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How Crypto-Currency Can Decrypt the Global Digital Divide: Bitcoins a Means for African Emergence

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Abstract: Low transaction cost, low level of entry, worldwide quickness, and anonymity of the transactions is the main advantage of cryptocurrency use, making it an attractive transaction media for African countries. At the same time, there are certain drawbacks of it in terms of strong volatility, lack of user-friendliness and its usage in crime. The conceptual paper explores the use of cryptocurrencies, and its potential in the African context. The research paper utilizes UTAUT 2 Model and adds key constructs for analyzing the adoption of new technology by Africans. These additional constructs include hedonistic motivation, habit and price cost. Key factors were considered in the case of African countries in order to analyze whether cryptocurrency is essential for economic growth in some economic countries. The application of UTAUT model in the case of Arica shows that performance, effort expectations, social influence are favorable for African countries while the influence of hedonic motivations and price is unfavorable for acceptance of cryptocurrencies in African countries.

Keywords: Cryptocurrency research, UTAUT model, Bitcoin use in Africa, Hedonic motivations

1. Introduction

From the entry of Information and Communications Technology (ICT) into global existence, all data show that despite these great human advancements, certain regions of the world have been left behind and incapable of exploiting the immense opportunities of digital innovations that provide socio-political and economic advantages to the most advanced nations on earth. This uncomfortable situation between the "Haves" and "Have-nots" is what experts call the Digital divide (Hoffman et al., 2001; P.Yu, 2002). Thus digital divide can be defined as "inequality of access to the internet" (Castells, 2002) and all the advantages that come with it. This apparent gap between developed and developing countries is a stark contrast to earlier expectations of what the internet could offer to the world, breaking down barriers and making the world flat (Friedman, 2005). However, some are of the opinion that the internet has instead intensified these differences and widened the gap between developed and developing nations (Hargittai, 2003). Despite the best intentions of the international community and its developmental initiatives as regards to ICT for development (ICT4D), few have actually been proven to be effective (Sahlfeld, 2007). One of the major reasons for this digital divide is the ever fast changing virtual landscape that is shifting from access to connection towards access to content (Burri, 2011). Despite the African continent boasting one of the fastest growing economies in the world¹, it remains the least developed in terms of infrastructure and economic development². This economic gap is further seen in the digital landscape, where Africa has an estimated 388,376,491 internet users, with a 31.2 % penetration, representing only 10.0% of the world's total internet users³ These data show how Africa is still trailing the other regions of

¹ (The World Economic Forum, 2017)

² (One, 2017)

³ (Internet Worlds Stats, 2018).

the world in terms of technology and economic development (Fuchs and Horak, 2008). This working paper recognizes the need and potential of Blockchain technology and cryptocurrency as a means of elevating the African continent from a developing region to an emergent one (Hileman, 2015).

The main aim of this paper is to pay close attention to the evolution of blockchain technology over the years. Particularly, the emergence of bitcoins are going to be discussed. These discussions will be followed by the several benefits and risks that are related to Bitcoins. Additionally, this research paper analyzes the factors that influence the adoption of cryptocurrency in Africa using UTAUT 2 acceptance model and weighing the cultural factor as an important determinant in adopting blockchain technology. In order to accomplish this, several points will be highlighted, which explains why Africa is appropriate for the development of cryptocurrencies. The paper is important in showing that cryptocurrency and blockchain technology are disruptive technologies capable of closing the digital divide and positively influence economic growth in Africa.

2. Literature Review

2.1 Concept of Cryptocurrency

The concept of cryptocurrency is a concept that was proposed when the internet was created in the late 20th century. "Cryptocurrency can be defined as a digital asset that is constructed to function as a medium of exchange, premised on the technology of cryptography, to secure the transactional flow, as well as to control the creation of additional units of the currency" (Chohan and Usman, 2017). The emergence of cryptocurrency was overshadowed by online banking and other virtual currency concepts. The problem of exchanging money between peers, without a third party, and through a secured network was first solved in 2008 when an anonymous programmer or group of anonymous programmers named Satoshi Nakamoto came up with a paper introducing the soon-to-be-popular virtual currency Bitcoin. The Bitcoin remains the flag bearer for cryptocurrencies because it was able to solve the recurrent problems surrounding digital currencies, such as the problem of **Trust** and **Double-spending** (Nair and Cachanosky, 2016; Fanning and Centers, 2016; Clement and Schreiber, 2016). All financial transactions are based on the concept of fiduciary money. There has to be trust in the system that money has moved from one party to another, and the same transfer cannot be used twice for another purpose. This problem of avoiding double-spending which was usually solved by passing through a third party operator such as Paypal or Alipay was solved by introducing a proof-of-work cryptographic algorithm that could verify peer- to- peer (P2P) transactions without passing through a financial institution. This system distributes a "timestamp server to generate computational proof of the chronological order of transactions" (Nakamoto, 2008).

