Revolutionizing the Global Stock Market

Artificial Intelligence

Artificial Intelligence:

Theoretical Foundations, Applications, and Societal Implications

Nuno Geada (http://orcid.org/0000-0003-3755-0711) (f38d4986-0577-4362-a42d-943dde3e3811)

ISCTE - University Institute of Lisboa, Portugal

ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative technology with the potential to revolutionize many aspects of human life. However, its rapid development and deployment have also raised significant ethical, social, and economic concerns. In this article, we provide a comprehensive overview of the theoretical background and applications of AI, with a focus on its current and potential impact in times of turbulence. We discuss the key concepts and techniques underlying AI, including machine learning, deep learning, and natural language processing. We then explore the applications of AI in various fields, including healthcare, finance, supply chain management, and climate change. We also examine the societal challenges and risks associated with AI, such as algorithmic bias, privacy violations, and job displacement. Finally, we discuss the future of AI and the need for responsible development and deployment of this technology. nalysis highlights the complex and multifaceted nature of AI and underscores the importance of a multidisciplinary approach.

Artificial Intelligence (AI) has emerged as a transformative technology with the potential to revolutionize many aspects of human life. However, its rapid development and deployment have also raised significant ethical, social, and economic concerns. In this article, we provide a comprehensive overview of the theoretical background and applications of AI, with a focus on its current and potential impact in times of turbulence. We discuss the key concepts and techniques underlying AI, including machine learning, deep learning, and natural language processing. We then explore the applications of AI in various fields, including healthcare, finance, supply chain management, and climate change. We also examine the societal challenges and risks associated with AI, such as algorithmic bias, privacy violations, and job displacement. Finally, we discuss the future of AI and the need for responsible development and deployment of this technology. Analysis highlights the complex and multifaceted nature of AI and underscores the importance of a multidisciplinary approach.

Keywords: Artificial Intelligence; Machine Learning; Societal Implications; Healthcare Applications.

INTRODUCTION

In recent years, the global stock market has witnessed a paradigm shift with the emergence of blockchain technology. This chapter explores the intersection of blockchain and healthcare, demonstrating how this revolutionary technology is enhancing adaptability and transforming investment strategies in the stock market. With a focus on transparency, security, and efficiency, blockchain has the potential to reshape the healthcare industry's relationship with the stock market and catalyse a new era of digital transformation. Blockchain, at its core, is a decentralized and tamper-resistant digital ledger. This foundational aspect of blockchain addresses some of the key challenges facing the healthcare sector, such as data security,

interoperability, and trust. In a realm where the accuracy and security of medical information are paramount, blockchain's immutable nature can provide a secure and auditable environment for health-related data. Blockchain's transformative power extends to the tokenization of healthcare assets. Traditional investment avenues in the healthcare sector, such as pharmaceutical companies and medical device manufacturers, can be fragmented and challenging to navigate. Through tokenization, investors gain access to fractional ownership, enabling greater liquidity and democratization of investment opportunities. For instance, a blockchain-based platform could facilitate investment in groundbreaking medical research, allowing individuals to invest in increments that suit their budgets.

Blockchain is a technology that has emerged in a revolutionary way and is inevitably radically transforming the world of business. Through its ability to provide immutable, transparent, and decentralised records, which are important characteristics of its format, blockchain is challenging traditional approaches to transactions, contracts, and data management. As such, this technology is what we might call disruptive, as it has the potential to reshape entire industries, bringing greater efficiency, security and making business processes more reliable. In this article, we'll explore how blockchain is revolutionising the business world. So, let's look at the many ways it can be applied in companies and the financial market. In addition, we'll analyse the benefits and possible limitations of blockchain. So, get ready to embark on this journey through the world of business driven by blockchain technology and discover how it is changing paths and opening up new possibilities for companies in all sectors.

First of all, we must understand that blockchain is a technology that enables the secure, transparent, and decentralised recording of transactions. In this way, it works like a shared digital ledger, distributed across several computers (nodes) in the network. In other words, each node has an up-to-date copy of the blockchain, guaranteeing transparency and immutability of the records. As a result, transactions are grouped into sequentially interconnected blocks. Each block contains transactions and a cryptographic code, called a hash, which links it to the previous block, guaranteeing data integrity. Blockchain is decentralised, i.e. without a central authority. In this way, the technology offers greater transparency, as transactions are visible to all participants. However, privacy is maintained by means of cryptographic keys. This technology goes beyond cryptocurrencies and has applications in various sectors, such as the supply chain, healthcare, entrepreneurship, and real estate. This is due to its ability to provide reliable and transparent records and is revolutionising transactions and processes. It eliminates intermediaries, reduces costs and time, and increases security. Finally, we must emphasise that this technology allows for easier international payments, reliable transaction records and automated smart contracts. With blockchain, the operational efficiency of companies and the entire financial chain improves, eliminating errors and streamlining operations. As it is a technology that can be harnessed in a number of areas, it can be applied in various ways in companies, providing significant benefits in terms of efficiency, security, and transparency. In this way, we can understand that technology is revolutionising everything that was previously known in the business world, thus making the business world more agile and modern. Here are the main ways in which blockchain is revolutionising the business world:

- Payments and transfers of value:

This is one of the most "traditional" and well-known blockchain formats, as it gained notoriety through cryptocurrencies and is still expanding.

Through this format, it is possible to make direct and fast payments and transfers of value, eliminating intermediaries and reducing fees and processing times.

This makes it especially useful for international transactions, where fees and delays can be significant.

- Supply chain management:

Blockchain can be used to track and record information about the supply of products throughout the entire chain, from production to final delivery. Consequently, increasing transparency and trust, guaranteeing the authenticity and origin of products.

- Auditing and compliance:

Through its data coding system, it provides immutable and transparent records of all transactions, facilitating auditing and regulatory compliance.

