Blockchain Adoption Among SMEs in Morocco: A qualitative study

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Abstract

Blockchain technology is considered a breakthrough and innovative solution to many business related problems and across various economic sectors such as finance, supply chain, retail, health care, tourisBlockm and travel industry, and education. For Small and Medium Enterprises, in particular, blockchain technology adoption could facilitate their digitalization initiatives, reduce transaction and financing costs, and help them access new international markets. In this qualitative exploratory study, the goal was to understand the factors that influence SMEs adoption of blockchain technology in Morocco. Face to face interviews were conducted with six professionals from various sectors of the economy. The Technology-organization-environment framework was used as the theoretical framework of the study. Findings revealed that SMEs intention to adopt blockchain is influenced by perceived benefits, size, culture, technological capabilities, government support, and government regulations. Recommendations for future research included the use of a mixed method approach in data collection and analysis and the integration of other theoretical frameworks in the study of blockchain adoption in Morocco.

Keywords: Blockchain technology, Adoption, TOE framework, Morocco

Blockchain Adoption among SMEs in Morocco: A qualitative study

Blockchain Technology has gained substantial momentum since its introduction in 2008 as a platform for users to exchange Bitcoin cryptocurrency without the need for a central authority and intermediaries (Kifokeris & Koch, 2019; Viriyasitavat & Hoonsopon, 2019). The technology could provide companies solutions to overcome many challenges of digitalization such as trust, transparency, security, and the cost of data storage across various industries and sectors in which many stakeholders have to operate together (Taherdoost, 2022). Because it is a shared and decentralized ledger with no ownership, Blockchain could also offer organizations a platform for better traceability of business data (Kim & Laskowski, 2016). In a survey of 1488 senior executives in 14 countries across the world, leaders no longer view Blockchain as a breakthrough technology, but rather as an integral part of organizational strategic vision (Deloitte, 2020). In addition, 83% of respondents of the same survey believe that their organization will lose competitive advantage if they don't adopt the technology and 88% said Blockchain is scalable and will achieve mass adoption (Deloitte, 2020).

Despite the growing interest in adopting the blockchain technology, most studies that examined this topic have focused mainly on large companies in developed economies (Nurqamarani & Nurlaeli, 2021; Viriyasitavat & Hoonsopon, 2019). Small and Medium Enterprises (SMEs) have received inadequate attention even if they comprise the majority of businesses in most countries in the world and in developing economies in particular (Abeygunasekera, 2022; Viriyasitavat & Hoonsopon, 2019). In the case of Morocco, SMEs represent 93% of the total number of firms in the private sector employing 65% of the working population (High Commission for Planning, 2019). They play an important role in jobs creation, poverty alleviation and the overall enhancing of the economy (High Commission for Planning, 2019). However, Moroccan SMEs are more vulnerable than larger companies because they have smaller sources of resources, mainly limited access to external

financing and international markets (High Commission for Planning, 2019). In 2019, SMEs contribution to Morocco total exports was only 30% and during in 2020 during covid19 many went bankrupt (International Finance Corporation, 2019).

In this environment, the adoption of Blockchain technology could provide new opportunities for SMEs in Morocco. Decentralized finance tools could help SMEs improve access to Finance and the use of blockchain-based systems, on the other hand, would drive operational efficiency by reducing costs and removing intermediaries (OECD, 2021).

The aim of this paper is to explore the extent to which SMEs in Morocco are aware of the benefits of Blockchain technology and its application and their willingness to adopt the technology. The first part of this paper gives an overview of Blockchain technology and its application in various sectors. The second part discusses the importance of SMEs in the Moroccan economy and the application of Blockchain-based systems in the context of SMEs. The third part presents the Technology Acceptance Model as the theoretical framework of the paper. The research method, findings, and discussion of the findings are also presented. concluding remarks are then provided at the end.

1. Blockchain Technology and its Applications

This section introduces the general characteristics of Blockchain technology and reviews its potential application across industries. The importance of SMEs in Morocco and the potential benefits of Blockchain based-systems in the context of SMEs are then discussed.

1.1 Blockchain Technology in General

Blockchain is defined as a decentralized ledger consisting of blocks of transactions between peers (Demirkan et al., 2020). This peer to peer transaction network uses the distributed ledger technology to hold all information and setting rules on the information being updated (OECD, 2021). Participants in a blockchain network can reach a consensus about changes to a shared database without the need to trust other participants in the network and requiring a centralized ledger or authority (Hileman & Rauchs, 2017). Blockchain

technology can then allow participants in a network to transfer assets and data without the need for a central trusted entity (Hileman & Rauchs, 2017; Kifokeris & Koch, 2019; Viriyasitavat & Hoonsopon, 2019).

