



Can the Blockchain Lead to New Sustainable Business Models?

Francesca Dal Mas^{1*}
Maurizio Massaro²
Juan Manuel Verde³
Lorenzo Cobiانchi⁴

1 Lincoln International Business School, University of Lincoln, Lincoln (United Kingdom)

2 Department of Management, Ca' Foscari University of Venice, Venice (Italy)

3 Institute of Image-Guided Surgery Institut Hospitalo-Universitaire (IHU) Strasbourg (France)

4 Department of Clinical-Surgical, Diagnostic and Pediatric Sciences, University of Pavia, Pavia (Italy)

** corresponding author. Email address: email.dalmas@gmail.com*

Abstract

New technologies can foster the development of new sustainable business models (SBMs). Our paper wants to investigate how the blockchain can facilitate the development of new SBMs by analyzing some real-world case studies. Findings highlight how the characteristics of the blockchain can extend existing theories in leading to new SBMs.

Introduction

New technologies and the development of new SBMs

New technologies enable economic, social, and business transformation (Cohen *et al.*, 2017). First studies focused mainly on the impact of new technologies for enhancing the organizations' competitive advantage

to increase profits and the value for the shareholders (Melville *et al.*, 2004). Later studies highlighted the need to enlarge the benefits gained with technological innovation to a new dimension, fostering sustainability. Technologies could so enhance environmental sustainability by, for instance, reducing the use of non-renewable resources, and social sustainability, by promoting equality and inclusion (Bagnoli *et al.*, 2018,

Keywords: Blockchain – Sustainable Business Models – Technologies

Please cite this paper as: Dal Mas et al. (2020), Can the Blockchain Lead to New Sustainable Business Models?, Vol. 8, No. 2, pp. 31-38

2019; Cancino *et al.*, 2018). In doing so, the need for developing new business models emerged, calling for a business model innovation (Lewandowski, 2016), and not only the creation of new sustainable products and processes.

New sustainable business models (SBMs) have the characteristics of bringing value not only to shareholders and customers but also for the whole society (Cosenz *et al.*, 2020; Massaro *et al.*, 2020), following the triple bottom line of principles of People, Planet, Profit (Wilson and Post, 2013). SBMs incorporate "concepts, principles, or goals that aim at sustainability, or integrating sustainability into their value proposition, value creation and delivery activities, and/or value capture mechanisms" (Cosenz *et al.*, 2020, p. 1). A different definition sees them as "A holistic and systemic reflection of how a company operationalizes its strategy, based on resource efficiency (through operations and production, management and strategy, organizational systems, governance, assessment and reporting, and change), so the outputs have more value and contribute to sustainability more than the inputs (with regard to material and resources that are transformed into products and services, economic value, human resources, and environmental value)" (Lozano, 2018, p. 1164).

Technological innovation may enhance sustainability both by providing a new value proposition or increasing resource efficiency (Angeles, 2019; Vafaei *et al.*, 2020). For instance, Presch *et al.* (2020) discuss how platform business models or so-called "platfirms" (Presch *et al.*, 2020) can create new SBMs through the circular economy. Dal Mas *et al.* (2020) highlight how platform business models can enhance social sustainability through data analytics by reducing decision-making biases, also in critical sectors like healthcare. Biloslavo *et al.* (2020) discuss how digital technologies and innovation can radically bring a new value proposition to organizations, turning the business model into a SBM one.