Finally, records on the blockchain can be efficiently verified and audited, reducing the need for manual processes, and making audits more reliable.

- Crowdfunding and collective financing:

It enables the use of initial coin offerings (ICOs) to raise funds in a decentralised and transparent way. It therefore allows companies to raise capital directly from investors, without relying on traditional intermediaries such as investment banks.

- Protection of intellectual property:

Records on the blockchain can serve as proof of authorship and originality, facilitating the defence of intangible assets. It can thus be used to register and protect intellectual property rights, such as patents and copyrights. These are just a few of the many applications of blockchain that are revolutionising the business world. This technology is constantly evolving, and new opportunities and use cases continue to emerge as more companies come up with new needs and/or exploit its potential.

Just as in the business world, blockchain technology is consequently causing transformations in the financial market, from the way transactions are carried out to how financial services are offered. Through its ability to create transparent, secure, and decentralised records, blockchain is opening up new possibilities and profoundly impacting the financial industry. Previously associated mainly with cryptocurrencies such as Bitcoin, blockchain has expanded its reach and is being applied to various areas of the financial market. From fast, low-cost international payments to automated smart contracts and asset tokenisation, blockchain applications are transforming the way transactions and processes are conducted in the financial sector. By eliminating intermediaries, reducing costs, and increasing efficiency, it is democratising access to financial services and promoting financial inclusion. In addition, the transparency and security provided by technology is helping to prevent fraud and illicit activity, promoting trust between the parties involved.

In this digital age, where agility and automation are essential, blockchain offers smart contracts, which automate the execution of agreements and transactions, guaranteeing compliance with the terms established in a transparent and immutable way.

Asset tokenisation is also becoming a reality, allowing the digital representation of financial assets on the blockchain. Thus, bringing greater liquidity, divisibility, and investment opportunities to a variety of assets, from shares and bonds to commodities.
Blockchain technology has made a significant impact on the business world, especially in the financial market. Through its decentralised nature and ability to create transparent and immutable records, blockchain is being explored in a number of areas, including international payments, transaction records and smart contracts.

Here are some of the ways blockchain is transforming the financial market:

One of the main applications of blockchain in the business world is the facilitation of international payments. Traditionally, these transactions involve intermediaries and can be time-consuming, expensive, and prone to errors. Through the use of blockchain, it is possible to carry

out value transfers directly, eliminating intermediaries and reducing costs and processing time. Another way in which blockchain is revolutionising the business world is through the creation of reliable transaction records.

In other words, it allows each transaction to be recorded immutably and transparently in a distributed ledger.

This ensures greater reliability and data integrity, making transactions more secure and reducing the need for audits and reconciliations.

Automated smart contracts

Smart contracts are another revolutionary aspect of blockchain. These contracts are self-executing programmes that are stored and executed on the blockchain network.

They allow agreements and transactions to be automated, eliminating the need for intermediaries and reducing the possibility of failure or fraud. Smart contracts can therefore be applied in a variety of areas, from the property sector to the supply chain. Security and privacy are central concerns in the business world. In this sense, blockchain addresses these concerns through features such as advanced cryptography and distributed consensus. Encryption protects the data stored on the blockchain, making it virtually impenetrable.

In addition, distributed consensus ensures that all transactions are validated by the network, increasing the security and reliability of operations.

Improved operational efficiency.

With the use of blockchain, business processes can become more efficient. Above all, the elimination of intermediaries and the automation of tasks through smart contracts reduces the need for human intervention, minimising errors and speeding up operations. In addition, the transparency it provides makes it easier to trace and audit transactions, improving efficiency and compliance.

Continuous exploration of new opportunities

Despite already being used in a variety of ways, blockchain's potential in the business world is far from being fully exploited. As more companies come to realise the benefits of this technology, new opportunities arise in different sectors. Therefore, innovation and experimentation with blockchain continue to shape and revolutionise how business is conducted, driving digital transformation around the world.

What are the benefits and possible limitations of blockchain?

The blockchain offers a number of benefits that are driving its adoption in different sectors. Firstly, its transparency and immutability provide a clear and unalterable record of all transactions, increasing trust between the parties involved and preventing fraud.

In addition, blockchain's enhanced security, with its advanced cryptography and consensus algorithms, guarantees the protection of transactions and reduces the risk of cyber-attacks. Another important benefit is the elimination of intermediaries. Through the blockchain, transactions can be carried out directly and peer-to-peer, without the need for traditional intermediaries such as banks, payment processors and brokers. This results in reduced costs and time, as well as increased process efficiency.

On the other hand, there's the automation it provides thanks to smart contracts. These self-executing contracts eliminate the need for human intervention, speeding up transactions and minimising errors. In addition, blockchain contributes to financial inclusion, enabling unbanked people to access basic financial services in a safe and affordable way.

Limitations

Despite its benefits, blockchain also has some limitations. Scalability is a challenge, especially on public networks, where the number of transactions per second can be limited. On the other hand, energy consumption is also a concern, especially in systems that use Proof of Work (PoW). In addition, regulatory and legal issues, such as data protection and compliance with financial laws, also need to be addressed. After all, implementing and adopting blockchain requires significant technical expertise and resources.

However, as blockchain technology continues to evolve, it is hoped that many of these limitations will be overcome. Over time, it will be possible to further harness the transformative potential of blockchain in business and other areas, driving innovation and efficiency around the world. Blockchain is technological security for the companies of the future.

In short, blockchain technology is redefining the financial market, providing greater efficiency, transparency, and security. Its ability to create reliable, decentralised records is triggering a transformation in the way transactions are conducted and financial services are offered. The impact of blockchain on the financial market is profound and promises to continue driving innovation and the evolution of the industry for years to come.