The elimination of a central third-party authority can have more benefits to the participants in a blockchain based network (Ilbiz & Durst, 2019). All Participants have a consistent view of the shared database and thus any inappropriate alteration of the data would be rejected by all participants in the network without having to rely on a trusted administrator (Hileman & Rauchs, 2017). The immutability of information is of a particular importance for sectors that require many untrusted actors to operate or work together (Demirkan et al., 2020). An example of this sector is the agri-food industry where controlling the quality and conformity of food products is a major challenge (Viriyasitavat & Hoonsopon, 2019).

The ability of all participants in a blockchain network to read and verify every transaction is also important for transparency and traceability (Seebacher & Schüritz, 2017). For instance, in the supply chain sector, any transaction within a blockchain network can be traced back to its origin which enables the participants to validate the origin and authenticity of a given product (Montecchi, Plangger, & Etter, 2019). This feature would make the audit of transactions easier, less costly, real time, and eliminate any fraudulent activities (Hileman & Rauchs, 2017).

Data integrity is another critical feature of blockchain based systems (Seebacher & Schüritz, 2017). In order to record a transaction in a blockchain based network, participants need a cryptographic key to authorize transactions (Ilbiz & Durst, 2019). Cryptographic algorithms ensures the validity of all transactions within the network (Al-Jaroodi &Mohamed, 2019). In addition, none of the participating entities can alter an approved transaction without involving the other entities. The data will remain unchanged and consistent which avoids costly reconciliation processes (Hileman & Rauchs, 2017).

1.2 Blockchain Technology Application

Blockchain is an evolving technology that was initially invented as a platform to trade Bitcoin (Montecchi et al., 2019). However, it has the potential to transform many sectors and industries (Queiroz & Wamba, 2019). Its transformative power could be compared to the introduction of the internet back in the 90s (Frizzo-Barker et al., 2020). Blockchain-based applications combine the advantages of peer to peer networks and cryptographic algorithms to ensure the integrity and validity of data and transactions (Aljaroodi & Mohamed, 2019). As a result, and starting in 2020, there has been a progress in adopting and implementing blockchain based solutions across many industries and sectors such as the financial industry, supply chain, healthcare, agriculture and food, and tourism (Deloitte, 2020). Large global companies, such as IBM, Microsoft, and Walmart, Goldman Sachs and Maersk, for instance, are gradually implementing the technology to improve their business (Frizzo-Barker et al., 2020).

1.2.1 Financial Industry

The first and most important application of blockchain technology was in the Bitcoin and later in other cryptocurrencies (Hileman & Rauchs, 2017). The inspiration was to create a new and decentralized global payment system that bypasses financial intermediaries (Frizzo-Barker et al., 2020). The number of cryptocurrencies that blockchain supports went from seven in 2013 to over 19,000 in 2022 (Schwab, 2022). According to Deloitte survey of top business leaders in 14 countries (2020), 80 percent of respondents believe that digital assets will be a replacement to fiat currencies in the next five to ten years.

The technology can also be used to transfer and store stocks, bonds, money, contracts and virtual assets without relying on banks, brokers or government agencies (OECD, 2021). For instance, stock trading using a blockchain based platform can facilitate stock trading and settlement without the need for a centralized authority and a clearing house (World Economic Forum, 2019). Banks could also use the technology to enable cross-border payments at lower

costs (Aljaroodi & Mohamed, 2019). Large financial companies such as JPMorgan Chase, Citigroup, and Credit Suisse are already investing large amounts of money in the technology to streamline their businesses (Deloitte, 2020). In Morocco and in 2022, Banque Centrale Populaire, one of the largest banks in the country, conducted a 9.8 million dollar bonds issuance using the blockchain technology (Morocco World News, 2022).

1.2.2 Supply Chain

Globalization of supply chains makes their management complex and difficult (Muduli et al,2022). One of the complexity in supply management channels stems from the involvement of multiple actors in the process such as manufacturing facilities, suppliers, transporters, and distribution centers (Ilbiz & Durts, 2018). In addition, the flow of products or material generates financial and Information flows that are shared using a lot of paperwork which can increase the costs from 15% to 20% (Lanzini et al., 2021). Blockchain-based applications can be used to store documents and data which can be tracked without the need to make electronic duplicates while increasing traceability, immutability and trust (Carson, 2018). In addition, the digitalization of supply chain operations can result in an increase in revenues and a reduction in human errors and time delays (Kim, H., & Laskowski, 2016).

Following Covd19, it is expected that e-commerce will continue to thrive (Muduli et al,2022) Consequently blockchain applications in the supply chain industry will become more popular (Malik et al, 2020). In 2017 for instance, Walmart launched a pilot project to improve food safety by tracking certain products from their origin in Latin America to Walmart stores in the Unites States using blockchain based application (Lanzini,et al., 2021). The results showed a reduction in the tracking time to obtain the origin records from six days to less than five seconds. Blockchain based systems in supply chain can then improve trust among stakeholders by obtaining accurate information about the product and in a timely manner (Wang et al., 2021).

