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RESEARCH ARTICLE

BLOCKCHAIN IN BANK AND FINANCE: WHAT'S THE IMPACT?

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ABSTRACT

The emergence of the blockchain has generated very strong echoes in the banking and financial sector. The launch of related projects by major banks on an international scale confirms its potential, while the successive declarations of Bank Al Maghreb as a Central Bank regulator corroborate its interest. In order to better understand its future – likely disruptive – impact on the business model of banks, we will first clarify the public perception of blockchain and identify the misconceptions that often cause confusion between blockchain as a technology and cryptocurrency. Despite the lack of popularization of this topic and empirical studies, this study focuses on the expected reaction of banks and their strategies to be implemented in such a complex situation subject to different variables. The literature review, the observation and the monitoring of Fintech solutions highlight a conflicting situation in the sector that requires strategies of balance and convergence of interests to be adopted by banks and also a coopetition between banks and Fintech in the face of accelerated technological and competitive change.

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INTRODUCTION

The Blockchain has strongly attracted the attention of financiers and economic operators in a few years. It will bring a technological revolution in different sectors, especially banking and finance. This technology, associated with the emergence of cryptocurrency such as Bitcoin and Ether as well as thousands of others, is considered as the computer underlying of their issuance and circulation. The disruptive aspect of this technology has led to the emergence of fintechs also in the field of finance and banking (Jean-Paul Delahaye, 2015) and has begun to challenge the business model of banks. The potential of the Blockchain goes beyond cryptocurrency, given the architecture of its decentralized network distributed between a series of sequential "blocks", as well as between its various users accordingly without a central control body (Jean-Paul Delahaye, 2015). Through the advantages and qualities that derive from it, such as the strengthening of traceability, transparency, efficiency ,speed of transactions at a lower cost, and the immutability of information (BIDISHA DATTA & INDRANIL SARKER, 2020), as well as the establishment of trust and credibility, it seems that the blockchain risks disrupting the classic model of banks and their services (CYNTHIA WEIYI CAI, 2018). Speaking of the blockchain, the mathematician (Jean-Paul Delahaye, 2015) wrote that it is necessary to imagine "a very large notebook, which everyone can read freely and for free, on which everyone can write, but which is impossible to erase and indestructible".

The operations are added to the ledger databases after verification and acceptance by all participating nodes following a given consensus such as the Proof of Work or the Proof of Stake (BITFURY GROUP, WHITE PAPER, 2015). These transactions are not modifiable or at risk of being deleted unless the majority of network participants agree (PRATYUSA MUKHERJEE & AL,2021), which consequently increases the trust and traceability of this technology. The nature of blockchain networks is subdivided into three categories: public, private or hybrid. The only distinction between public and private blockchain is simply related to who is authorized to participate in the network, to execute the consensus protocol and to maintain the shared ledger (PRAVEEN JAYACHANDRAN, 2017). A public blockchain network is completely open and anyone can join and participate in the network. The network usually has an incentive mechanism to encourage more participants to join the network. Bitcoin is one of the largest public blockchain networks in production today (PRAVEEN JAYACHANDRAN, 2017). In between, there is the concept of hybrid blockchain. It is a technology that merges the components of the public and private blockchain or tries to use the ideal part of public and private blockchain solutions. Private information is kept inside the network but remains verifiable (WU& AL, 2017). Although a company can own a hybrid blockchain network, it cannot modify transactions. A hybrid blockchain allows organizations to establish a private, authorization-based system next to a public, permissionless system, allowing them to administer who can access particular data stored in the blockchain and which data will be made public (WU& AL, 2017).

The scalability of this technology has also allowed the emergence of several generations of blockchain: 1.0, 2.0, 3.0 and 4.0, which refer respectively to the use of concepts and techniques summarized in the Proof of Work, Smart Contracts, dApps and the association of artificial intelligence and the Internet of Things (PRATYUSA MUKHERJEE & AL,2021).

METHODOLOGY

Research on the topic of blockchain in relation to the banking sector and Decentralized Finance (DeFi) has a special particularity. First of all, it is very new with a technical aspect little known to the public. For the literature review, the selection of articles and books exceeded 100, in order to identify the functioning mechanisms and characteristics of the blockchain. The study focused, in addition to the economic and financial aspect, on articles in the field of computer science. However, it is important to emphasize that almost all the publications available for this topic are in English. This initiative also has a qualitative research dimension based on the observation and monitoring of the evolution of the blockchain and its applications to the banking and financial sector on an international scale, as well as in a Moroccan context since the outbreak of the cryptocurrency bubble in 2017 and the ban by the Foreign Exchange Office on its use in Morocco. The research focused on the main proposed uses of blockchain for the banking sector, in order to understand and discuss their possible impact on the business model of banks and their strategies. To do this, we mobilized two theories, namely those of the disruptive technology of (CHRISTENSEN. C.M, 1997) relating to the disruptive aspect of the introduction of technology and the game theory or NASH equilibrium developed by (JHON FORBES NASH, 1954) and which concern collective reasoning strategies. The originality of this study finds its logic in the introduction of this game theory in the banking field in relation to the use of blockchain, and this; in order to test its added value and identify possible strategies to mobilize in the face of the emergence of this blockchain technology.

RESULTS

USES OF BLOCKCHAIN IN THE BANKING AND FINANCIAL SECTOR: We recall that due to the recent emergence of this technology and lack of disclosure, the public understanding of this technology often refers to cryptocurrency, while it is considered as a network technology on which these electronic currencies are issued and circulated like any other data. Technically, it is obvious that cryptocurrency can also be backed by a conventional centralized system unlike a decentralized system like that of the blockchain. The use of blockchain technology goes beyond cryptocurrencies to different fields such as finance, logistics, public service management, the pharmaceutical industry, land conservation services, intellectual and industrial property protection and others (ANTONOPOULOS, 2016). In banking and finance, the use of Blockchain is much more feasible and optimal to carry out several basic operations, including records keeping and cybersecurity of currencies, loans and equity management (FRIEDLMAIER ET AL, 2018).