Healthcare organisation involved in blockchain technology is pharmaceutical manufacturer Roche. The company has been looking to implement a blockchain organisation to manage its relationship with suppliers and payment institutions, due to the transparency, resistance to fraud and automation of payment processes characteristic of this technology.

In an article published by Deutsche Bank, Roche's senior treasury manager, Stefan Windisch, gave more details about what led the company to blockchain technology. "We came to the conclusion that blockchain technology would allow us to share and create transparency in information from multiple perspectives."

By employing blockchain in its logistics process, Roche has recognised that it can organise information from various suppliers and financial institutions into a single data container. In addition, the process can be automated by implementing smart contracts, which are self-executing codes that operate under pre-established conditions.

"We can process more payment orders faster, reducing the mutability of data, which is essential for reducing the risk of fraud. We believe the solution is also scalable. From a merchant's perspective, there are fewer manual processes, and access to valuables is made faster, with the same visibility over contracts that we have at Roche," added Windisch about applying blockchain to the company's supply chain.

In addition to the application in its supply chain, Roche has signed a partnership to use its blockchain platform to optimise hospital processes. The aim is to reduce patient waiting times, generate faster diagnoses, and create a fair payment structure for the services offered.

Prospects and opportunities

Blockchain is thriving even in sectors where there is no belief in the potential of cryptocurrencies, let alone financial speculation. Although it has been popularised for its role as

the backbone of digital assets, this technology has already significantly outgrown this application.

What's more, blockchain applications could have even more developments, given its versatility. It is possible to combine the distributed model of recording information with Artificial Intelligence, the Internet of Things and augmented reality, sectors of technology that are also growing in application. We can't forget Web3, the movement to decentralise the internet, which is also based on blockchain.

Given the flexibility of blockchain's use cases, it's no exaggeration to say that its prominence among technological innovations is likely to last for at least another decade. What's more, it's quite certain that this innovation will evolve and have a profound impact on an entire era, humanity, and society. It is imperative to be attentive and with an appetite for experimentation so that we can be at the forefront of this transformation (Mollah, 2020). A unique opportunity to undertake and prosper in this new cycle of exponential technologies.

The clinical trial process is notorious for its complexity and lack of transparency. Blockchain's integration of smart contracts can streamline and automate various aspects of clinical trials, including participant recruitment, data collection, and compliance monitoring. These self-executing contracts can ensure that trial milestones are met, reducing the risk of data manipulation, and increasing the reliability of results. Pharmaceutical supply chains are susceptible to counterfeit drugs and product recalls, leading to substantial financial losses and potential harm to patients. Blockchain's transparent and traceable nature can revolutionize supply chain management by providing real-time visibility into the movement of drugs and medical supplies. This transparency not only mitigates risks but also promotes accountability among stakeholders (Mörtberg, A *et al*, 2021); (Mollah, 2020).

Interoperability remains a significant challenge in healthcare, impeding the seamless exchange of patient data between institutions. Blockchain's decentralized architecture can enable patients to own and control their health records, granting permission to healthcare providers for access. This patient-centric approach enhances data privacy and fosters a more comprehensive and accurate medical history(Mörtberg, A *et al*, 2021).

As blockchain technology continues to intersect with healthcare and investment, regulatory challenges come to the forefront. Regulations must strike a balance between innovation and safeguarding public interests. Navigating these legal and regulatory landscapes requires collaboration among governments, financial institutions, and healthcare bodies to ensure patient safety, data privacy, and investment integrity (Basaglia. 2022); (Chen, 2021) (Bogdan. 2020).

The success story of MediChain illustrates the transformative potential of blockchain in healthcare investment. MediChain, a blockchain-based platform, allows patients to securely share their medical data with researchers and clinicians while retaining control over access permissions. This case study exemplifies the marriage of blockchain's security and interoperability with healthcare's data-sharing needs (Nakamoto, 2008); (Basaglia. 2022).

The intersection of blockchain technology and healthcare investment represents an exciting frontier in the global stock market's evolution. By enhancing transparency, security, and interoperability, blockchain has the capacity to revolutionize investment strategies and drive digital transformation in the healthcare sector. As stakeholders collaborate to navigate regulatory challenges and harness blockchain's potential, the future holds promise of a more adaptable and patient-centric investment landscape (Bogdan. 2020); (Chen, 2021).

Case Study: Health Chain – Enhancing Healthcare Investment with Blockchain

Health Chain is a hypothetical blockchain-based platform designed to enhance healthcare investment in the global stock market. The platform aims to address key challenges in healthcare investment, such as transparency, liquidity, and patient-centric data sharing. By leveraging blockchain's capabilities, Health Chain aims to transform the investment landscape and bring about a new era of digital transformation (Dauner, K.,, 2021);(Grady, V, 2021).

Features and Benefits

1. **Tokenization of Healthcare Assets:** Health Chain enables the tokenization of healthcare assets, allowing investors to purchase fractional ownership in pharmaceutical companies, medical research initiatives, and healthcare startups. These tokens represent shares in these entities, providing investors with greater liquidity and access to a diverse range of investment opportunities.
2. **Smart Contracts for Clinical Trials:** Health Chain incorporates smart contracts to automate and streamline the clinical trial process. These self-executing contracts ensure that trial protocols are adhered to, data is accurately recorded, and milestones are met. This automation reduces the administrative burden on researchers and enhances the reliability of clinical trial results.
3. **Interoperable Health Records:** The platform facilitates the secure exchange of patient health records across healthcare providers using blockchain's decentralized architecture. Patients maintain control over their data and grant access to authorized medical professionals. This interoperability improves patient care and medical decision-making.
4. **Supply Chain Transparency:** Health Chain enhances transparency in the pharmaceutical supply chain. By recording every step of a drug's journey on the blockchain, the platform ensures the authenticity and safety of medications. This feature mitigates the risk of counterfeit drugs entering the market and safeguards patient well-being.

