Blockchain in Dubai: Toward a Sustainable Digital Future

Sarra Baroudi and Sonia Benghida

1 Introduction

Blockchain is one of the new technologies that have laid the groundwork for a revolution not only in the financial sector but also in the energy, tourism, medical, industrial, and supply chain sectors among others (Di Vaio & Varriale, 2020).

In 2016, the Gulf States started to show interest in blockchain technologies. It began in the UAE, Bahrain, and Saudi Arabia, particularly in the financial and public services sectors. When Bahrain concentrated on researching the regulatory implications of blockchain, the United Arab Emirates and Saudi Arabia focused their efforts on studying and reviewing existing and potential blockchain technologies for government, industrial, and commercial services (Alsubaei, 2019).

This book chapter is an exploratory qualitative study that investigates the effectiveness, obstacles, and advantages of blockchain technology,

S. Baroudi (✉)
Department of Accounting, Heriot-Watt University, Edinburgh, Scotland, UK
e-mail: s.baroudi@hw.ac.uk

S. Benghida
Sociology Department, McGill University, Montreal, QC, Canada

with a particular emphasis on five blockchain-powered case studies in Dubai. The application of blockchain technology in Dubai is recent, with very few peer-reviewed published papers in the field. This research is an exploratory investigation of blockchain for sustainability, with a focus on the state-of-the-art of this technology in the Emirates. Its main target audiences are policymakers, strategists, and researchers with an interest in sustainability.

Several studies on Blockchain technology have appeared worldwide in the last decade; nevertheless, there is a lack of research focus on the Mena area. The latter covers a huge geographical region with 20 countries (UNICEF, 2021) having different economic, social, and political conditions. Due to its proven impact on the economy, blockchain's contribution to the concept of financial inclusion has been globally propagandized and endorsed in recent years.

The chapter addresses three main questions: what is the current state of blockchain in the Arab world? What differences can blockchain technology make for the development of Arab countries? Especially after the global disruptions, the COVID-19 crisis has caused. What sustainability potentials exist for using this technology in the Emirates? This chapter begins by presenting blockchain technology, contrasting its various types, providing an overview of blockchain in Dubai, and then discussing how blockchain promotes sustainability via the use of examples from Dubai initiatives. Finally, the importance of Blockchain technology is emphasized.

2   Blockchain Technology

An asymmetry of information between the financial industry and investors marked the global financial crisis of 2008, voicing concern about how the financial sector operates. FinTech proposed a solution to the lack of transparency in this context. FinTech has undeniably opened doors for the financial sector, due to its digitalized processes. FinTech combines "Finance" and "Technology", it's a catch-all term for any technology that involves blockchain, data capture, data analysis, and artificial intelligence used to digitize traditional financial services.

There is no consensus around the origin of FinTech, some authors suggest that it was associated with Internet finance in China (Lee & Low, 2018), while others claim it was linked to Silicon Valley in 2000 (Ma & Urpelainen, 2018; Treiblmaier & Beck, 2019).

Satoshi Nakamoto is said to be the first to introduce bitcoin to the world via a white paper peer-to-peer electronic cash system (Nakamoto, 2008). Blockchain, the underlying technology that developed Bitcoin and its innovations in the Global Payments industry, has had a far-reaching effect far beyond the core finance domain. Blockchain is now regarded as a unique form of a distributed ledger. It safely and securely records peer-to-peer transactions that are carried out through smart contracts using advanced cryptography protocols. This provides secure and transparent transactions. It allows for the transfer of cryptocurrency ownership without the use of an intermediary, such as the bank, to validate the transactions (Lee & Low, 2018). This is made possible because the records, stored as blocks, are distributed across all the network's computer nodes. i.e., all the computers will have the same information given at the same time frame to all network users. This is similar to the cloud-based software process where individuals can work collaboratively and update the records without the authorization of the administrator.

When it comes to Bitcoin, blockchain is used in a decentralized manner, meaning that no single individual or group of individuals has/have authority- rather, all users have control collectively. Furthermore, decentralized blockchains are permanent, meaning that it is difficult to alter entered data on the system without alerting the entire network. As a result, blockchain technology eliminates the risk of fraud, making it highly secure. As Magnuson (2020) puts it: «It [blockchain] is purpose-built to avoid the perils of Big Tech».

