





The interaction of actor-independent and actor-dependent factors in new venture formation: The case of blockchain-enabled entrepreneurial firms

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ABSTRACT

The study seeks to explore how blockchain technology enables the creation of new ideas for ventures and to examine the activities of founders and entrepreneurial teams in shaping those ideas. We adopted several theoretical frameworks – external enablers theory, dynamic capabilities (DCs), and dynamic managerial capabilities (DMCs) – to explain the interaction of the actor-independent and actor-dependent factors in the process of new firm formation. We analysed four Hungarian blockchain start-ups that operate across financial services, cryptocurrency trading, crypto asset management, energy, information technology, and identity industries and create high value-added and cross-industrial offerings for Hungarian and foreign markets. Using qualitative study research results, the study develops the model of external enablers,

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founders' and firm capabilities and new venture creation. We identify three interconnected external enablers – namely, market volatility associated with the growing popularity of cryptocurrencies and the underlying blockchain technology, the properties of blockchain, and the ideology behind the technology – and discuss the role of entrepreneurs' DMCs and sensing and seizing activities in discovering and shaping these enablers into profitable business ideas.

KEYWORDS

cryptocurrencies, dynamic capabilities, dynamic managerial capabilities, external enablers

JEL CLASSIFICATION INDICES

L20, L26, M10

1. INTRODUCTION

Digital technologies can enhance opportunities in the entrepreneurial process by enabling greater activity in terms of new venture formation (Nambisan 2017; Boeker et al. 2021). Technological characteristics can be used by entrepreneurial agents to create new value propositions. In the entrepreneurial literature, such technologies have been suggested to represent the actor-independent external enablers of new firms (Davidsson 2015; Davidsson et al. 2020). Scholars have studied the mechanisms through which digital technologies affect the entrepreneurial outcomes (von Briel et al. 2018) and the daily organisational practices of entrepreneurial firms that have developed new digitally enabled venture ideas (Chalmers et al. 2021). However, there has been limited attention to understand the role of entrepreneurs' knowledge, experience and contacts in identifying and capturing the mechanisms of external enablers throughout the venture-creation process.

The incorporation of an actor-dependent view of external enablers into external enabler theory has been suggested in prior research (Davidsson et al. 2020; Chalmers et al. 2021). We have referred to the concepts of *dynamic managerial capabilities* (DMCs) and *dynamic capabilities* (DCs) to understand the role of entrepreneurs and entrepreneurial teams in sensing the external enablers and shaping them into new venture ideas. Several authors (Newbert 2005; Zahra et al. 2006; Corner – Wu 2011) have examined DCs in the context of new ventures and reached some consensus that the DCs associated with new firm formation are executed at the individual level to meet uncertain and changing market needs. DCs reside originally in several individuals that make up the entrepreneurial team but do not always exist throughout the organisation. So far, relatively little research has been carried out on DCs and DMCs in the context of technology-based small firms. Our research contributes to the limited research stream (Newbert 2005; Sapienza et al. 2006; Corner – Wu 2011; Andersson – Evers 2015; Razmdoost et al. 2020) that is devoted to the examination of DCs and DMCs in the context of new ventures.

In this study, we explore one of the most recent and most prominent new technologies. This is versatile blockchain technology, which is applicable to diverse fields by creating the means for customisation (Seebacher et al. 2020), and which facilitates fundamentally new ways of



coordinating transactions and economic activities (Davidson et al. 2018; Frolov 2021). To date, the potential of blockchain technology and its performance and usage by customers have not been extensively studied. An empirical examination of the successful blockchain applications is scarce (Schmidt – Wagner 2019), thus we contribute to the literature on the commercial applications of blockchain technologies. Due to the paucity of research on DCs in the emerging ventures and on the use of blockchain, this study adopted a qualitative method based on the interviews with start-ups' management and archival material.