LOCAL AND CROSS-BORDER TRANSFER: Already the Ripple Labs company has decided to make its Ripple electronic currency (XRP) and its protocol an alternative for the cross-border transfer of Swift. Its RippleNet payment project has managed to constitute a global interbank network of more than 200 institutions, of which the Moroccan bank Attijariwafa Bank has been part since January 2022 (www.boursenews.ma , 01/18/2022). This membership will allow AWB to exchange transfers in a transparent, secure and instant way. This initiative also aims to alleviate the problems of correspondent banks in terms of speed, dormant provisions in Nostro accounts and pre-financing (LUDOVICO RELLA, 2019). Banks in general have been committed about a decade ago to minimizing their correspondent banks in the face of costs and risks related to compliance and money laundering. Faced with this situation, a decentralized system with a cryptocurrency or tokenization protocol can do the trick. Ripple ensures a processing capacity of 50,000 transactions per second against 24,000 to be ensured by the traditional operator Visa (AMANLAL RAJAK, 2020). For example, the transfer of 100,000 USD will cost only 14 USD against 1% to be debited by Visa, i.e., 1000 USD in this case, which sums up a big difference (AMANLAL RAJAK, 2020). We think that the recent Russian-Ukrainian war and its repercussions reflected on the Western policy of sanctions on banking transactions among others, surely urge some operators and even states to look at other SWIFT alternatives to be found in the blockchain, knowing that it should be noted that SWIFT does not keep funds and does not keep accounts , but its function boils down to its permission to its community of banks to communicate and exchange standardized financial messages in a reliable way but on a centralized system whose control rests with a third party (SWIFT, 2022). Note also that the SWIFT system is not necessarily open at the same time for all stakeholders, therefore the risk of failure known communally as Herstatt Risk remains always probable (DAVID LOADER, 2020). Following the above-mentioned sanctions and in order to circumvent them in terms of payment and exchanges with Morocco, the Russian ambassador in Rabat Valerian Shuvaev said, in an interview with the Spanish press agency EFE, and proposed the use of barter or other alternatives such as the use of currencies other than the dollar and the euro, or even national currencies (Aujourdui le Maroc, April2022). According to our personal estimation, the language of a diplomat is often well chosen and the word (alternatives) can also assume other implicit interpretations (such as cryptocurrency for example) given that it remains legally prohibited in Morocco. However, the use of cryptocurrency in order to circumvent the sanctions remains limited and very theoretical in view of the installation of the main crypto exchange platforms in the USA (Ex: Binance; Coin base) and the ban on access to Russian oligarchs following the sanctions (futura-sciences.com ,2022). In the context of multi-polarization, the BRICS countries seem primarily interested in restructuring the world monetary and financial system and using a common currency instead of the dollar (www.cointribune.co, September 2023).

The project was reaffirmed by Russian President Vladimir Putin at the BRICS Summit in South Africa in August 2023 (www.cointribune.co,September 2023). Nikita Kulikov, a member of the Russian State Duma Council of Experts, explained that creating a cryptocurrency today is not difficult. But he noted that understanding how different countries are preparing for deployment is most important. He went a step further and explained that cryptocurrencies are a practical solution for supranational structures like BRICS (insidebitcoins.com, 2019). But really, we think It is still difficult to imagine what the next BRICS cryptocurrency will look like, it will depend on several countries with different economies and the solutions are still being studied and it will take time. In a logic of disruptive technologies, we believe that the blockchain will risk making SWIFT what Swift itself did with the old Telex system previously used in similar operations. With regard to transfer, financing and placement operations in the local financial center between the various commercial banks and financial institutions, the Real-Time Gross Settlement system (RTGS) is considered the most robust, fast and resilient infrastructure in a very sensitive sector under the supervision of central banks (XIN WANG ET AL, 2017). However, these qualities suffer from some disadvantages related to the cost of interoperability between the heterogeneous information systems linked to RTGS and their centralized architecture. Faced with these considerations, the same RTGS mechanism can work with distributed ledger blockchain technology to reform it in a decentralized way (XIN WANG ET AL, 2017). Preliminary attempts at an international scale are multiplying with projects such as Jasper, Hyperledger, Ubin, Stella, Corda and others that aim to explore the feasibility and challenges of implementing an RTGS domiciled on a distributed blockchain network (MILON BISWAS, 2020).

ISSUANCE OF DIGITAL CURRENCY (CBDC): In parallel, a Central Bank Digital Currency concept or CBDC (Central Bank Digital Currency) is beginning to emerge as a project in several central banks by exploring CBDCs, more than a quarter of them are currently developing or executing concrete pilot projects. It is

important to clarify that the CBDC planned by the central banks will be a Stable Coin different from the Colored Coins known by their volatility, it is a currency indexed to a national fiat currency regulated by a central bank (ANDREI-DRAGOS POPESCU, 2021); The Bank for International Settlements has updated previous surveys that questioned central banks about their commitment to CBDCs. The latest answers published on 06/05/2021 from 81 central banks show that the Covid-19 pandemic and the emergence of cryptocurrencies have accelerated their work related to CBDCs. In addition, some banks are even likely to issue CBDCs in the short or medium term, confirms the RBI (BIS paper n° 125,2021).