Blockchain technology was designed initially as a platform for bitcoin trading, however, its applications expanded beyond the financial industry. Disintermediation of social media websites and e-commerce marketplaces is posing a significant threat to multinational companies like Google, Amazon, Apple, or Facebook. Thanks to Blockchain, these companies could solve misaligned incentives with blockchain-based initiatives.

The threat of counterfeit products in global pharmaceuticals, auto parts, and high-end, high-quality exported goods is driving the market for tamperproof, on-demand authentication. Enterprise blockchain applications make it possible to trace and monitor products from "source to consumption," from "farm to store," and from "farm to fork."

Similarly, new applications in marine goods, farms, and other food products can be monitored across supply chains through multiple industries using blockchain networks that abstract many components using

sophisticated smart contracts and ingeniously implemented consensus protocols.

It is no surprise that food giants such as Walmart have introduced Food Trust to ensure the authenticity of items sold in their stores. Before the emergence of blockchain apps, the skepticism engendered by academic credentials, land records, permits, and inaccurate health records for insurance claims was not conclusively addressed.

Citizens' and customers' identification records, as well as birth, academic, credentials, medical records, property ownership, marriage certificates, and death certificates, are now considered to be immutably and indefinitely registered on the blockchain, removing the need to hold paper-based records. Government services such as marriage registration, patent management, and income tax services will benefit from blockchain technology (Akins et al., 2014). Estonia, Switzerland, Singapore, and the UAE are the first to adopt the blockchain paradigm wholeheartedly and are expected to go paperless soon. The blockchain industry is maturing, and by 2021, it could be more widely adopted.

3   Comparing the Different Types of Blockchains

When it was first used to operate bitcoin, blockchain was considered a public permissionless technology, but since then other forms of blockchains have emerged and there is currently mainly public or open blockchain, private or closed blockchain, consortium blockchain, and Linux based Hyperledger. Each category or type of blockchain is best suited to a particular number of case studies. When deciding on a type, one must consider the trade-offs.

The transactions in the blockchain are irreversible. i.e., a new information block is added to the ledger every time there is a new record. To be approved, the cryptographic problem associated with the transaction (the "hash algorithm") must be solved. This hash algorithm will be sent to all computer nodes and will generate a unique identifier that will be incorporated in the new information block. Since, the hash of this recent transaction embeds the hash of the earlier transaction, modifying one block implies changing the hash of all previous transactions' blocks, including the blocks related to their cryptographic validation.

Since the transactions are transparent, anybody, including users, miners, developers, and community members may participate in the public blockchain because it is an accessible network with no privilege

to a specific person. This means that all participants have access to all of the records' details and their history, but they cannot see the identity of the initiators because it is kept anonymous. One drawback of the public blockchain is the significant amount of computing power needed to keep a distributed ledger running at a large scale (Andoni et al., 2019). A private blockchain is a closed network where only pre-approved individuals have access to the network and can view data. Unlike a public blockchain, participants have information about the identities of all participants in the network before transacting.

The consortium model is a version of the private blockchain where the blockchain works under the leadership of a team. This type of blockchain allows sharing the copy of transactions to only authorized users. Authorization of new entrants can be guaranteed by existing users or regulatory authorities. Linux-based Hyperledger is a closed blockchain network that helps to facilitate the creation and applications of blockchains in banking, insurance, supply chain, manufacturing, and infrastructure.

Overall, a private Blockchain, as opposed to a public blockchain, offers greater privacy in transactions which is essential for sensitive information such as medical and financial information. Additional benefits include improved protection, reduced costs, increased reliability, and an increased degree of confidence since only pre-verified individuals could start an additional node in the blockchain.

Despite their differences, open and closed blockchains share certain similarities, most notably that they are both decentralized peer-to-peer systems in which each participant maintains a copy of the distributed ledger.

4   BLOCKCHAIN STRATEGY IN DUBAI

The United Arab Emirates is the world's sixth-largest oil producer and one of the wealthiest nations, with a gross domestic product (GDP) per capita exceeding $ 43,000 in 2019, according to the World Bank. In line with its "Vision 2021," this oil and the natural gas-dependent economy are committed to sustainable development to become the most diverse economy of the Gulf Cooperation Council (GCC). This includes the digitization of the economy, which has become a high priority during the COVID-19 pandemic.