The paper is organised as follows. The second section includes the literature review on external enablers of entrepreneurship, blockchain characteristics and its implications, and describes the DCs in the context of new ventures. The third section explains the methodology and process of data collection and analysis. In the fourth section, we describe findings about the key external enablers and the role of entrepreneurs in enacting those enablers, and we identify the key microfoundations of sensing and seizing activities. The following section discusses the findings, as well as promising future research directions. Finally, concluding remarks complemented by policy and managerial implications are presented.

2. LITERATURE REVIEW

2.1. External enablers of entrepreneurship

Recent research on the external enablers (Davidsson 2015; Davidsson et al. 2020) has contributed to the reconceptualisation of fundamental entrepreneurial processes. The external enablers approach integrates external conditions with fundamental aspects of entrepreneurial agency (Davidsson et al. 2020; Chalmers et al. 2021). The core of entrepreneurship lies in the formation of new ventures or new economic activity (Wiklund et al. 2011; Davidsson et al. 2020) which is triggered by objective, external influences. Davidsson (2015) introduced external enablers as an aggregate-level construct for theorising about pre-existing actor-independent opportunities. A study by von Briel et al. (2018) applied Davidsson's (2015) external enabler construct to determine how and when digital technologies enable entrepreneurial processes in the high-technology sector. Earlier, digital technologies were acknowledged as an objective factor that has a strong effect on entrepreneurial opportunities, actions and outcomes (Nambisan 2017). The entrepreneurial literature lacks study of how enablers are discovered and further used in practice by entrepreneurs. Following Davidsson et al. (2020), we attempt to understand the impact of external factors in new venture development by examining the interaction of multiple enablers and the actions of entrepreneurs in shaping those enablers. Specifically, the study aims to obtain additional insight into how enablers relate to one another and to agents in deriving enabling mechanisms and contributing to venture creation.

2.2. Blockchain technology as an external enabler of entrepreneurship

Digital technologies have been used by scholars as one of the major factors for operationalising the construct of external enablers (von Briel et al. 2018; Browder et al. 2019). For example, a recent study on blockchain technology and entrepreneurship examined how blockchain was used to develop new venture ideas in the music industry (Chalmers et al. 2021). In our study, we seek to extend his research to the new blockchain-enabled firms in different industries and



to obtain insight into how this foundational technology may trigger the formation of new ventures.

The technology of blockchain and other types of distributed ledger technologies (DLTs) are regarded as one of the most important technological innovations. Blockchain is a decentralised and distributed ledger that enables more efficient and transparent transactions (e.g., payment processes or transfers of information), while the need for a trusted intermediary is eliminated through consensus-based record validation (Nowiński – Kozma 2017; Schmidt – Wagner 2019). Blockchain-based systems can be used across all industries and organisations due to their key characteristics, such as the decentralisation of decision making, peer-to-peer transmission, reliability, privacy, immutability of data, speed, low transaction fees and transparency (Nakamoto 2008; Iansiti – Lakhani 2017; Grover et al. 2019; Mnif et al. 2021).

The technology has led to the enhancement of existing activities, the expansion of the range of transactional services, as well as the creation of new economic activities (Frolov 2021). Blockchain supports new types of contracts and novel forms of economic institutions such as initial coin offering (ICO), which is a new way of fundraising, as well as decentralised autonomous organisations (DAOs). Blockchain technology enables the existence of digital currencies. On the one hand, cryptocurrencies meet a market need for faster and more secure payment and transaction systems. As alternative payment instruments, they facilitate international trade by reducing the transaction costs. On the other hand, blockchain operation is very energy intensive; the bitcoin system, in particular, consumes an enormous level of electricity (Chang et al. 2020), which can cause a significant environmental burden (Kouhizadeh et al. 2019). The unstable value of cryptocurrencies makes them speculative investments. Cryptocurrency adoption is considered as an economic incentive for illegal conduct, such as money laundering, financing terrorism and tax evasion, due to liberalized capital controls (Kher et al. 2020). Cryptocurrencies are highly volatile, yet they add economic value and move financial markets forward in terms of efficiency and growth (Giudici et al. 2020).

