E/B/R ECONOMIC AND BUSINESS REVIEW

Volume 24 | Issue 2 Article 5

June 2022

Will Blockchain Really Impact Your Business Model? Empirical Evidence from Slovenian SMEs

Horst Treiblmaier
Modul University, Vienna, Austria, horst.treiblmaier@modul.ac.at

Žan Špan
University of Vienna, Master Student, Vienna, Austria

Recommended Citation

Treiblmaier, H., & Špan, Ž. (2022). Will Blockchain Really Impact Your Business Model? Empirical Evidence from Slovenian SMEs. *Economic and Business Review, 24*(2), 132-140. https://doi.org/10.15458/2335-4216.1302

ORIGINAL ARTICLE

Will Blockchain Really Impact Your Business Model? Empirical Evidence from Slovenian SMEs

Horst Treiblmaier [a,*], Žan Špan [b]

[a] Modul University, Vienna, Austria
[b] University of Vienna, Master Student, Vienna, Austria

Abstract

In this paper, we use the widely popular business model canvas, which was previously adapted for the blockchain environment, to assess the experiences and perceptions of Slovenian small and medium-sized companies (SMEs) pertaining to blockchain technologies. The results reveal that SMEs expect applications built on blockchain technologies to have a highly positive effect on numerous aspects of their business model. This positive evaluation is even stronger among companies that already have experience with blockchain technologies.

Keywords: Blockchain, Distributed ledger technology, Business model canvas, Survey

JEL classification: M00, O32, L00

1 Blockchain evolution and controversies

The emergence of blockchain caused a brief but turbulent technological evolution that has lasted for several years and witnessed numerous heated debates, featuring widely conflicting opinions that frequently reveal an insufficient understanding of the underlying concepts, technologies, and potentials. Contrary to widespread belief, blockchain neither manifested itself first in Bitcoin nor is it a uniform technology that can be easily defined. The development of the fundamental building blocks of blockchain, such as linked time-stamping, digital cash, proof of work, byzantine fault tolerance, public keys as identities, and smart contracts (Narayanan & Clark, 2017), preceded Bitcoin by a couple of decades. An early application of a blockchain can be witnessed in the New York Times, which has published a chronological chain of hashed data invented by cryptographers Haber and Stornetta since 1995 (Oberhaus, 2018). The cryptocurrency Bitcoin made a giant leap in 2009 by enabling the sharing of value via the internet, but it was not until the middle of the following decade that seminal publications began to identify numerous business applications of blockchain that span industry sectors as diverse as finance, energy, healthcare, transportation, entertainment, tourism, and public governance (Swan, 2015). During the following hype, blockchain was alternatively praised as a "revolution" (Tapscott & Tapscott, 2016) or condemned as "one of the most overhyped technologies ever" (Roubini as cited in Kharpal, 2018).

Blockchain technology was quite often considered as some single technology in this debate rather than the aforementioned combination of technologies (and several others) that allow for the creation of various types of distributed ledgers with different characteristics. The objects of investigation should therefore be the features that are created by a given combination and their impact on business processes and the economy in general. Additionally, controversy persists regarding which features blockchain applications must have. Some argue that truly innovative blockchain solutions need to be public and permissionless ledgers that create trust through the network rather than having dedicated entities to validate transactions (Antonopoulos, 2017), while

Received 14 March 2021; accepted 19 May 2021.
Available online 1 June 2022.

* Corresponding author.
E-mail addresses: horst.treiblmaier@modul.ac.at (H. Treiblmaier), zan.span1@gmail.com (Ž. Špan).

https://doi.org/10.15458/2335-4216.1302

business can also reap benefits by creating shared applications that are managed by a trusted consortium (Lacity, 2020). In light of this debate and the constant technological progress that regularly augments different layers of the blockchain technologies stack, which consists of the internet, blockchain protocol, application layer (e.g. smart contracts), and the user experience, we refrain from referring to specific implementations in this paper and rather focus on the underlying characteristics that can be enabled by blockchain applications such as immutability, transparency, programmability, decentralisation, and distributed trust (Treiblmaier, 2019).