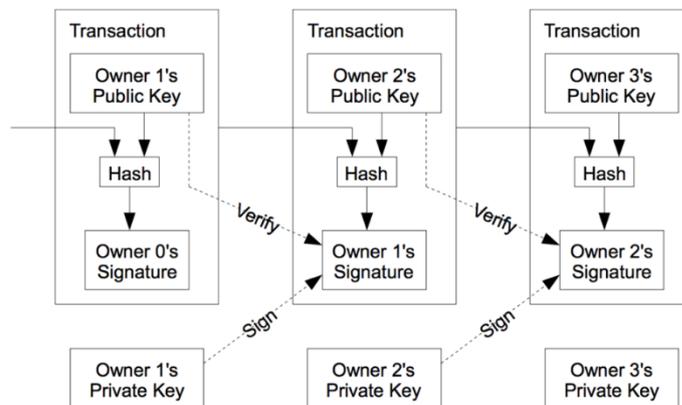


Figure 1: Transaction process according to Satoshi Nakamoto (2008)

The above system greatly depends on "Blockchain technology" which is a kind of Distributed Ledger Technology (DLT) that has been defined as a "distributed, shared, encrypted database that serves as an irreversible and incorruptible repository of information." (Wright and Filippi, 2015). Blockchain technology is the spine of virtual currency. These transactions are to some extent anonymous, in the sense that it protects the personal information of the parties involved (Srinivas, Dillon, and Zagone, 2014). Though the transactions are encrypted, the records are stored in the global Bitcoin general ledger that is used to validate transactions. Blockchain technology started being popularized due to Bitcoin cryptocurrency and it is considered as an open source, decentralized and database for storing transaction information. Instead of relying on banks which are known as centralized intermediaries, this technology uses duplicated and linked ledgers which are called as block chains. As a result, this type of transactions is considered as more transparent. Cryptocurrencies are becoming more and more popular as a form of technology that is groundbreaking, and scientists also call it as disruptive for the whole payments system. Due to the presence of different stakeholders and due to their varying needs, future of cryptocurrency is considered as uncertain. Media is describing blockchains as being disruptive and enabling technology. However, some arguments are stating that block chains are neither disruptive nor enabling technology. Instead, they are regarded as a transformative technology that contributes to the economic and social development. Blockchains are reported to use cryptocurrencies that provide them with an incentive to reach security information goals. From the perspective of the business, blockchain technology can be considered as a ledger that is considered to be essential for the functioning of an organization. The blockchain is known to introduce a new type of consensus which enables the companies to come up with new consensus which does not require the presence of banks and trust mechanisms. In other words, these financial intermediaries such as banks, government organizations and large firms are regarded as pillars of modern capitalism. Initially, blockchain was regarded as a form of a decentralized web. However later, due to the influence of the government in terms of limiting internet access and misuse of private consumer data by large corporations such as Amazon and Facebook led to different problems. It is worth to mention that the economic value provided by blockchains significantly differs from the value provided by the regular Internet. The ecosystem of blockchains has led to the creation of new types of funding based on ICO which is also known as token sales. ICO stands for Initial Coin Offerings. Most of the industry experts firmly believe that ICO is more likely to become standard funding option compared to other nonblockchain startups.

2.2 Benefits and Risks of Cryptocurrencies

There are several benefits of the cryptocurrencies compared to existing methods of payment. Firstly, it should be noted that due to the low transaction cost and low level of entry barriers, users can easily enter the system and start using the bitcoins. In this regard, they can act as payer or payee. In addition to that, worldwide fastness, a transaction in cross-border level and anonymity which is partial can be considered as an advantage of cryptocurrencies.