2.3. Dynamic capabilities in the context of new ventures

The creation of new firms takes place through several phases which require entrepreneurial capability (Vohora et al. 2004). Entrepreneurs combine and reconfigure resources in new ways (Schumpeter 1934; Penrose 1959) and, as start-ups' resources are limited, they need to acquire them from sources outside the firms' boundaries (Stuart et al. 1999; Zahra – George 2002). Wu (2007) believes that entrepreneurial resources do not translate into performance without DCs (Arend 2014). Prior studies have mainly focused on incumbent companies and denied the existence of DCs at the founding stage (Teece et al. 1997; Eisenhardt – Martin 2000; Helfat – Peteraf 2003). In this study, we appeal to the research stream that views the development of DCs as a crucial sub-process in venture creation (Corner – Wu 2011) and which argues that DCs can exist from the time of new venture formation (Zahra et al. 2006; Arend 2014).

Research on DCs has developed through the analysis of the microfoundations which underpin such capabilities. Teece (2007) introduced the microfoundations of the DCs which are the organisational and managerial processes and procedures underlying those capabilities. DCs may be conceptually subdivided into a firm's capacities to sense and shape opportunities, seize those opportunities, and reconfigure the firm's tangible and intangible assets. Scholars contend that the microprocesses within new ventures differ from those of the incumbent firms because such processes are embodied in the entrepreneur and reflected in their actions and



decisions (Vohora et al. 2004; Corner – Wu 2011; Lanza – Passarelli 2013). Zahra et al. (2006) add that entrepreneurial activities are important for the conception, development, configuration and maintenance of DCs in both established organisations and new ventures. The concept of DMCs presented by Adner – Helfat (2003) provided a more granular understanding of DCs. DMCs reflect interactions between human capital, social capital and managerial cognition (Adner – Helfat 2003; Helfat – Peteraf 2015; Razmdoost et al. 2020). In a small business context, DMCs transform entrepreneur’s abilities into the organisational level and convert them into routines capable of implementing processes of innovation and change.

Thus, scholars have suggested that the DCs perspective represents a theoretical framework for understanding the process of new firm formation (Newbert 2005; Zahra et al. 2006; Wu 2007; Corner – Wu 2011). DCs can explain how new ventures create, discover and exploit entrepreneurial opportunities in the search for the strategic matching of resources and market needs by means of using new technology (Jiao et al. 2013). Our study extends the DCs perspective to the small business management setting through the examination of blockchain innovation and commercialisation by entrepreneurial firms.

To sum up, we have integrated the literature on external enablers, blockchain technologies and DCs to address the following questions: *How do entrepreneurial agents make use of the potential provided by the external enablers? What are the key microprocesses that are associated with integrating those enablers into developing new businesses?*

3. METHODOLOGY

To obtain insight into the uptake of blockchain technology in Hungary and the value this technology creates for organisations, we chose to engage with the startup companies – namely, with innovative entrepreneurs who are developing blockchain-based solutions. Our sample consists of four firms derived from the financial services-, cryptocurrency trading and crypto asset management, energy, information technology and identity industries, working mainly in Hungary and abroad. This number of cases is enough to provide an accurate account in empirical research when the purpose of the latter is mainly explorative (Eisenhardt 1989). The main source of information was the semi-structured interviews which were conducted with the representatives of the selected companies (see Table 1). We sought to ensure similarity regarding the structure of each interview and the comparability of the corresponding results. All interviews were conducted online, recorded and transcribed. They lasted between 75 and 100 minutes. To achieve the maximum variance and diversity, we selected cases associated with different combinations of sources, including companies’ white papers and official websites, social media posts, press announcements and other internet resources.