2 Predicting and assessing the impact of blockchain

The growing interest in blockchain and the proliferation of creative application scenarios have triggered a need to embed the technology within broader frameworks, models, and theories that enable the systematic and critical assessment of its impact for SMEs (Morgan-Thomas, 2016). Such frameworks can be of an academic nature and allow for the application of well-accepted academic theories such as principal agent theory, transaction cost theory, resource-based view of the firm, or network theory (Treiblmaier, 2018). Other frameworks have more applied roots such as value analysis for blockchain adoption (Angelis & Ribeiro da Silva, 2019) or straightforward decision trees to answer the question of whether or not to adopt blockchain in the first place (Pedersen et al., 2019). One of the most prominent frameworks to comprehensively visualize and assess a business' building blocks is the business model canvas, which consists of nine boxes that describe a company's infrastructure (key activities, key resources, key partners), market offering (value proposition), customers (customer segments, customer relationships, channels), and financial situation (cost structure, revenue stream) (Osterwalder & Pigneur, 2010). The business model canvas has previously been identified as an important tool for entrepreneurship education (Sarooghi et al., 2019; Thrane et al., 2016). As can be seen in Fig. 1, this tool was modified by Morkunas et al. (2019) to account for the idiosyncrasies of blockchain technologies. In their paper, they detail how blockchain technologies can impact each of the nine building blocks of the business model canvas and conclude with several important questions that managers and executives should ask themselves when evaluating the business case for blockchain adoption. These questions include, amongst others, the value contribution of blockchain, its fit with an organisation's strategy and goals, the existing resources, the impact on current business relationships, the overall value proposition, and the integration with existing ecosystems. In this paper, we put the proposed framework to the test by empirically assessing the experiences and expectations of SMEs.

3 Blockchain experiences and perceptions of Slovenian SMEs

According to the European Commission (2019), SMEs account for 64.5% of value added and 72% of employment in the Slovenian economy. From 2014 to 2018, Slovenian SMEs' value added rose by 33.5%, which exceeded the growth of large firms (30.8%). Additionally, the report points out that the

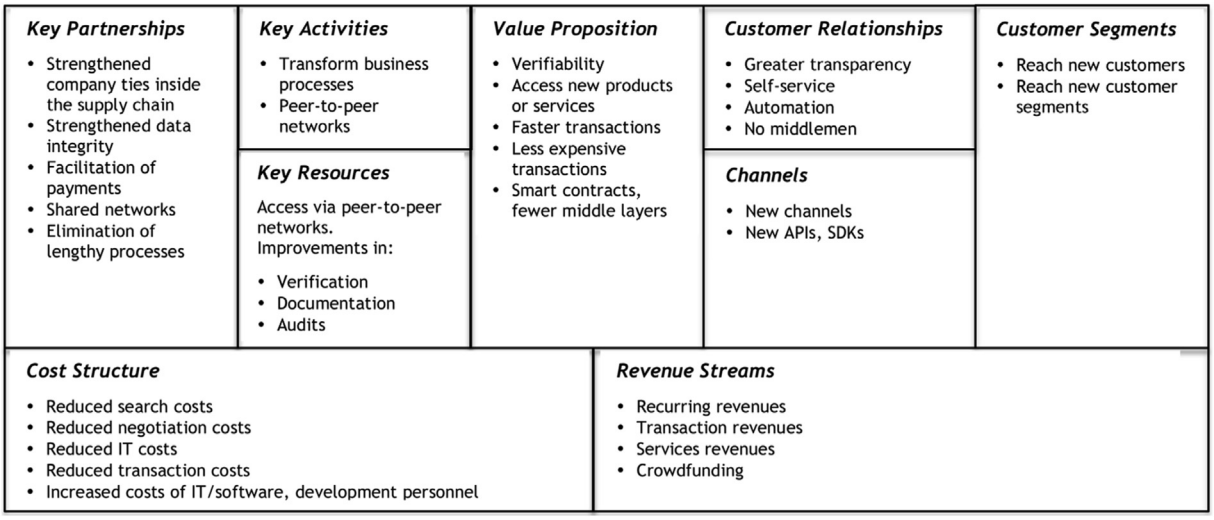

Fig. 1. Blockchain and the business model canvas. Source: Morkunas et al., 2019; Osterwalder & Pigneur, 2010.

"professional, scientific, and technical activities sector has generated consistent strong growth" and that "many Slovenian firms have successfully scaled up their operations in recent years" (p. 3). Given the small size of the country and its relatively homogenous structure, the Slovenian market therefore provides an ideal testbed to scrutinize the adoption of novel technologies and their economic impact on SMEs. Furthermore, restricting our sample to one specific country eliminates distortions that may arise from external contingency factors such as national policies and legislation.

In order to select appropriate sampling units, a list of organisations was selected from an online portal that serves as a platform that makes Slovenian SMEs visible for clients as well as partners. The portal includes companies from all industries and covers the whole territory of Slovenia. The survey was administered via e-mail to 200 randomly selected small and medium-sized companies in August and September 2020. Each of the firms on the list was contacted individually, and follow-up phone calls were conducted to ensure a high rate of participation.