The blockchain technology and the development of new SBMs

Among the new disruptive technologies, the blockchain has been placed among the top five technology trends in 2018 (Panetta, 2018; Ruzza *et al.*, 2020). The

European Commission has defined the blockchain as "a technology that allows people and organisations to reach agreement on and permanently record transactions and information in a transparent way without a central authority" (EU, 2020). The European Union Agency for Cybersecurity has given a more technical definition, as "a public ledger consisting of all transactions taken place across a peer-to-peer network. It is a data structure consisting of linked blocks of data, e.g. confirmed financial transactions with each block pointing/referring to the previous one forming a chain in linear and chronological order. This decentralised technology enables the participants of a peer-to-peer network to make transactions without the need of a trusted central authority and at the same time relying on cryptography to ensure the integrity of transactions" (Enisa, 2020). According to the European Commission, the blockchain "has been recognised as an important tool for building a fair, inclusive, secure and democratic digital economy" which will have "significant implications for how we think about many of our economic, social and political institutions" (EU, 2020). According to Iansiti and Lakhani (2017), blockchain "has the potential to create new foundations for our economic and social systems" becoming more than a disruptive technology and fostering, therefore, the development of new business models. Following Tapscott and Tapscott (2016) blockchain is "the first native digital medium for value, just as the internet was the first native digital medium for information ... and this has big implications for business and the corporation". However, despite its implications, most of the attention on the blockchain is concentrated on its use in the crypto economy fostered by bitcoins and other cryptocurrencies. A research on the scientific database Scopus shows that while there are more than 7,500 papers published on the blockchain, only 1,100 of those focus on business management and accounting. Therefore, we argue that there is a need to foster the development of the theoretical implications of blockchain technology for the creation of new SBMs. As a brand new domain, further empirical research is needed. Thus, building on this premise, our research question (R.Q.) is:

R.Q. How can the blockchain technology facilitate the development of new SBMs?

Approach

To develop our analysis, we employ a multiple case study approach to test how the blockchain can extend the existing theories to create new SBMs. We collected data from secondary sources such as company whitepapers, investors' opinions published online, newspaper articles, corporate websites, and video interviews of the founders, managers, and experts in the field. Starting from the real-world cases, we try to identify which features of the blockchain can have an impact to foster the creation of new SBMs. Results presented in the paper are the preliminary findings of a study conducted analyzing 5,967 startups presented in the website icobench.com. From the study, a group of researchers focused on top-rated companies according to the website evaluation. A sample of 516 startups was considered. Secondary material from each company was downloaded, such as the whitepaper, investor comments, and founders' interviews.

A crucial step in multiple case study research is the selection criteria, that should be developed on the theoretical relevance of the case rather than using a statistical sampling technique (Eisenhardt, 1989). As suggested by Eisenhardt (1989), we defined a theoretical sampling approach based on a selection of cases that we believed likely to extend existing theories staying within the range of 4-10 cases suggested by Eisenhardt. Therefore, we defined a selection protocol focusing on the following key elements: 1. Clear connection with an existing theory; 2. The global value of the company to avoid companies that lost all their value from the initial quotation; 3. Availability of further documents such as funders interviews. Following that procedure, we shortlisted a group of five companies/cases.

The data analysis was developed by collecting all the material in a Nvivo database. An In Vivo Coding process was employed (Miles *et al.*, 2019). Results were then discussed among all the authors to assure reliability (Massaro *et al.*, 2019). The following sections present the key insights of the preliminary analysis.

Key Insights

Asset tokenization and stakeholders' engagement

According to Tapscott and Tapscott (2016) "at its most basic, blockchain is a vast, global distributed ledger or database running on millions of devices and open to anyone, where not just information but anything of value – money, titles, deeds, music, art, scientific discoveries, intellectual property, and even votes – can be moved and stored securely and privately". The possibility of creating unique data exchangeable through the web created what it is called the "internet of value" (Tapscott and Euchner, 2019) allowing companies to digitalize some of their assets and exchange them through the web into specific tokens. Additionally, when the assets tokenized give specific rights to the owners, they might be used to create transparent and shared decision processes, allowing stakeholders to participate in the company's decision. For example, with the specific aim to create fan engagement, some major football clubs are creating "fan tokens" to involve fans and followers in the company decision process (see: www.socios.com). Following those examples, the blockchain can support the development of more participated business models, where stakeholders are actively involved in a company's decisions, making the overall decision process more transparent and shared with external stakeholders. The blockchain allows the stakeholders' engagement formally and clearly, ensuring maximum trust. Although several other modern technologies, like the internet and smartphones, can promote participated business models, the level of trust, transparency, and the possibility to set specific rules, are indeed more rigorous in the case of the blockchain, as in the case of Socios.