Data analysis started with constructing individual case stories through the lens of the research questions. The goal was to identify the main external enablers that triggered the formation of the firms under analysis and the microfoundations of the DCs associated with each case. Next, the cross-case analysis was undertaken whereby patterns from each case were compared to patterns from other cases to develop consistency (Eisenhardt – Graebner 2007). As a result, the main external enablers and DCs in the new ventures could be defined, as discussed in the following sections. Note that the empirical results of this research should be interpreted in line with their limitations. As our data were self-reported by the key players



Table 1. Overview of companies and data sources

Firm information (Year of foundation, location, size)	Services/products	Primary data sources	Additional data sources
b-cube.ai (<i>R&D startup in AI and blockchain</i>)			
<p><i>Acintya Global Holdings</i> (parent company) 2017, France <i>b-cube.ai</i> 2018, France, Hungary Size: 12 employees Over \$400 million worth of trading volume</p>	<ul style="list-style-type: none"> - Cryptocurrency trading bots - Educational courses, webinars, and consultancy 	<p>CEO interview, 100 mins White paper (2021, 50 pages)</p>	<p>Co-Founders (CEO, CTO, CMO) interviews with <i>ICOHOLDER</i></p>
CoinCash Payments (<i>Fintech start-up specialising in cryptocurrency exchange</i>)			
<p>2017 The UK, Hungary Size: 12 employees</p>	<ul style="list-style-type: none"> - Online transfer services (buy or sell more than 50 cryptocurrencies for local currency) - ATM network (16 ATMs) with bi-directional functionality 	<p>CEO interview, 75 mins Blog articles</p>	<p>CEO interview with <i>Forbes Hungary</i> (November 2021)</p>
Enerhash Data Centre Operator (<i>Energy tech company</i>)			
<p>2019, Hungary Size: 20 employees</p>	<ul style="list-style-type: none"> - Computer facilities management activities - Building data centres and renting out places inside them to power plants 	<p>CEO interview, 80 mins Articles about operations and key results (30 pages)</p>	<p>CEO interview for <i>Sesterce Group</i> on the topic of 'The European mining ecosystem' (July 2021) CEO and COO interviews given to <i>Kripto Akadémia</i> (August-September 2021) and to <i>Mandiner</i> (February 2022)</p>
Internet of People (IOP) Ventures			
<p>2018, 2 HQs: <i>IoP Ventures</i> (Budapest, Hungary) <i>IoP Divisions</i> (Karlsruhe, Germany) Size: 18 employees</p>	<ul style="list-style-type: none"> - Building the IOP technology stack and related infrastructure - Cloud and support services 	<p>Product & Technical Coordinator interview, 80 mins White paper (2019, 42 pages)</p>	<p>Founder interview with <i>XT AMA channel</i> (June 2021), <i>SmartOptions.io</i> (November 2017), <i>LATOKEN</i> (2020)</p>



from the selected firms, we complemented the interview data with additional secondary data. However, this cannot fully rule out informant bias.

4. FINDINGS

4.1. External enablers

Among the external enablers three enablers were identified: the unpredictable nature of blockchain technology development, the enabling mechanisms (i.e., characteristics) of the technology, and the ideology that boosts the emergence of new venture ideas (see Table 2).

4.1.1. Market volatility. The market hype around cryptocurrencies and their underlying blockchain technology triggered interest among the founders of the selected start-ups. As can be seen from the quotations in Table 2, all the founders were initially users of cryptocurrencies, the most well-known applications of blockchain. For instance, the founder of *IOP* bought his first Bitcoin as early as in 2011. *Enerhash's* founder mined Bitcoin in his apartment. One of *b-cube.ai's* founders started to pay the other founder for yoga classes with Bitcoin, then they started to mine cryptocurrencies, and later invested these assets in a variety of ICOs. Most of those ICOs turned out to be scams, which is why the founders made it to their mission to help rid the crypto industry of scammers and began trading to compensate for their losses. *Coin-Cash's* co-founder wanted to invest in cryptocurrency before setting up the cryptocurrency exchange business. The growing popularity of digital assets and the technology behind them enabled diverse entrepreneurial endeavours – for instance, setting up cryptocurrency exchange businesses or consulting services.

