https://doi.org/10.38104/vadyba.2023.2.04

Vadyba
Journal of Management
2023, № 2 (39)
ISSN 1648-7974

AN INVESTIGATION BLOCKCHAIN TECHNOLOGY ON ENTERPRISE OPERATIONAL CAPABILITIES: A META-ANALYSIS APPROACH

Ashveen Kutowaroo[1], Bhavish Jugurnath[1], Samanta Straupaite-Simonavice[2]
[1]Faculty of Law and Management, University of Mauritius, [2]Lithuania Business College

Abstract
Blockchain technology, a brand-new category of disruptive internet technology, is frequently employed by businesses as a technological aid to enhance production procedures and reduce spending. In this paper, we will examine the effects of blockchain technology on business operations, as well as their advantages for internal business processes and their effects on external business collaboration. An examination of the literature revealed that it has largely ignored the link between blockchain technology and corporate operational capabilities based on actual data, focusing instead solely on the business process modelling and technology design process of a blockchain-based solution. As a result, this paper gathers information from African businesses that are either preparing to implement blockchain technology or already have. Quantitative analysis of the data was done. The findings indicate that one of the key driving forces for the adoption of blockchain technology is the growth of the enterprise asset scale. Additionally, this study demonstrates how implementing blockchain technology improves asset rotation rates and lowers sales expense rates. However, the adoption of blockchain technology is one of the key business choices, which is influenced by a number of significant elements, including the manager's style, the structure of human resources, and the external policy framework, in addition to the development circumstances and stage of the firm. This paper offers some helpful recommendations for developing blockchain initiatives in the future based on the findings of theoretical and empirical investigation.
KEY WORDS: Blockchain, Operational capabilities, Meta-analysis.

Introduction

The use of blockchain technology is gaining worldwide prominence and Mauritius is also a part of it. Blockchain technology, which has gained global attention for its many advantages, has a lot to offer to the financial services industry and it is important to understand the technology behind a blockchain-based system to effectively integrate the financial services industry. Blockchain has attracted a lot of interest from businesses, allowing them to have more efficient and effective workflows in international markets. Due to the distributed ledger established by blockchain technology, which has the ability to facilitate international trade, this has transformed how international trade is carried out along with finance and business management.

Blockchain-based system offers safer transactions since it enables paperless trade, facilitates trade financing, improves intellectual property rights and speeds up government procurement procedures. Moreover, blockchain helps lower trade costs, improve business transparency, and create new business prospects for both small and large businesses. This technology increases trust, eliminates intermediaries, speeds up market access and serves as a link between individuals across the globe. Owing to its efficiency, central banks, regulators and governments around the world have recently started implementing blockchain technology to help international trade. Haber and Stornetta were the first to introduce the term "blockchain technology" in 1991 and later Satoshi Nakamoto popularized it in 2008. Blockchain was first conceptualised by Nakamoto as the core technology behind the bitcoin cryptocurrency (Mai et al., 2018; Zhao et al., 2016). It is anticipated that blockchain technology will advance from blockchain 1.0 for digital money to blockchain 2.0 for digital finance and to blockchain 3.0 for a digital society as it finds applications outside the cryptocurrency (Zhao et al., 2016).

While blockchain is being explored across many sectors, Friedlmaier, Tumasjan and Welpe (2016) pointed out that the financial services sector is one where it is extremely well represented. This suggestion will consider an organization's operational skills and management as well as blockchain applications in international trade. The objective of this study is to find out the effect of blockchain technology on operational capabilities and to determine if this technology is able to improve operational capabilities.

Literature review

The effectiveness of business operations and dynamic responsiveness are reflected in operation management, which is extremely important to the day-to-day operations of enterprises (Jantunen et al., 2018). The main goals of business operation management are to reduce production costs, manufacturing costs, transportation costs, maximize profit margins and produce high-quality products at the lowest possible operating cost (Prajogo et al., 2018). Additionally, knowledge and information sharing are an important aspect in establishing efficient collaboration across organisation and departments (Fiorini and Jabbour, 2017; Liu et al., 2018; Zhu et al., 2018; Cao et al., 2019).

Besides introducing the trust mechanism and lowering the cost of online transactions to increase business effectiveness, blockchain technology rebuilds the incentive mechanism in an organisation (Funk et al.,

2018). Furthermore, according to Wu and Chiu (2018), external collaboration is an important factor of integrating business functions into a productive and cohesive business model and it significantly enhances enterprise Operational Capabilities (OCs).

Operational Capabilities

Operational capabilities (OCs), according to Winter (2003), is "a high-level routine (or collection of routines) that, along with its implementing input flows, confers upon an organization's management of a set of decision options for producing significant outputs of a particular type."

Organizations usually accomplish this by gaining a competitive advantage through improved processes, thereby lowering firm costs (Miocevic and Morgan, 2018). According to Lu et al. (2014) and Zhang and Chen (2018), the most important responsibilities for global enterprises are, promoting business transformation and enhancing their OCs. While at the same time, the fast development of information technology offers businesses significant opportunities to increase OCs and management models, enabling them to provide customers with high value-added goods (Akter, Wamb and Barrett, 2018; Cotteleer and Bendoly, 2006; Karabasevic et al., 2018). As stated by the World Economic Forum (held in Switzerland in January 2016) on "Managing the Fourth Industrial Revolution", information technology will bring a "new normal" to global economic growth.

Blockchain Technology

Blockchain technology (BT) is a distributed ledger database that records business transactions in a way that is both verifiable and permanent (Perboli et al., 2018). Due to its distinct consensus mechanism and appropriate encryption algorithms, it has steadily gained interest in many sectors (Hughes et al., 2019; Lu and Xu, 2017).