The UAE government has long invested in the economy to diversify its income sources and reduce its reliance on oil. Twelve years ago,

the majority of Dubai's GDP was based on oil exports, but times have changed as oil now has only contributed less than 1% of Dubai's GDP. The Emirates offers competitive services in varied fields like tourism, real estate, banking and finance, and healthcare. It has evolved into a multinational city and has gained notoriety as an international business and investment hub over the last 40 years.

This explains why, in order to avoid the demise of fossil fuels, Dubai has become a more varied and diversified market. According to estimates published on Statista (2021), the gross domestic product (GDP) fell 10.8 percent in 2020. However, considering the global economic impact of the COVID-19 pandemic, this fallout falls beyond the predicted spectrum of economic recession.

The Institute for Management Development (IMD) presented a 2020 Smart City Index where both Abu Dhabi and Dubai are tagged as the region's smartest cities. Understandably, the concept of a «Smart City» is one of the most increasingly evolving issues of modern sustainability trends. Dubai has transitioned to a Smart City platform taking up all the challenges including technological, political, socioeconomic, local talent capital, regulation, cyber, and infrastructural dimensions (Samad & Azar, 2019). The financial and trade center of the country has been essential in promoting government efficiency, ingenuity, technology, and scientific research.

According to the second edition of the Smart Centre Index (SCI), Dubai is the best smart center in the Arab world for developing talent, innovation, and delivering innovative technologies. Dubai is ranked first in the Arab world for innovative strength, creativity, and distribution of new technology. Dubai is emerging as one of the early pioneers in the development of an integrated, intelligent city that integrates digital technology into all aspects of its operations. The city has indeed made great strides in the field of smart transformation, taking advantage of all advanced technologies to synchronize these technologies to meet residents' needs. Dubai has confidently launched bold and pragmatic initiatives and programs that leverage technology to make people's lives easier and happier.

Since 1995, Dubai has been a leader in governance and digital city development. Dubai Internet City (DIC), established in October 1999 by TECOM Group, was the UAE's first communication technology plan. After only one year of its launch, the new business succeeded in

attracting a hundred companies; and since then, there has been considerable development. These measures paved the way for the establishment of Dubai's E-Government service in 2001, as well as the opening of a new government office a decade later. By 2015, Dubai Internet City, Dubai E-government, and then both Dubai Smart Government and the Smart Dubai Office were all established.

The Ruler of Dubai, Sheikh Mohammad bin Rashid Al Maktoum, is the one who emphasizes "human well-being" as the heart of Smart Dubai. His priority has long been the progress and happiness of Dubai and the UAE's residents. For over twenty years, he has driven the rapid technology growth and deployment in all levels of the public and private sectors in Dubai.

In October 2016, Dubai announced a city-wide blockchain plan. Because of Dubai's exponential growth in different economic sectors, Traditional practices had to be regularly revised to ensure good performance. Hence, the efficiency of government has become increasingly important. The expansion of the industry, construction, and tourism industries, in particular, revealed that the government required tighter controls on activities such as permits, transaction monitoring, and tracking.

Blockchain is one of the most advanced technologies that humankind has reached in recent years, yet the world is still hesitant at times and at other times refusing to explore and use this technology to its full potential. This, of course, does not apply to Dubai, whose government launched the blockchain Dubai Strategy, becoming the first government in the world to completely abandon paperwork and conduct all its business through blockchain technology from 2020.

While policymakers worldwide are slowly exploring various blockchain developments, Dubai has already recognized the full potential of this technology on a citywide scale. The Dubai government aims to build an atmosphere conducive to the success of Blockchain technologies.

Three pillars endorse the Blockchain strategy (Bishr, 2019):

1. Improve government effectiveness by implementing blockchain technology in all related government buildings.
2. Enterprise Development: Promote the growth of the blockchain industry by developing a welcoming atmosphere for start-ups.

3. Local and International Thought Leadership: Take the lead in global thought around blockchain technologies and establish it as a center for blockchain human capital and competencies development.

The implementation of Blockchain is ideally aligned with the vision of embracing technological advancement across the region, allowing Dubai to have the most effective, streamlined, secure, and impactful experiences.