4.1.2. Characteristics and functionalities of blockchain. The results of the qualitative analysis of interviews and additional sources revealed several key features of blockchain technology and its derivative innovations (e.g., cryptocurrencies and smart contracts), which the reviewed companies listed. In Table 2, we have categorised those features into technological, informational, strategic and economic domains, as earlier suggested in the literature (Grover et al. 2019; Mnif et al. 2021). The findings show that the usefulness of blockchain is primarily perceived when it is used as an informational and technological instrument. These features of technology enabled the firms to solve different kinds of problems. Further, we have explained the specific purposes of using blockchain technology and other closely linked innovations by these firms. All the examined cases, supported by quotations extracted from the interviews, demonstrate how these companies utilise and test blockchain technology.

According to *b-cube.ai's* CEO, blockchain technology is the basic building block of the business. The technology helped the company solve two main problems: one related to clients' lack of trust regarding sharing personal data; and another associated with improving transparency regarding the distribution of profits made from crypto trading. First, the company uses the blockchain application software for securely storing and encrypting the application program interface (API) key which is a code used to identify and authenticate a user. The application helps overcome clients' fear of sharing their unique IDs, as the company can only see encrypted API keys instead of the real keys. The CEO highlighted that “*this was a problem that we had now solved for some of the people who were scared of losing API keys.*” Thus, instead of the company



Table 2. External enablers

Market volatility
Growing popularity of cryptoassets
b-cube.ai: <i>"From 2013, Erwan [CTO] started to pay Guruprasad [CEO] for yoga classes in Bitcoin. They started to get a lot of interest in cryptocurrencies and blockchain technology"</i> (White paper)
CoinCash: <i>"I just wanted to invest in Bitcoin. And it was a very painful process in 2016. There was no convenient player on the market"</i> (Interview with CEO)
Enerhash: <i>"At first I mined Bitcoin with an average mining machine in my apartment"</i> (Interview with CEO)
IOP: <i>"Maybe some of us remember the good old days in crypto, before the money craziness and all the institutions came in"</i> (Interview with CEO)
Blockchain characteristics
Technological: Security, Efficiency, Trust, Immutability, Authentication, Faster speed
Strategic: Transparency, Fraud
Economic: Reduced cost
b-cube.ai: <i>"Our team is building a secure, efficient, and easy-to-use blockchain-based platform....If there was no smart contract, then there would be no trust between us to do business"</i> (Interview with CEO)
CoinCash: <i>"We can carry out transactions with each other in an unalterable, irrevocable, and transparent manner"</i> (Interview with CEO)
Enerhash: <i>"With blockchain you could transfer money immediately. With US dollars and euros, you need days....It is completely transparent and much faster to make payments through cryptocurrency transactions"</i> (Interview with CEO)
IOP: <i>"We ensure with the help of cryptography tied to timestamped proof on a blockchain that nobody can be de-platformed, or have their wallets frozen or identity eliminated"</i> (Interview with Core Developer)
Informational: Decentralisation, No intermediary
b-cube.ai: <i>"Feeling something unique in humankind's history was happening – a new way of transferring value, giving trust through decentralisation, bypassing banks and governments"</i> (White paper)
CoinCash: <i>"With a smart contract you are able to lend or borrow a significant amount of money without intermediaries. I think the next big thing that will happen in blockchain and cryptocurrency will be decentralised finance"</i> (Interview with CEO)
Enerhash: <i>"The banking system is so slow and not working well enough. I think we need a different type of payment structure"</i> (Interview with CEO)
IOP: <i>"The reason why blockchain and cryptography were invented is to make people freer and change the power structure of the ownership of the data"</i> (Interview with CEO)
Ideology
b-cube.ai: <i>"Our ambition is to inaugurate a new financial industry era which is fair, transparent, and efficient"</i> (Interview with CTO)
CoinCash: <i>"I really wanted to be part of that wave when we rebuild financial services"</i> (Interview with CEO)

(continued)