1.2.3 Healthcare

One of the most important and sensitive factors in the health care industry is a patient's personal health records (Wang et al., 2019). The sharing of these health records provides valuable benefits to patients, healthcare providers and pharmaceutical companies. However, the security and privacy of these records remain a challenge in the healthcare system (Frizzo-Barker et al., 2020)

Blockchain technology can allow patients to share health records and data with medical institutions while preserving their privacy (Wang et al., 2019). Furthermore, medical records can be shared in real time without the need for a trusted intermediary resulting in reduced transaction costs and more efficient health care system (Deloitte, 2020). In 2016, for example, the government of Estonia became the most successful country to secure the health records of over one million citizens using blockchain technology (Price waterhouse cooper, 2017). In the United States, Intermountain Healthcare, a not for profit American system of 22 hospitals was able to save the system tens of millions of dollar over a two year period after they adopted blockchain-based platforms in the surgical area in 2019 (Gaynor et al., 2020).

1.2.4 Agriculture and food

Blockchain-based application can play an important role in enhancing food safety and reducing uncertainty and risk in the agriculture and food industry (Frizzo-Barker et al., 2020). For instance, the technology could be used to build an agri-food supply system where products are easily traceable (Hileman & Rauchs, 2017. Such a system can enhance food safety and integrity but also allow farmers to have more stake in the food supply chains. In 2014, EZ lab, an Italian start up, developed a blockchain-based platform where farmers can input data regarding their agricultural produce (Bianchini & Kwon, 2020). Data collected included weather conditions, use of chemical treatment, and water resources. If certain conditions are met, a certification is issued on the platform and is accessible by all

participants in the system. Consumers could also use the platform to underhand the quality of the product and its origin (Bianchini & Kwon, 2020)

1.2.5 Tourism

The tourism industry plays an important role in economic development throughout the world (Andrei, O., et al., 2019). In 2019, the total tourism industry contribution was 10% of the world Gross Domestic Product. The application of blockchain technology in the tourism industry can help increase its competitive advantage and enhance its digitalization drive and performance (Andrei, O., et al., 2019). For example, creating a blockchain-based platform that contains unbiased information about suppliers and the travel and tourism experience could lead to an increase in disintermediation and create more trust in the industry (Onder, 2018; Calvaresi et al., 2019). Other areas of impact on the tourism industry include "digital payment, loyalty programs, identity management, and reservations & ticketing" (Kwok and Koh, 2018). Countries that rely heavily on tourism such as Malta and Aruba, have already started making investments in blockchain technology to improve the performance of their tourism sector (Andrei, O., et al., 2019). The sector is expected to have the highest share of blockchain investment in the next five years (PWC, 2018).

In addition to the applications discussed above, block chain technology can also be used in many other industries and areas such the media, insurance, real estate, energy and the public sector (Hileman & Rauchs, 2017).

2. SMEs in Morocco

2.1 Definition and challenges

There is no globally agreed definition of SMEs. In Morocco, SMEs are defined as companies with an annual turnover of 75 million dirhams (MAD) or less and employing less than 200 employees (HCP, 2019). This segment plays an important role in Morocco's economy and its economic development (HCP, 2019). SMES are a major source of employment and help expand the country's middle class (Hcp, 2019). In 2019, they

accounted for more than 93% of operating companies in the country, contributed 50% to total employment, to over 30% in exports, and 20% to Morocco's total GDP (HCP, 2019). Table 1 shows that most SMEs in Morocco are micro enterprises (less than 10 employees and an annual turnover of less than 3 million MAD) (HCP, 2019). In addition, most of these SMEs operate mainly in the services sector (85%) compared to only 8% in the manufacturing industry as Table 2 illustrates (HCP, 2019).

Table 1

Distribution of enterprises by category, 2019

Category	Percentage
Micro enterprises	93%
Small and medium enterprises	29%
Large enterprises	7%

Note: Adapted from the High Commission for Planning (HCP): 2019 Report on Enterprises in Morocco. Copyright 2019 by the HCP

Table 2

Distribution of enterprises by sector, 2019

Category	Manufacturing	Construction	Services	Trade
Micro enterprises	7.7%	20.9%	43.5%	27.9%
Small and medium enterprises	10.9%	21.2%	41.5%	26.5%
Large enterprises	25.8%	22.9%	23.8%	27.5%

Note: Adapted from the High Commission for Planning (HCP): 2019 Report on Enterprises in Morocco. Copyright 2019 by the HCP

Since the 1990s, the Moroccan government has implemented a variety of economic measures and reforms aimed at liberalizing the economy and promoting international trade and large investments in economic sectors viewed as strategic to growth (IFC, 2019).