5   BLOCKCHAIN IMPLEMENTATION

Dubai has developed a detailed roadmap focused on the three pillars of the Blockchain strategy as shown in Fig. 1. The next steps for the city's blockchain objectives are outlined in this framework. Each of the strategy's pillars has actionable initiatives in Dubai's plan.

- **Government trust and Efficiency**
  In 2018, the Smart Dubai Office (SDO) introduced the "Payment Reconciliation and Settlement" System. It was the first blockchain application. Instead of the six-week manual process, this new process

Fig. 1   Dubai blockchain strategy (*Source* Developed by the authors)

reconciles transactions between government departments and banks in seconds.

Dubai recognized the importance of implementing a governance system mainly to ensure that all stakeholders are receiving the necessary assistance notably in terms of clarifying blockchain policies in several areas. The Smart Dubai Office conducted workshops with stakeholders individually to determine their best potential pilots and to provide them with any technical tools they might need.

- **Industry creation**
  Dubai made it possible to attract significant interest from multinational banking and FinTech companies. Dubai has taken part in two accelerators: Dubai Future Accelerators and Start-up Bootcamp Smart City Dubai Accelerator (Bishr, 2019).

  In 2018, more than 200 submissions were received for the second Global Blockchain Challenge from 85 cities eager to demonstrate their brightest blockchain solutions. 17 out of the 200 proposals were selected to be presented in Dubai, and three out of them won prizes and were invited to collaborate with local government agencies to test Blockchain deployment.

- **Thought Leaders**
  Thought leaders prominent leaders in their respective disciplines who can bring a unique and useful outlook on blockchain in Dubai (Bishr, 2019).

- Leaders in technology: who present a guide in blockchain, cryptocurrencies, and distributed ledgers, then move on to case studies of blockchains and "smart contracts" in action.
- Leaders in governance are more expert in explaining the cooperation between innovators, policymakers, and tax authorities.
- Leaders of social innovation introduction of the usage of Blockchain in sustainability news.

6   BLOCKCHAIN AS A VITAL TOOL TO BOOST SUSTAINABILITY: CASE STUDIES FROM THE EMIRATES

Sustainability advocates achieving economic development while preserving the environment and the society is possible (Purvis et al., 2019). Sustainability has three core pillars: economic, environmental, and social.

Being aware of the promise of blockchain, the United Nations suggests the need of understanding how a blockchain-based framework would solve sustainability challenges while ensuring a safe, reliable, and cost-effective system. In this light, the United Nations Environment Programme (UNEP) has established a set of long-term targets to accomplish by 2030 for all state members. This initiative acknowledges the relevance of blockchain technology to these targets. In this section, we discuss how blockchain technology can benefit sustainability by looking at its application in different sectors in Dubai.

6.1   Can Blockchain Prevent Corruption? Case of UAE Trade Connect (UTC)

Financial institutions in the UAE have become more focused on the small and medium-sized enterprise (SME) market. The lack of digitalization involved in data verification has resulted in a substantial risk of fraud. More SMEs are interested in invoice discounting, which means more controls are required to prevent the occurrence of duplicated invoices to lenders which will be problematic given that several banks will have to deal with fake invoices and finance the same invoice due to a lack of coordination among these banks.

Blockchain is a distributed ledger initially designed to record cryptocurrencies. Therefore, its application is heavily tested by the accounting and finance sectors especially its potential to offer a digital alternative to hard copy and an automated solution to manual recordings. It has been suggested that blockchain technology improves the process of authentication of transactions and audit and offers a more efficient transaction reporting system (Schmitz & Leoni, 2019). Furthermore, Iansiti and Lakhani (2017) suggest that smart contracts help automate transfers by connecting them with GPS features and updating the transactions at various locations. This will prevent fraudulent transactions and contribute to social responsibility.

This is the reason why UAE Trade Connect (UTC) as a blockchain-based solution will prevent fraud, by detecting duplication of invoices. Using blockchain technology eliminates the risk of submitting the same invoices several times. There will be automatic "red flags" to alert the Trade Office to potentially corrupt activity.