According to many scholars and researchers, BT forms the basis of a new digital business (Figorilli et al., 2018; Kshetri, 2018; Toyoda et al., 2017; Yoo and Won, 2018). The efficiency, reliability and transparency of business management are increased by BT due to its capacity to ensure data immutability and public access to data streams (Wamba et al., 2018). The relationships between all participants in logistics and supply chain systems are also being transformed and remodelled through BT (Queiroz and Wanba, 2019).

Blockchain Technology and Operational Capabilities

From business point of view, the effective integration of internal and external information resources helps in improving OCs (Eltayeb et al., 2011; Dubey et al., 2017; Dubey, Gunasekaran, Papadopoulos et al., 2017; Pan et al., 2018). BT has helped in numerous issues with resource integration and information sharing in conventional business management and external collaboration. It has also introduced a new style of business operation and management (Nakasumi, 2017; Kshetri, 2018). The development of BT and its use, however, still face several challenges. The State Council's guidelines, on actively promoting "Internet Plus", pointed out that conventional businesses lack the knowledge and skills necessary to use internet information technology and that there are numerous barriers to the creation of new formats, such as a lack of resources and qualified personnel. Additionally, very few organizations have actual plans to use BT, even though many are aware of its potential (Ying et al., 2018).

The implementation of BT has a positive impact on business operation capabilities such as improving business asset turnover rate and reducing sales expense rate, (Xiongfeng et al., 2020). Moreover, it has been found that BT has the potential to contribute positively to many sustainable developments goals as well as bringing positive changes within established industries and practices (Hughes et al., 2019).

The use of a blockchain system has been linked to a number of advantages, according to Drescher (2017) and Rabah (2017), as follows:

i. Disintermediation: In the blockchain process, this refers to the absence of intermediaries or third parties. Blockchain has this built in by default, unlike traditional centralised procedures that require humans or additional technology to ensure trust.

ii. Non-repudiation - This benefit pertains to the blockchain's integrity, where parties cannot dispute or reject their additions to the blockchain because the transaction history is accurate.

iii. Automation: The way blockchains work can replace tasks that need to be done by hand if the use case involves automated interactions between parties.

iv. Process streamlining - As company processes are adapted for the switch from old technologies to blockchain, they will become more transparent, standardized, and streamlined.

v. Processing speed: The increased use of automation in blockchain processes, compared to centralized architectures, is likely to lead to big improvements in execution speed for some use cases.

vi. Cost reduction - For applications that can benefit from blockchain technology, disintermediation and automation have the overall effect of lowering costs.

vii. Trust - Blockchain efficiently substitutes technology and related protocols for human verification and trust. This will probably represent a considerable departure from the way things are done now in company. As blockchain becomes more widespread and costs start to come down, confidence in the reliability of security and payment processing may eventually become a commodity.

viii. Increased technical awareness - This may be a byproduct of using blockchain, but it results in the development of new uses and insights for this technology.

The list of advantages mentioned above is supported by Lnes et al. (2017) who examined the possibilities of blockchain technology through the lens of governmental organizations and same falls under the categories of strategic, organizational, economic, international, and technological. Additional research has praised the benefits for businesses adopting blockchain technology, emphasizing the advantages of the distributed ledger

design (Swan, 2015; White, 2017; Lacity, 2018; Ying et al., 2018).

When opposed to conventional centralised designs, blockchain technology has the potential to provide a number of distinct advantages. The technology, however, has a number of drawbacks that must be taken into account in any business case for adoption (Beck et al., 2016; Gomber et al., 2018). Böhme et al. (2015), Coyne and McMickle (2017), Drescher (2017), Axios (2018) and Forester (2018) have identified some of the literature's issues with blockchain technology, including:

i. lack of privacy – every node within the network keeps a comprehensive record of all transactions. This may be a quality for particular applications and a benefit in terms of security, but it may be a drawback for use cases where privacy is essential.

ii. high costs – the blockchain's underlying processing which involves replicating the entire transaction history across all nodes, is computationally expensive. Although this characteristic offers security benefits, larger networks may be constrained by it. Blockchains' public key encryption is used for transaction execution and authentication. Although extremely secured, this technique needs the usage of both a public and a private key. The solution does not have a safety mechanism to add extra security in the case that one of the parties misplaces or unintentionally releases their private key.

iii. limitations on flexibility - while the immutable append-only nature of blockchain preserves the integrity of transactions, it can be a hindrance to use cases that call for changes to transactions.

iv. latency - the blockchain network's security credentials are ensured by the idea that every node stores the whole transaction history of every information block, however, adding new blocks and subsequent transaction records is currently computationally expensive.

v. governance - the blockchain architecture's distributed nature offers particular benefits for some use cases. It, however, poses a serious obstacle to general management and governance by oversight-based organizations.

The list of restrictions presented above highlights some of the unique technological difficulties and unforeseen consequences that could restrict the advancement and widespread use of blockchain technology. Lack of approval from governing bodies and user acceptability are two examples of non-technical restrictions. Due to the fact that blockchain technology is still relatively new, organizations have not yet fully addressed these important challenges, which pose serious risks to the technology's ability to gain wider adoption. There are still concerns about the legality of transactions, privacy and the implementation of the GDPR, as well as opposition among users due to their lack of technological understanding and confidence (Kypriotaki et al., 2015; Drescher, 2017; Kshetri, 2017; Levine, 2017). Additionally, there are restrictions when using blockchain in specific application genres.