Implementation and Model

Health Chain operates as a consortium blockchain involving key stakeholders in healthcare and investment sectors, including pharmaceutical companies, research institutions, healthcare providers, and investors. The platform utilizes a permissioned blockchain model, ensuring that only authorized participants can engage in transactions and access sensitive data. The case study of Health Chain exemplifies how blockchain technology can revolutionize healthcare investment within the global stock market. By addressing challenges related to transparency, liquidity, and patient data management, blockchain-driven platforms have the potential to reshape investment strategies, enhance adaptability, and drive digital transformation in the healthcare sector. As blockchain adoption grows and regulatory hurdles are overcome, the prospect of a more patient-centric and secure investment landscape becomes increasingly tangible. Rapidly evolving landscape of healthcare, the intersection of technology and finance is becoming increasingly vital. Health Chain emerges as a pioneering solution, leveraging blockchain technology to address critical challenges in healthcare investment. Through its innovative features and benefits, Health Chain aims to transform the global stock market by enhancing transparency, liquidity, and patient-centric data sharing. Let's delve deeper into how this groundbreaking platform works and its potential impact on the healthcare industry (Alikhani, *et al,* 2019).

One of Health Chain's primary features is the tokenization of healthcare assets. Traditional investment in healthcare often requires significant capital and can be inaccessible to many investors. By tokenizing healthcare assets, Health Chain democratizes investment opportunities, allowing individuals to purchase fractional ownership in pharmaceutical companies, medical research initiatives, and healthcare startups. These tokens represent shares in these entities, providing investors with greater liquidity and access to a diverse range of investment opportunities. Moreover, tokenization reduces the barriers to entry, enabling smaller investors to participate in the healthcare market.

Health Chain integrates smart contracts into the clinical trial process, revolutionizing the way research is conducted. Smart contracts are self-executing agreements with predefined rules encoded within them. In the context of clinical trials, these contracts automate and streamline various aspects of the trial process, ensuring adherence to protocols, accurate data recording, and timely execution of milestones. By automating administrative tasks, smart contracts reduce overhead costs and increase the efficiency of clinical trials. Furthermore, the transparency and immutability of blockchain technology enhance the reliability and integrity of clinical trial data, fostering trust among stakeholders. The interoperability of health records is a longstanding challenge in healthcare, often resulting in fragmented patient data and inefficiencies in care delivery. Health Chain addresses this issue by facilitating the secure exchange of patient health records across healthcare providers using blockchain technology. Through its decentralized architecture, Health Chain ensures that patient data remains secure and tamper-proof while allowing patients to maintain control over their information. Authorized medical professionals can access patient records seamlessly, leading to improved care coordination, informed decision-making, and better patient outcomes. By enabling interoperability, Health Chain empowers patients and healthcare providers alike to make data-driven decisions that enhance the quality and efficiency of healthcare delivery. The pharmaceutical supply chain is complex, involving multiple stakeholders and numerous handoffs. However, this complexity also presents vulnerabilities, such as counterfeit drugs entering the market and compromising patient safety. Health Chain addresses these challenges by enhancing transparency in the pharmaceutical supply chain through blockchain technology.
By recording every step of a drug's journey on the blockchain, from manufacturing to distribution, Health Chain ensures the authenticity and safety of medications. This transparent and immutable record mitigates the risk of counterfeit drugs and ensures that patients receive genuine pharmaceutical products. Additionally, by promoting supply chain transparency, Health Chain fosters trust and accountability among stakeholders, ultimately safeguarding patient well-being and public health. Health Chain is poised to revolutionize healthcare investment by harnessing the power of blockchain technology. Through its innovative features such as tokenization of healthcare assets, smart contracts for clinical trials, interoperable health records, and supply chain transparency, Health Chain addresses key challenges in the healthcare industry while unlocking new opportunities for investors, researchers, and patients alike. As the platform continues to evolve and gain traction, it has the potential to drive significant advancements in healthcare delivery, research, and investment, ultimately shaping the future of healthcare for the better.

Conclusion

Health Chain represents a monumental leap forward in the convergence of healthcare and blockchain technology, promising to revolutionize the way healthcare investment is conducted and healthcare services are delivered. Through its innovative features such as tokenization of healthcare assets, smart contracts for clinical trials, interoperable health records, and supply chain transparency, Health Chain addresses longstanding challenges plaguing the healthcare industry while unlocking new opportunities for investors, researchers, and patients alike.

By leveraging blockchain's decentralized and immutable ledger, Health Chain democratizes healthcare investment, making it more accessible, transparent, and liquid. The tokenization of healthcare assets enables fractional ownership, allowing investors of all sizes to participate in the burgeoning healthcare market. Furthermore, smart contracts streamline clinical trials,

reducing administrative burdens, enhancing data integrity, and accelerating medical research and development.

The interoperability of health records facilitated by Health Chain fosters seamless data exchange among healthcare providers, empowering patients to control their health information while improving care coordination and clinical decision-making. Additionally, the platform's focus on supply chain transparency ensures the authenticity and safety of pharmaceutical products, safeguarding patient well-being and public health.

As Health Chain continues to evolve and gain traction, its impact on the healthcare landscape is poised to be profound. By promoting transparency, efficiency, and accountability across the healthcare ecosystem, Health Chain has the potential to drive significant advancements in healthcare investment, research, and delivery. Ultimately, Health Chain represents a transformative force in healthcare, paving the way for a future where innovation thrives, patient outcomes improve, and healthcare becomes more accessible and equitable for all.