This platform went live recently on 19 April 2021 after a rigorous phase of testing. At present, the main scope of this project is fraud detection in the trade finance sector, particularly it prevents:

- Invoice duplication scenarios: This system detects if a particular invoice is submitted to the same bank several times to obtain different invoice finance.
- Invoice Financing: The project detects if the same invoice is submitted to different banks.
- Sanctions Risks and financial crime: This system highlights instances of over-invoicing and under-invoicing, money laundering, and transfers involving classified accounts. The developers aim to expand the application of this technology to detecting money laundering, sanctions evasion, and e-invoicing.

The success of the UTC platform depends on the number of entities participating in this project and their commitment level. At present, there are eight UAE banks taking part in this project. Since all records can be viewed by all users of the network, and since it is difficult to alter the records, fraud perpetrators will be prevented from committing frauds.

Despite their corporate governance structures differences, the network participants are working to achieve a common objective of combating the risk of double invoicing thanks to the leadership of an external party, i.e., the Etisalat group who played as a neutral facilitator. In this regard, Blakstad and Allen (2018) suggest that the main advantage of blockchain technology relates to its transparency, irrevocability, and decentralization.

As Fig. 2 shows, corruption and fraud are linked to confidentiality, privacy, and the possibility of alteration of the records, while blockchain provides transparency and irreversibility. Additionally, corruption and fraud are linked to the centralization of power.

Although the UTC platform foundation of this project is blockchain, it makes use of other technologies where relevant. For instance, it requires artificial intelligence and machine learning to detect more advanced fraud techniques such as document fabrication and to identify over and under-invoicing and over-invoicing. Blockchain-based procurement allows UTC to disinfect its system by using varied technologically induced solutions.
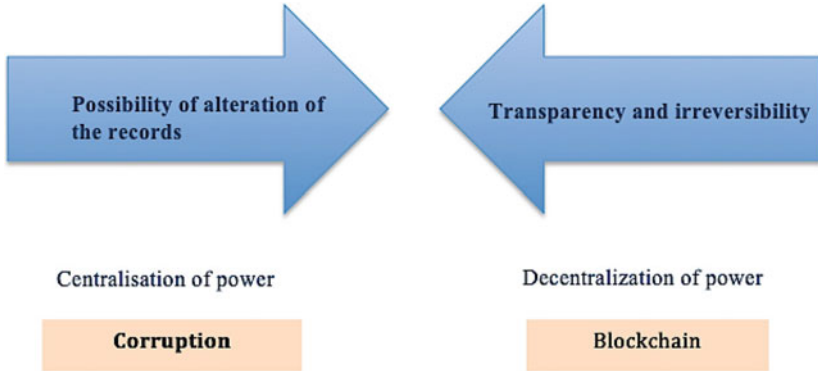
Fig. 2 Blockchain to stunt corruption (*Source* Developed by the authors)

6.2   How Blockchain Is Applied to Crowdfunding Platforms? Case of Ideology and Smart Crowd in Dubai

According to crowdfunding experts, four key benefits of blockchain explain why crowdfunding has become extremely useful. First, the decentralization offered by blockchain means that start-ups will no longer rely on platforms to raise funds. Second Tokenization means that start-ups can provide investors with equity and adopt employee-owned enterprise models. Third, high availability and immediate provision, means that it is easier for projects to get funded, finally Smart Contracts features used to enforce funding terms provide greater accountability in crowdfunding. In this light blockchain enables equitable access to capital for entrepreneurs (Dierksmeier & Seele, 2020; Greenberg & Mollick, 2017) and helps socially responsible investments to see the light (Schulte, 2013). Furthermore, it offers higher traceability of investments and ownership, thus minimizing the probability of fraud, dishonest use of funds, and data alterations.

Being aware of the potential that blockchain can offer to crowdfund, different platforms implemented this technology in Dubai such as Ideology and Smartcrowd Ideology is a crowdfunding platform that connects entrepreneurs, developers, and investors. It offers community members a full ecosystem that encompasses the steps required to set up a project from initial idea to raising funds. Applications should go through a rigorous review process by the Ideology team. Once the project is

approved, it proceeds to the voting stage where members vote on the project. however, if the reviewer team has concerns over the project, it will be referred to the upcoming projects section. Applicants will be given feedback on how to improve their proposal and they will be given another chance of submitting a new application once they addressed the reviewer team feedback. A fixed fee charge is applied to entrepreneurs when they submit their proposals, and a commission is applied when they collect the funds raised.