Previous studies have focused mostly on the business process modelling and technological design processes of a BT-based solution. However, based on simulation approaches, research findings have often confirmed the implementation impact of BT. There is, in fact, lack of evidence about the value of the BT as well as the total costs and benefits, restricting the development of real cases. In the same line, Trujillo et al. (2018), stated that there are very few BT projects with a lengthy lifespan. Only 8% of initiatives are actively maintained, while the rest failed.

This paper adds to the existing literature in two aspects:

1. to propose a standard model to examine the influence of BT on enterprise OCs; and
2. to quantitatively examine the effects of adopting BT on enterprise OCs by gathering relevant data from blockchain companies.

BT and enterprise OCs from the perspective of internal operation

The complexity and uncertainty of the enterprise's living environment are increasingly becoming significant as a result of the more intense market competition (Dubey et al., 2017; Dubey, Gunasekaran, Papadopoulos et al., 2017). Moreover, formal control and supervision help in facilitating business operations management (Jensen and Meckling, 1976). However, many scholars laid emphasis on the fact that these formal controls have a number of limitations when it comes to predicting and analyzing management behaviour (Davis et al., 1997). They emphasize on the importance of informal factors, such as, commitment and trust in internal corporate governance.

A healthy work environment that fosters trust enables individuals and groups to prevent the loss of financial gains through knowledge sharing (Chai and Kim, 2010). Knowledge sharing at the organizational and team levels refers to the transfer, acquisition, organization and storage of knowledge for effective implications. Building a trust mechanism using BT helps in developing a trust environment in the organization, boosts knowledge stock and flow, shapes core competitiveness and improves OCs (Dubey et al., 2017; Dubey, Gunasekaran, Papadopoulos et al., 2017).

Furthermore, BT's consensus mechanism promotes fairness amongst departments as it generates synergy between all process nodes, builds participation rules and incentive mechanisms (Fernandez-Carames and Fraga-Lamas, 2018). Using the BT consensus mechanism and technologies like Artificial Intelligence and big data, organizations may easily manage complicated data and information, alter internal business rules, and establish successful operational processes (Dinh et al., 2018; Wamba et al., 2018; Wamba, Kamdjoug et al., 2018).

BT and enterprise OCs from the perspective of external collaboration

BT applications have now upgraded to blockchain 3.0 from blockchain 1.0. Blockchain 1.0 refers to the use of BT in virtual digital currency markets such as currency transfer and payment system while Blockchain 2.0 refers to the application of BT in financial markets such as securities, futures, loans and bills, and primarily for the liquidation of financial assets and the use of smart contracts. On the other hand, Blockchain 3.0 is an extension based on 2.0, with a special focus on extending BT into additional parts of social life.

BT continues to strengthen payment, transaction clearing, trade finance, digital currency, equity, and risk control in financial services (Treleaven et al., 2017). BT encourages proxy voting, identity authentication and social credit in social management (Figorilli et al., 2018). Similarly, Fernandez-Carames and Fraga-Lamas (2018), stated that BT focuses on product information traceability, network security and contracts for Internet of things (IoT). From raw materials to finished goods, the business is a sophisticated functional network made up of suppliers, manufacturers, distributors, retailers, customers, logistics and other related businesses (Balasubramanian and Shukla, 2018; Mohamed et al., 2017). The idea is to enable businesses to operate together via trust-based foundations, connect individual businesses and to create a composite network which will eventually maximize overall efficiency, while providing more advantages to linked businesses along the chain (Woo, et al., 2016; Chi et al., 2018; Namagemb et al., 2018).

Effective business management methods encourage information exchange throughout the business and improve company OCs by enhancing external customer awareness and adaptability. Moreover, a diverse range of customer requirements also increase business adaptability. Business management is a strategic business approach including internal firms, customers and suppliers. If organizations can manage these integration connections well, their OCs will benefit. However, the existing business operation has information islands (Dominguez et al., 2018). Information is discretely disseminated throughout business firms, with minimal sharing, delayed operation, and poor authenticity and trustworthiness.

Establishing a business information platform with BT as the core can link business alliances, financial institutions and government regulatory departments together with integrating business flow, logistics, capital flow and information flow in the business (Kamble et al., 2019; Queiroz and Wanba, 2019; Wang et al., 2019; Wang, Singgih and Rit, 2019). By developing a BT-based business management platform, organizations may collect large volumes of data and record commodity circulation information based on source tracking, certificate storage, mutual trust and information exchange (Nakasumi, 2017). Furthermore, lower operational costs and enhanced quality can be obtained by connecting business firms and integrating commodity flows, logistics, capital flows and information flows (Khouri et al., 2018; Perboli et al., 2018; Aydiner et al., 2019).

Methodology

Sample selection

Following the report from the African Union Development Agency, it can be noted that blockchain based technologies is not a new subject in Sub-Saharan Africa. In fact, there are several economic sectors (finance, security, e-commerce and agriculture) which have already implemented same in their operations. For the purpose of this study, 100 listed companies were selected from the African Stock Market companies and their annual financial data was collected from 2017 to 2021. In order to ensure validity of data, companies which were recently listed in the stock were excluded from the financials. Any missing values were removed and finally 60 samples that met the selected requirements were processed.

