establish multiple layers of authentication [42].

In most countries' payments infrastructure has been the challenges towards fully adoption of the non-cash payments such as lack of reliable internet connectivity, and the scarcity of point of sale. The fear of not having enough infrastructure to deliver cashless systems also makes some decision makers to show resistance to changes in technology. The adequate operative technological infrastructure supports the systems availability of physical instrumental resources, connectivity and information quality act as the important considerations for consumers [43]. Infrastructure will lead to boost the availability of the payment services at any time, and anywhere.

In a truly cashless economy, the central banks will have lost the largest parts of most revenue because it would have lost its monopoly position in the creation of cash and settlement balances [44]. This makes most central banks to be reluctant towards cashless economy. Cashless economy however does not refer to an outright absences of cash transaction in the economic systems settings but rather the amount of cash-based transactions will be kept to the plainest minimum [45]. Also, the lack of awareness on the benefits of new technologies among stakeholders, and the tendency to content with existing systems tend to be the deadlock on the adoption of cashless payment systems.

III. Results

3.1 Study results

This study was intended to find out how the situation currently on the adoption of digital payments. The world economy has been using cashless payments in terms of cheques since 1882 where they used it as a bill of exchange [46]. Currently the world is moving towards cashless economy effortlessly. The disappearance of cash would lead to a contraction of the central bank's balance sheet, since cash is one of the principal liabilities of a central bank [47]. The central banks have been acting like a road bump towards cashless economy due to fear of losing monetary control. However, presence of COVID-19 pandemic has boosted the pace towards non-cash systems as no one was allowed to go anywhere to make physical payments due to lockdown.

This makes some central banks like Tanzania to make extra efforts to facilitate mobile payments such as increase in daily transaction limits and initiate new monetary policies to foster the economic downturn due to pandemic. Nowadays several countries have adopted cashless economy such as China, Canada, Sweden, and England. China have been leading by examples by providing cashless market across the country by using WeChat payment method. Canada and Sweden are the second largest economy with cashless payments by volumes. India on the other hand has been facilitating tirelessly to promote cashless payments methods but they are hindered by the poor infrastructure and largely populated country.

3.1.1 Benefits of Cashless Payments

The study has revealed the following benefits of cashless economy:

- Reduced cost due to storage and delivery of cash money
- Low transaction cost in making payments
- Very easy to distribute money to anywhere, anytime, to anyone regardless of the physical infrastructures.
- Minimized risk of robbery, or money loss
- Very easy to trace the transaction from all individuals/institutions
- Increased government revenue from tax collected from traceable transactions
- Cashless payments don't need expensive infrastructure and hence it can be operated in area with poor infrastructure
- Central banks don't have to worry on the number of cash to deliver in the circulation
- Minimized cost of cash printing services
- Controlled exchange rates as everything available electronically
- Simplified bills payments systems as compared to traditional bank queue for bills payments
- Controlled money laundering crime as every transaction is traceable no loop holes
- Central banks have the optimum control of economy as the number of transactions can be monitored on daily basis.

3.1.2 Challenges of Cashless Payments Methods

The following are the challenges faced when using non-cash payments which deaccelerates the pace of adoption:

- Fears of central banks to lose monetary control discourages the pace towards cashless
- Perceived unknown risk by customers such as hackers, pharming, phishing, and identity theft
- Fears of adoption of new technology also makes some stakeholders to be reluctant towards cashless economy
- Poor infrastructure has been acting like a road bumps to adopt the method
- Delayed transactions have been discouraging users from choosing such payment method
- Lack of enough security to prevent fraud related crime makes some user to reluctant to change towards new technology
- Lack of government intervention on some digital payment platform like Cryptocurrency makes it to be discouraged by financial institutions.