Examples of these sectors include aerospace, electronics, offshoring, and automotive industry (IFC, 2019). The government has also invested heavily in logistics, transport and communications infrastructures allowing private firms and SMEs, in particular, to participate in large scale projects as subcontractors and opening the door for these SMEs to new domestic and global markets (IFC, 2019).

There are a number of government agencies that provide assistance and support to SMEs in Morocco. For instance, Maroc PME is the main public agency that works with SMEs and offers assistance and training programs to SMEs and entrepreneurs in order to enhance their competitiveness and growth (Maroc PME, 2019). The agency also offers incentives to support SMEs investments in new information systems (Maroc PME, 2019). In 2017 the government created the Agency for Digital Development aimed at leading the digital transformation of the economy (IFC, 2019). The agency main role is to provide a support for digital technology adoption for various entities including SMEs (IFC, 2019). For instance, the agency launched the Smart Factory project for SMEs which allows them to test digital systems before investing in their development (IFC, 2019).

Despite the crucial role SMEs play in Morocco's economic development and the government efforts to support the growth and sustainability of this sector, Moroccan SMEs still face many challenges that limit their integration in global trade, growth and competitiveness (IFC, 2019). For example, they only contribute 30 % to Morocco's total exports and the Covid-19 pandemic showed the vulnerability of these companies compared to large firms (HCP, 2022). For instance, 98% of companies that have ceased their activities in Morocco during the pandemic were SMEs (HCP, 2022) and more than ten thousands SMEs went bankrupt in 2021 (HCP, 2022).

Some of the most important barriers SMEs face in Morocco include the limited access to financing sources (HCP, 2022). In fact, banks are the main source of financing in Morocco financial markets (HCP, 2022). However, young and startup companies with

potential growth find it difficult to get access to loans (IFC, 2019) mainly because banks are cautious to lending to SMEs which are perceived as high risk borrowers (IFC, 2019). High collateral demands push many SMEs, and in particular the very small enterprises, to rely on microfinance loans with a high cost (IFC, 2019).

SMEs face more difficulties than large companies in undertaking the required investments in skills and organizational changes needed to adopt and implement new technologies (OECD, 2019). In Morocco, limited use of technology is also another important constraint to SMEs development (HCP). For instance, in 2019 only 26.9% of Moroccan SMEs have an internet website, 43% have a mobile device fleet, and only 6% invest in Research and Development activities (HCP, 2019).

Table 3

Percentage of companies that have a website, 2019

Category	Manufacturing	Construction	Services	Trade
SMEs	20.6%	13.8%	35.9%	22.4%
Large enterprises	68.3%	70.1%	76.8%	83.2%

Note: Adapted from the High Commission for Planning (HCP): 2019 Report on Enterprises in Morocco. Copyright 2019 by the HCP

Table 4

Percentage of companies that have a mobile device fleet, 2019

Category	Manufacturing	Construction	Services	Trade
SMEs	46.1%	40.7%	50.1%	36.5%
Large enterprises	91.7%	95.3%	94.2%	98.8%

Note: Adapted from the High Commission for Planning (HCP): 2019 Report on Enterprises in Morocco. Copyright 2019 by the HCP

2.2 Blockchain technology and SMEs in Morocco

The covid-19 pandemic has forced many businesses across the globe to adapt their existing operating models around information and communication technologies (OECD, 2021). Companies had to introduce digital solutions in order to overcome the pandemic challenges and continue their operations during lockdown (OECD, 2021). In the case of Morocco, the government initiated a national strategy to prioritize the digitalization of the economy. The rollout of e-governance project in 2019, for instance, aimed at reducing social inequality in the country and making the public sector more efficient (OECD, 2021). In addition, other programs were launched to make Morocco a hub in Africa in outsourcing and offshoring activities (IFC, 2019). In the private sector, digitalization has become a priority and a necessity for companies, and SMEs in particular, looking to expand their businesses and integrate new markets.

In this context, blockchain technology could add more value to the digitalization initiatives that Morocco has undertaken. Blockchain technology could help SMEs in globalizing their business and gain access to new markets domestically and globally (PWC, 2018). For instance, Morocco joined the African Continental Free Trade Area in 2018 (IFC, 2019). One of the main objectives of this act is to create a single market in Africa by removing tariffs barriers (Chivunga & Tempest, 2021). Blockchain-based platforms could help SMEs in Morocco engage in a more cost effective way in conducting trade and expanding their operations in this new market (Chivunga & Tempest, 2021).

The adoption of blockchain technology can help in cutting intermediaries in value transactions and reducing the administrative efforts needed for record keeping and reconciliation (Carson et al., 2018). For SMEs in Morocco, this would result in reduction of costs and allow for more efficiency in an economic environment where unfair competition from the informal sector remains an important challenge (IFC, 2018). For instance, in the supply chain management, Moroccan SMEs could be part of a large blockchain-based network which would help them to reduce the cost of verification and sustain efficiency by

tracking products real time from their origin to the destination (Chivunga & Tempest, 2021).