Model selection

Blockchain has a unique aspect to its application. Given that it is on an econometric scale, more benefits can be created in analysing the financial performance of a financial institution, thereby exploring the corporate behaviour and the way in which the business is carried out. The implementation of blockchain technology was then analysed, bearing in mind asset size, staff size and sales size. In order to analyse and confirm the research problem number one, a logistic regression was employed, with the implementation of blockchain technology being a categorical, Yes and No variable, and asset size, staff size and sales size were employed as independent variable, with year being the control variable.

$$BT_{it}=a_1\text{Asset}+a_2\text{ Staff}+a_3\text{Sales}+\text{Year}+e_{it}$$

In the model, BT is a 0 or 1 variable which represents the implementation of blockchain in a company i in year t. Asset is the company's asset size, measured as the logarithm of the total assets. Staff is the company's staff size and Sales represents the company's revenue from sales. The Tobit model was utilised for the regression as the regression model is left centred. Secondly, to confirm the results of this study and analyse the influence of BT on operational capability, the second research problem, a second empirical model was employed, whereby BT, leverage, sales, asset and staff were independent variables while operational capabilities was the dependent variable. The Model is as follows:

$$OC_{it}=b_1\text{BT}+b_2\text{Leverage}+b_3\text{Asset}+b_4\text{Staff}+b_5\text{Sales}+e_{it}$$

OC makes reference to the operational capabilities of a certain company I in year t, BT makes reference to the implementation of Blockchain Technology in that company "i" in year "t" and is a categorical variable, Leverage is the financial leverage ratio, Asset is the total asset size, Staff is the total staff size and Sales is the total revenue. For this model, linear ordinary least square regression shall be used as estimation method.

Variable description

Operational capabilities

Operation management is essential to an organization's everyday operations since it reflects the effectiveness of business operations and the adaptability of the organization (Jantunen et al., 2018). The main goals of enterprise operation management are to maximize profit margins, manufacture high-quality products at the lowest possible operational costs, and decrease production, manufacturing, and transportation costs (Prajogo et al., 2018). Therefore, in the estimation, three main variables were used to represent operational capability, namely

asset turnover rate (AT), current asset turnover rate (ET) and sales expense ratio (SC).

Blockchain Technology

BT has been adopted in all the selected companies. It is only the year of implementation that differs in between the samples. A value of 1 is assigned to the variable as from the year in which BT has been implemented.

Analysis

Table 1 shows the descriptive analysis results for the study. The Pearson correlation coefficients were examined and it can be found that none of the coefficients are larger than 0.8. The Variance inflation factors were also examined and it was found that they are between 1 and 4, which is smaller than the maximum threshold of 10 as recommended by Gujarati (2011).

Table 1. Descriptive Analysis

Variable	Mean	SC	BT	Asset	Staff	Leverage	Sales
AT	0.362						
ET	0.410						
SC	0.420	1.000					
BT	0.363	-0.365	1.000				
Asset	6.345	-0.234	0.342	1.000			
Staff	2.364	-0.562	0.563	0.761	1.000		
Leverage	0.956	-0.723	0.459	0.634	0.364	1.000	
Sales	1.204	-0.420	0.653	0.561	0.432	0.612	1.000
VIF			1.36	3.64	2.36	1.69	1.36

Regression analysis – Model 1

Table 2 shows the results of the regression analysis of Model 1 with BT being the dependent variable. It can be noted that the regression coefficient of Asset is 0.182 indicating that a 1 unit increase in Asset shall result in an increase of 0.182 in BT. It is to be noted that the positive impact of Assets on BT is not followed by other variables and hence an ordinary least square regression was employed to test the robustness of the results. It was found that the results were consistent and robust as they followed a similar trend.

Table 2. Model 1 Regression Analysis

Variable	Tobit Model		Ordinary least squared	
	Coefficient	Std error	Coefficient	Std error
Asset	0.182**	0.067	0.162**	0.063
Staff	-0.086	0.089	-0.063	0.086
Sales	-0.076	0.094	-0.045	0.095
Cons	0.630	0.036	0.360	0.031
R squared	0.689		0.750	

Regression analysis – Model 2

For the second model, a threefold regression analysis was carried out in order to test the impact of BT implementation on OC, which is represented by AT, ET, SC. The Hausman test was used to test the panel model and the effect of BT implementation on OC was tested by using the fixed effect model. The results of the regression is shown in Table 3. From the results, it can be found that the relationship between OC and BT is statistically significant at 5% level of significance with a positive coefficient. From the asset turnover rate, it can also be found that the coefficient for BT is significant at 10% and positive. With respect to sales expense ratio, it can be found that it shares a negative relationship with BT and is still statistically significant at 10%. This shows that the implementation of BT reduces the sales expense of companies.

Table 3. Model 2 Regression Analysis

Variable	AT		ET		SC	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
BT	0.102**	0.302	0.136**	0.036	0.122*	0.072
Asset	-0.306***	0.032	-0.630***	0.075	-0.236***	0.206
Staff	0.693***	0.036	0.632***	0.034	0.963***	0.145
Leverage	0.362***	0.056	0.014***	0.096	0.096***	0.163
Sales	0.176***	0.047	0.061***	0.042	0.016***	0.209
Cons	0.630***	0.362	2.62***	0.563	4.631***	0.663
R squared	0.485		0.369		0.402	
F test	23.21***		18.32***			
Hausman	15.32**		14.86**		6.31	

Discussion and conclusion

Blockchain technology is a distributed ledger database that records business transactions in a way that is both verifiable and lasting. It presents an incredible possibility for the growth of company operational capabilities with the advancement of research and development performed by academics. On the other hand, there still exists some hurdles in the implementation of blockchain technology. Blockchain technology not only improves a transaction by bringing forward trust and security but also reduces the cost of an operation by improving the overall system management and efficiency. Hence, from a theoretical point of view, it was necessary to study the implementation of blockchain technology with respect to organisational capability. Therefore, this study developed two theoretical models in order to test the relationship between blockchain and operational capabilities.

From the result of the analysis, it can be noted that asset turnover plays a key role in the implementation of blockchain technology. It is also worth noting that the implementation of blockchain technology has had a significant positive impact on operational capabilities and has indeed improved the way through which a company operates. This paper hence adds to the body of knowledge by providing valuable insight on the effect of blockchain on enterprise operational capabilities, by testing a new model incorporating sales, asset and staff size.