A total of 118 companies filled out the survey, resulting in a response rate of 59%. The majority of them are in manufacturing (71), followed by transportation and logistics (32), financial services (10), and commerce (5). 38 of the responding companies have 5 or fewer employees, 63 have 6 to 10 employees, and 17 report having 11 or more employees. Additionally, we asked about prior experience with blockchain technologies. 19 out of the 118 responding companies indicated that they have previous experience with blockchain, which means that they have either already implemented applications or are currently in the process of doing so. We asked firms to indicate their level of agreement with a number of statements on a Likert-type scale ranging from 1 to 5 (1: "strongly agree", 2: "agree", 3: "neutral", 4: "disagree", 5: "strongly disagree"). The respective items correspond closely to the criteria suggested by Morkunas et al. (2019) with only minor changes made to achieve greater clarity and understandability following an initial pretesting. The findings are discussed in some detail in the subsequent sections, and the items within each section are ordered by descending level of agreement. Additionally, we compare the answers for all items between those companies that have experience with blockchain and those that do not. In order to account for the differences in sample size, the significance tests conducted (i.e. Welch's t-test) did not assume equal variances.

3.1 Key partnerships

One of the most frequently mentioned features of blockchain technology is its ability to transform basic market structures by enabling P2P (peer-to-peer) networks that can function without dedicated intermediaries. However, this does not mean that trust becomes obsolete; instead, it simply shifts from powerful intermediaries toward other entities, such as the majority of network nodes, programmers of smart contracts, or a consortium. As is the case in the following sections, the average perceptions of the SMEs were positive for all of the items (a mean value of >3 would indicate a negative sentiment), and the perception of those SMEs with blockchain experience was more positive than that of the SMEs without any prior involvement. As can be seen in Table 1, this difference is statistically significant for all of the items. The most-valued property of blockchain turns out to be the facilitation of payments, which is presumably regarded as the best-proven use case of a blockchain application due to the widespread popularity of Bitcoin. Additionally, the SMEs value blockchain for its ability to tighten relationships in supply chains through the removal of intermediaries and facilitation of communication by shared access to data (Saberi et al., 2019). Shared ledgers also foster the integrity of data, which can either be tamper evident (i.e. any tampering will be noticed) or tamper proof (i.e. an object cannot be tampered with). The SMEs were most sceptical about blockchain's potential to eliminate lengthy processes as is widely predicted in supply chains through the removal of paperwork; again, scepticism of this claim was higher among companies without blockchain experience than among those with previous experience.

Table 1. The impact of blockchain on key partnerships.

	total sample	bc exp	no bc exp	sig
Blockchain facilitates payments.	1.47 (.64)	1.00 (.00)	1.56 (.66)	<.01
Blockchain creates tighter relationships within the supply chain.	1.72 (.80)	1.00 (.00)	1.86 (.81)	<.01
Blockchain serves as a shared communication network between actors in the supply chain.	2.06 (.95)	1.05 (.23)	2.25 (.91)	<.01
Blockchain improves data integrity.	2.15 (.97)	1.00 (.00)	2.37 (.90)	<.01
Blockchain eliminates lengthy processes.	2.77 (1.10)	1.32 (.48)	3.05 (.95)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

3.2 Key activities

Key activities encompass actions that a company performs to provide value to its consumers. In this respect, blockchain promises the transformation of existing relationships, most notably by substituting traditional hierarchical structures with P2P networks in which information flows are not controlled and filtered by traditional intermediaries (see Table 2). Instead, new types of intermediaries will emerge and take over new roles in blockchain-based economic transactions (Zamani & Giaglis, 2018). All participating companies regard blockchain to be an enabler for the creation of peer-to-peer networks. Additionally, there is a strong level of agreement that blockchain will substantially transform the way that business is conducted in the future, however, this confidence is significantly higher among companies with blockchain experience than those without blockchain experience.

3.3 Key resources

Key resources, which may be physical, financial, intellectual, or human, constitute the underlying foundation for creating value, reaching out to markets, maintaining customer relationships, and, ultimately, earning revenues (Morkunas et al., 2019). In this respect, the core strength of blockchain is its capability to create data records that are tamper proof or at least tamper evident, which facilitates auditing, documentation, and verification. Taking this one step further, the trusted third-party auditor can be replaced by a smart contract that runs on a decentralized network (Fan et al., 2020). As can be seen in Table 3, key resources is the business canvas building block for which the gap between blockchain-experienced and inexperienced companies is the biggest. While the former strongly agree that this technology constitutes an important key resource, the latter are more sceptical in their assessment.