Access to financing sources and cash flow management remain some of the main challenges for SMEs in Morocco (IFC, 2018). The disintermediation factor of blockchain could make it possible for SMEs to raise necessary funds through equity (Chivunga & Tempest, 2021). The automation of equity issuance process also means less costs associated with selling shares. For cash flow management, smart contracts, for instance, could be used to automate and enforce payments from customers without the need to send an invoice (Bianchini & Kwon, 2020).

Blockchain technology is still in the early phase of development in non-financial applications (Clohessy et al., 2019). In the case of Morocco, the public sector and large companies in the banking industry, insurance, and international trade are developing new applications and launching pilot projects. For instance, in 2021, OCP Group, one of the biggest Moroccan companies and the world's largest phosphate mining and fertilizers company, was the first African company to conduct a $400 million trade transaction with Ethiopia using dltledgers' blockchain platform (OCP, 2021). The trade was executed digitally using blockchain and in under two hours compared to three weeks if it was carried out through the traditional banking system (OCP, 2021).

From a regulatory perspective, Morocco has banned the use of cryptocurrencies since 2017 (BAM, 2019), however, 3.1% of the population own and trade in cryptocurrency despite the ban (Morocco World News, 2022). In June 2022, the Moroccan central bank announced that it was drafting a bill that will regulate the use of cryptocurrencies in Morocco and was also looking into the possibilities of launching a digital currency (Morocco World News, 2022). Nevertheless, there is no legal or regulatory framework for the use of blockchain technology in different industries.

SMEs play an important role in Morocco economic growth and social inclusion (IFC, 2019). The adoption of blockchain technology could help these companies become more productive, competitive and be able to expand their operations in new markets (Chivunga & Tempest, 2021). However, there are many challenges at a technical and regulatory level that need to be addressed before the technology is widely adopted (IFC, 2019). As indicated earlier, large companies in Morocco are looking to integrate blockchain-based applications in their businesses. In the case of SMEs, there is no research that has investigated the use of this disruptive technology in this sector. The current paper intends to fill the gap in the literature on blockchain adoption in a developing economy. The next section of this study discusses the theoretical framework of the research, the methodology, and describes the findings and implications of the research.

3. Theoretical framework

Blockchain technology has gained significant momentum in a variety of sectors and industries worldwide (Hughes et al., 2019). In Morocco, large companies and public institutions are already investing in pilot projects and testing of the new technology (Morocco World News, 2022). SMEs, however, don't have enough resources to invest in new and innovative technologies, yet, they have the same needs as large companies to be efficient in managing these resources (Erol et al., 2016). The purpose of this research is to identify the factors that determine Moroccan SMEs' intention to adopt blockchain in their operations.

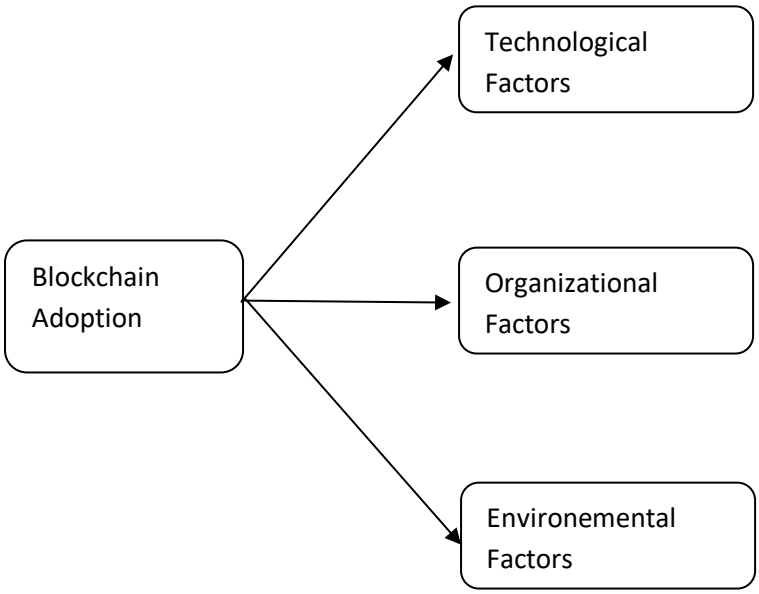
This study used the Technology, Organization, and Environment (TOE) framework to determine factors that influence SMEs in Morocco to adopt blockchain technology. The TOE was developed by Tornatzky and Fleischer (1990) as an organization-level framework that explains an organization acceptance of an innovative technology using three important drivers. The technological driver or context includes the characteristics and usefulness of the technology; the organization context focuses on firm-specific factors such as size of the firm, the structure of the management team; and finally the environment context pertains to issues

related to the business environment of the company such as competition and government (Taherdoost, 2022).