IV. Discussion

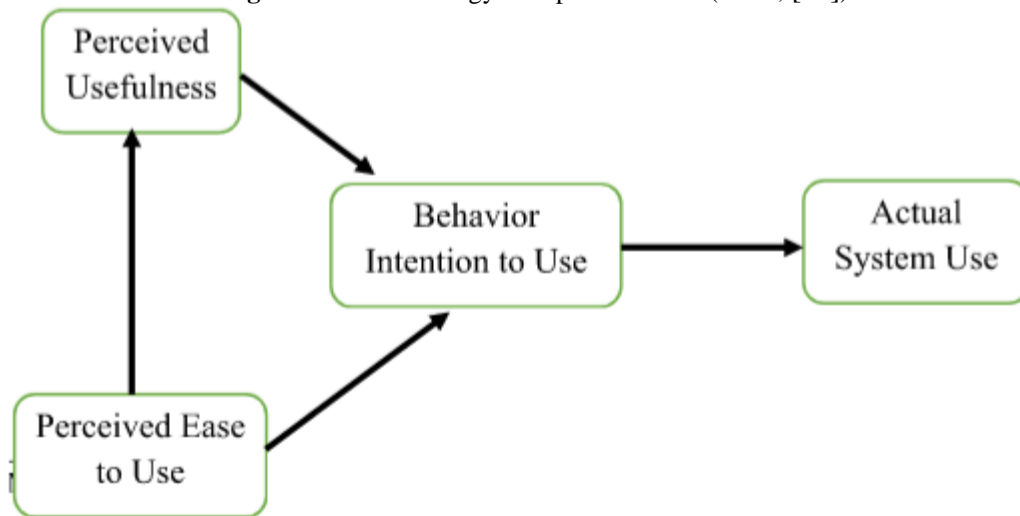
Digital world has attracted billions of investments due to its promising future. Nowadays everything moving to digital forms to harvest the new technological advancement in all sectors. The economic directions towards digital payments shouldn't be driven by the presence of technology but rather should be motivated by the perceived benefits by the stakeholders. Most consumers fear to make wrong decision which may lead to the severity of the consequences of uncertainty of losing the property and do not know what kind of risk will face. This makes consumer intention to use the service to be determined by the perceived benefits and unexpected risk. If the intended benefits outweigh the unknown risk, the consumer will be motivated to adopt the services. The efforts made by service provider to attract customers by differentiating their services as compared to other providers often wasted because marketers fail to adequately comprehend what motivates consumer choice [48],[49]. There are several theories and models which suggest the best way to adopt to new technology and offer best approach to consider for the successfully adoption of any new technology. These include the Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM). These models/theories have been used extensively by researchers to suggest the directions to be taken by any industry before it starts any adoption of new technology.

4.1 The Use of Technology Acceptance Model (TAM) in Adoption of Cashless Payments

TAM is a prominent concept that helps to provide directions on how people are eager to accept and use new technologies [50], [51]. TAM articulate that user intention to use technology is determined by age, gender,

and experiences of usage of such technology [52]. The promotion made by the financial institutions to adopt cashless payment as a new technology should therefore focus on age, gender, and experiences. The user with experiences will tend to adopt the technology immediately as it emerged while older users without such experiences will be reluctant to adopt new technologies. Also, the TAM further suggests that young people with or without experiences are normally the first one to go for any new technology [53].

Figure no 4: Technology Acceptance Model (TAM, [53])



Perceived ease to use and perceived usefulness has been the factor on intention to use new technologies. In this regard the efforts made by these companies to facilitate cashless payments should focus on the perceived usefulness of such payment method. This technology acceptance model should be implemented and integrated into the new payment method to boost the user intention towards cashless economy.

4.2.2 The Use of Unified Theory of Acceptance and Use of Technology (UTAUT) in Adoption of Cashless Payment.

This theory suggests that, apart from intention to use technology to be determined by age, gender, and experiences as suggested by TAM there are other factors. The other factors are Facilitating conditions, Performance Expectance, Social Influence, and Effort Expectance [54]. The effort made to promote cashless economy adoption in the world will be successfully if these factors are considered before introducing such payment method. Performance expectancy is the degree of which the individuals believe that using the system will help them to attain competitive advantages in their business performances. This theory suggests that every effort made to boost cashless payments should align with injections of individual beliefs towards the expected advantages. This will lead to the financial institution to embrace the new payments methods to reach organization goals and gain competitive advantages against their competitors in the market.

Also, the Effort Expectance found in this model can be explained as the perceived ease of use, and lack of complexity of the systems. This suggest that, complex payment systems that need extra effort to learn how to use will most likely receive little attention by the consumers and finally fails to prevails on the market as compared to simple to use payment systems. Therefore, the stakeholders should make extra efforts to introduce simplified payment applications to be accepted by the consumers easily. The UTAUT also suggest the social influence and facilitating factors as the model for technological adoption [55]. The promotions for usage of non-cash payment should focus on individual perceived security that will boost the feeling of others to use the systems.