3.4 Value proposition

A company's value proposition comprises activities that create value for its customers. Enhanced verifiability is especially important for supply chain management, since it helps to create trusted systems. In food supply chains, for example, it might turn out to be a key enabler to create transparency and to get consumers actively involved (Rejeb, Keogh, Zailani, et al., 2020). The application of blockchain in the supply chain has been predicted to reduce numerous types of risks, including financial risk through origin assurance, psychological and social risks through authenticity assurance, functional risk through custody assurance, and physical risk through integrity assurance (Montecchi et al., 2019). In a similar vein, smart contracts can automate and facilitate business processes; quicker and cheaper transactions help businesses to offer their services at a lower cost and thereby stay

Table 2. The impact of blockchain on key activities.

	total sample	bc exp	no bc exp	sig
Blockchain enables the establishment of peer-to-peer networks.	1.00 (.00)	1.00 (.00)	1.00 (.00)	n/a
Blockchain implementation is followed by a transformation of business processes.	1.14 (.34)	1.00 (.00)	1.16 (.37)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

Table 3. The impact of blockchain on key resources.

	total sample	bc exp	no bc exp	sig
Blockchain makes audits easier.	2.32 (.93)	1.05 (.23)	2.57 (.81)	<.01
Blockchain offers enhanced documentation practices.	2.35 (.91)	1.11 (.32)	2.59 (.78)	<.01
Blockchain enhances and facilitates the process of verification.	2.37 (.95)	1.00 (.00)	2.64 (.80)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

Table 4. The impact of blockchain on value propositions.

	total sample	bc exp	no bc exp	sig
Blockchain technologies offer enhanced verifiability.	1.16 (.37)	1.00 (.00)	1.19 (.40)	<.01
Blockchain technology enables quicker and cheaper transactions.	1.17 (.38)	1.00 (.00)	1.20 (.40)	<.01
By using smart contracts, organisations have less of a need for third parties serving as intermediaries.	1.54 (.69)	1.05 (.23)	1.64 (.71)	<.01
By implementing blockchain, organisations can benefit from access to new services and products.	2.09 (.80)	1.58 (.69)	2.19 (.78)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

competitive. The data in Table 4 illustrate that there is a high level of agreement among SMEs regarding these potentials. Their assessment of whether organisations will be able to benefit from access to new services and products is more reserved, particularly among companies with no prior blockchain experience.

3.5 Customer relationships

From a customer relationship perspective, blockchain has been predicted to reinforce trust and transparency, enhance privacy protection, empower digital marketing security, and enable creative loyalty programs (Rejeb, Keogh & Treiblmaier, 2020). As can be seen in Table 5, on average the companies acknowledge blockchain's potential to create and strengthen customer relationships as evidenced by the more positive evaluations from those companies that have already gained some experience with blockchain. Transparency can be increased by allowing customers access to share data stored on a distributed ledger. This does not necessarily mean that all data must be made accessible, but dedicated roles can be assigned that allow consumers to access those data that are relevant for them. The emergence of customer relationship management has led to highly complex processes that can be automated through the use of sophisticated software applications. In this regard, blockchain can enable data marketplaces in which consumers not only control their own personal data, but can also capitalize on the use of such data (Travizano et al., 2020). As opposed to companies without blockchain experience, those with this experience are considerably more convinced that blockchain will lead to the demotion of third-party providers of customer relationship management services. The same is true for the introduction of self-service options, which might include the aforementioned management of consumers' own personal data.

3.6 Channels

Companies reach their customers via a multitude of different channels, which might be online or offline. Table 6 shows that the interview partners strongly believe that blockchain technologies enable new communication channels. Once again, this can be seen as a consequence of removing intermediaries, which might open up new opportunities for companies to directly get in touch with their customers. Another consequence of this development might be that the relevant data is stored and analysed at the conversation or transaction endpoints, otherwise known as customers and companies, rather than being used by powerful intermediaries to build their own business models on these data. By facilitating participation in development projects via application programming interfaces (APIs) and software development kits (SDKs) (Morkunas et al., 2019), companies can relatively easily join sophisticated ecosystems that open up new channels for them.

3.7 Customer segments

A customer segment refers to a relatively homogenous group that can be differentiated by common characteristics so that it can be addressed via a specific marketing strategy and channel. It is especially the payment potentials of blockchain, often referred to as payment tokens or cryptocurrencies, that are predicted to facilitate access to global

Table 5. The impact of blockchain on customer relationships.

	total sample	bc exp	no bc exp	sig
Blockchain offers more transparency for customers.	2.05 (.89)	1.11 (.32)	2.23 (.86)	<.01
Blockchain allows for the automation of multiple processes in customer relationship management.	2.06 (.88)	1.26 (.45)	2.21 (.86)	<.01
Blockchain reduces the need for third-party service providers.	2.36 (.99)	1.21 (.42)	2.58 (.92)	<.01
Blockchain introduces self-service options in customer relationship management.	2.62 (.84)	1.84 (.69)	2.77 (.78)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