Transparency and social proof

One of the main characteristics to allow asset tokenization is that the overall chain of the transaction is transparently observable (Schmitz and Leoni, 2019). Interestingly enough, this can create imitation processes. Previous studies developed in sustainable food consumption revealed that quality signals coming from other consumers work as social proof and have

a significant influence on other consumer behaviours (Sigurdsson *et al.*, 2019). Other tools, commonly used to create social proof, are experts' opinions, testimonials, accreditation badges/shields, and customer feedback (ConsumerAffairs, 2016).

Building on the "social proof theory", the company Vouchforme (see: <https://vouchforme.co/>) aims to create a transparent approach where people vouch for other drivers allowing everyone to see drivers perceived quality. The company's tokens award the backing, but car accidents caused by the endorsed person will lead to vouchers obligations. According to the company's white paper, transparency and social proof will lead to a more sustainable system that changes the insurance sector and influences drivers' behaviours. Fostering people to drive safer, Vouchforme is showing how transparency of the blockchain can be used to develop new SBMs.

Due to its transparency, blockchain technology is gaining more and more interest also in the healthcare and medicine sector. The American Food & Drug Administration (FDA) held a public meeting back in 2016 to evaluate some design objectives of potential pilot initiatives that would "explore and evaluate methods to enhance the safety and security of the pharmaceutical distribution supply chain"¹. The result was the draft of the Drug Supply Chain Security Act (DSCSA) Interoperability Pilot. The goal was to provide end-to-end transparency of the pharmaceutical supply chain, making it possible to digitally verify a drug product and its journey, as well as eliminate data siloes among supply chain actors. Thus, accreditation badges can be used to create trustworthiness and support sustainability, eliminating risks of the fake drugs trade, which is worth 10% of the total market of drugs in developing countries². A new way of managing the supply chain supports thus social sustainability. First of all, the blockchain-based business model ensures that all the pharmaceutical products in the market are not counterfeit, preserving so the health and safety of patients. The financial

aspect assures that the public, as well as private money spent, are paid for real drugs, and not wasted. Last but not least, the new business model ensures the efficacy of the distribution in case, for instance, of defected or expired products to be withdrawn from the market.

Absence of middleman and the transaction costs

The trust mechanisms provided by the blockchain technology does not require the presence of a middleman. Immutable data registered in the blockchain allow reaching a system where people trust the mechanisms. Additionally, the introduction of smart contracts within the blockchain permitted the automation of transactions. In all, the overall transaction process within the blockchain technology is developed with no need to involve an intermediary, with a significant impact in terms of transaction costs (Andreassen *et al.*, 2018). The reduction of the transaction cost and the asset tokenization will allow the development of new forms of sharing economy. For example, the company Golem.network (see: www.golem.network) offers a new approach to share unused computational power, offering, therefore, an alternative and more sustainable approach that allows utilizing unused resources.

Distribution and the democratization of entrepreneurship and innovation

Interestingly, while the sharing economy is not new (see for example Airbnb, Zipcar, and other similar services), the blockchain allows the development of a democratic process where everyone can participate, and profits are not massively retained by the middleman. In the blockchain system, the overall process is organized through "smart contracts," that allow the automation of the transaction process and the reduction of fees. Additionally, everyone can participate in the system, offering the required technology to develop the transaction, resulting in a democratization entrepreneurship process (Chen, 2018). For example, the company DAV network (see: <https://dav.network/>) offers an automatic drone delivery system. Autonomous drones need recharging stations to cover the delivery systems. Instead of building recharging stations all over the cities, DAV network uses blockchain technology to allow everyone to participate in the system. People offering recharging stations will be rewarded using tokens issued by the company creating a shared system.