Research on a CBDC ecosystem is underway to involve private sector collaboration and interoperability with existing payment systems (ALEXANDRA SIMS, KANCHANA KARIYAWASAM, DAVID MAYES, 2018). Several CBDC projects are already launched by the Central Banks of Japan, Sweden, England, Canada, Kenya and others, while at the local level, the governor of Bank AL MAGHRIB has already started talking about the advantages of this project and adapted his firm speech after the ban by BAM and the Foreign Exchange Office in their press release in 2017 on the use of cryptocurrencies in MOROCCO; the perceived potential of the block chain in Morocco was unveiled gradually in chronological order as follows :

- In November 2017: Press release from the Foreign Exchange Office and BAM banning cryptocurrency in Morocco after a big upswing in cryptocurrency prices.
- In 2019 BAM unveiled the idea of creating an electronic Dirham and established a reflection committee.
- February 2021: Approval of the Crowdfunding Law n° 15-18.
- In his press briefing on March 23, 2021, the Governor of BAM confirmed that Morocco is part of the global debate around cryptocurrencies and declared that “The pandemic crisis has demonstrated that digital will take a lot of place and importance and not only in the register of commerce and exchanges, but also on the monetary level” (www.media24.com ,03/24/2021)
- On March 30, 2021, the OCP Group carried out on the blockchain in collaboration with Trade and Development Bank and the DltLedgers company in Singapore a large commercial transaction involving the shipment of several thousand tons of fertilizers in Ethiopia of 400 million USD (finances news, Mars 2021).
- Creation of 3 commissions in BAM in 2021: “One for the electronic money of the central bank and the other two for crypto-assets and the monitoring of its evolutions”.
- The Governor of the Moroccan central bank Mr JOUAHRI reaffirmed in his periodic interview of 03/23/2022 the potential of cryptocurrency and recalls the mission of the commissions designated in this directionn, so a draft law for the regulation of their use was announced by the central bank BAM (Aujourd’hui le Maroc,2022)
- Morocco attended a conference in El Salvador on 05/17/2022 to discuss financial inclusion, financing of small and medium-sized enterprises and Bitcoin (Ledesk.ma , May 2022).

Finally, on the eve of the discussion of this paper in a conference, the Governor of BAM announced during a press briefing at the end of the second quarterly meeting of the board of directors of BAM in 2022 that a bill to regulate the use of cryptocurrencies is planned. The use of CBDCs reserved for institutions in a first step will strengthen the hypothesis of an alternative to the RTGS system. But beyond that, it will be likely to witness a change concerning the circulation of funds and the quantity of bank deposits accordingly. The introduction of a CBDC can replace the financing modalities of banks and lead to a decrease in their bank deposit structures, especially demand bank deposits, as well as disintermediation thereafter (ANDREI-DRAGOS POPESCU, 2021). (ANDOLFATTO D, 2018) suggests a utility to be seized to increase financial inclusion and decrease the circulation of cash through cryptocurrency. The potential of CBDC is also enormous for custodian banks in terms of money market or equity investments. Clearing and settlement functions will be merged in a logic of a decentralized and distributed system with smart contracts and virtual currency liquidity. Back office automation in this case is supposed to reduce costs to 30% according to a study done by The Canadian portfolio company FAIROM in order to automate the management of its derivatives (RANDY PRIEM,2020). We also believe that several commission-generating services for retail or investment banks will disappear, such as the case of stock custody rights, brokerage, transfer or title account feeding. For this financial issuance function, we cite the experience of a Moroccan bank, namely, the BCP, as part of the continuous digitalization of its offer and the improvement of the customer experience, the Banque centrale populaire (BCP) group is launching, with the support of the Moroccan Capital Market Authority (AMMC) and the participation of Maroclear, a bond issuance operation based on Blockchain technology. This operation, the first of its kind in Morocco, involves the issue of securities of its subsidiary Maroc Leasing, for a total amount of 100 million dirhams (MDH) (www.agenceecofin.com , 2022). Carried out on the basis of a "Proof of Concept" and according to the rules of issue in force, It should be noted that this unprecedented initiative represents the very first "bond issue" operation launched in Morocco on a Blockchain platform (SNRT NEWS,July 2022).

COMPLIANCE ACTIVITY AT THE BANK: The losses generated by compliance violations are estimated at billions of dollars each year. The latest statistics in 2021 relating to fines for non-compliance with anti-money laundering (AML), Know your Customer (KYC) and data privacy regulations in the financial sector totaled $ 5.4 billion (Fenergo Report, 2021). The main conclusions of the penalties at the global level are illustrated as follows:

- Asia and the Pacific (APAC) regulators issued a total of $718.6 million in enforcement measures against financial institutions in 2021, knowing that they are down by 86% compared to 2020.
- The EMEA region recorded a 244% increase in the value of financial sanctions, from just over $1 billion in 2020 to $3.4 billion in 2021.
- North America experienced a sharp decrease in enforcement measures during the 2021 calendar year, i.e., less than 73% compared to 2020.
- Overall, approximately 16 employees were fined $16.5 million for their role in anti-money laundering compliance violations.
- Latin American regulators have imposed a fine of $14.3 million on financial institutions, up 46% compared to 2020 (Fenergo Report,2021).

This huge cost deserves to look for other ways of improving processes to overcome this situation in banks. The distributed ledger of the blockchain seems to be a possible alternative. The blockchain can come to the aid not only for commercial banks but even for central banks in their missions as regulators. Some research speaks in this logic of the emergence of a 2.0 compliance (VALKANOV, 2019). The concept of RegTech and SubTech companies will also find a vital impetus in blockchain technology (IOANNIS ANAGNOSTOPOULOS, 2018). The total global investments in egtech were very high in 2021, with a record number of transactions, which generated almost $10 billion in investments, just next to the record of 2020. While the first half included the acquisition of the Canadian company Verafin for US$2.7 billion and the takeover of the Irish company Fenergo for US$600 million, the results of the second half were mainly driven by late-stage venture capital transactions, including a fundraising of US$500 million by Deel and US$153 million by Quantexa (KPMG fintechpulse report, 2021). The shortcomings related to the current management of the compliance policy are mainly found in the asymmetry of information between banks and regulators, also, the duplication and lack of coordination of work between banks as well as the high rate of occurrence of operational risk due to manual work (DENTOS, 2019). The risk of fraud such as that of double spending will be neutralized with the blockchain consensus (LIN WILLIAM CONG ET AL,2018). The assured traceability and the transparency that derives from it also helps to alleviate the audit function.