Future Projects

Looking ahead, the future of Health Chain promises a myriad of opportunities for further investigation and enhancement, spanning various domains such as technology, finance, healthcare delivery, and regulatory compliance. Here are some potential areas for future investigations. **Scalability and Performance Optimization** as Health Chain continues to expand its user base and transaction volume, research into scalability solutions becomes paramount. Investigating techniques such as sharding, sidechains, and off-chain scaling solutions could help improve the platform's performance without sacrificing decentralization or security. Ensuring the privacy and security of patient health records remains a critical concern. Future investigations could explore advanced cryptographic techniques, zero-knowledge proofs, and privacy-preserving technologies to enhance data confidentiality while maintaining interoperability and auditability. **Data Analytics and AI Integration:** Leveraging the wealth of data stored on the Health Chain platform, future investigations could focus on utilizing advanced analytics and artificial intelligence to derive actionable insights for investors, researchers, and healthcare providers. Predictive analytics, machine learning models, and data-driven decision-making tools could enhance investment strategies, optimize clinical trial design, and improve patient outcomes. **Regulatory Compliance:** Given the highly regulated nature of the healthcare and financial industries, ongoing investigations into regulatory compliance are essential. Researchers could explore regulatory frameworks, compliance requirements, and legal implications associated with tokenization, smart contracts, and health data management on blockchain. **User Experience and Adoption:** Investigating user experience (UX) design principles and behavioural economics could help drive user adoption and engagement on the Health Chain platform. Understanding user needs, preferences, and pain points could inform the design of intuitive interfaces, seamless workflows, and incentive mechanisms to encourage participation and retention. Collaborations with healthcare institutions, research organizations, pharmaceutical companies, and regulatory bodies could foster ecosystem growth and innovation. Future investigations could explore strategic partnerships, consortiums, and industry alliances to expand the reach and impact of Health Chain on the global healthcare landscape. Long-term Impacts and Outcomes Research into the long-term impacts and outcomes of Health Chain's interventions is essential for assessing its efficacy and value proposition. Longitudinal studies, outcome evaluations, and economic analyses could provide insights into the platform's effectiveness in improving healthcare investment, research productivity, and patient outcomes over time.

Health Chain should encompass a multidisciplinary approach, drawing upon expertise from fields such as computer science, finance, healthcare, law, ethics, and social sciences. By addressing key research questions and challenges, these investigations can contribute to the continued evolution and advancement of Health Chain as a transformative force in healthcare investment and delivery.

References

Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. https://bitcoin.org/bitcoin.pdf

Kuo, T. T., & Kim, H. E. (2017). Blockchain distributed ledger technologies for biomedical and health care applications. Journal of the American Medical Informatics Association, 24(6), 1211-1220.

Radanović, I., & Švaco, M. (2020). The potential of blockchain technology in pharmaceutical supply chain. World Conference on Information Systems and Technologies, 785-794.

Mörtberg, A. M., Sallander, E., & Olsson, E. (2021). Transforming clinical trials with blockchain—A patient-centred approach. Frontiers in Blockchain, 3, 29.

(Note: This is a condensed version of the chapter you requested. You can expand upon each section and include more case studies, examples, and references to reach the desired 16-page length.)

Mollah, M. B. A., & Chang, V. (2020). Blockchain in healthcare: A systematic literature review, synthesizing framework, and future directions. Computers in Industry, 123, 103329.

Liang, X., Zhao, J., Shetty, S., Liu, J., & Li, D. (2017). Integrating blockchain for data sharing and collaboration in mobile healthcare applications. In 2017 IEEE 28th Annual International Symposium on Personal, Indoor, and Mobile Radio Communications (PIMRC) (pp. 1-5). IEEE.

Azaria, A., Ekblaw, A., Vieira, T., & Lippman, A. (2016). MedRec: Using blockchain for medical data access and permission management. In 2016 2nd International Conference on Open and Big Data (OBD) (pp. 25-30). IEEE.

Cheng, R., Zhang, H., & Wang, P. (2019). Blockchain-based fair payment for outsourcing services in clouds. IEEE Transactions on Services Computing, 12(2), 280-294.

Abou Tarieh, R., Zayyat, R., Naoufal, R., & Samaha, H. (2022). A case study exploring the impact of JCI standards implementation on staff productivity and motivation at the laboratory and blood bank. HEALTH SCIENCE REPORTS, 5(1). https://doi.org/10.1002/hsr2.497

Al-alawy, K., Moonesar, I. A., Obaid, H. A. M., Gaafar, R., & Bawadi, E. I. A.-A. (2021). A Mixed-Methods Study to Explore the Impact of Hospital Accreditation. Inquiry-the Journal of Health Care Organization Provision and Financing, 58, 0046958020981463. https://doi.org/10.1177/0046958020981463

Alikhani, M., Vatankhah, S., Gorji, H., & Ravaghi, H. (2019). A Comparison of Policy Analysis of Palliative Care for Cancer in UK, Malaysia, and South Africa. INTERNATIONAL JOURNAL OF CANCER MANAGEMENT, 12(12). https://doi.org/10.5812/ijcm.94841

Basaglia, A., Spacone, E., van de Lindt, J., & Kirsch, T. (2022). A Discrete-Event Simulation Model of Hospital Patient Flow Following Major Earthquakes. INTERNATIONAL JOURNAL OF DISASTER RISK REDUCTION, 71. https://doi.org/10.1016/j.ijdrr.2022.102825

Beran, D., Lazo-Porras, M., Mba, C., & Mbanya, J. (2021). A global perspective on the issue of access to insulin. DIABETOLOGIA, 64(5), 954–962. https://doi.org/10.1007/s00125-020-05375-2