Table 6. The impact of blockchain on channels.

	total sample	bc exp	no bc exp	sig
Implementing blockchain technologies establishes new channels of communication.	1.19 (.43)	1.00 (.00)	1.22 (.46)	<.01
Blockchain allows the development of new APIs and SDKs.	1.99 (.77)	1.47 (.51)	2.09 (.77)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

commerce for billions of unbanked and underbanked people all over the world. Additionally, blockchain might also turn out to be a viable means to address customer groups that have specific privacy concerns or are interested in capitalizing on the use of their personal data (Travizano et al., 2020). Finally, blockchain technologies can also trigger innovative product and service offerings that might appeal to new customer segments. Table 7 illustrates an overall positive agreement of all companies and, once again, those companies that are experienced in blockchain express a higher level of agreement than those that have not yet tried out the technology.

3.8 Cost structure

Companies face a huge number of different costs in operating their business model. Blockchain is frequently touted as a means to reduce costs in general, but a more differentiated perspective is advisable. The results in Table 8 reveal that there is overwhelming agreement from all companies, independent of whether they have blockchain experience or not, that blockchain is a suitable means to reduce transaction costs. This is in line with its potential to facilitate processes, to automate or simplify transactions, and to reduce costs associated with negotiations and searching for resources, which are predicted in conceptual studies (Treiblmaier, 2018). At the same time, there is widespread agreement that the introduction of blockchain solutions necessitates heavy investment in both IT/software and personnel development. Consequently, all companies agree that the introduction of blockchain actually increases IT costs. In summary, SMEs perceive that substantial initial investments are needed to later reap the financial benefits of blockchain-based solutions.

3.9 Revenue streams

Revenue streams include the inflow of proceeds from customers, which can be split into one-time payments or recurring revenues. Again, it is the removal of intermediaries that companies perceive as the major driver of increased transaction revenues (see Table 9). Additionally, our survey data also confirm the overall positive perception of SMEs in regard to the opportunity to increase service revenues through blockchain technologies. This especially pertains to offerings that cannot be offered without relying on distributed ledgers, as is the case when specific privacy and security options or the monetisation of personal data are concerned. Additionally, blockchain-based technologies can be used to raise capital with relative ease as

Table 7. The impact of blockchain on customer segments.

	total sample	bc exp	no bc exp	sig
Blockchain enables companies to reach new customers.	2.25 (.96)	1.11 (.32)	2.46 (.88)	<.01
Blockchain allows companies to reach new customer segments.	2.45 (1.01)	1.26 (.45)	2.68 (.92)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

Table 8. The impact of blockchain on cost structures.

	total sample	bc exp	no bc exp	sig
Blockchain reduces transaction costs.	1.00 (.00)	1.00 (.00)	1.00 (.00)	n/a
Blockchain increases the costs of IT/software and personnel development*.	1.47 (.72)	1.00 (.00)	1.57 (.76)	<.01
Blockchain reduces negotiation costs.	1.87 (.87)	1.00 (.00)	2.04 (.86)	<.01
Blockchain reduces the costs for searching for resources.	2.33 (.97)	1.21 (.42)	2.55 (.90)	<.01
Blockchain reduces Information Technology costs.	4.03 (1.02)	2.95 (1.31)	4.23 (.81)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience
* Reverse coding.

Table 9. The impact of blockchain on revenue streams.

	total sample	bc exp	no bc exp	sig
Blockchain increases transaction revenues as it eliminates the need for intermediaries.	1.22 (.42)	1.00 (.00)	1.26 (.44)	<.01
Blockchain has the potential to increase service revenues.	1.85 (.87)	1.11 (.32)	1.99 (.87)	<.01
Blockchain introduces new options for crowdfunding.	2.62 (.89)	1.47 (.61)	2.84 (.75)	<.01
Blockchain enables or increases recurring revenues via license agreements and system subscriptions.	2.79 (.99)	1.26 (.45)	3.08 (.78)	<.01

Note: 1: "strongly agree" … 5: "strongly disagree"
bc exp: blockchain experience … no bc exp: no blockchain experience.

demonstrated by the emergence of the so-called initial coin offerings (ICOs) (Bogusz et al., 2020) that were soon followed by more strictly regulated ways of fundraising such as equity token offerings (ETOs) and security token offerings (STOs) (Kranz et al., 2019). Finally, recurring revenues can be simplified through the deployment of smart contracts that allow for the automated execution of pre-defined contractual clauses. Once again, all of these options are very positively assessed by those companies that exhibit blockchain competence. Those without such experience see the main potential in eliminating intermediaries and increasing service revenues and are rather sceptical about crowdfunding opportunities and recurring revenues.