4.2.3 Risk Mitigation Associated with Cashless Payments

Previous sections shows that there are several risks associated with non-cash payments. There are dramatic increases in malicious application targeting online payments in the past few years which discourages its usage [26]. Risk management plays a vital role in tackling security threats that can be enabled by identifying critical assets, vulnerabilities and threats, and determining suitable proactive control measures for the risk mitigation [56],[57]. Several techniques have been suggested to mitigate the risk such as artificial intelligence, machine learning, two factor authentication, deploy biometric systems, and the use of encrypted systems. However, the electronic payments systems attacks are normally unpredictable and remains the major obstacles towards cashless economy. Further studies are required to have fully secured payments systems.

V. Conclusion and Recommendations

The study was carried out to answer three motivational questions, situation analysis, types of cashless payments, and the benefits/challenges of cashless economy. The study revealed that there are several efforts to adopt in digital economy which are hindered by several drawbacks. The study recommends the following for stakeholders and for security concern in general.

5.1 Recommendations to Stakeholders

The study recommends the following to be implemented by the government to fulfil their ambitions of going to digital economy

- The government should facilitate the usage of cashless methods to boost their economy by increase the government revenue as the government will be capable of tracking all transactions.
- Promotions made for adoption of these payments' methods should align with TAM theories and UTAUT model to grab enough consumer attention.
- Central banks should carry out special campaign to facilitate centralized payments systems.
- As the world is moving to digital, the governments should come up with new policies to ripe the digital cryptocurrency benefits.
- The government should come up with secured new payment technologies to gain consumer confidence and prevent any vandalism.
- The financial institutions/vendors should focus on customer satisfaction to attract more customers of all economic background.

5.2 Recommendations for Security Improvements

The study has realized that, there are various security threats that discourages the usage of some cashless payment methods. The threats include: fraud, identity theft, phishing, pharming, and service denial attacks. These threats act like a road block towards cashless economy. Therefore, the study recommends the future studies to be carried out on the following sectors:

- New payment methods that will have no security vulnerability.
- New blockchain technology that will improve transaction/mining speed and hence cost-effective cryptocurrency.
- New empirical survey on cashless adoption in the world to come-up with common solutions worldwide.