Bogdan, I., Gurylina, M., Zverev, A., & Chistyakova, D. (2020a). A Political Perception of the Healthcare System: An Experience of a Monitoring Research. VESTNIK TOMSKOGO GOSUDARSTVENNOGO UNIVERSITETA-FILOSOFIYA-SOTSIOLOGIYA-POLITOLOGIYA-TOMSK STATE UNIVERSITY JOURNAL OF PHILOSOPHY SOCIOLOGY AND POLITICAL SCIENCE, 55, 216–230. https://doi.org/10.17223/1998863X/55/22

Bogdan, I., Gurylina, M., Zverev, A., & Chistyakova, D. (2020b). A Political Perception of the Healthcare System: An Experience of a Monitoring Research. VESTNIK TOMSKOGO GOSUDARSTVENNOGO UNIVERSITETA-FILOSOFIYA-SOTSIOLOGIYA-POLITOLOGIYA-TOMSK STATE UNIVERSITY JOURNAL OF PHILOSOPHY

SOCIOLOGY AND POLITICAL SCIENCE, 55, 216–230. https://doi.org/10.17223/1998863X/55/22

Bueno, M., Stevens, B., Barwick, M., Riahi, S., Li, S., Lanese, A., Willan, A., Synnes, A., Estabrooks, C., Chambers, C., Harrison, D., Yamada, J., Stinson, J., Campbell-Yeo, M., Noel, M., Gibbins, S., LeMay, S., & Isaranuwatchai, W. (2020). A cluster randomized clinical trial to evaluate the effectiveness of the Implementation of Infant Pain Practice Change (ImPaC) Resource to improve pain practices in hospitalized infants: A study protocol. TRIALS, 21(1). https://doi.org/10.1186/s13063-019-3782-9

Bulawayo, M., Silumbwe, A., Munakampe, M., Mukumbuta, N., Musabula, J., Chewe, M., Mweemba, C., Michelo, C., & Hangoma, P. (2020). A needs assessment for postgraduate training in selected public health disciplines: Evidence from health services organisations in Lusaka, Zambia. BMC HEALTH SERVICES RESEARCH, 20(1). https://doi.org/10.1186/s12913-020-05935-7

Chen, T. (2021a). A FAHP-FTOPSIS approach for choosing mid-term occupational healthcare measures amid the COVID-19 pandemic. HEALTH POLICY AND TECHNOLOGY, 10(2). https://doi.org/10.1016/j.hlpt.2021.100517

Chen, T. (2021b). A FAHP-FTOPSIS approach for choosing mid-term occupational healthcare measures amid the COVID-19 pandemic. Health Policy and Technology, 10(2), 100517. https://doi.org/10.1016/j.hlpt.2021.100517

Churi, P., Pawar, A., & Moreno-Guerrero, A. (2021). A Comprehensive Survey on Data Utility and Privacy: Taking Indian Healthcare System as a Potential Case Study. INVENTIONS, 6(3). https://doi.org/10.3390/inventions6030045

Conti, V., Militello, C., Rundo, L., & Vitabile, S. (2021). A Novel Bio-Inspired Approach for High-Performance Management in Service-Oriented Networks. IEEE TRANSACTIONS ON EMERGING TOPICS IN COMPUTING, 9(4), 1709–1722. https://doi.org/10.1109/TETC.2020.3018312

Daghash, H., Haegdorens, F., Gillis, K., Slootmans, S., De Smedt, K., & Van Bogaert, P. (2022). A Hospitality Improvement Intervention in Residential Care Does Not Warrant Staff Job Satisfaction or Turnover Intention: A Cross-Sectional Survey Study Investigating the Hostmanship Program. CUREUS JOURNAL OF MEDICAL SCIENCE, 14(3). https://doi.org/10.7759/cureus.23601

Dauner, K., & Loomer, L. (2021a). A qualitative assessment of barriers and facilitators associated with addressing social determinants of health among members of a health collaborative in the rural Midwest. BMC HEALTH SERVICES RESEARCH, 21(1). https://doi.org/10.1186/s12913-021-06859-6

Dauner, K., & Loomer, L. (2021b). A qualitative assessment of barriers and facilitators associated with addressing social determinants of health among members of a health collaborative in the rural Midwest. BMC HEALTH SERVICES RESEARCH, 21(1). https://doi.org/10.1186/s12913-021-06859-6

Duis, J., van Wattum, P., Scheimann, A., Salehi, P., Brokamp, E., Fairbrother, L., Childers, A., Shelton, A., Bingham, N., Shoemaker, A., & Miller, J. (2019). A multidisciplinary approach to the clinical management of Prader-Willi syndrome. MOLECULAR GENETICS & GENOMIC MEDICINE, 7(3). https://doi.org/10.1002/mgg3.514

Furnival, J., Boaden, R., & Walshe, K. (2019). A dynamic capabilities view of improvement capability. JOURNAL OF HEALTH ORGANIZATION AND MANAGEMENT, 33(7/8), 821–834. https://doi.org/10.1108/JHOM-11-2018-0342

Grady, V., Soylu, T., Goldberg, D., Kitsantas, P., & Grady, J. (2021a). A Cross-Sectional Analysis of Primary Care Practice Characteristics and Healthcare Professionals' Behavioral Responses to Change. INQUIRY-THE JOURNAL OF HEALTH CARE ORGANIZATION PROVISION AND FINANCING, 58. https://doi.org/10.1177/0046958021996518

Grady, V., Soylu, T., Goldberg, D., Kitsantas, P., & Grady, J. (2021b). A Cross-Sectional Analysis of Primary Care Practice Characteristics and Healthcare Professionals' Behavioral Responses to Change. INQUIRY-THE JOURNAL OF HEALTH CARE ORGANIZATION PROVISION AND FINANCING, 58. https://doi.org/10.1177/0046958021996518

Haliday, H. (2021). A contribution to the clinical study of healthcare institutions. The "malicious institution'' fantasy. Annales Medico-Psychologiques, 179(3), 220–226. https://doi.org/10.1016/j.amp.2020.07.004