4 An overall assessment of blockchain technologies

The results of our analyses are summarised in Fig. 2. To provide a non-distorted picture, the full range of the scale is shown from "strongly agree" at the centre of the circle to "strongly disagree" at the outer circumference. Our findings illustrate an inherently positive attitude of SMEs toward blockchain technology. Interestingly, this attitude is even more positive for those companies that have blockchain experience (inner blue ring), ranging in value from 1.00 (key activities) to 2.23 (cost structure, taking into account the reverse coding of cost increases in software and personnel development). Those SMEs without blockchain experience (outer orange ring) show a more negative attitude, but it is noteworthy that their range of answers is also highly optimistic, ranging from 1.08 (key activities) to 2.67 (cost structure). As we have shown in the tables above, almost all of the differences between these two groups are statistically significant. Interestingly, all the assessments were positive with the exception of a general agreement that blockchain implementations increase IT costs in general and software and personnel development in particular as well as the critical assessment by blockchain-inexperienced companies of blockchain's potential to reduce the time needed to conduct lengthy processes.

5 The road ahead

This is one of the first quantitative empirical surveys that assesses the perception of blockchain technologies using a representative sample of companies. In our survey, we focus on Slovenian SMEs to eliminate the impact of external contingency factors such as national legislation or funding policies. We especially consider the specific needs of small and medium-sized companies and evaluate the general sentiment toward the deployment of blockchain by using a relatively homogeneous sample. The application of the blockchain business model framework helped us to explore the suitability of a tool that is widely recognised among academics and practitioners. Based on these

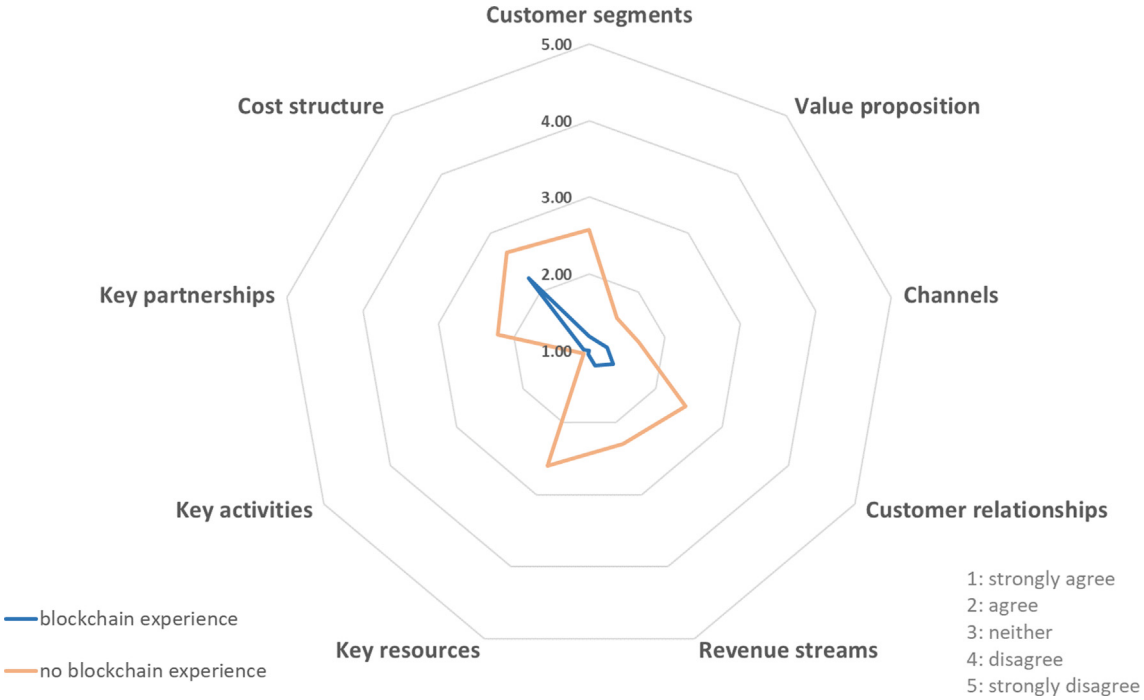

Fig. 2. Assessment of blockchain's potential to impact key business areas.

findings, we encourage future empirical studies that further investigate whether blockchain adoption helps companies to become and remain successful and if our findings hold across national borders. Additionally, future studies might be based on more objective measurements such as Return on Investment (RoI) rather than relying on self-reported perceptual data.