Table 2. Continued

IOP: <i>"Many of our decisions are based on idealistic instincts...We always focus on how to make an impact on society"</i> (Interview with Core Developer)
IOP: <i>"We want to make people freer and change who has the power over our data and how things work. We aim to build a real sharing economy"</i> (Interview with CEO)

Note: Quotations represent analytical codes.

having custody of any funds, the use of the encrypted API key of the client helped the firm assure its clients that their money would not be taken away. Second, *b-cube.ai* created Ethereum-based smart contracts to be sure that the company would get a share of any profit. When a trade is completed, the smart contract automatically allocates 80% of the profits to the user and 20 per cent to *b-cube.ai*. Users can withdraw their funds at any time and *b-cube.ai* is authorised to withdraw its 20 per cent of the profit, as well. The CEO noted that smart contracts ensured accurate revenue-sharing and created trust between the company and their clients. The advantage of blockchain technology was emphasised by *b-cube.ai*'s CEO: *"When there were no smart contracts, then there was no trust between us regarding doing business. But now it is possible because we have smart contracts. So, this is one of the biggest ways in which FinTech companies like us can benefit"*. A similar opinion was expressed by *CoinCash*'s CEO: *"With a smart contract you are able to lend or borrow a significant amount of money without intermediaries"*. This demonstrates that blockchain and its applications reduce the impact of opportunistic behaviour and behavioural uncertainty in transactional relationships and ensure greater transparency.

By ensuring the anonymity of transactions, cryptocurrencies create value that traditional currencies cannot. In comparison to bank transfers, cryptocurrencies allow donations to be made anonymously. To increase the spread and acceptance of cryptocurrencies and help the community, *CoinCash* undertook cryptoasset fundraising activities. The CEO of *CoinCash* explained: *"We believe that people can see that you can do a lot of good things with bitcoin and other cryptocurrencies; we wanted to show Hungarian people how you can help with Bitcoin"*. In the case of *Enerhash*, due to its involvement in the global operations, the firm uses cryptocurrencies to make payments quickly and avoid high overseas transaction fees. *Enerhash* benefits from higher transaction speed and lower transaction fees (Table 2). In our interview, *Enerhash*'s CEO confirmed: *"We realised that cryptocurrency transactions are much faster"*. The IOP's Core Developer stated that: *"Blockchain itself allows quite a lot of creative ways to build internal workflows for companies"*. He believes that *"decentralised solutions will come into the picture"* as companies and individuals seek to get rid of the centralised services provided by large corporations (e.g., Google and Facebook).

4.1.3. Ideology about social change. By using blockchain technologies, the interviewees want to reduce the power of a central authority and increase liberty and freedom for individuals. Their beliefs, which are related to the ownership of power in society, embody an ideology. Indeed, besides all the practical changes that the blockchain-based solutions can offer in terms of the economy and businesses, blockchain has an ideological element (Huckle – White 2016).



Members of the management of the selected firms expressed both a negative assessment of current financial and banking systems and positive evaluations of systems that provide alternative future visions, including such systems based on cryptocurrencies, self-sovereignty and decentralisation. The strongest intention to tackle social imbalances was manifested by the *IOP* company, which seeks to steer technological progress for people's benefit by reducing poverty, maximising freedom, protecting data and enhancing security in relation to corporations and states. The *IOP*'s vision is to build a trusted, decentralised, global internet where everyone has control over their own data. Among the clients of *IOP* there are small and medium-sized enterprises that do not trust the large technology companies (e.g., Facebook) which are claimed to exploit user data. Blockchain is seen as an alternative to such organisations: “*There are mid-sized German companies that are frightened of using Google and Facebook... Big tech companies are not their friends, and as a result, decentralised solutions will come into the picture*” (Interview with Core Developer).