Analysis results showed that the implementation of blockchain is dependent on the assets of a company. Blockchain also improves trust in between different stakeholders and significantly improves asset turnover rate and reduces sales expenses. This result goes in line with the study of Caro et al. (2018), who also highlighted trust as being an important factor driving the implementation of blockchain. This paper highlights the importance of staff size which is also sine-qua non to the implementation of blockchain as a good communication and timely cooperation shall be key for the successful implementation of blockchain and for improving enterprise operational capacities (Wu et al,, 2012; Dubey, Gunasekaran, Childe et al., 2017; Dubey, Gunasekaran, Papadopoulos et al., 2017).

References

Aitzhan, N. Z., & Svetinovic, D. (2018). Security and privacy in decentralized energy trading through multi-signatures, blockchain and anonymous messaging streams. IEEE

Transactions on Dependable and Secure Computing, 15(5), 840–852. https://doi.org/10.1109/tdsc.2016.2616861

Akter, S., Fosso Wamba, S., Barrett, M., & Biswas, K. (2019). How talent capability can shape service analytics capability in the big data environment? Journal of Strategic Marketing, 27(6), 521–539. https://doi.org/10.1080/0965254x.2018.1442364

Alexander, C., & Dakos, M. (2020). A critical investigation of cryptocurrency data and analysis. Quantitative Finance, 20(2), 173–188. https://doi.org/10.1080/14697688.2019.1641347

Aydiner, A. S., Tatoglu, E., Bayraktar, E., & Zaim, S. (2019). Information system capabilities and firm performance: Opening the black box through decision-making performance and business-process performance. International Journal of Information Management, 47, 168–182. https://doi.org/10.1016/j.ijinfomgt.2018.12.015

Balasubramanian, S., & Shukla, V. (2017). Green supply chain management: the case of the construction sector in the United Arab Emirates (UAE). Production Planning & Control, 28(14), 1116–1138. https://doi.org/10.1080/09537287.2017.1341651

Beck, R., Czepluch, J. S., Lollike, N., & Malone, S. (2016). Blockchain-the gateway to trustfree cryptographic transactions. MayECIS153.

Bennett, M. (2017, November 9). Predictions 2018: The blockchain revolution will have to wait A little longer. Forrester. https://www.forrester.com/blogs/predictions-2018-the-blockchain-revolution-will-have-to-wait-a-little-longer/

Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: Economics, technology, and governance. The Journal of Economic Perspectives: A Journal of the American Economic Association, 29(2), 213–238. https://doi.org/10.1257/jep.29.2.213

Bottazzi, G., Dosi, G., Lippi, M., Pammolli, F., & Riccaboni, M. (2001). Innovation and

corporate growth in the evolution of the drug industry. International Journal of

Industrial Organization, 19(7), 1161–1187.

Brown, C. (2018, November 11). Corporate America's blockchain and bitcoin fever is over. Axios. https://www.axios.com/2018/11/11/corporate-america-blockchain-bitcoin-fervor-over.

Cao, G., Duan, Y., & Cadden, T. (2019). The link between information processing capability and competitive advantage mediated through decision-making effectiveness. International Journal of Information Management, 44, 121–131. https://doi.org/10.1016/j.ijinfomgt.2018.10.003

Caro, M. P., Ali, M. S., Vecchio, M., & Giaffreda, R. (2018). Blockchain-based traceability in Agri-Food supply chain management: A practical implementation. 2018 IoT Vertical and Topical Summit on Agriculture - Tuscany (IOT Tuscany), 1–4.

Chai, S., & Kim, M. (2010). What makes bloggers share knowledge? An investigation on the role of trust. International Journal of Information Management, 30(5), 408–415. https://doi.org/10.1016/j.ijinfomgt.2010.02.005

Chi, M., Wang, W., Lu, X., & George, J. F. (2018). Antecedents and outcomes of collaborative innovation capabilities on the platform collaboration environment. International Journal of Information Management, 43, 273–283. https://doi.org/10.1016/j.ijinfomgt.2018.08.007

Cotteleer, & Bendoly. (2006). Order lead-time improvement following enterprise information technology implementation: An empirical study. MIS Quarterly: Management Information Systems, 30(3), 643. https://doi.org/10.2307/25148743

Coyne, J. G., & Mcmickle, P. L. (2017). Can blockchains serve an accounting purpose? Journal of Emerging Technologies in Accounting, 14(2), 101–111.

Davis, J. H., David Schoorman, F., & Donaldson, L. (2018). Toward a stewardship theory of management. In Business Ethics and Strategy, Volumes I and II (1st Edition, pp. 473–500). Routledge.

De Camargo Fiorini, P., & Jabbour, C. J. C. (2017). Information systems and sustainable supply chain management towards a more sustainable society: Where we are and where we are going. International Journal of Information Management, 37(4), 241–249. https://doi.org/10.1016/j.ijinfomgt.2016.12.004

Di Ciccio, C., Cecconi, A., Mendling, J., Felix, D., Haas, D., Lilek, D., Riel, F., Rumpl, A., & Uhlig, P. (2018). Blockchain-Based Traceability of Inter-organisational Business Processes. In Lecture Notes in Business Information Processing (pp. 56–68). Springer International Publishing.