In summary, three major findings emerge from this study; namely, the suitability of the business model framework, the overall positive assessment of SMEs, and the more favourable assessment of companies with blockchain experience as opposed to those without said experience.

5.1 Suitability of the framework

The framework proposed by Morkunas et al. (2019) turns out to be an appropriate means of comprehensively evaluating the impact of blockchain on companies' business models. The underlying business model canvas from Osterwalder and Pigneur (2010) enjoys widespread recognition as a tool that can be used to systematically assess all major components of a company's business model. By integrating nine essential elements, each of which can be assessed with just a couple of key questions, a company's infrastructure, financial situation, customers, and value proposition can be easily summarised. Since the deployment of blockchain-based applications is expected to impact all of these areas simultaneously, it is necessary to adapt the assessment criteria to specifically focus on changes that are triggered by blockchain technologies.

5.2 Positive assessment of blockchain through SMEs

This study was undertaken in the middle of the year 2020, at a time when the blockchain hype that started around 2015 had already waned and only a few fully-functioning applications were available. We consider this to be an ideal time to evaluate the current mood toward a technology that is predicted to disrupt countless industries and has also faced sharp criticism. One of the most striking results of our study was the consistently positive assessment of all companies regarding the impact of blockchain on their business model. With the exception of non-experienced companies that doubted the elimination of lengthy processes and a critical stance taken by all companies toward the costs that are needed to deploy blockchain solutions, all of the evaluations were positive as indicated by scores below the threshold of 3, which represents a neutral evaluation. This is especially noteworthy given that the current sentiment in the media toward blockchain technology is still equivocal and the lack of widely accepted reference applications that could showcase important use cases to companies.

5.3 Previous blockchain experience leads to a more positive assessment

One of the most outstanding findings of our research was that the evaluation and the expectations of those companies that had already tried out blockchain technologies was consistently better than those of inexperienced companies. This held for all of the items that we used for our assessment except for the two questions in which all participating companies expressed full agreement and the statement that the deployment of blockchain leads to increased software, IT, and personnel development costs. Even though the number of companies with blockchain experience was substantially smaller than the number with no experience (19 as opposed to 99), our findings that experience improves perceptions support the notion of blockchain as a promising game changer.

In conclusion, our empirical findings indicate that blockchain technologies are perceived as positively affecting all core components of a business model despite increasing certain cost categories during adoption. Perhaps even more importantly, the experiences of early blockchain adopters appear to boost optimism about these positive impacts. However, two caveats remain. Firstly, the technology is still at an early stage, and expectations might be exaggerated and therefore be in a position to positively bias the assessment of those who already have solutions that are up and running. Secondly, blockchain is a very broad term that is inconsistently defined and comprises a lot of different concepts and respective implementations. In a narrow sense, blockchain consists of protocols and algorithms that establish distributed consensus on public ledgers. Many of the features that are included in the blockchain canvas are not core characteristics of the technology, but rather implemented in applications that are based on distributed ledgers. It is therefore not a specific technology that we used as a blueprint for our study, but rather the sum total of all existing and future implementations, with each having its own offerings and shortcomings. Future studies need to be specific about the idiosyncrasies of a particular application and how exactly it can shape a company's existing business model or even trigger the invention of new ones. By fully understanding how this technology can impact business models, companies will be in a much better position to purposefully select those applications that they

actually need. As we have shown in this study, the sentiment of SMEs in 2020 is fairly positive and expectations are still high, which provides fertile ground to develop and deploy applications that provide actual business value. Academia is called upon to contribute to this development by offering tools that can assess the actual business value of the (proposed) use cases.

References

Angelis, J., & Ribeiro da Silva, E. (2019). Blockchain adoption: A value driver perspective. *Business Horizons, 62*(3), 307–314. https://doi.org/10.1016/j.bushor.2018.12.001

Antonopoulos, A. M. (2017). *The internet of money volume two: A collection of talks by Andreas M. Antonopoulos* (1st ed.). Merkle Bloom LLC.

Bogusz, C. I., Laurell, C., & Sandstrom, C. (2020). Tracking the digital evolution of entrepreneurial finance: The interplay between crowdfunding, blockchain technologies, cryptocurrencies, and initial coin offerings. *IEEE Transactions on Engineering Management, 67*(4), 1099–1108. https://doi.org/10.1109/TEM.2020.2984032

European Commission. (2019). *2019 SBA fact sheet: Slovenia* (pp. 1–24). European Commission Directorate.