Thus cryptocurrency is greatly dependent on three correlated elements, which are the users, the blockchain and the miners (Kerscher, 2014). The ecosystem of blockchain technology presents certain advantages which can be exploited in other areas of financial markets, smart contracts, real estate, healthcare, smart government and artificial intelligence (Kakavand and Kost De Sevres, 2016).

However, despite the convenience of Bitcoins guaranteeing a higher level of anonymity, its reputation was soiled when it was used for criminal activities (buying and selling drugs, illegal arms, illegal activities and money laundering) as seen during the silk road scandal that rocked the credibility of cryptocurrencies (Christin, 2012). Another commonly discussed topic in the case of cryptocurrencies is a crime. This can be explained by the fact that usage of bitcoins has widely been associated with crime in media. Due to the certain features of bitcoins, particularly ease of use and anonymity led to the belief that it provides greater opportunity for its use in

criminal transactions or supporting criminal activities. However, the review of the literature shows that so-called pseudo anonymity in the case of bitcoins imply that anonymity is just partial in the case of bitcoins and most of the transactions are particularly visible and observable by the public. The review of the literature shows that there are many different factors which impact on the operations of bitcoins.

The first main obstacle can be explained by the factors which prevent the ease of use. In other words, there is a lack of user-friendliness in using the bitcoins, as the majority of the users are not sure about the safety of their bitcoins. Another major issue is security risks which are described by the process of stealing the cryptocurrency using the direct attack and hacking. Moreover, the Bitcoin system has seen some setbacks as some analysis show that a group of miners can collude to reach the majority of mining power. This scenario is called "selfish mining" which is a danger to the future of cryptocurrencies and shows the vulnerability of Bitcoins (Eyal & Sirer, 2013).

Furthermore, the extreme volatility of cryptocurrencies, especially Bitcoins is at the same time a blessing and a curse. Though it can be argued that the risk of inflation is quite low, due to the limited Bitcoins in circulation (21 million Bitcoins), its extreme volatility is a great concern to financial institutions and world governments who are still trying to understand the technology behind cryptocurrencies in general and Bitcoins in particular. Due to the presence of speculation and liquidity problems, most of the bitcoin holders are worried about keeping their cryptocurrencies since there is a strong variability in its price.

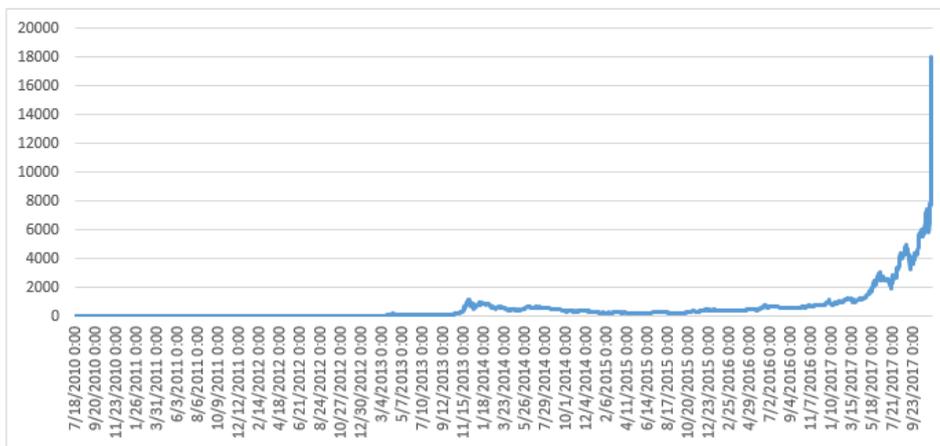


Figure 2: History of price valuation of Bitcoins in \$USD (2010- 2017)

The above chart shows the extreme volatility of Bitcoins. Its valuation started rising when it got mainstream media and academic attention. There is hardly a fiat currency on earth that has known such rapid valuation from \$0.06 in 2009 to about \$18,000 in December 2017. The volatility of cryptocurrencies is paradoxical in the sense that these digital assets do not rely on any tangible asset or organization backing up the currency but rather on the demand and supply dynamics of P-2-P.