¹ Source FDA at the following link <https://www.fda.gov/drugs/drug-supply-chain-security-act-dscsa/dscsa-pilot-project-program>

² See <https://www.reuters.com/article/us-pharmaceuticals-fakes/tens-of-thousands-dying-from-30-billion-fake-drugs-trade-who-says-idUSKBN1DS1XJbv>

Discussions and Conclusions

To end our paper, we want to start from the premise that inspired it. New technologies foster the creation of new SBMs by providing a new value proposition or increasing resource efficiency. The blockchain is defined as one of the most disruptive technologies, and the analysis of real-world examples from several sectors allowed us to claim how it can enhance the creation of new SBMs extending existing theories, thanks to its unique features.

The asset tokenization influences the stakeholders' engagement theory. The blockchain allows the development of participated business models, in which stakeholders can be actively involved in the organization's decision-making process. Such engagement is more trustable, clear, and rigorous, thanks to the technological features of the blockchain than other available modern technologies.

The transparency of the distributed ledger can build on the social proof theory, positively affecting the consumers' behaviour, thus leading to more sustainable approaches.

The absence of intermediaries or middlemen has an impact on transaction costs, allowing the more sustainable use of extra resources and reducing waste. The overall sharing economy is enhanced at a lower price.

As in the case of Golem.network, unused computation capacity can be shared, reducing the need to build new data elaboration centres. Differently from other solutions based on the sharing economy such as Airbnb, Golem.network works as a peer-to-peer system. The system operates automatically; the infrastructure allows to split the computational request into parallel sessions. The automation enables to reduce the transaction costs. Additionally, even though a centralized data centre might be more efficient in terms of energy consumption, it would also require a specific building and the needed plants. Therefore, even though energy consumption cannot be optimized in a distributed solution, the sharing economy has proved to be more sustainable compared to more traditional solutions.

The distribution of the ledger builds on the democratization of entrepreneurship and innovation. The possible distribution and diffusion of investments and profits allow more people to participate in the business idea offering new ways for financing startups.

The following table summarizes the blockchain's features, the theories used, the impacts on sustainability, and some real-world examples from different fields.

Further studies may investigate how the single blockchain's characteristics may enhance the development of SBMs more in details.

Blockchain characteristic	Theories used to develop new SBMs	Sustainable impacts	Examples	Sector
Asset tokenization	Stakeholder engagement	Participated business models where stakeholders can take part into companies' decisions	Socios.com	Sports and leisure
Transparency	Social proof	Consumer behaviors are driven though more sustainable approaches	Vouchforme/DSCSA Pilot	Insurance - Healthcare/Pharma
No middleman	Transaction cost	Utilization of unused resources leading to waste reduction	Golem.network	ICT
Distributed	Democratization of entrepreneurship and innovation	Distributed investments and profits allowing more people to participate the business idea	DAV network	Transportation