Dinh, T. T. A., Liu, R., Zhang, M., Chen, G., Ooi, B. C., & Wang, J. (2018). Untangling blockchain: A data processing view of blockchain systems. IEEE Transactions on Knowledge and Data Engineering, 30(7), 1366–1385. https://doi.org/10.1109/tkde.2017.2781227

Dominguez, R., Cannella, S., Barbosa-Póvoa, A. P., & Framinan, J. M. (2018). OVAP: A strategy to implement partial information sharing among supply chain retailers. Transportation Research Part E: Logistics and Transportation Review, 110, 122–136. https://doi.org/10.1016/j.tre.2017.12.016

Drescher, D. (2017). Blockchain basics: A non-technical introduction in 25 steps (1st edn). Apress.Dubey, R., Gunasekaran, A., Papadopoulos, T., Childe, S. J., Shibin, K. T., & Wamba, S. F. (2017). Sustainable supply chain management: framework and further research directions. Journal of Cleaner Production, 142, 1119–1130. https://doi.org/10.1016/j.jclepro.2016.03.117

Dubey, R., Gunasekaran, A., Childe, S. J., & Papadopoulos, T. (2017). World class sustainable business management: Critical review and further research directions. International Journal of Logistics Management, 28(2), 332–362. Gujarati, D. (2011). Econometric by example. UK: Palgrave Macmillan.

Eltayeb, T. K., Zailani, S., & Ramayah, T. (2011). Green supply chain initiatives among certified companies in Malaysia and environmental sustainability: Investigating the outcomes. Resources, Conservation, and Recycling, 55(5), 495–506. https://doi.org/10.1016/j.resconrec.2010.09.003

Fernandez-Carames, T. M., & Fraga-Lamas, P. (2018). A review on the use of blockchain for the internet of things. IEEE Access: Practical Innovations, Open Solutions, 6, 32979–33001. https://doi.org/10.1109/access.2018.2842685

Figorilli, S., Antonucci, F., Costa, C., Pallottino, F., Raso, L., Castiglione, M., Pinci, E., Del Vecchio, D., Colle, G., Proto, A. R., Sperandio, G., & Menesatti, P. (2018). A blockchain implementation prototype for the electronic open source traceability of wood along the whole supply chain. Sensors (Basel, Switzerland), 18(9), 3133. https://doi.org/10.3390/s18093133

Fosso Wamba, S., Gunasekaran, A., Papadopoulos, T., & Ngai, E. (2018). Big data analytics in logistics and supply chain management. International Journal of Logistics Management, 29(2), 478–484. https://doi.org/10.1108/ijlm-02-2018-0026

Fosso Wamba, S., Kala Kamdjoug, J. R., Bawack, R., & G. Keogh, J. (2018). Bitcoin, Blockchain, and FinTech: A systematic review and case studies in the supply chain. https://papers.ssrn.com/abstract=3281148

Friedlmaier, M., Tumasjan, A., & Welpe, I. M. (2016). Disrupting industries with blockchain: The industry, venture

capital funding, and regional distribution of blockchain ventures. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2854756

Funk, E., Riddell, J., Ankel, F., & Cabrera, D. (2018). Blockchain technology: A data framework to improve validity, trust, and accountability of information exchange in health professions education. Academic Medicine: Journal of the Association of American Medical Colleges, 93(12), 1791–1794. https://doi.org/10.1097/acm.0000000000002326

Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the fintech revolution: Interpreting the forces of innovation, disruption, and transformation in financial services. Journal of Management Information Systems : JMIS, 35(1), 220–265. https://doi.org/10.1080/07421222.2018.1440766

Gunasekaran, A., Papadopoulos, T., Dubey, R., Wamba, S. F., Childe, S. J., Hazen, B., & Akter, S. (2017). Big data and predictive analytics for supply chain and organizational performance. Journal of Business Research, 70, 308–317. https://doi.org/10.1016/j.jbusres.2016.08.004

Gürkaynak, G., Yılmaz, İ., Yeşilaltay, B., & Bengi, B. (2018). Intellectual property law and practice in the blockchain realm. Computer Law and Security Report, 34(4), 847–862. https://doi.org/10.1016/j.clsr.2018.05.027

Haber, S. (1991). How to time-stamp a digital document". Journal of Cryptology, 99–111.

Hughes, L., Dwivedi, Y. K., Misra, S. K., Rana, N. P., Raghavan, V., & Akella, V. (2019). Blockchain research, practice and policy: Applications, benefits, limitations, emerging research themes and research agenda. International Journal of Information Management, 49, 114–129. https://doi.org/10.1016/j.ijinfomgt.2019.02.005

Jantunen, A., Tarkiainen, A., Chari, S., & Oghazi, P. (2018). Dynamic capabilities, operational changes, and performance outcomes in the media industry. Journal of Business Research, 89, 251–257. https://doi.org/10.1016/j.jbusres.2018.01.037

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305–360. https://doi.org/10.1016/0304-405x(76)90026-x

Kamble, S., Gunasekaran, A., & Arha, H. (2019). Understanding the Blockchain technology adoption in supply chains-Indian context. International Journal of Production Research, 57(7), 2009–2033. https://doi.org/10.1080/00207543.2018.1518610

Karabasevic, D., Zavadskas, E. K., Stanujkic, D., Popovic, G., & Brzakovic, M. (2018). An approach to personnel selection in the IT industry based on the EDAS method. Transformations in Business & Economics, 17, 54–65. https://etalpykla.lituanistikadb.lt/object/LT-LDB-0001:J.04~2018~1580310756787/

Klausnordby.com. Retrieved October 28, 2022, from https://klausnordby.com/bitcoin/Bitcoin_Whitepaper_Document_HD.pdf

Khouri, S., Rosova, A., Straka, M., & Behun, M. (2018). Logistics performance and corporate logistic costs, their interconnections and consequences. Transformations in Business & Economics, 17.