Furthermore, Blockchain technology has been applied to real estate crowdfunding by the Smart crowd project which is the first financially regulated digital investment platform where members caninvest together in a specific real estate and gain additional income by crowdfunding. Smart crowd manages individual contributions on behalf of the crowd funders, ensuring the timely payment of the rent income and overseeing the sales process. This project solves two main challenges of the real estate market: the high lump sum cash required and the market illiquidity: In fact, Smart crowd enables small/novice or large/expert investors to crowdfund their projects without the need of a high deposit, this will encourage investors to enter the real estate markets.

6.3   Supply Chain Management: Case of DP World

Supply chain management is one of the most successful implementations of digital blockchain technologies. Blockchain can assist supply chain partners by providing an effective, open, and tamperproof history of information flows, product flows, and financial flows in transactions. Indeed, blockchain enhances supply chain management thanks to its transparency, traceability, and security (Venkatesh Kang, et al., 2020). Blockchain also helps monitor long and complex supply chains by recording the relevant data over the life journey of the product starting from the raw material to the final product offered to the consumer (Xu et al., 2019). This helps in identifying and getting rid of any inefficient processes. Furthermore, blockchain records give evidence about the extent of using environmentally friendly raw materials, the extent of respecting basic human rights and avoiding child labor of all supply chain participants (Dierksmeier & Seele, 2020).

As an example of supply chain management, there is the DP World project. It is implemented by an Emirati company that provides supply

chain solutions while highlighting the importance of sustainable development goals (SDGs) to their strategy. In 2019 they joined the UN global compact, and they are committed to platforms at the world economic forum. This project is currently still in a trial phase to ensure the efficiency of its system before full implementation.

This project aims to reduce the cost and confusion of consumers. Blockchain technology can reduce the cost by incorporating automated procedures and confusion by providing consumers with clear information about how the products have been made without the need to look at various documents. This helps ethical buyers to make informed decisions in a reasonable time.

Implementing Blockchain tracking technology requires a complex infrastructure, which is expected to be expensive, potentially increasing the cost of green products. Furthermore, consumers' trust in blockchain depends on the trustworthiness of the information that is entered into it; therefore, this ambitious project should have a system that guarantees this to avoid the confusion of consumers and achieve its main objective.

Many businesses use sustainability as a marketing tool; however, customers may find it difficult to recognize the greenwash practices of businesses that use this technology because it necessitates a thorough understanding of blockchain technology. Since DP world is committed to sustainability goals, it is expected to search its network for greenwash practices of the businesses.

One big challenge of this project is that not all companies want to participate in such a transparent system because their practices would be scrutinized by the public, particularly if they are not socially and environmentally sustainable.

6.4   Health Care Management

By digitizing and decentralizing information in a distributed archive, blockchain is efficient in enhancing health management systems. As a result, patient information would be accurate, complete, and accessible only by the relevant users.

Smart contract functionality improves delivery systems by automated processes such as updating and prescribing medications (Engelhardt, 2017), preventing health care fraud (McGhin et al., 2019), and assisting in the withdrawal of toxic or defective medicines (Wu & Lin, 2019).

The mission of the UAE Ministry of Health and Prevention (MOHAP) is to improve the health of its residents by delivering robust, creative, and equitable healthcare services in compliance with international norms. In addition to serving as a regulator and supervisor of the healthcare industry, the MOHAP is evolving with advanced technologies by implementing blockchain technology to help the healthcare system.

NMC hospital group collaborated with DU in 2018 to upgrade its electronic health reports and integrate blockchain technologies. This technology enables various healthcare providers to remotely view patients' data in real-time. Patients can be treated at many hospitals or clinics without having to physically transfer their records. In this context, Yue et al. (2016) argue that blockchain's simultaneous data access enables patients to access, share, and upload their health records. As a result, the patient information infrastructure will be enhanced. General principles of ethics and social responsibility advocate for patient data protection, which can be achieved because blockchain parties can only see the details that they have been allowed to see (Engelhardt, 2017). Furthermore, Private Encrypted Blockchain enables access to interconnected databases, resulting in data reliability in terms of completeness and speed (Engelhardt, 2017; McGhin et al., 2019; Yue et al., 2016).