Table I: Blockchain characteristics, theories, and examples

References

- Andreassen, T.W., Riel, A.C.R. Van, Sweeney, J.C. and Vaerenbergh, Y. Van. (2018), "Business model innovation and value-creation : the triadic way", *Journal of Service Management*, Vol. 29 No. 5, pp. 883–906.
- Angeles, R. (2019), "Internet of Things (IOT)-Enabled Product Monitoring at Steadyserv: Interpretations From Two Frameworks", *Journal of Cases on Information Technology*, Vol. 21 No. 4, pp. 27–45.
- Bagnoli, C., Dal Mas, F. and Massaro, M. (2019), "The 4th Industrial Revolution and its features. Possible business models and evidence from the field", *International Journal of E-services and Mobile applications*, Vol. 11 No. 3, pp. 34–47.
- Bagnoli, C., Massaro, M., Dal Mas, F. and Demartini, M. (2018), "Defining the concept of business model: Searching for a business model framework", *International Journal of Knowledge and Systems Science*, Vol. 9 No. 3, pp. 48–64.
- Biloslavo, R., Bagnoli, C., Massaro, M. and Cosentino, A. (2020), "Business Model Transformation Toward Sustainability: The Impact of Legitimation", *Management Decision*, Vol. In Press.
- Cancino, C.A., La, A.I., Ramaprasad, A. and Syn, T. (2018), "Technological innovation for sustainable growth : An ontological perspective", *Journal of Cleaner Production*, Vol. 179, pp. 31–41.
- Chen, Y. (2018), "Blockchain tokens and the potential democratization of entrepreneurship and innovation", *Business Horizons*, "Kelley School of Business, Indiana University", Vol. 61 No. 4, pp. 567–575.
- Cohen, B., Amorós, J.E. and Lundy, L. (2017), "The generative potential of emerging technology to support startups and new ecosystems", *Business Horizons*, Vol. 60 No. 6, pp. 741–745.
- ConsumerAffairs. (2016), *The Top 5 Tools for Social Proof. And why they matter now more than ever.*, available at: www.consumeraffairs.com/brands.
- Cosenz, F., Rodrigues, V.P. and Rosati, F. (2020), "Dynamic business modeling for sustainability: Exploring a system dynamics perspective to develop sustainable business models", *Business Strategy and the Environment*, Vol. 29 No. 2, pp. 651–664.
- Dal Mas, F., Piccolo, D. and Ruzza, D. (2020), "Overcoming cognitive bias through intellectual capital management . The case of pediatric medicine .", in Ordonez de Pablos, P. and Edvinsson, L. (Eds.), *Intellectual Capital in the Digital Economy*, Routledge, London.
- Eisenhardt, K.M. (1989), "Building Theories From Case Study Research", *The Academy of Management Review*, Vol. 14 No. 4, pp. 532–550.
- Enisa. (2020), "Blockchain", *Csirts in Europe, glossary*, available at: <https://www.enisa.europa.eu/topics/csirts-in-europe/glossary/blockchain> (accessed 25 May 2020).
- EU. (2020), "Blockchain Technologies", *Shaping Europe's digital future*, available at: <https://ec.europa.eu/digital-single-market/en/blockchain-technologies> (accessed 25 May 2020).
- Iansiti, M. and Lakhani, R.K. (2017), "The Truth About Blockchain", *Harvard Business Review*, No. January-February, pp. 1–17.