A document saved on the system is auditable and retained as a reference by all participants (XIAOYAN CHU ET AL,2020). Being part of the blockchain, the hosting of smart contracts on this network will ensure the automation of transactions and help in the programmed establishment of contracts following the conditions to be fulfilled and monitored by a computer language on the Ethereum network (WU& AL, 2017). It joins the theory of "Code is Law" of (LAWRENCE LESSIG, 1999), whose jurisdiction between the protagonists now refers to computer programs. So Centralization is about controlling activities under one governance. It means getting rid of silos, integrate the systems and standardize processes. This approach gathers credentials to a central repository, which is made available to the whole organization (Donohue & Carblanc, 2009). Trust in control of private information is put into one directory but through this approach, credentials can be reused in other systems and services in an organisation. It is also one of the most popular approaches to IDM.

COST REDUCTION AND PROCESSING TIME: One of the main shortcomings affecting the reliability of information systems in the banking and financial sector is the difficulty of interoperability between systems and networks that are supposed to be interconnected. Already the complexities inherent in the adoption of the blockchain are also under-studied, such as the outstanding issues concerning transaction costs, interoperability, network speed, scalability, security and immutability (RYAN BROWNE, 2018). The way in which organizations approach the technological considerations resulting from the implementation of the blockchain is an area ripe for more advanced empirical studies. Traditional finance operates in silos and tends to erect barriers. One financial department may not be able to interact with another because the different banking institutions and financial institutions must keep their own records. Therefore, the transfer of capital and value via silos can be expensive and tedious (ANTONOPOULOS, 2016).

The first option for total interoperability is to promote the emergence of large platforms and convince all projects to depend on the same platform. Currently, the Ethereum platform seems the best candidate to improve interoperability. On the other hand, decentralized finance is based on a public blockchain and open standards, improving interoperability between different services (ANTONOPOULOS, 2016). With high interoperability, capital and value can flow seamlessly across a variety of services and borders, creating an Internet of value (ANTONOPOULOS, 2016). The fact of striving towards total interoperability generates in parallel a reduction in cost and time per transaction. The classic segmentation of the processing processes at the bank under three levels called Front Office - Middle Office and Back Office will no longer be valid with the decentralization and automation of tasks (RANDY PRIEM, 2020) self-audited in addition to perfect cyber-security. According to (Goldman Sachs, 2016) the decentralized blockchain technology could reduce the transaction costs of insurance subscriptions by $2 to $4 billion in the United States alone and the costs related to clearing securities and settlement would decrease by $11 to $12 billion. An analysis by Banco Santander, (OLIVER WYMAN AND ANTHEMIS GROUP, 2015) suggests that the blockchain could reduce the infrastructure costs of banks attributable to cross-border payments and securities trading by $15 to $20 billion. The World Economic Forum (2015) even estimates that by 2027, up to 10% of the value of global GDP will be stored on blockchains. Beyond the direct costs, the estimated environmental costs seem too salty for the issuance of fiat currencies. In an article entitled "Under the Microscope: "The True Costs of Banking" published on (Coindesk) by (Hass McCook,2021) its study conducted in 2014 and updated in 2021 shows that to estimate the carbon footprint of the world banking and finance industry within an order of magnitude ,we can draw the conclusion that while ATMs reduce the need for bank branches, these machines have their own carbon footprint which isn't insignificant. It is estimated that each of the world's 2,394,700 ATMs has an energy usage of 0.25 kWh (Roth, et al, 2002). This translates to a yearly energy use of 18.9 million GJ, or 3.2 million tonnes of CO2. At 0.75 million tonnes of CO2 produced per year, Bitcoin has 99.8% fewer emissions than the banking system (Hass McCook,2021).

It is true that on the blockchain side, operations also consume energy for verifying cryptocurrency transactions following the PoW consensus for Bitcoin, but PoS seems much more environmental. It offers many advantages over PoW as a mining method. In fact, to secure the network, it is not necessary for miners to burn computing power on unnecessary calculations (BITFURY GROUP, 2015). However, the PoS also registers some shortcomings as explained by (BUTERIN VITALIK, 2014) in his statement on the Internet: For example, the so-called problem of "Nothing at Stake" is a serious problem as described by some Bitcoin developers. It means in the context of a PoW blockchain, if there is an accidental Fork or a deliberate attempt to reverse a transaction ("double spend"), and that there are two competing Forks of the blockchain, that miners must choose which of the three choices they contribute to:

- Do not participate on any chain and would not get any reward.
- Mine on chain A and get the reward if chain A wins.
- Mine on chain B and get the reward if chain B wins.

Note that the Fork, which exists in two types, namely the hard Fork and the soft Fork, touches on the process to which the blockchain nodes will have to comply with its rules. The Fork consists in giving birth to a process, when the existing process does not allow a change. The process that derives from it can in this case work in parallel with the one preceding or originating. Let's talk computer language: it is similar to an update to be made (Futura-sciences.com , 01/10/2021). In soft Fork, the modification is compatible with previous versions, while in hard Fork, the modification becomes incompatible. It can also create a new blockchain independent of the original one, such as the one that occurred on 08/01/2017 for Bitcoin which split into two, namely Bitcoin and Bitcoin Cash. A Fork can occur accidentally when the blockchain nodes do not replicate the same data (Futura-sciences.com, 01/10/2021).