Kim, S.-K., & Huh, J.-H. (2018). A study on the improvement of smart grid security performance and Blockchain smart grid perspective. Energies, 11(8), 1973. https://doi.org/10.3390/en11081973

Kshetri, N. (2018). 1 Blockchain's roles in meeting key supply chain management objectives. International Journal of Information Management, 39, 80–89. https://doi.org/10.1016/j.ijinfomgt.2017.12.005

Kube, N. (2018). Daniel Drescher: Blockchain basics: a non-technical introduction in 25 steps: Apress, 2017, 255 pp, ISBN: 978-1-4842-2603-2. Financial Markets and Portfolio Management, 32(3), 329–331. https://doi.org/10.1007/s11408-018-0315-6

Kypriotaki, K. N., Zamani, E. D., & Giaglis, G. M. (2015). From bitcoin to decentralized autonomous corporations: Extending the application scope of decentralized peer-topeer networks and blockchains. Paper Presented at the ICEIS 2015 - 17th International Conference on Enterprise Information Systems, 3, 284–290.

Lacity, M. C. (2018). Addressing key challenges to making enterprise blockchain applications a reality. MIS Quarterly Executive, 17(3), 201-222.

Liu, S., Chan, F. T. S., Yang, J., & Niu, B. (2018). Understanding the effect of cloud computing on organizational agility: An empirical examination. International Journal of Information Management, 43, 98–111. https://doi.org/10.1016/j.ijinfomgt.2018.07.010

Lu, C., Rong, K., You, J., & Shi, Y. (2014). Business ecosystem and stakeholders' role transformation: Evidence from Chinese emerging electric vehicle industry. Expert Systems with Applications, 41(10), 4579–4595. https://doi.org/10.1016/j.eswa.2014.01.026

Levine, M. (2017). Cargo blockchains and Deutsche bank.

Lu, Q., & Xu, X. (2017). Adaptable blockchain-based systems: A case study for product traceability. IEEE Software, 34(6), 21–27. https://doi.org/10.1109/ms.2017.4121227

Mai, F., Shan, Z., Bai, Q., Wang, X. (shane), & Chiang, R. H. L. (2018). How does social media impact bitcoin value? A test of the silent majority hypothesis. Journal of Management Information Systems : JMIS, 35(1), 19–52. https://doi.org/10.1080/07421222.2018.1440774

Meng, X. H., Zeng, S. X., & Tam, C. M. (2013). From voluntarism to regulation: A study on ownership, economic performance and corporate environmental information disclosure in China. Journal of Business Ethics, 116(1), 217–232. https://doi.org/10.1007/s10551-012-1462-8

Miocevic, D., & Morgan, R. E. (2018). Operational capabilities and entrepreneurial opportunities in emerging market firms: Explaining exporting SME growth. International Marketing Review, 35(2), 320–341. https://doi.org/10.1108/imr-12-2015-0270

Mishra, D., Gunasekaran, A., Papadopoulos, T., & Dubey, R. (2018). Supply chain performance measures and metrics: a bibliometric study. Benchmarking An International Journal, 25(3), 932–967. https://doi.org/10.1108/bij-08-2017-0224

Mohamed Abdul Ghani, N. M. A., Egilmez, G., Kucukvar, M., & S. Bhutta, M. K. (2017). From green buildings to green supply chains: An integrated input-output life cycle assessment and optimization framework for carbon footprint reduction policy making. Management of Environmental Quality, 28(4), 532–548. https://doi.org/10.1108/meq-12-2015-0211

Nakasumi, M. (2017). Information sharing for supply chain management based on block chain technology. 2017 IEEE 19th Conference on Business Informatics (CBI), 01, 140–149.

Ølnes, S., Ubacht, J., & Janssen, M. (2017). Blockchain in government: Benefits and implications of distributed ledger technology for information sharing. Government Information Quarterly, 34(3), 355–364. https://doi.org/10.1016/j.giq.2017.09.007

Pan, X., Pan, X., Song, M., Ai, B., & Ming, Y. (2020). Blockchain technology and enterprise operational capabilities: An empirical test. International Journal of Information Management, 52(101946), 101946. https://doi.org/10.1016/j.ijinfomgt.2019.05.002

Pan, X., Zhang, J., Song, M., & Ai, B. (2018). Innovation resources integration pattern in high-tech entrepreneurial enterprises. International Entrepreneurship and Management

Journal, 14(1), 51–66. https://doi.org/10.1007/s11365-017-0464-5

Perboli, G., Musso, S., & Rosano, M. (2018). Blockchain in logistics and supply chain: A lean approach for designing real-world use cases. IEEE Access: Practical Innovations, Open Solutions, 6, 62018–62028. https://doi.org/10.1109/access.2018.2875782

Prajogo, D., Toy, J., Bhattacharya, A., Oke, A., & Cheng, T. C. E. (2018). The relationships between information management, process management and operational performance: Internal and external contexts. International Journal of Production Economics, 199, 95–103. https://doi.org/10.1016/j.ijpe.2018.02.019

Queiroz, M. M., & Fosso Wamba, S. (2019). Blockchain adoption challenges in supply chain: An empirical investigation of the main drivers in India and the USA. International Journal of Information Management, 46, 70–82. https://doi.org/10.1016/j.ijinfomgt.2018.11.021

Rabah, K. (2017). Overview of blockchain as the engine of the 4th industrial revolution. Mara Research Journal of Business & Management, 1(1), 125-135.

Schwab, K., & World Economic Forum. (2016, January 14). The Fourth Industrial Revolution: what it means and how to respond. World Economic Forum. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Swan, M. (2015). Blockchain: Blueprint for a new economy. " O'Reilly Media, Inc.".