Furthermore, despite the growing publicity of cryptocurrencies and the gradual recognition by some world governments such as Japan, it is still perceived as a threat to the existing fiat-based world digital economy. This lack of recognition or global legality makes it sometimes difficult for major financial institutions to adopt cryptocurrencies in their portfolio. Though there are some encouraging signs that status quo may change or not change in the near future, will greatly affect the volatility of cryptocurrencies. Thus, this perceived risk in the adoption of use creates a cultural problem or barrier for some markets in Africa which are used to alternative payment

systems (M-PESA mobile payments in Kenya) or do not simply have the technological infrastructure to adequately exploit such sophisticated technology. These cultural factors or regional realities call into mind the manner in which this technology will be distributed and whether it is disruptive enough for Africans to align with their developmental goals.

3. Diffusion of Innovation Theory

Everett Rogers defined diffusion of innovation in his first model of diffusion as, “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers, 1962). In his second model of diffusion, he further explains that innovation could be an “idea, practice, or object that is perceived as new by an individual or another unit of adoption” (Rogers, 2003). He proposes four main elements that influence the spread of new technology: the innovation itself, communication channels, time, and a social system (Rogers, 2003). He divides the population of consumers into the categories of innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003)

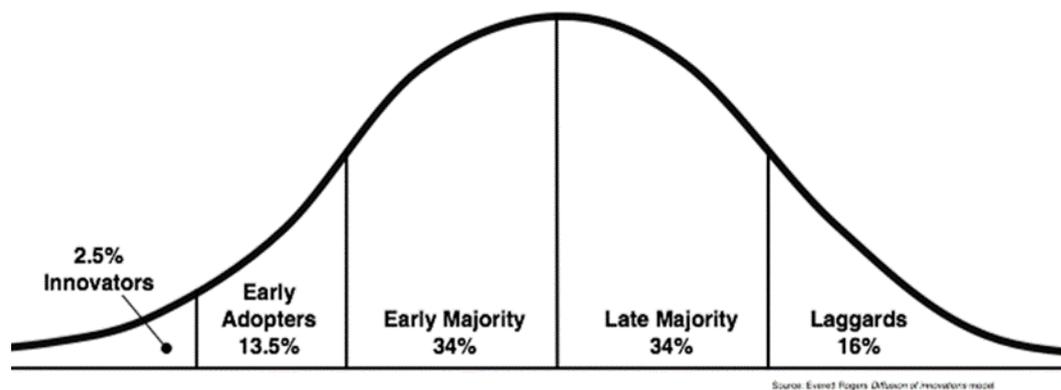


Figure 3: Diffusion of Innovation theory (Rogers, 2003)

3.1 The Theory of Disruptive Innovation

This term was first introduced by Clayton Christensen to describe an innovation that creates a new market and value network that eventually disrupts an existing market and value network, displacing established leading firms, products, and alliances. According to him, innovation can be sustaining (evolutionary or revolutionary) or disruptive. There are three types of DI, low End and new market (Christensen and Raynor, 2003) and High End (Govindarajan & Kopalle, 2006a, pp. 13-15). Three criticisms of DI theory, namely the vague original definition, the choice of case study examples and the strong ex – post perspective / questionable usage for ex – ante predictions have been discussed. (Tellis, 2006).

4. Methodology and Model Application

This paper will use UTAUT 2 Model because it adds other constructs that are more useful in analyzing the adoption of such a new technology to Africans. These additional constructs include hedonistic motivation, habit and price cost. The paper shall also include the Diffusion of Innovation Technology (Rogers, 2003) and the theory of Disruptive Innovation (Christensen, 1997) in order to analyze the way such a new technology can be spread and adopted by Africans.