FROM INTERMEDIATION TO DESINTERMEDIATION: Before the blockchain, it is important to clarify that the business model of banks and the process of banking activities has changed partially in view of the effect of the Internet, online banking services, mobile banking and digitalization in general. As traditionally agreed, banks have two functions: the primary one of collecting deposits and the secondary one which consists in the distribution of its bank deposit in the form of credits intended for investment or consumption. However, the financial sphere has already begun to witness the emergence of other channels for a decade. Intermediation has moved from traditional banks to parallel institutions (Shadow Banks) such as Virtual Banks, Open Banks; Fintech Start-ups, Crowdfunding, Dapps and Initial Coin Offering (GREG BUCHAK ET AL, 2018). The cryptocurrency currently in circulation also gives the same role of intermediary but without regulatory control by a Central Bank. A strong divergence is noted in terms of the legal qualification given to crypto, which varies between prohibition in some countries, to be considered as currency or asset in others and authorization by some governments. Now that the Internet has become widely used, depositors will process cryptocurrency in a more convenient way and will also provide users with intermediate actions. This will probably encourage banks to focus over time on their functions which are secondary in nature, i.e., the distribution of credits for their survival. But it could also in another scenario push banks to change and reduce intermediation and get loans off their balance sheets. We think that in the long term a bank will risk summarizing banking intermediation in an exchange auction between savers and investors or between depositor and borrower. It is thanks to the smart contract that disintermediation can be achieved, and it is thanks to the neutralization of the need for trust in intermediaries that economic agents will dare to negotiate loans and investments over the counter under the automatic and programmed application of the conditions of contracts on the blockchain (IMMACULATE DADISO & MOTSI-OMOIJIADE, 2018). This foundation of disintermediation is also based on the strengthening of trust between the protagonists in a shared blockchain system (LELOUP, 2017).

The market known by the English-speaking name of Peer to Peer lending will find in the blockchain a catalyst for its evolution. Several small and medium-sized companies prefer in the North American European or Asian market to resort to these institutions for financing as a substitute for traditional banks (GREG BUCHAK ET AL, 2018). A decentralized system that ensures traceability and transparency of market conditions will also help to overcome the problems of information asymmetry and mistrust between stakeholders (IMMACULATE DADISO & MOTSI-OMOIJIADE,2018). Crowdfunding can also become a part of decentralized finance and rely on the issuance of Tokens or the receipt of cryptocurrencies for the fund arising dedicated to investment (CYNTHIA WEIYI CAI, 2018). It is important to emphasize that according to Law n ° 15-18 of Crowd funding in Morocco adopted on 02/22/2021, the funds paid by the contributors during a collaborative financing operation are not considered as funds received from the public as defined by Law n ° 103-12 relating to credit institutions and similar organizations. Collaborative financing operations of the "loan" category are not also considered as credit operations or similar operations as governed by the aforementioned Law n° 103-12. On the investment side, the provisions of Law n ° 44-12 relating to the public offering and the information required of persons and organizations making a public offering are not applicable to collaborative financing operations of category "investment".

BANCASSURANCE: The insurance and bancassurance sector seems to be the best sector that will fully benefit from the contribution of blockchain. A study carried out in 2011 by (IAIS) the International Association of Insurance Supervisors under the theme: "deterrence, prevention, detection, reporting and repair of insurance fraud" notes that about 20 % to 30% of insurance claims are suspected of fraud. The related risk involves the lack of integrity and the low legal knowledge of policyholders which often lead to fraudulent practices. Information about policyholders cannot be shared well in the current system. Even if some policyholders are blacklisted by an insurance company, it cannot prevent other insurance companies from treating this dishonest clientele (IAIS, 2011). The risk is of an internal nature even with regard to intermediaries, such as insurance agents and brokers, which leads by the asymmetry of information and the lack of transparency to exposure to a high probability of occurrence of operational risk (IAIS, 2011). The complication of its process is spread over the entire life cycle of the insurance policy, starting from the subscription to the occurrence of a possible loss. The insurance market has a low efficiency of supervision and control (IAIS,2011). Thus, it is impossible to effectively assess the risks of insurance applicants and prevent moral hazards. It is also unable to effectively solve the current problem of money laundering by criminals using Internet insurance (IAIS, 2011). The field of intervention of insurers and reinsurers is very extensive. It affects by way of indication individuals, car insurance, real estate and health, employers and employees, property, securities, equipment, finance, banking, international trade, logistics and climate multi-risk insurance for Agri and Agro business etc.

To overcome the shortcomings of this sector, the potential for improving the operating mode of insurance management goes beyond the blockchain to the Internet of Things. Indeed, the implementation of an insurance policy will depend on a smart contract with predetermined conditions to be fulfilled or to occur (LIN WILLIAM CONG & AL, 2018), but which requires a detection, monitoring and control system to be ensured by detectors, sensors and information to be collected online thanks to the Internet of Things (IoT) and to be transposed to the database on the blockchain (TARUN KUMAR SINGHAL & AL, 2021). For example, faced with the climatic hazards of drought which weighs heavily on cereal cultivation, the government in Morocco has committed, within the framework of the Green Morocco Plan, a budget to subsidize, in collaboration with insurance company MAMDA, the subscription of insurance policies that cover this climate multi-risk. The possible implementation of the policy subscribed and the compensation of farmers will depend on the rainfall recorded and the nature of the harvest of the farms by zoning and regions declared affected, as well as the level of coverage. However, the method remains arbitrary and fixed. It depends on the statistics provided by the Minister of Agriculture. For an automated assessment of claims accurately and a quantification in real time with precision of the risk of drought above all, it is possible to link smart contracts on blockchain - as an insurance contract support - to rainfall data held by the competent centers and images of cultivated areas taken by satellites or even by drones. And this, in order to estimate claims without moving in Situ. The collected data is then translated into the form of models programmed in the smart contracts of the blockchain for decision. Artificial intelligence and the Internet of Things are two other levers that will increase the accuracy and fairness of refunds at lower costs and reduce the risk of fraud and false declarations (CHIN-LING CHEN & AL, 2021). Connected objects work mainly from the Cloud service. By using the blockchain, connected objects could operate in a distributed manner without a central body that risks modifying its collected data. They also allow the blockchain to have access to certified real-world data with more credibility on the other side facing customers. It is important to emphasize that we proposed – on a personal basis - this idea and discussed this solution and its preliminary scheme in an Agri Tech innovation Hackathon held in April 2019 at the SIAM in Meknes and organized by the Crédit Agricole du Maroc, during which we conducted a monitoring work in favor of the young participants. The above-mentioned idea has just been concretized recently in 2022 by the two startups Avalanche and the insurtech Lemonade in partnership with other crypto players which allowed the launch of Lemonade Crypto Climate Coalition dedicated to the decentralized coverage of African low-income operators facing the risk of global warming (IAIS, 2022). The coalition is built in the form of a decentralized autonomous organization (DAO) dedicated to the construction and distribution of insurance based on an ecological blockchain using the Proof of Stake consensus. This concept will also help to allow crypto investors to inject their capital into this project and receive their dividend in the form of cryptocurrency (lemonade.com, March 2022);The Blockchain and its characteristics, such as decentralization, immutability and non-falsification, transparency and traceability, are suitable for promoting compliance and accuracy of insurance operations.