Haramaki, T., & Nishino, H. (2020). A Multi-sensor Based Physical Condition Estimator for Home Healthcare. Em L. Barolli, P. Hellinckx, & T. Enokido (Eds.), Oita University (WOS:000578467600002; Vol. 97, pp. 12–21). https://doi.org/10.1007/978-3-030-33506-9_2

Henrique, D., Godinho, M., Marodin, G., Jabbour, A., & Jabbour, C. (2021). A framework to assess sustaining continuous improvement in lean healthcare. INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, 59(10), 2885–2904. https://doi.org/10.1080/00207543.2020.1743892

Housel, D. A., Weinstock, H., Mahadeswaraswamy, C., & Michelin, P. D. (2023). A Case Study of Innovative Workplace Development Programming at Community Colleges in the United States. ADULT LEARNING. https://doi.org/10.1177/10451595231205555

Ishimaru, T., Wada, K., & Smith, D. (2017). A consensus for occupational health management of healthcare workers infected with human immunodeficiency virus, hepatitis B virus, and/or hepatitis C virus. JOURNAL OF OCCUPATIONAL HEALTH, 59(3), 304–308. https://doi.org/10.1539/joh.16-0275-OP

James, S., Perry, L., Gallagher, R., & Lowe, J. (2020). A discussion of healthcare support for adolescents and young adults with long-term conditions: Current policy and practice and future opportunities. INTERNATIONAL JOURNAL OF NURSING PRACTICE, 26(5). https://doi.org/10.1111/ijn.12882

Javanparast, S., Baum, F., Ziersch, A., & Freeman, T. (2022). A Framework to Determine the Extent to Which Regional Primary Healthcare Organisations Are Comprehensive or Selective in Their Approach. INTERNATIONAL JOURNAL OF HEALTH POLICY AND MANAGEMENT, 11(4), 479–488. https://doi.org/10.34172/ijhpm.2020.182

Jensen, H., Thude, B., Boye, L., Gram, B., Primdahl, J., Elkjaer, M., & Specht, K. (2022a). A cross-sectional study of COVID-19 pandemic-related organizational aspects in health care. NURSING OPEN, 9(2), 1136–1146. https://doi.org/10.1002/nop2.1153

Jensen, H., Thude, B., Boye, L., Gram, B., Primdahl, J., Elkjaer, M., & Specht, K. (2022b). A cross-sectional study of COVID-19 pandemic-related organizational aspects in health care. NURSING OPEN, 9(2), 1136–1146. https://doi.org/10.1002/nop2.1153

Keshtkar, L., Rashwan, W., Abo-Hamad, W., & Arisha, A. (2020). A hybrid system dynamics, discrete event simulation and data envelopment analysis to investigate boarding patients in acute hospitals. OPERATIONS RESEARCH FOR HEALTH CARE, 26. https://doi.org/10.1016/j.orhc.2020.100266

Kyratsis, Y., Ahmad, R., Iwami, M., Castro-Sanchez, E., Atun, R., & Holmes, A. (2019). A multilevel neo-institutional analysis of infection prevention and control in English hospitals: Coerced safety culture change? SOCIOLOGY OF HEALTH & ILLNESS, 41(6), 1138–1158. https://doi.org/10.1111/1467-9566.12897

Larsen, B. & ASSOC COMP MACHINERY. (2021). A Framework for Understanding AI-Induced Field Change: How AI Technologies are Legitimized and Institutionalized. Copenhagen Business School, 683–694. https://doi.org/10.1145/3461702.3462591

Lee, M., Lee, Y., Huang, C., Wu, C., Hsueh, H., & Wu, H. (2022). A Longitudinal Study of Nurses' Work-Life Balance: A Case of a Regional Teaching Hospital in Taiwan. APPLIED RESEARCH IN QUALITY OF LIFE, 17(1), 93–108. https://doi.org/10.1007/s11482-020-09881-8

Lunkka, N., Pietilainen, V., & Suhonen, M. (2019). A Discursive Sensemaking Perspective on Project-Based Work in Public Healthcare. PROJECT MANAGEMENT JOURNAL, 50(6), 657–672. https://doi.org/10.1177/8756972819847062

Mattila, E., Koskelo, J., Lappalainen, R., Salminen, J., Nyman, P., Lahteenmaki, J., Leino, T., Korhonen, I., & IEEE. (2007). A concept for ICT assisted health promotion in the occupational healthcare. VTT Technical Research Center Finland, 1786-+. https://doi.org/10.1109/IEMBS.2007.4352658

Mazzini, E., Soncini, F., Cerullo, L., Genovese, L., Apolone, G., Ghirotto, L., Mazzi, G., & Costantini, M. (2021a). A focused ethnography in the context of a European cancer research hospital accreditation program. BMC HEALTH SERVICES RESEARCH, 21(1). https://doi.org/10.1186/s12913-021-06466-5

Mazzini, E., Soncini, F., Cerullo, L., Genovese, L., Apolone, G., Ghirotto, L., Mazzi, G., & Costantini, M. (2021b). A focused ethnography in the context of a European cancer research

hospital accreditation program. BMC HEALTH SERVICES RESEARCH, 21(1). https://doi.org/10.1186/s12913-021-06466-5

Milkman, K., Patel, M., Gandhi, L., Graci, H., Gromet, D., Ho, H., Kay, J., Lee, T., Akinola, M., Beshears, J., Bogard, J., Buttenheim, A., Chabris, C., Chapman, G., Choi, J., Dai, H., Fox, C., Goren, A., Hilchey, M., … Duckworth, A. (2021). A megastudy of text-based nudges encouraging patients to get vaccinated at an upcoming doctor's appointment. PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, 118(20). https://doi.org/10.1073/pnas.2101165118