b-cube.ai and *CoinCash* aim at making the financial industry fairer, more transparent and more efficient, which is believed to be possible with blockchain technology. Specifically, *b-cube.ai* aims at making trading in cryptocurrencies more transparent, secure and automatic. The CTO of *b-cube.ai* explained the motive behind their project and the role of technology: “*Our mission is to bring efficient and innovative financial tools to the common man which were so far reserved for the super-rich. All this is possible thanks to the combined technology leap of blockchain, cryptocurrencies and artificial intelligence (AI)*” (Interview with CTO). The CEO of *CoinCash* believes that the enthusiasts who are building a decentralised finance system are building a new world. The company's mission is to serve as a “gateway between traditional finance and the crypto economy” by transferring value between both worlds. One of the *CoinCash*'s goals is to onboard more people to the new world.

Although the use of the technology and its application will not necessarily lead to social change, these advances can optimise many processes – for example, streamlining energy production (i.e., *Enerhash*). As an energy tech company, *Enerhash* acts as an intermediary between energy producers and blockchain server owners by taking part in load balancing. The firm's databox, which is a new form of technology for the energy industry, is an alternative to the energy storage units that help optimise the production of energy. Thus, the mission of *Enerhash* founders is to maximise the value of the excess capacity of energy producers and convert this into an additional source of revenue for clients.

4.2. The role of entrepreneurs in recognising and enacting external enablers

The properties of the external enabler cannot be activated by themselves, leading to venture formation. Entrepreneurs are at the forefront of blockchain-enabled firms. They were the first to learn about external enablers and to combine them into new venture ideas. The founders played a crucial role in the process of new venture formation, from the identification of new venture ideas and acquisition of resources to the establishment of their firms.

We found that the human capital (i.e., knowledge and skills) of the founders led to opportunity recognition and increased their confidence in terms of opportunity evaluation. Regarding the backgrounds of the founders and co-founders, they were the former founders of other start-ups (both founders of *b-cube.ai*, the CEOs of *CoinCash* and *IOP* and the COO of *Enerhash*) and/or were employees or managers of large companies. For example, the CEO of



b-cube.ai founded an investment management and advisory company at the age of 16 which became the most successful start-up and was profitably sold. Later, the CEO had experience working for multinationals like Bosch as an industrial engineer and Morgan Stanley as an investment analyst. He was also an early investor in cryptocurrencies and an inventor of several unique strategies for successful trading and investing.

Further, the founders' social capital (i.e., social ties) enabled them to reach out to the outside entities and establish strategic partnerships (e.g., *b-cube.ai* and *CentraleSupélec*), and to convince their former colleagues (e.g., *CoinCash*) or relatives (e.g., *Enerhash*) to join them. For instance, the CTO of *b-cube.ai* graduated from the best French engineering university, which became their key partner in developing *b-cube.ai*'s project and products. The CEO of *Enerhash* persuaded his older brother, who had experience at building business models from scratch, to team up with him. Our findings demonstrate that the founders' human and social capital (see Table 3) had a signalling effect on attracting financial and human resources and the external partners required for developing products and setting up a new venture.

Founders managed to employ highly skilled employees and established a network of relationships thanks to their managerial cognition (i.e., beliefs and mental models). For example, the founder of *IOP* searched for smart people who shared similar ideas. The founder talked about the team's commitment to the firm's ideas: "My colleagues know what community is, and they live by the ideas of self-sovereignty and decentralisation. Everybody knows why they are part of the team and for what goal". The *IOP* team is diverse; most of its employees have been working for many years in the IT field. One of the developers worked previously in a research lab at a Nokia company. The core developer is experienced at teaching programming and crypto; his expertise helps the firm to integrate young developers. Thus, through the entrepreneurs' knowledge and experience, their beliefs, and access to their network of relationships, they generated the firm's resources and capabilities that led to the formation of their firms.

4.3. Opportunity sensing and seizing

In this section we explain how the selected entrepreneurial firms incorporated and shaped the external enablers into new venture ideas. We found that the sensing capabilities of the entrepreneurial team helped them discover new opportunities and then address them through their seizing capabilities. We identified the key microfoundations of sensing and seizing activities (as presented in Table 4) which are most salient for nascent ventures. Despite the firms' young age, some traits of transforming activities at these companies were revealed in the form of further development of their products, alteration of business models, restructuring from a movement to a company, or expansion of a range of services and projects.