Trade finance: The gap related to international trade finance is estimated at $ 1 trillion in 2020, i.e., an aggravation of the deficit of 15% spread over two years previously according to a study conducted by the Asian Development Bank (ADB, 2020). Without having more figures to confirm this trend, the gap has surely dug even deeper in the conditions of the COVID19 pandemic having disrupted the supply chain at the global level and generated restrictions to access sources of supply. However, this gap already has its origin mainly in access to financing and services from banks and financial institutions (STEVEN BECK AND ALISA DICAPRIO 2017). We also think that the problem is first of all systemic, since access to financing in this sector refers to a Rating system according to country risk and a segmentation of companies between public and private. It also goes back to the cross-border nature of trade finance and the disadvantage of the plurality of the number of actors and the documents required in an international trade. According to one estimate, a credit transaction letter has 15 documents, 19 steps and 65 data fields in addition to repeated checks and verifications (STEVEN BECK AND ALISA DICAPRIO 2017). These gaps that slow down the process with a lot of restrictions can be solved with the blockchain. Fintechs are now intervening with digitalization and the emergence of technology as a provider of alternative solutions. Notwithstanding, banks and financial institutions are finding regulatory and compliance restrictions to address this track. It is for this reason, we suggest that the adoption of the blockchain will have to be done in a global way and approach with a transverse strategy that touches on several links of the Finance Supply Chain, such as money laundering, customer knowledge (AML / KYC) and the history of the solvency of customers. A distributed register with all the data shared there will reduce the rate of data duplication (FEDERICO GIOVANNI REGA & AL, 2018) in different stakeholder information systems as well as the number of unnecessary stakeholders in the international trade finance intermediation circuit.

In a conference organized by the Trade Finance Global platform and held with stakeholders at the end of the publication of the ADB report on the same topic, Mr Chris Southworth, the Secretary General of the International Chamber of Commerce of the United Kingdom, supported Mr Andrew Wilson's call for a transformation in the way trade finance is provided (Trade Finance Global, 2021). "We can close the gap in international trade finance and adapt the solutions if we reform the laws to manage commercial documents in digital form, also find smarter ways to manage the compliance bureaucracy and establish a more proportionate regulatory regime for trade finance, which presents a low to zero risk, but is treated as a high risk," said Mr. Andrew Wilson, the Director of Global Policy of the International Chamber of Commerce (Trade Finance Global, 2021). Nowadays, documentary credit is the usual way to carry out import-export transactions. It is a credit by signature, in which banks act as intermediaries and guarantors at the same time. However, its scheme and its stakeholders generate a delay and an inefficiency of high-cost processes for opening a credit card. It includes notification, confirmation, document collection, verification and authentication as well as settlement or possible modification and/or lifting of reserve if necessary, all this with the back and forth that is required. The process does not stop only at banks, but it also integrates other actors, such as carriers, customs, freight forwarders, port services, insurance and others (ADRIANA CIOCA & AL., 2020). The blockchain can help facilitate the documentation process and guarantee a reduction in costs and time for banks. In a logic of decentralization, automation and disintermediation, manual contracts can be replaced by "Smart Contracts" to be hosted on the blockchain (ADRIANA CIOCA & AL., 2020). This paves the way for modifications, corrections and faster payments without the need for correspondent banks as third parties, ensuring both the consultation of data concerning the obligations of KYF and AML and thus reducing additional costs and risk (DICAPRIO ET AL., 2020). We believe that this private or hybrid blockchain network can be opened up to other stakeholders for the issuance of transport documents, the endorsement of bills of lading, the lifting of reservations by the carrier or the supplier, the receipt of the tokens to be issued, customs clearance and customs imputation regarding regulators such as the case of the Office of Foreign Exchange in Morocco and so on. We also recall that the Chérifien Phosphate Office carried out in March 2021 a large operation involving a transaction of thousands of tons of fertilizers with Ethiopia thanks to the blockchain. The overall amount was about $400 million, of which $270 million had already been executed. This transaction was carried out with the Trade and Development Bank of Eastern and Southern Africa (Trade and Development Bank – TDB) and dltledgers, a blockchain technology solution company in Singapore that specialized in the digitization of trade and supply chains (L'Economiste Newspaper 03/30/2021).It's considered as an historic achievement for OCP Group, TDB, and Singaporian company dltledgers, as well as for the African continent, as it demonstrates the potential of blockchain technology to reduce the trade finance gap, improve the efficiency and security of trade transactions, and foster intra-African trade (Morocco world news, April 2021).

DATA SECURITY: On another side of risk, we need to question the central system used by banks, which rely on the Internet to send and share data. Nowadays, there is some talk about the risk of a global Internet collapse with many scenarios that can affect the infrastructure of internet such as submarine cables, servers, routers, or satellites. What will happen if there is a global Internet collapse ? A disruption lasting even a few minutes can lead to huge losses for service providers and damages in cyber-physical systems (Sangeetha Abdu Jyothi,2021). (Sangeetha Abdu Jyothi,2021) assumed a possible solar storm to be the cause of the global internet collapse, an extreme solar storms are natural phenomena that can cause significant damage to human infrastructure. Although humans are protected from these storms by the Earth's magnetic field and atmosphere, they can lead to large-scale power and communication outages . The largest recorded solar events took place in 1859 and 1921, long before the advent of modern technology. They caused extensive power outages and damaged the communication network of the time, the telegraph network.