The TOE framework has been used widely in research to understand the determinants of technology adoption at an organization level across various industries in both developed and developing economies (Zhu, et al., 2006). In addition, the framework allows for flexibility when choosing the factors of each context (Taherdoost, 2022). This advantage makes the TOE model adaptable to various applications and industries (Clohessy & Acton, 2019; Zhu et al., 2006). In this study, the TOE model is used as the theoretical framework to determine factors (Technological, Organizational, and environmental) that influence SMEs adoption of this technology.

Figure 1

Theoretical framework



4. Sampling and Data Collection

The purpose of this qualitative study is to examine the factors that influence SMEs in Morocco to adopt blockchain technology. The nature of a research problem is important when determining a research approach (Creswell, 2009). Qualitative approaches are

appropriate to use if the researcher needs to understand how a phenomenon is experienced by participants (Trochim & Donnelly, 2008) or to achieve a deep understanding of the various dimensions of the issue being analyzed (Almeida et al., 2017). Blockchain Technology is a new concept and there is a lack of studies on SMEs adoption of this technology in Morocco. The qualitative research is then the appropriate method to use in this context.

Semi-structured interviews were employed in this study to examine the factors that influence SMEs in Morocco to adopt blockchain technology. In addition the TOE framework was used as a theoretical lens that shaped the interviews questions and how the data was analyzed to develop themes (Creswell, 2008). Interviews are one of the most used types of data collection in qualitative studies (Trochim & Donnelly, 2008). Furthermore, in semi-structured interviews, in particular, participants are more likely to discuss more sensitive topics with multiple themes (Creswell, 2008).

The study was conducted in two phases. First, a soliciting email was sent to 100 companies located in the Casablanca-Rabat region. The study focused on this region because 47% of Moroccan SMEs are located in this important industrial zone (HCP, 2019). A purposive sampling approach was used to select the SMEs. The goal was to cover various organizations in different sectors of the Moroccan economy. In total, 26 responses confirming the willingness of the potential participants to take part in the face to face interviews were collected. A follow up phone call was then placed to potential participants to confirm they meet the criteria of being professionals in organizations familiar with blockchain or are interested in the technology and have plans to adopt it in the future. 20 respondents were excluded because they didn't meet the main criteria for selection. The second phase consisted of conducting semi-structured face to face interviews with the six respondents. Despite being a small sample size, the purpose of the study was to not to statistically test quantitate hypotheses but rather to explore a new phenomenon. In addition,

the data collected from the six interviews was sufficient Table 5 shows the details of the participants and their organizations

Table 5

Interviewee Details

Organizations	Number of employees	Participants	Age	Respondent ID
IT	21	Owner	45	P1
Transportation	43	Manger	56	P2
Hotel	34	Director	47	P3
Education	46	IT manager	41	P4
Retail	27	Director	55	P5
Accounting	12	Director	43	P6

In this study, the face to face semi-structured interviews were used as the primary tool for collecting data. Six interviews were conducted and every interview lasted 25 minutes on average. The interview questions were designed using the TOE framework but participants were also encouraged to provide insights based on their organizations experiences.
The interviews were audio-recorded after receiving the permission of each participant. The audios were then manually transcribed for analysis. QDA Miner Lite was used for coding the data.

5. Findings

The findings of the study are discussed under the three categories of the TOE framework.

5.1 Technological Factors

According to all participants in the study, SMEs in Morocco lack the resources, and skills, both financial and technological, to invest in innovative technologies. However, all

participants agree that expected benefits from integrating blockchain-based applications in their business processes are major factors that would motivate them to adopt the technology. Participant P1 mentioned several benefits including trust, decentralization, and transparency. He added "think about the effects blockchain would have on SMEs profitability if they integrate a large network. It is a win-win for all stakeholders". Furthermore, Participant P3 added "for us in the hospitality industry, having access to a global database in real time would be a revolution. It simply means more customers". In addition, Participant P5 stated that traceability is very important in the retail business. "Blockchain-based applications would add value to the business if customers are able to know the origin of products".

Participant P2 talked about the importance of an innovative technology, such as blockchain, in the transportation and logistics industry. He stated that blockchain-based platforms eliminate the need to rely on paper works and improve the flow of information for tracking and deliveries. He added "it could improve efficiency and reduce costs". On the other hand, P6 talked about how educational institutions could use the technology to store important information about students and professors such as transcript, academic achievements, diplomas, and other important credentials. Companies and universities can access this platform to validate the credibility of these documents. Furthermore, he added that the technology could reduce the cost of exchanging goods and services and provide the highest security to SMEs that have a lot of sensitive information.