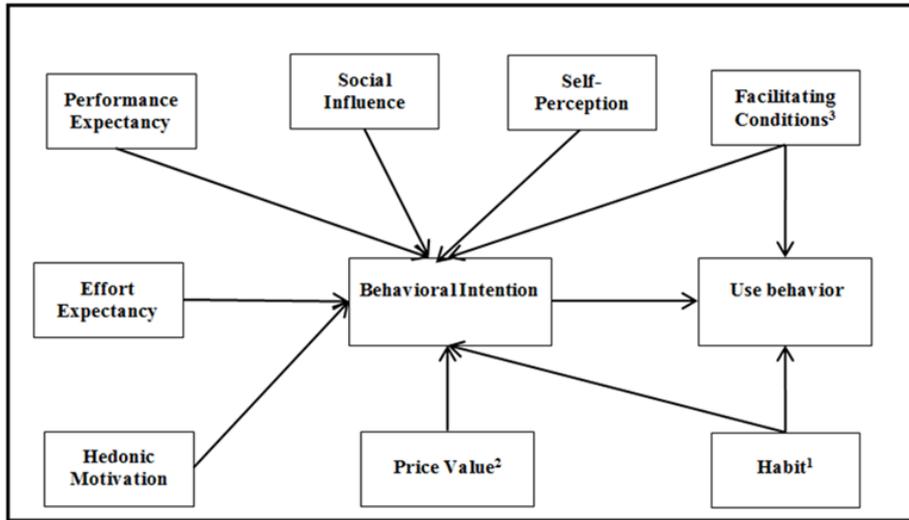


Figure 3: UTAUT2 model, Venkatesh et al. 2012

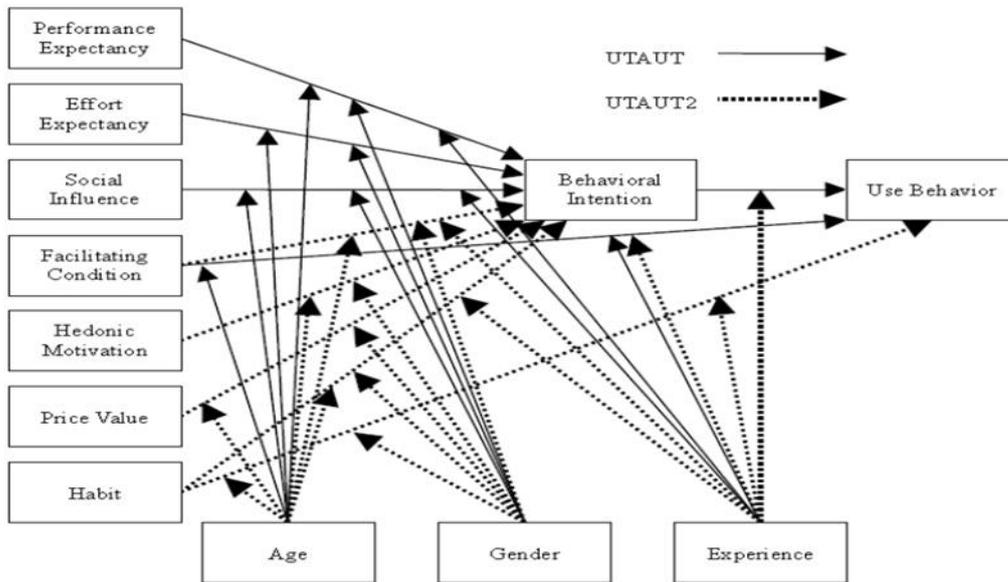


Figure 4: The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2).⁴

UTAUT2 methodology and includes the aspect of culture, our research bias will show that most Africans interviewed have never heard of cryptocurrency and the benefits involved. Their expectations of technological advancements allude to infrastructural investments or hardware components. This low information on cryptocurrency is due in large part to the poor technological, infrastructural development in most parts of Africa south of the Sahara and the traditional banking or financial institutions operating on the continent. These traditional financial institutions (Banks, cooperatives, mobile telephone networks and money transfer agencies) are more visible and guarantee the important aspect of Trust as regards to financial transactions. Block-chain technology has a lot of promises which still needs to be understood and properly advertised for Africans to adopt such technology. The end game is for Africans to create, propose and promote their crypto-currencies that will project their financial independence and emergence from poverty. These cryptocurrencies can be national, regional or continental. This

⁴ Chang CW, Xue F. 2017

process will maybe produce a future cryptocurrency called "Afro-coin" or "Afro-bits" that will be an improvement of the existing blockchain technology and ensure one of the Pan African goals of financial autonomy and economic emergency.

UTAUT is considered as a comprehensive model which explains the influence of factors that might impact on individuals intention of acceptance of the technology. This model consists of four main constructs such as performance expectancy, effort expectancy, social influence and facilitating conditions that directly impact on technology usage. Performance expectancy implies to what extent users will benefit from the use of technology while effort expectancy implies the extent of easiness of the technology. In other words, how it is easy for customers to use the technology. Social influence is another important factors since it implies to what extent users believe that certain technology should be used by others including family and friends. Based on UTAUT model, it can be mentioned that performance expectancy; effort expectancy is important in terms of determining behavioral intention to use technology whereas behavioral intention ad facilitating conditions are critical for identifying the technological use.