The probability of occurrence of extreme space weather events that directly impact the Earth is estimated at 1.6% to 12% per decade (Sangeetha Abdu Jyothi, 2021). The Internet has bescomes an essential element of modern life but is vital for banking and finance sector, so relating to this risk and the centralized and decentralized system, how can we recover the data and where can it be stored? we think that the Blockchain sounds best system to distribute data and avoid losing it regarding its storing in a few servers. As an example, the economic cost impact of a one-day Internet disruption in the United States is estimated at more than $11 billion in the United States and more than $ 51 Million in Morocco and reaches more than $ 29 billion for all the world (netblocks.org, 2023). In another scenario and unless we propose really radical ideas, the use of the Internet is increasing at such a rate that by 2035, the British academic Andrew Ellis told Daily Mail in 2015 and predicts that the Internet will use all the electrical power in Great Britain, which will make it impossible to meet the demand, He therefore proposes possible solutions, such as the use of new technologies, the optimization of transmission protocols (Andrew Ellis, 2015).

DISCUSSION

The potential of blockchain goes beyond cryptocurrency and finds its logic in the radical change of information systems, as well as in the interactivity ensured between all participants. It is considered as a new generation of the Internet or Internet 3.0. It joins the theory of disruptive innovation by (Clayton Christensen, 1997) focusing on the risk posed by some innovations or "technological disruptions" that generate both new markets and "value networks". It is characterized by the opening of new markets and the creation of value, by endangering dominant players in a given market. It proposes something unexpected and new, out of step with the current valuation criteria. We assume that banks are forced to adopt a strategy, regardless of its nature or orientation, in the face of the emergence of blockchain for a simple reason: it's that this technology has created (Challengers) or new players represented by Fin Tech startups in front of (Incumbents) or companies already in place represented by banks and financial institutions. New entrants do not have to fight other forces of reluctance internally. They do not have long-standing commitments to existing value networks. And they can focus on small niche markets and grow with them, migrating upwards as their technology matures and its performance attributes improve (CHRISTENSEN, 1997). They also have the economic incentive to invest in unproven technologies that present a high-risk but high-return profile. If a new disruptive technology succeeds on the market, it often constitutes a discontinuity that radically changes the conditions of a market. Incumbent operators are seeing a decrease in demand for their product or service ranges as consumers change their purchases for products and services backed by new technology (CHARLES W. L. HILL & FRANK T.ROTHAERMEL, 2003). In his works relating to the idea of "Creative Destruction", the economist Schumpeter J.A. argued that in the long term: "the process of Creative Destruction is the essential fact about Capitalism, but it is not the competition related to the Price that counts, but the competition from new technologies and practices; a competition that does not hit the profit margins of existing companies, but their foundations and their very life" (SCHUMPETER, J.A., 1942). Thus, radical technological innovations create new market opportunities while damaging, destroying or transforming the demand for many existing products in the markets. However, the banking and financial market is not completely free and open. It is an area with a strong presence of regulators and a legal arsenal that governs its activities, whose incentives are subject to regulatory and regulatory restrictions. Also, the maturity of the sector over time has dedicated the installation of well-defined commercial and prudential rules of play and given rise to universal banks and colossal equity financial coalitions that have absorbed small-sized banks. The restrictions are not always linked to a given regulation, but even to a legal vacuum and a judicial vagueness for other likely uses such as the case of smart contracts in insurance in Morocco.

On an international scale, the concept of digital currency still needs several mechanisms of supervision and regulation. Even the Stablecoins have not managed to gain the complete trust of investors. At starting this research, the stablecoin TerraUSD (UST) indexed to the US dollar collapsed and fell as low as (0.000033 USD at the time of writing) against its peak of 1.0098 USD (coinmarketcap.com). Platforms have even de-listed the LUNA/UST and LUNA/USDT trading pairs. A historic crash, nearly 40 billion in capitalization that evaporated in a few hours. The circumstances and conditions that led to this scandal remain unknown. However, Charles Hoskinson, the founder of the Cardano platform, put forward on Twitter the hypothesis of an attack. According to him, the Terra project would have been the victim of manipulation by an institution. This body would have caused a panic sale of buyers by a Ponzi Pyramid type system, which would explain the sudden collapse of Luna. Nevertheless, the coming days should bring more clarifications (Clubic, May 2022). Do KWON, the founding CEO of Luna Terra, said on 05/15/2022 that he is looking for a Hard Fork solution with the issuance of a new token to the holders of UST and LUNA (cointelegraph.com ,05/16/2022). ChangPeng Zhao, the CEO of the Chinese platform Binance, argued that the Hard Fork will be useless and recommended resorting to the Burn mechanism to be set up by the Terra Luna Foundation in order to reduce the mass of crypto in circulation (the blockcrypto.com , May 2022).

In a Moroccan context, at the beginning of the year 2022, the Triple A research platform specialized in cryptocurrency announced that it estimates according to a study that 0.9 Million Moroccans hold cryptocurrency in their Wallets in 2021 and that trading has reached an outstanding amount of 6 Million USD, resulting in the 4th ranking at the African level and 24th at the global level (Triple A 2022). Following these statistics, the Minister of Finance Mrs. Nadia FETTAH ALAOUI spoke on 10/01/2022 before parliament about the opportunities of setting up a legal framework to regulate the use of cryptocurrency. This will be done in the form of a joint reflection between the departments of the Ministry of Economy and Finance and Bank Al Maghrib in collaboration with international partners (Challenge Magazine, January 2022). Some regulators, such as the Australian Securities and Investment Commission (ASIC) as well as the Financial Services and Markets Authority (FSMA) in Belgium have preferred to launch innovation hubs to exchange and discuss with stakeholders on the regulatory issue. In its survey on the adoption of blockchain conducted in 2018 by PwC, the said firm identified through 600 participants the following barriers:

- 48% consider the lack of regulation as the main barrier;
- 45% of the interviewees think that lack of confidence or mistrust prevents them from adopting it;
- 44% think they need the ability to federate a network;
- 41% find that different blockchain networks cannot work together;
- 29% spoke about inability of blockchain to evolve.