- Lewandowski, M. (2016), "Designing the Business Models for Circular Economy – Towards the Conceptual Framework", *Sustainability*, Vol. 43 No. 8, pp. 1–28.
- Lozano, R. (2018), "Sustainable business models: Providing a more holistic perspective", *Business Strategy and the Environment*, Vol. 27 No. 8, pp. 1159–1166.
- Massaro, M., Dal Mas, F., Chiappetta Jabbour, C.J. and Bagnoli, C. (2020), "Crypto-economy and new sustainable business models: Reflections and projections using a case study analysis", *Corporate Social Responsibility and Environmental Management*, Vol. in press, doi:10.1002/csr.1954.
- Massaro, M., Dumay, J. and Bagnoli, C. (2019), "Transparency and the rhetorical use of citations to Robert Yin in case study research", *Meditari Accountancy Research*, pp. 44–71.
- Melville, N., Kraemer, K. and Gurbaxani, V. (2004), "Review: Information technology and organizational performance: An integrative model of it business value", *MIS Quarterly: Management Information Systems*, Vol. 28 No. 2, pp. 283–322.
- Miles, M.B., Huberman, A.M. and Saldana, J. (2019), *Qualitative Data Analysis A Methods Sourcebook*, SAGE Publications Inc., Newbury Park, 4th ed.
- Panetta, K. (2018), *5 Trends Emerge in the Gartner Hype Cycle for Emerging Technologies, 2018 - Smarter With Gartner, Gartner*.
- Presch, G., Dal Mas, F., Piccolo, D., Sinik, M. and Cobianchi, L. (2020), "The World Health Innovation Summit (WHIS) platform for sustainable development. From the digital economy to knowledge in the healthcare sector", in Ordonez de Pablos, P. and Edvinsson, L. (Eds.), *Intellectual Capital in the Digital Economy*, Routledge, London.
- Ruzza, D., Dal Mas, F., Massaro, M. and Bagnoli, C. (2020), "The role of blockchain for intellectual capital enhancement and business model innovation", in Ordonez de Pablos, P. and Edvinsson, L. (Eds.), *Intellectual Capital in the Digital Economy*, Routledge, London.
- Schmitz, J. and Leoni, G. (2019), "Accounting and Auditing at the Time of Blockchain Technology: A Research Agenda", *Australian Accounting Review*, Vol. 29 No. 2, pp. 331–342.
- Sigurdsson, V., Magne Larsen, N., Alemu, M.H., Karlton Gallogly, J., Menon, R.G.V. and Fagerstrøm, A. (2019), "Assisting sustainable food consumption: The effects of quality signals stemming from consumers and stores in online and physical grocery retailing", *Journal of Business Research*.
- Tapscott, D. and Euchner, J. (2019), "Blockchain and the Internet of Value", *Research-Technology Management*, Vol. 62 No. 1, pp. 12–19.
- Tapscott, D. and Tapscott, A. (2016), "The Impact of the Blockchain Goes Beyond Financial Services", *Harvard Business Review*, Vol. 10, p. 7.
- Vafaei, A., Yaghoubi, S., Tajik, J. and Barzinpour, F. (2020), "Designing a sustainable multi-channel supply chain distribution network: A case study", *Journal of Cleaner Production*, Vol. 251, p. 119628.
- Wilson, F. and Post, J.E. (2013), "Business models for people, planet (& profits): Exploring the phenomena of social business, a market-based approach to social value creation", *Small Business Economics*, Vol. 40 No. 3, pp. 715–737.

About the Authors

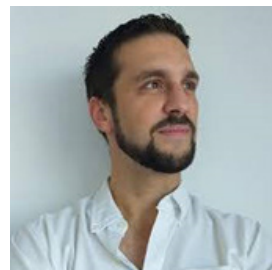
Francesca Dal Mas, MSc, JD, PhD is a Lecturer in Strategy and Enterprise at the Lincoln International Business School of the University of Lincoln, UK. Her research interests include the impact of new technologies on sustainable business models, knowledge management, and knowledge translation. She is a member of the Editorial Advisory Board of JOBIM.



Maurizio Massaro, MSc, PhD is an Associate Professor in Digital Management and Control at the Department of Management of the Ca' Foscari University of Venice. His research interests include the impact of new technologies on sustainable business models, innovation, and knowledge management. He is the Scientific Chief of the MIKE – Most Innovative Knowledge Enterprise Award for Italy.



Juan Manuel Verde, MD, MS is an Associate Researcher in Surgical Innovation and Image-Guided liver procedures at the Institute of Image-Guided Surgery Institut Hospitalo-Universitaire (IHU) of Strasbourg, France. His research interests include the impact of disruptive technologies in the field of minimally-invasive and image-guided hepatobiliary surgery. He is also interested in the use of blockchain technology in healthcare.



Lorenzo Cobianchi, MD, PhD is an Associate Professor in General Surgery at the Department of Clinical-Surgical, Diagnostic and Pediatric Sciences at the University of Pavia, Italy. Besides his clinical research topics about minimally-invasive surgery, oncology, new integrated approaches for the treatment of pancreatic cancer and regenerative medicine, he is interested in the impact of new technologies on surgery and healthcare, knowledge translation, and co-production in medicine and surgery.