According to Carlos Domingo, chief new business and innovation officer at Du: "By digitizing all health records, and putting them in blockchain technology, data can be shared and distributed across all hospitals. We are looking at fully digitizing the health system with blockchain technology to assure data integrity with zero error and guarantee end-to-end accountability of the patients' records." The goal of this project is to guarantee data accuracy and to protect data confidentiality.

The application of Blockchain technology is not limited to patient records management in Dubai, it also covers healthcare professionals licensing. Relevant governmental organizations will connect smart licensing systems e.g., Masaar e-services portal and Sheryan regardless of the location of the candidate. Blockchain technologies can assist health partitioners in identifying the requirements of various licenses and the processes involved.

Furthermore, Blockchain technology is being used to improve and secure organ donation. The UAE Ministry of Health and Prevention (MOHAP) implemented "Hayat," a register that is used to document donors' legal will. This system would make it easier to access organ donation offers, as well as optimize and accelerate the transplantation process.

6.5   *Blockchain-Powered Autonomous Taxis: For a Sustainable Transportation Planning*

With the continuous blockchain development and the increasing demand for self-driving cars, Dubai has opted for the blockchain digital ecosystem to store and manage vehicles' digital records: "vehicle identification, possession, warranties, wear and tear, mileage, leases, loans, parts, and service information for automobiles" (Grewal, 2020). This information will be saved in a decentralized, shared ledger. Authorized parties will have partial access to this ledger data based on their access rights. As a result, blockchain different stakeholders will be able to use credentials instantaneously.

By 2030, Dubai City expects driverless modes of transportation to account for 25% of all trips. Meeting this goal would be a significant step forward especially that it is projected to produce 22 billion AED of annual economic revenues (UAE, 2021). The Dubai Autonomous Transportation Strategy is aiming at:

- Lowering transportation costs up to 44 %, resulting in annual savings of more than AED 900 million.
- Preventing accidents, reducing losses by 12%
- Rising individual efficiency by 13%
- Reducing time wasted in traditional transportation, resulting in saving 396 million hours on transportation trips yearly.
- Decreasing environmental carbon emissions and pollution by 12%, resulting in savings of up to AED 1.5 billion per year.
- Reducing the allocated parking spaces.

7   CONCLUSION

A decade ago, bitcoin was supposed to be both the biggest cryptocurrency and the greatest revolution in the financial ecosystem when it was first introduced to the world, but this revolution is still a long way off. Bitcoin was afflicted with scaling problems, controversies, missteps, and price swings and has received a fusillade of criticism after the slump in its price to 51,541 in April 2021. Despite a turbulent decade with bitcoin, investors did not hesitate to predict a profound economic, social, and political change, where trust would prevail over mistrust, horizontality over verticality, decentralization over-centralization.

Blockchains are changing the way we trade money, buy assets, manage food safety, track patient data in healthcare, control supply chains, and vote in elections, among other things. Decentralization, openness, immutability, and automation are all advantages of blockchain technology. The world is increasingly prone to benefit from blockchain networks and their positive effects on all economic spheres, growth, and quality of life change.

Since the Emirates already has a well-developed ICT market, their government departments, financial institutions, and educational institutions acknowledged the promise of Blockchain as a key to a better future. Consequently, many companies are currently piloting programs to understand how to apply blockchain to improve operating processes and structures while developing alternative approaches for delivering services in collaboration with specialist international firms.

The unprecedented turmoil caused by the COVID-19 pandemic has devastated societies and ecosystems in the Mena area and all around the world. The pandemic has compelled many companies to incorporate more technological solutions, and more businesses understand the importance of adopting emerging technologies, such as blockchain. Hence it is crucial for the Arab countries to learn from Dubai, and to restart their trading network by turning the harsh lessons into action. As said Mariam Obaid AlMuhairi, a project manager at the Centre for the Fourth Industrial Revolution UAE: "*If there were any lingering doubts over the value of blockchain platforms to improve the transparency of businesses that depend on the seamless integration of disparate networks, COVID-19 has all but wiped them away*" (Smart cities, 2020).

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