We note that Central Banks - as is the case at local level - are still adopting, in a context of ambiguity, a preventive approach against probable regulatory risks without clearly defining and delimiting them. However, we assume in this regard that they are called upon to separate in their approaches two concepts: that of cryptocurrency on the one hand and its blockchain network on the other hand as a technology that can be used in several operations. In its February 2022 report, the Financial Stability Board reported that the crypto-asset markets are evolving rapidly and could reach a point where they represent a threat to global financial stability due to their scale, their structural vulnerabilities and their increasing interconnection with the traditional financial system. The rapid evolution and the international nature of these markets also increase the potential for regulatory gaps, fragmentation or arbitrage, highlighting the need for a rapid and preventive evaluation of related policies (FSB, 2022). Trust in banks is an essential element of the credibility and efficiency of the banking and financial system. However, the impact of banking crises on trust in banks has not been well explored.

Blockchain technology can bring added value to the re-establishment and strengthening of trust in banks. The concept of Decentralized Finance is starting to take hold. Its paradigm, brought by the blockchain, is radically different from the existing one based on the theory of transaction costs (TCE) ; The TCE focuses on opportunism in a free market, while this new paradigm is based on distributed trust (Seidel, 2018), a form of trust that "flows laterally between individuals" without pre-existing trust relationships (Botsman, 2017) (Yan Chen & Cristiano Bellavitis, 2020). As for Correspondent Banking and related compliance obligations, the banks themselves have become sensitive to the issue of trust between them. Over the course of a decade, the number of correspondent relationships between banks has decreased and has been concentrated in the hands of a reduced number of financial institutions. This is explained by the risk exposure reduction policy or (De-risking) linked to regulatory compliance costs such as customer knowledge (KYC), the fight against money laundering (AML), the fight against terrorist financing (CFT) and the real or perceived risk profiles of partner financial institutions (FSB 2015). This problem, which was the subject of a report intended for the G20 summit, may have possible solutions in the blockchain (World Bank, 2015). One of the obstacles of the blockchain lies in the environmental side and energy consumption for mining work. The PoW consumes more energy than the PoS. Scalability represents a serious challenge for the blockchain (Jean-Paul Delahaye, 2015) in view of the increasing number of transactions and the growing size of the network. This consequently generates difficulties in throughput, delays, latency, as well as security (R. Vedapradha, Hariharan Ravi and Arockia Rajasekar, 2020). However, we believe that the scalability - explained before - of this technology will be much more capable of overcoming this problem. But overall, several factors come together to make the blockchain a path of improvement for several projects and not only the banks. If the states are first concerned about the question of sovereignty with regard to the issuance and regulation of money through central banks, we also think that they have other shortcomings to fill for which the blockchain is emerging as a possible solution for financial inclusion, digitalization, traceability and the fight against tax evasion.

Faced with these different variables, the choices to be made by the banks do not support pure competition, but suggest a work of coordination and synergy. The strategies to be established and the decisions to be taken will have to be made in interaction between the operators of the place and the starts up of fintech among them. The game theory developed by John Forbes Nash suits this conflicting situation for interacting operators. It directs them towards reasoned choices and a point of equilibrium where all the participants say they are satisfied with the result obtained (Nash Equilibrium). The gathering of commercial banks on an international scale around blockchain projects such as the R3 consortium, Ripple and the research laboratories of Goldman Sachs, J.P. Morgan, UBS and other giants (Bidisha Datta & Indranil Sarker, 2020), as well as the coordination and exchange between central banks confirm this trend a priori. But the disruptive aspect of this technology cannot occur suddenly in view of the economic and financial power of banks. The rules of the game - on the regulatory side - are well defined by central banks and financial market authorities, but still fit into a traditional doctrinal logic, while the potential of Blockchain and cryptocurrencies is becoming a reality.

CONCLUSION

The results of the analysis show that the use of blockchain in finance and banking operations can lead to a number of positive effects, even though this technology is still in its infancy. Admittedly, the speed of its evolution and the amplification of cryptocurrency markets is a double-edged sword, gathering advantages and threats both for the business model of banks. However, the disruptive aspect of this technology cannot suddenly change the current business model in view of the regulatory nature and the commercial alliance in banking activity. But it seems clear that whatever the degree of its impact, it will be inevitable and deterministic.

This is explained by two factors. First of all, the banking and financial system does not allow a disconnection with the financial sphere on a national or international scale. It always works in a logic of networking, interactivity and it even undergoes a domino effect. Also, this system no longer only includes banks, but it is witnessing the emergence of fintechs as new players in a logic of coexistence but faced with regulators. In this much more complex situation, banks will be called upon to find a deterministic equilibrium strategy. It will be possible through collective reasoning and a convergence of interests in a competitive model of the game theory of (John Forbes Nash, 1954) under the term Coopetition, or prudential actions, cooperation and competition between them at the same time in order to jointly benefit from the benefits of the blockchain and face its threats. This topic is really little discussed in Morocco and poorly known even among bankers. Technically, with the exception of the aforementioned initiatives of the OCP , AWB and BCP there are almost no projects in this direction for verification on the ground. This is partially explained by the legal prohibition of cryptocurrency in Morocco. However, we reiterate our recommendation to separate the concept of blockchain technology from that of cryptocurrency, and draw attention here that BANK AL MAGHREB itself has appointed commissions that study the blockchain. On this point, we believe that local regulators such as BAM and AMMC, in addition to commercial banks, are called upon to open up to universities and higher education institutions. This will help promote scientific research and financial innovation for this subject and consequently strengthen the resilience of the Moroccan banking and financial system.

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