References

- [1]. A. Beck and M. Hopkins, "Scan and rob! Convenience shopping, crime opportunity and corporate social responsibility in a mobile world oa," *Secur. J.*, vol. 30, no. 4, pp. 1080–1096, 2017, doi: 10.1057/sj.2016.6.
- [2]. Atzei, N., Bartoletti, M., Lande, S., & Zunino, R. A formal model of Bitcoin transactions. In *International Conference on Financial Cryptography and Data Security*. Springer, Berlin, Heidelberg. pp. 541-560, 2018, February.
- [3]. P. Kumar, "' an Analysis of Growth Pattern of Cashless Transaction System ",'' *Int. J. Res. Bus. Manag.*, vol. 3, no. 9, pp. 2321–886, 2015.
- [4]. M. Humbani and M. Wiese, "A Cashless Society for All: Determining Consumers' Readiness to Adopt Mobile Payment Services," *J. African Bus.*, vol. 19, no. 3, pp. 409–429, 2018, doi: 10.1080/15228916.2017.1396792.
- [5]. Duarte, A., Frost, J., Gambacorta, L., Wilkens, P. K., & Shin, H. S. (2022). Central banks, the monetary system and public payment infrastructures: lessons from Brazil's Pix–online appendix.
- [6]. Governor. BANK OF TANZANIA: ANNUAL REPORT 2020/21. ISSN 0067-3757, Online, available at [www/http/bot.co.tz](http://bot.co.tz)
- [7]. K. Vipin and M. Sumathy, "Digital payment systems: Perception and concerns among urban consumers," vol. 3, no. 6, pp. 1118–1122, 2017, [Online]. Available: www.allresearchjournal.com
- [8]. D. Rajesh, M. Arpana Sagar, and N. Roshitha, "Users Perceptions and Problems on Mobile Wallet Payments – A Study in Visakhapatnam City," *ComFin Res.*, vol. 10, no. 1, pp. 12–16, 2022.
- [9]. Rana, R., & Bhutani, A. (2022). Artificial Intelligence: The Need of the Hour. In N. Dewani, Z. Khan, A. Agarwal, M. Sharma, & S. Khan (Ed.), *Handbook of Research on Cyber Law, Data Protection, and Privacy* (pp. 332-344). IGI Global. <https://doi.org/10.4018/978-1-7998-8641-9.ch020>
- [10]. L. Hanyang, Z. Yongzhao, L. Shiqin, K. Xiao, C. Yuzhong (2022). A deep learning based bank card detection and recognition method in complex scenes. <https://doi.org/10.1007/s10489-021-03119-2>, DOI: 10.1007/s10489-021-03119-2.
- [11]. S. S. Rodrick, H. Islam, and S. A. Sarker, "Prospects and Challenges of using Credit Card Services : A Study on the users in Dhaka City," vol. 18, no. December, pp. 161–186, 2021.
- [12]. O. Dospinescu and B. Anastasiei, "SS symmetry Key Factors Determining the Expected Benefit of Customers When Using Bank Cards : An Analysis on," *J. symmetry*, 2019.
- [13]. Swartz, D. D. G., Hahn, R. W., & Layne-Farrar, A. (2004). The economics of a cashless society: an analysis of the costs and benefits of payment instruments (pp. 221-222). AEI-Brookings Joint Center for Regulatory Studies.
- [14]. A. Dabas and C. Dabas, "Implementation of Real Time Tracking using Unstructured Supplementary Service Data," *Eng. Technol.*, pp. 241–245, 2009.
- [15]. S. U. Otor, B. O. Akumba, J. S. Idikwu, and I. P. Achika, "An Improved Security Model for Nigerian Unstructured Supplementary Services Data Mobile Banking Platform," *Int. J. Sci. Res. Comput. Sci. Eng. Inf. Technol.*, pp. 974–987, 2020, doi: 10.32628/cseit2063213.
- [16]. PATIENCE, B. A. (2019). Challenges facing customers in the use of unstructured supplementary service data (USSD) in banking in Delta State. *SOUTH EASTERN JOURNAL OF RESEARCH AND SUSTAINABLE DEVELOPMENT (SEJRSD)*, 1(1), 30-36.