4.1 Hedonic Motivation

This type of motivation indicates fun and pleasure that individuals receive from the usage of specific technology and it is considered as one of the important criteria which determines the acceptance of technology and its use. In the case of information search, examples of hedonic motivation such as perceived enjoyment are found to influence on acceptance of technology and its direct usage. Thus, hedonic motivation can be regarded as a predictor of consumer's intention of using technology.

4.2 Price

The price is another important determinant which impacts on the individual's acceptance of technologies. For instance, SMS is considered as a popular means of communication due to its low cost compared to other means. The value of price is regarded to be greater when the benefits offered by the technology outweighs the monetary cost, and thus such price has a positive influence on technology usage acceptance and usage. As a result, it can be stated that price can be an important predictor of using technology.

5. Discussion

Based on the performance expectancy element of UTAUT model, it can be mentioned that users in African countries benefit from the usage of bitcoins. Particularly, in Africa, the burgeoning popularity of cryptocurrencies resulted in the increase of trade venues. Especially, this was observed in the case of peer-to-peer marketplaces where there is a recorded increase in the price of bitcoins. For instance, the volume of trades in Kenya on localbitcoins.com reached to \$8.1 million in December 2017. Moreover, there is a report by Luno which implies that increase in transactions worth 2000 BTC. Especially, in this period, the price of cryptocurrencies was increasing over \$10,000 range. Luno is regarded as cryptocurrency exchange which is common in Africa. Operation of Luno started in 2013, and approximately there are 1.5 million users across 40 countries. According to its plans, there is an expectation of 1 billion customers by 2025. Additionally, Coinbase, which is regarded as North America's largest cryptocurrency exchange, has reported 11.7 million number of users last year. In this regard, a number of factors can be provided to explain why Africa might become the largest market with full of opportunities for the cryptocurrency. Effort expectancy implies that how it is easy for Africans to use blockchain technology. In this regard, to identify the extent of easiness of using blockchain technology, it is worth to consider important reasons which enable it to be accepted. The first and foremost reason is local conditions in Africa, which are considered as conducive for cryptocurrency adoption. There are several countries in the market which suffer from the impact of inflation. Precisely, Zimbabwe and South Sudan are the countries with the high inflation rates. Cryptocurrencies have a decentralized system which puts them on advantage compared to

several central bank management policies. Moreover, the increase in usage of mobile phones has contributed to the popularity of cryptocurrency technology. In the process of developing of financial ecosystem, many countries in Africa have taken a step forward to develop its physical banking to the decentralized mobile platform. There are businesses that use blockchain technology in Africa. For instance, BitPesa is a company based in Kenya that offers money transfer system works with more than 50 banks in Africa which owns various mobile wallets on its platform. Moreover, another favorable condition which can be observed in Kenya is the low threat of government regulation. Many countries failed with blockchain technology due to the threats of uncertain government changes and regulation. However, Africa has to take into consideration several forces which impose threat for cryptocurrency market.

Social influence is one of the most important elements in UTAUT model as most Africans believe that usage of cryptocurrencies by their friends and family members contribute to the improvement of living standards. However, they should be offered necessary training and resources which enable them to access it. Hedonic motivation implies the extent of pleasure that users receive by accepting and using the technology. However, this is not the case with the cryptocurrencies due to their fluctuating nature. As most of the individuals invest in the initial stage for buying the equipment, they may not be satisfied when there is a strong decrease in the price of cryptocurrencies. As the majority of African countries are low-income countries, there might be a challenge for different customers in African countries in terms of having enough resources in order to start mining cryptocurrencies, which makes this price element unfavorable for the condition of African countries.

6. Conclusion

The report has provided several advantages of using cryptocurrencies such as low transaction cost, low level of entry, and worldwide quickness. Moreover, the anonymity of the transactions is the main advantage of bitcoins. However, there are certain drawbacks of it regarding strong volatility, lack of user-friendliness and its usage in crime. Several factors were considered in the case of African countries to analyze whether cryptocurrency is essential for economic growth in some economic countries. UTAUT model was applied to analyze. The application of this model in the case of Arica shows that performance, effort expectations, social influence are favorable for African countries` while the influence of hedonic motivations and price is unfavorable for acceptance of cryptocurrencies for African countries.

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