Nakayama, F., Lenz, P., Banou, S., Nogueira, M., Santos, A., & Chowdhury, K. (2019). A Continuous User Authentication System Based on Galvanic Coupling Communication for s-Health. WIRELESS COMMUNICATIONS & MOBILE COMPUTING, 2019. https://doi.org/10.1155/2019/9361017

Narayanamurthy, G., Gurumurthy, A., & Moser, R. (2018). "8A" framework for value stream selection—An empirical case study. Em JOURNAL OF ORGANIZATIONAL CHANGE MANAGEMENT (Vol. 31, Número 5, pp. 1001–1026). https://doi.org/10.1108/JOCM-06-2017-0234

Oh, S., Jahmunah, V., Arunkumar, N., Abdulhay, E., Gururajan, R., Adib, N., Ciaccio, E., Cheong, K., & Acharya, U. (2021). A novel automated autism spectrum disorder detection system. COMPLEX & INTELLIGENT SYSTEMS, 7(5), 2399–2413. https://doi.org/10.1007/s40747-021-00408-8

Ramitha, K., Ankitha, T., Alankrutha, R., & Anitha, C. (2021). A cross-sectional study on occupational health and safety of municipal solid waste workers in Telangana, India. INDIAN JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE, 25(3), 169–177. https://doi.org/10.4103/ijoem.ijoem_21_21

Rathee, G., Sharma, A., Saini, H., Kumar, R., & Iqbal, R. (2020). A hybrid framework for multimedia data processing in IoT-healthcare using blockchain technology. MULTIMEDIA TOOLS AND APPLICATIONS, 79(15–16), 9711–9733. https://doi.org/10.1007/s11042-019-07835-3

Scorza, A., Porazzi, E., Strozzi, F., Garagiola, E., Gimigliano, A., & De Filippis, G. (2022a). A new approach for emergency department performance positioning: The quality-efficiency matrix. INTERNATIONAL JOURNAL OF HEALTH PLANNING AND MANAGEMENT, 37(3), 1636–1649. https://doi.org/10.1002/hpm.3428

Scorza, A., Porazzi, E., Strozzi, F., Garagiola, E., Gimigliano, A., & De Filippis, G. (2022b). A new approach for emergency department performance positioning: The quality-efficiency matrix. INTERNATIONAL JOURNAL OF HEALTH PLANNING AND MANAGEMENT, 37(3), 1636–1649. https://doi.org/10.1002/hpm.3428

Semantha, F., Azam, S., Shanmugam, B., Yeo, K., & Beeravolu, A. (2021). A Conceptual Framework to Ensure Privacy in Patient Record Management System. IEEE ACCESS, 9, 165667–165689. https://doi.org/10.1109/ACCESS.2021.3134873

Sligo, J., Roberts, V., Gauld, R., Villa, L., & Thirlwall, S. (2019a). A checklist for healthcare organisations undergoing transformational change associated with large-scale health information systems implementation. HEALTH POLICY AND TECHNOLOGY, 8(3), 237–247. https://doi.org/10.1016/j.hlpt.2019.08.001

Sligo, J., Roberts, V., Gauld, R., Villa, L., & Thirlwall, S. (2019b). A checklist for healthcare organisations undergoing transformational change associated with large-scale health information systems implementation. Health Policy and Technology, 8(3), 237–247. https://doi.org/10.1016/j.hlpt.2019.08.001

Sutton, E., Bion, J., Mannion, R., Willars, J., Shaw, E., & Tarrant, C. (2021). A qualitative study of organisational response to national quality standards for 7-day services in English hospitals. BMC HEALTH SERVICES RESEARCH, 21(1). https://doi.org/10.1186/s12913-021-06213-w

Terpos, E., Jamotte, A., Christodoulopoulou, A., Campioni, M., Bhowmik, D., Kennedy, L., & Willenbacher, W. (2019). A cost-effectiveness analysis of denosumab for the prevention of skeletal-related events in patients with multiple myeloma in four European countries: Austria, Belgium, Greece, and Italy. JOURNAL OF MEDICAL ECONOMICS, 22(8), 766–776. https://doi.org/10.1080/13696998.2019.1606002

Vainieri, M., Noto, G., Ferre, F., & Rosella, L. (2020a). A Performance Management System in Healthcare for All Seasons? INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH, 17(15). https://doi.org/10.3390/ijerph17155590

Vainieri, M., Noto, G., Ferre, F., & Rosella, L. C. (2020b). A Performance Management System in Healthcare for All Seasons? International Journal of Environmental Research and Public Health, 17(15), 5590. https://doi.org/10.3390/ijerph17155590

Vardhini, B., Dass, S., Sahana, R., Chinnaiyan, R., & IEEE. (2021). A Blockchain based Electronic Medical Health Records Framework using Smart Contracts. Visvesvaraya Technological University. 2021 INTERNATIONAL CONFERENCE ON COMPUTER COMMUNICATION AND INFORMATICS (ICCCI). https://doi.org/10.1109/ICCCI50826.2021.9402689

Xu, J., Kunaviktikul, W., Akkadechanunt, T., Nantsupawat, A., & Stark, A. (2020). A contemporary understanding of nurses' workplace social capital: A response to the rapid changes in the nursing workforce. JOURNAL OF NURSING MANAGEMENT, 28(2), 247–258. https://doi.org/10.1111/jonm.12914

Zoeliner, J., You, W., Hill, J., Brock, D., Yuhas, M., Alexander, R., Price, B., & Estabrooks, P. (2019). A comparative effectiveness trial of two family-based childhood obesity treatment programs in a medically underserved region: Rationale, design & methods. CONTEMPORARY CLINICAL TRIALS, 84. https://doi.org/10.1016/j.cct.2019.06.015