5.2 Organizational Factors

Three different themes were identified within the data and are categorized under organizational factors; culture of the company, size of the company, and technological infrastructure capabilities. In fact, all respondents agreed that the implementation of blockchain technology is costly. Participant P1 in particular said "my company is involved in developing a blockchain-based platform for a large bank. I can tell you that the capabilities

and resources needed to implement this technology are beyond what small companies in Morocco can afford". P5 added that the retail business is dominated mostly by micro companies. Most of these companies conduct their business in cash and would be reluctant to integrate a transparent network.

Participant P4 stated that his company invests heavily in technology and is always looking for innovative ways to integrate technology in education. He added "our president encouraged me to take courses on line about blockchain technology. I am working now on a project to identify the feasibility of integrating blockchain-based platforms in our school. Upper management support is definitely important in this context". Participant P6 talked about the importance of digital infrastructure in adopting blokchain technology. He stated that access to broadband connection is required to use blockchain-based platforms. He added "Access to high speed internet is limited in Morocco. Outside the urban area, it is difficult for SMEs to get access to fast internet connections"

5-3 Environmental Factors

Government support and government regulations were identified as important themes under the environmental factors. All six respondents agreed that government regulations and government support would be the driving force behind a mass adoption of blockchain in Morocco. For instance participant P1 stated "there is a lack of awareness about blockchain technology. Most people are still confusing cryptocurrencies with the technology". Participant P4 added that the government could sponsor campaigns to raise awareness among SMEs about blockchain technology and its application in different industries. Participant P6 added that blockchain is still a new and innovative technology, "it makes sense for public universities in Morocco to start offering blockchain courses. This is the only way to promote the technology". Participant 3, on the other hand, stated that the government should fund research about blockchain and its applications and challenges.

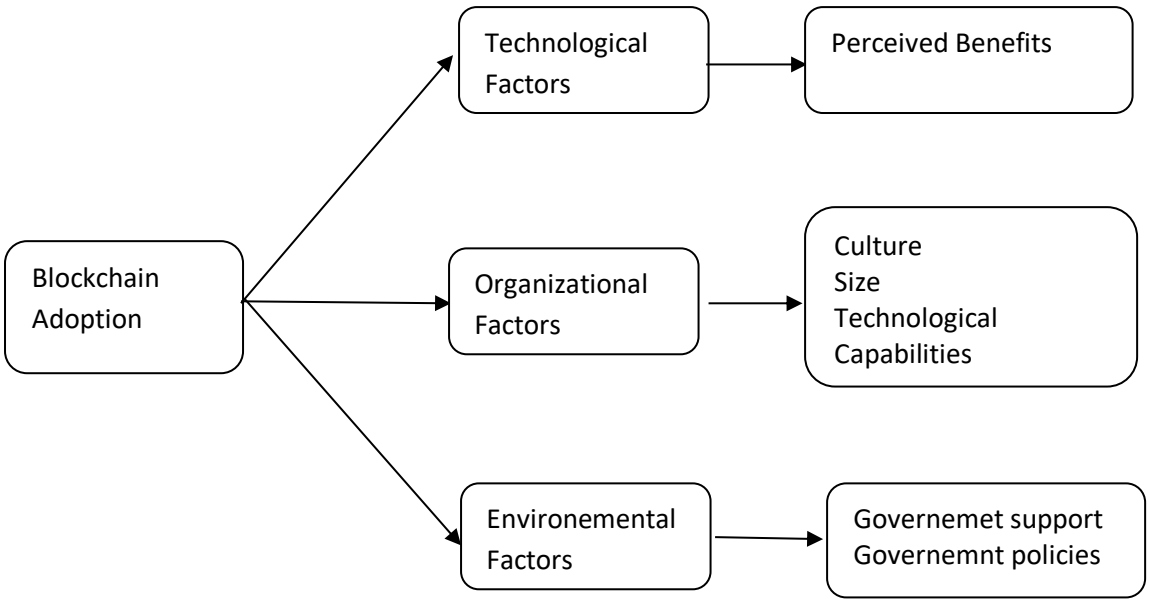
Government policies and regulations were also identified as an important enabling factor for SMEs adoption of blockchain technology. On this factor, participant P5 stated that "without a clear vision of where we stand as a country on cryptocurrencies, I don't believe there will be a mass adoption of blockchain in Morocco". Participant P2 added that if the government enacts policies that promote the use of blockchain and invests more in information technology infrastructure, more SMEs would adopt it.

6. Discussion

Based on the findings derived from the six interviews data, the study derived a model that describes the most important factors that influence SMEs adoption of blockchain technology in Morocco. The model is grounded on the TOE theoretical framework. The technology factors consist of perceived benefits of blockchain technology. Organizational factors include the culture of the company, size of the company, and technological infrastructure capabilities. Finally, government support and government regulations are the main components of the environmental factor. The proposed model could be used as a foundation to develop a national ecosystem in Morocco that encourages SMES to adopt blockchain technology. Figure 2 shows the proposed model.