- [17]. Taskin, E. (2012). GSM MSC/VLR Unstructured Supplementary Service Data (USSD) Service. Online, available at <https://www.diva-portal.org/smash/get/diva2:587744/fulltext01.pdf>
- [18]. A. O. Akinje and A. Fuad, "Fraudulent Detection Model Using Machine Learning Techniques for Unstructured Supplementary Service Data," *Int. J. Innov. Comput.*, vol. 11, no. 2, pp. 51–60, 2021, doi: 10.11113/ijic.v11n2.299.
- [19]. A. B. Mtaho and L. Mselle, "Securing Mobile Money Services in Tanzania: A Case of Vodacom M-Pesa," *Ijcsns.Com*, vol. 2, p. 5, 2014, [Online]. Available: <http://www.ijcsns.com>
- [20]. T. S. Sujith and C. D. Julie, "Opportunities and Challenges of E- Payment System in India," *Int. J. Sci. Res. Manag.*, no. September 2017, 2017, doi: 10.18535/ijstrm/v5i9.02.
- [21]. Ahmad, S., & Bano, M. (2018, January). ROLE OF AADHAAR ENABLED PAYMENTS SYSTEM (AEPS) IN RETAIL PAYMENTS. In TWO DAY NATIONAL SEMINAR GST AND DIGITAL ECONOMY-IMPLICATIONS ON TRADE AND COMMERCE (p. 80).
- [22]. A. Sharma, "Unified Payments Interface: The Recent Indian Financial Innovation Demystified," *Apeejay J. Manag. Technol.*, vol. 11, no. 2, p. 17, 2018, doi: 10.29385/apeejay.11.2.2016.21-33.
- [23]. R. B. Kakade and N. A. Veshne, "(Upi) -a Way Towards Cashless Economy," *Int. Res. J. Eng. Technol.*, vol. 4, no. 11, pp. 762–766, 2017.
- [24]. Alam, M.M., Awawdeh, A., & Muhamad, A. I. (2021). Using E-Wallet for Business Process Development: Challenges and Prospects in Malaysia. *Business Process Management Journal*, 27(4), 1142-1162. (online) <https://doi.org/10.1108/BPMJ-11-2020-0528>
- [25]. Singh, N., Sinha, N., & Liébana-Cabanillas, F. J. (2020). Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence. *International Journal of Information Management*, 50, 191-205.
- [26]. U. Bogdan-Alexandru, "Security Issues and Solutions in E-Payment Systems," *Fiat Iustitia*, pp. 21–28, 2015.
- [27]. P. Hanafizadeh, B. W. Keating, and H. R. Khedmatgozar, "A systematic review of Internet banking adoption," *Telemat. Informatics*, vol. 31, no. 3, pp. 492–510, 2014, doi: 10.1016/j.tele.2013.04.003.
- [28]. Ministry of Finance India (2022). DIGITAL PAYMENT METHODS. Online, available at http://cashlessindia.gov.in/digital_payment_methods.html.
- [29]. G. P. Gallardo, "EPRA International Journal of Research and Development (IJRD) SELF-LEARNING MODULE IN HORTICULTURAL PRODUCTION EPRA International Journal of Research and Development (IJRD)," vol. 7838, no. June, pp. 381–391, 2021.
- [30]. Gujral, M., & Dash, A. P. (2021). Technology and the Changing Communications Environment. In *Marketing Communications in Emerging Economies, Volume I* (pp. 261-292). Palgrave Macmillan, Cham.
- [31]. P. Kumar, "New Business Opportunities for E-Commerce: Post Lockdown Mr . Shine NA New Business Opportunities for E-Commerce: Post Lockdown," no. December, 2021.
- [32]. Ahamad, S., Nair, M., Varghese, B.: A survey on crypto currencies. Presented at the 4th International Conference on Advances in Computer Science, AETACS, pp. 42–48 (2013)
- [33]. O. Alqaryouti, N. Siyam, Z. Alkashri, and K. Shaalan, "Cryptocurrency usage impact on perceived benefits and users' behaviour," *Lect. Notes Bus. Inf. Process.*, vol. 381 LNBP, pp. 123–136, 2020, doi: 10.1007/978-3-030-44322-1_10.
- [34]. Euromoney (2020). What is blockchain?. Online available at <https://www.euromoney.com/learning/blockchain-explained/what-is-blockchain#:~:text=Blockchain%20is%20a%20system%20of,computer%20systems%20on%20the%20blockchain>.
- [35]. Pilkington, M. (2016). Blockchain technology: principles and applications. In *Research handbook on digital transformations*. Edward Elgar Publishing.
- [36]. W. Xu, "The Study of WeChat Payment Users Willingness Factor," *J. Serv. Sci. Manag.*, vol. 10, no. 03, pp. 251–259, 2017, doi: 10.4236/jssm.2017.103021.
- [37]. M. Szurawitzki, "The Chinese Messaging Application WeChat as Used by German Speakers in China," *Linguist. Online*, vol. 113, no. 1, pp. 111–152, 2022, doi: 10.13092/lo.113.8329.
- [38]. Goczek, Ł., Witkowski, B. 2015. Determinants of non-cash payments. NBP Working Paper No. 196. Warsaw: Economic Institute.
- [39]. F. Thirupathi, G. Vinayagamoorthi, and S. P. Mathiraj, "Effect of cashless payment methods: A case study perspective analysis," *Int. J. Sci. Technol. Res.*, vol. 8, no. 8, pp. 394–397, 2019.
- [40]. I. Priananda, M. Stevani, T. I. Sutanto, and M. Mariani, "Grassroots economy towards cashless society: An empirical analysis of micro-merchant's readiness in continuing the usage of cashless payment system," *Int. J. Sci. Technol. Res.*, vol. 9, no. 3, pp. 929–938, 2020.
- [41]. Baklaci, H. F., & Yelkenci, T. (2022). Cross-time-frequency analysis of volatility linkages in global currency markets: an extended framework. *Eurasian Economic Review*, 1-48.
- [42]. Fatima, E-Banking Security Issues – Is There A Solution in Biometrics? *Journal of Internet Banking and Commerce*, August 2011, vol. 16, no. 2.
- [43]. D. Kumar, "Prospects and Challenges of Mobile Financial Services (MFS) in Bangladesh," no. December, pp. 320–341, 2021, doi: 10.4018/978-1-7998-9035-5.ch017.
- [44]. T. Nyoni and W. G. Bonga, "Cashless Transacting Economy: A Necessary Evil for Development! A Zimbabwean Scenario!," *J. Econ. Financ.*, vol. 2, no. 4, pp. 1–10, 2017, [Online]. Available: <https://ssrn.com/abstract=2958717www.dynamicresearchjournals.orgwww.dynamicresearchjournals.org>
- [45]. O. Yaqub, H. Bello, Adenuga, and M. Ogundeji, "The Cashless Policy in Nigeria: Prospects and Challenges," *Int. J. Humanit. Soc. Sci.*, vol. 3, no. 3, pp. 1–13, 2013, [Online]. Available: www.ijhssnet.com
- [46]. J. Vines, P. Dunphy, M. Blythe, S. Lindsay, A. Monk, and P. Olivier, "The joy of cheques: Trust, paper and eighty somethings," *Proc. ACM Conf. Comput. Support. Coop. Work. CSCW*, no. June 2014, pp. 147–156, 2012, doi: 10.1145/2145204.2145229.
- [47]. W. Engert, B. S. C. Fung, and S. Hendry, "Is a Cashless Society Problematic?," *Bank Canada Staff Discuss. Pap.*, no. 2018–12, pp. 12–18, 2018.
- [48]. M. J. Dorsch, S. J. Grove, and W. R. Darden, "Consumer intentions to use a service category," *J. Serv. Mark.*, vol. 14, no. 2, pp. 92–117, 2000, doi: 10.1108/08876040010309220.
- [49]. Aniefiok, N. A. (2020). Covid-19 city locked down: The need for effective cashless policy practices among nigerian populace. *Asian Journal of Multidimensional Research (AJMR)*, 9(5), 12-21.
- [50]. M. Yang, A. Al Mamun, M. Mohiuddin, N. C. Nawi, and N. R. Zainol, "Cashless transactions: A study on intention and adoption of e-wallets," *Sustain.*, vol. 13, no. 2, pp. 1–18, 2021, doi: 10.3390/su13020831.
- [51]. L. Măță, O. Clipa, and K. Tzafilkou, "The development and validation of a scale to measure university teachers' attitude towards ethical use of information technology for a sustainable education," *Sustain.*, vol. 12, no. 15, 2020, doi: 10.3390/SU12156268.