Tian, F. (2017). A supply chain traceability system for food safety based on HACCP, blockchain & Internet of things. 2017 International Conference on Service Systems and Service Management, 1–6.

Toyoda, K., Mathiopoulos, P. T., Sasase, I., & Ohtsuki, T. (2017). A novel blockchain-based product ownership management system (POMS) for anti-counterfeits in the post supply chain. IEEE Access: Practical Innovations, Open Solutions, 5, 17465–17477. https://doi.org/10.1109/access.2017.2720760

Trujillo, J. L., Fromhart, S., & Srinivas, V. (2017). Evolution of blockchain technology: Insights from the GitHub platform. Deloitte Insights, 24.

Treleaven, P., Gendal Brown, R., & Yang, D. (2017). Blockchain Technology in Finance. Computer, 50(9), 14–17. https://doi.org/10.1109/mc.2017.3571047

Wamba, S. F., Angappa, G., Papadopoulos, T., & Eric, N. (2018). Big data analytics in supply chain and logistics: An empirical approach. The International Journal of Logistics Management, 29(2).

Wamba, S. F., Kamdjoug, J. R. K., Bawack, R., & Keogh, J. G. (2018). Bitcoin, blockchain, and fitech: A systematic review and case studies in the business. Production, Planning and Control, 6, 54.

Wang, Y., Han, J. H., & Beynon-Davies, P. (2019). Understanding blockchain technology for future supply chains: a systematic literature review and research agenda. Supply Chain Management: An International Journal, 24(1), 62–84. https://doi.org/10.1108/scm-03-2018-0148

Wang, Y., Singgih, M., Wang, J., & Rit, M. (2019). Making sense of blockchain technology: (How) will it transform supply chains? International Journal of Production Economics, 211, 221–236. https://doi.org/10.1016/j.ijpe.2019.02.002

Weber, I., Xu, X., Riveret, R., Governatori, G., Ponomarev, A., & Mendling, J. (2016). Untrusted business process monitoring and execution using blockchain. In Lecture Notes in Computer Science (pp. 329–347). Springer International Publishing.

White, G. R. T. (2017). Future applications of blockchain in business and management: A Delphi study. Strategic Change, 26(5), 439–451. https://doi.org/10.1002/jsc.2144

Winter, S. G. (2003). Understanding dynamic capabilities. Strategic Management Journal, 24(10), 991–995. https://doi.org/10.1002/smj.318

Woo, C., Kim, M. G., Chung, Y., & Rho, J. J. (2016). Suppliers' communication capability and external green integration for green and financial performance in Korean construction industry. Journal of Cleaner Production, 112, 483–493. https://doi.org/10.1016/j.jclepro.2015.05.119

Wu, G. C., Ding, J. H., & Chen, P. S. (2012). The effects of GSCM drivers and institutional pressures on GSCM practices in Taiwan's textile and apparel industry. International Journal of Production Economics, 135, 618–636.

Wu, I.-L., & Chiu, M.-L. (2018). Examining supply chain collaboration with determinants and performance impact: Social capital, justice, and technology use perspectives. International Journal of Information Management, 39, 5–19. https://doi.org/10.1016/j.ijinfomgt.2017.11.004

Ying, W., Jia, S., & Du, W. (2018). Digital enablement of blockchain: Evidence from HNA group. International Journal of Information Management, 39, 1–4. https://doi.org/10.1016/j.ijinfomgt.2017.10.004

Yoo, M., & Won, Y. (2018). A study on the transparent price tracing system in supply chain management based on blockchain. Sustainability, 10(11), 4037. https://doi.org/10.3390/su10114037

Zhang, Y.-J., & Chen, M.-Y. (2018). Evaluating the dynamic performance of energy portfolios: Empirical evidence from the DEA directional distance function. European Journal of Operational Research, 269(1), 64–78. https://doi.org/10.1016/j.ejor.2017.08.008

Zhao, J. L., Fan, S., & Yan, J. (2016). Overview of business innovations and research opportunities in blockchain and introduction to the special issue. Financial Innovation, 2(1). https://doi.org/10.1186/s40854-016-0049-2

Zhu, T.-T., Peng, H.-R., & Zhang, Y.-J. (2018). The influence of higher education development on economic growth: Evidence from central China. Higher Education Policy, 31(2), 139–157. https://doi.org/10.1057/s41307-017-0047-7

RECEIVED: 31 August 2023 ACCEPTED: 13 September 2023 PUBLISHED: 06 October 2023

Ashveen Kutowaroo, Research Scholar at the University of Mauritius – Reaserch areas – Finance, International Banking and Fintech. The author has published 2 articles. He is currently involved in few projects on International banking. Address: Dhuny Lane St Paul Phoenix, Mauritius, Phone: +230 57743308, Email: akutwaroo@gmail.com

Bhavish Jugurnath, Senior Professor at the University of Mauritius. Research Areas – International Finance, Emerging technology, Smart Agriculture and Taxation. The author has already published 32 articles in Accounting, Finance and Emerging Technologies area, prepared a Book Publication 'Global Microfinance' which is currently in press by World Scientific Publishing (USA). Address: Dhuny Lane St Paul Phoenix, Mauritius, Phone: +230 52525108, Email: b.jugurnath@uom.ac.mu, ORCID ID: 0000-0002-9895-1597

Samanta Straupaite-Simonavice, PhD candidate in Educology, Head of International Relations and Projects Department and assistant at Lithuania Business College. Research area – digitalization and sustainability in ecological citizenship. The author has already published 4 articles about youth and Erasmus+ students. Address: Turgaus str. 21, Klaipėda, Lithuania, phone:+370 46 314 320, E-mail: samanta.straupaite@ltvk.lt