Figure 2

Proppsed model for SMEs adoption of blockchain in Morocco



The findings showed that perceived benefits were the main technological factor that determines SMEs adoption of blockchain in Morocco. An organization needs to perceive a given technology as providing benefits to the company before investing in it. The particpants in this study identified some of the main befits of blockchain in various industries such as trust, transparency, traceability, cost reduction, decentralization, and high level of security. Other studies in the literature have reported similar findings. For instance, Wang, Singgih, Wang, and Rit (2019) stated that perceived benefits were the main reason why companies in supply chain adopt blockchain. Barnes and Xiao (2019) reported that an organization needs to perceive a given technology as providing benefits to the company before investing in it. Treiblmaier and Span (2022) showed that SMEs in Slovenia perceive blockchain as a mean to reduce transaction costs. However, the study stated that more objective measurement such as return in investment should be used to assess the long term benefits of SMEs adoption of blockchain.

The organizational context of the TOE framework refers to firm-specific factors that could influence a company to adopt a new technology (Taherdoost, 2022). In this research, the participants identified three factors as the main drivers to influence SMEs to adopt blockchain technology. They include culture of the company, size of the company, and technological infrastructure capabilities. An organizational culture includes factors such as vision, beliefs, and values that determine the performance of a company (Taherdoost, 2022). In this study and according to participant P4, upper management support in an innovative culture create an environment that promotes adoption of a new technology such as blockchain. However, Participant P5 stated that resistance to change could be a barrier to SMEs adopting blockchain technology in Morocco. Prior studies have also reported similar findings (Barnes et al., 2019; Clohessy et al., 2019; Liu et al., 2019).

The size of a company and its technological capabilities were also identified in the data of the study as organizational factors that influence SMEs adoption of blockchain.

Large companies with wide access to financial resource are more likely to invest in new technologies, as participant P1 stated. However, SMEs and in particular micro companies are less focused on investing in expensive innovative technologies. Clohessy and Acton (2019) have also reported similar results.

The factors categorized under the environmental context include government support and government regulations. The findings showed that these two factors play a crucial role in the intention of SMEs to adopt blockchain in Morocco. Lack of support and regulations and lack of awareness about the technology could be a potential barrier to the adoption of new technologies. These findings are consistent with the findings of other studies that showed the importance of clear and supportive government policies in adopting blockchain technologies (Kouhizadeh et al., 2021; Yeoh, 2017).

Other studies, however, have reported that technological factors tend to play an important role in technology adoption rather than organizational and environmental factors (Kuhn et al., 2019; Queiroz & Wamba, 2019). The discrepancy in findings could be explained by the difference in the economic structure of each country. In Morocco, most SMEs are small companies that lack financial and technological resources and are looking for the government support when investing in technology.

Conclusion

The purpose of this exploratory qualitative study was to identify the factors that determine the intention of SMEs to adopt blockchain technology in Morocco. The TOE framework was used as a theoretical lens to conduct face to face interviews with six respondents. Findings of the proposed model indicated that the technological factors (perceived benefit), organizational factors (culture, size, and technological infrastructure capabilities), and environmental factors (government support and government regulations) influence the intention of Moroccan SMEs to adopt blockchain technology. The study further

indicated that the environmental context of an organization had the most important influence in the decision to adopt blockchain.

The study contributes to filling the gap in academic literature since it is the first research to identify factors that influence SMEs adoption of blockchain in a developing country such as Morocco. In addition, it extends the existing research on the application of the TOE theoretical model in technology adoption in a developing economy. From a practical point of view, international organizations looking to sell their blockchain-based products and services in Morocco could also benefit from the findings of this study. SMEs in Morocco would invest in blockchain-based platforms if the upper mangers or the owners of these companies are convinced of the benefits they provide such as trust, cost reductions, transparency, and traceability, etc.

Findings of this research would also provide policy makers in Morocco with a framework when they formulate a national strategy to develop a modern digital economy. SMEs place high importance on blockchain's regulatory issues. They also need the government to invest more in technological infrastructure, to raise awareness about blockchain, and to support them to acquire the skills and knowledge needed in case they want to adopt the technology.

The study has two main limitations. First, the use of interviews was the main data source and the number of respondents that participated in the research was small. The findings of this study are based on the information that the participants provided during the interviews. Second, the study used one single theoretical framework to explore blockchain adoption among SMEs in Morocco. Future research could integrate others theoretical frameworks with the TOE to explore blockchain adoption in specific sectors. Furthermore, future studies could use a mixed method approach that uses qualitative and quantitative methods with a larger sample size.

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