- [52]. I. D. Sudirman, D. P. Alamsyah, O. R. Yustian, and I. Dwija, "Green Product Purchase Intention in Emerging Country : An UTAUT-2 Adoption," *IEOM Soc. Int.*, vol. 9, no. 1, pp. 32–40, 2022, [Online]. Available: <http://ieomsociety.org/proceedings/2021indonesia/5.pdf>
- [53]. F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Q. Manag. Inf. Syst.*, vol. 13, no. 3, pp. 319–339, 1989, doi: 10.2307/249008.
- [54]. Venkatesh, Viswanath, James YL Thong, and Xin Xu. "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology." *MIS quarterly* (2012): 157-178.
- [55]. Calderón-Fajardo, V., Carrasco-Santos, M. J., & Rossi Jiménez, C. (2022). The intention of consumers to use augmented reality apps in gastronomy—case of Málaga. *Current Issues in Tourism*, 1-17.
- [56]. H. I. Kure, S. Islam, M. Ghazanfar, A. Raza, and M. Pasha, "Asset criticality and risk prediction for an effective cybersecurity risk management of cyber-physical system," *Neural Comput. Appl.*, vol. 34, no. 1, pp. 493–514, 2022, doi: 10.1007/s00521-021-06400-0.
- [57]. Tinmaz, H., & Doan, V. P. (2022). User perceptions of WeChat and WeChat pay in China. *Global Knowledge, Memory and Communication*.

Abdulkadir Kirobo, et. al. "Adoption of Cashless Economy in the World: A Review." *IOSR Journal of Economics and Finance (IOSR-JEF)*, 13(02), 2022, pp. 37-48.