Fan, K., Bao, Z., Liu, M., Vasilakos, A. V., & Shi, W. (2020). Dredas: Decentralized, reliable and efficient remote outsourced data auditing scheme with blockchain smart contract for industrial IoT. *Future Generation Computer Systems, 110*, 665–674. https://doi.org/10.1016/j.future.2019.10.014

Kharpal, A. (2018, March 6). *Blockchain is "one of the most overhyped technologies ever," Nouriel Roubini says.* CNBC. https://www.cnbc.com/2018/03/06/blockchain-nouriel-roubini-one-of-the-most-overhyped-technologies-ever.html

Kranz, J., Nagel, E., & Yoo, Y. (2019). Blockchain token sale. *Business & Information Systems Engineering, 61*(6), 745–753.

Lacity, M. C. (2020). *Blockchain foundations: For the internet of value* (1st ed.). Epic Books.

Montecchi, M., Plangger, K., & Etter, M. (2019). It's real, trust me! Establishing supply chain provenance using blockchain. *Business Horizons, 62*(3), 283–293. https://doi.org/10.1016/j.bushor.2019.01.008

Morgan-Thomas, A. (2016). Rethinking technology in the SME context: Affordances, practices and ICTs. *International Small Business Journal, 34*(8), 1122–1136. https://doi.org/10.1177/0266242615613839

Morkunas, V. J., Paschen, J., & Boon, E. (2019). How blockchain technologies impact your business model. *Business Horizons, 62*(3), 295–306. https://doi.org/10.1016/j.bushor.2019.01.009

Narayanan, A., & Clark, J. (2017). Bitcoin's academic pedigree. *Communications of the ACM, 60*(12), 36–45. https://doi.org/10.1145/3132259

Oberhaus, D. (2018). *The world's oldest blockchain has been hiding in the New York Times since 1995*. Vice. https://www.vice.com/en/article/j5nzx4/what-was-the-first-blockchain

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers*. John Wiley & Sons.

Pedersen, A., Risius, M., & Beck, R. (2019). A ten-step decision path to determine when to use blockchain technologies. *MIS Quarterly Executive, 18*(2), 99–115.

Rejeb, A., Keogh, J. G., & Treiblmaier, H. (2020). How blockchain technology can benefit marketing: Six pending research areas. *Frontiers in Blockchain, 3*(3), 1–12. https://doi.org/10.3389/fbloc.2020.00003

Rejeb, A., Keogh, J. G., Zailani, S., Treiblmaier, H., & Rejeb, K. (2020). Blockchain technology in the food industry: A review of potentials, challenges and future research directions. *Logistics, 4*(4), 1–26. https://doi.org/10.3390/logistics4040027

Saberi, S., Kouhizadeh, M., Sarkis, J., & Shen, L. (2019). Blockchain technology and its relationships to sustainable supply chain management. *International Journal of Production Research, 57*(7), 2117–2135. https://doi.org/10.1080/00207543.2018.1533261

Sarooghi, H., Sunny, S., Hornsby, J., & Fernhaber, S. (2019). Design thinking and entrepreneurship education: Where are we, and what are the possibilities? *Journal of Small Business Management, 57*(S1), 78–93. https://doi.org/10.1111/jsbm.12541

Swan, M. (2015). *Blockchain: Blueprint for a new economy* (1st ed.). O'Reilly and Associates.

Tapscott, D., & Tapscott, A. (2016). *Blockchain revolution: How the technology behind bitcoin is changing money, business, and the world*. Portfolio.

Thrane, C., Blenker, P., Korsgaard, S., & Neergaard, H. (2016). The promise of entrepreneurship education: Reconceptualizing the individual–opportunity nexus as a conceptual framework for entrepreneurship education. *International Small Business Journal, 34*(7), 905–924. https://doi.org/10.1177/0266242616638422

Travizano, M., Sarraute, C., Dolata, M., French, A. M., & Treiblmaier, H. (2020). Wibson: A case study of a decentralized, privacy-preserving data marketplace. In H. Treiblmaier, & T. Clohessy (Eds.), *Blockchain and distributed ledger technology use cases: Applications and lessons learned* (pp. 149–170). Springer International Publishing. https://doi.org/10.1007/978-3-030-44337-5_8

Treiblmaier, H. (2018). The impact of the blockchain on the supply chain: A theory-based research framework and a call for action. *Supply Chain Management: International Journal, 23*(6), 545–559.

Treiblmaier, H. (2019). Toward more rigorous blockchain research: Recommendations for writing blockchain case studies. *Frontiers in Blockchain, 2*(3), 1–15. https://doi.org/10.3389/fbloc.2019.00003

Zamani, E. D., & Giaglis, G. M. (2018). With a little help from the miners: Distributed ledger technology and market disintermediation. *Industrial Management & Data Systems; Wembley, 118*(3), 637–652. https://doi.org/10.1108/IMDS-05-2017-0231