4.3.1. Sensing activities. According to our findings, the sensing activities are made up of three primary categories:

4.3.1.1. Problem and opportunity identification. The identification of problems and opportunities presented by external enablers is mainly associated with the entrepreneurs. Their knowledge and professional experience have enabled them to identify the problems in the industries they worked in and to offer innovative solutions. The deep knowledge of trading, business, technology and cryptocurrency mining and trading activities of the *b-cube.ai*'s founders allowed them to sense the potential of cryptocurrencies and blockchain technology as a



Table 3. Characteristics of founders and key employees

Founders	Previous entrepreneurial experience	Education	Previous work experience
b-cube.ai			
Co-founder & CEO	Yes	Bachelor of Engineering / Industrial Management	15+ years of experience in global equities and commodities as a fundamental and technical analyst (Bosch, Morgan Stanley)
Co-founder & CTO	Yes	Master of Engineering, Digital Engineering	15+ years of experience in software engineering
CoinCash Payments			
Co-founder & CEO	Yes	Bachelor of Business Studies, Master of Communication and Media Studies	20+ year multinational career (SONY Pictures, Telenor)
Founder & COO	No	N/A	5 years of experience in software development
Enerhash			
Founder & CEO	No	Bachelor of Business Administration and Management, Bachelor of International Administration	6+ years of experience as business analyst and gas wholesale expert (MET Group)
Co-founder & COO	Yes	Bachelor of Transportation Engineering	10+ years of experience in marketing, namely industrial marketing, management
IOP			
Founder & CEO	Yes	Electronic Engineering, Management	20+ years of experience in the IT field and FinTech sector
Product and Technical Coordinator, Core Developer	No	Master of Electrical and Electronics Engineering	20+ years of experience as a software engineer, lecturer

new way of transferring value as well as the necessity of building transparency and trust in the crypto asset management industry. First, the founders registered the company *Acintya Global Holdings* in France and offered consulting services and e-commerce activities. Later, the *b-cube.ai* project was born out of this company to overcome challenges in the asset management industry – namely, non-transparent dealing, low returns and fraud.

The founders of *CoinCash* sensed the potential of the evolving cryptocurrency market and the need for setting up a convenient and trusted cryptocurrency exchange company. The CEO



Table 4. Sensing and seizing capabilities

Constructs	Exemplar data
Sensing activities	
Problem and opportunity identification	b-cube.ai: <i>"I worked for Morgan Stanley as an investment analyst and after that I was really thinking what I should do next as my venture. Then I came to Bitcoin. It was a little different from equities as it is so volatile"</i> (Interview with CEO)
	CoinCash: <i>"I had been following the technology of blockchain and Bitcoin for several years already when I decided to create my own start-up focusing on exchanging cryptocurrencies"</i> (Interview with COO)
	"There was no convenient player on the market with which you could buy cryptocurrencies for Hungarian Forints" (Interview with CEO)
	Enerhash: <i>"I was hedging options for electricity production, and I saw an opportunity regarding how to implement mining technology into the energy industry"</i> (Interview with CEO)
	IOP: <i>"I bought my first Bitcoin in 2011 and I have been involved in the blockchain industry since 2014"</i> (Interview with CEO)
Market analysis and technology monitoring	b-cube.ai: <i>"There is nothing like the 'best thing' in this business, the market always keeps changing. We always need different approaches"</i> (Interview with CEO)
	CoinCash: <i>"We are following all interesting developments regarding blockchain"</i> (Interview with CEO)
	Enerhash: <i>"I read a lot of articles and consultant stuff about blockchain"</i> (Interview with CEO)
	IOP: <i>"We are involved in monitoring news and innovations about blockchain start-ups. We check if there is something new that is worth adapting. Therefore, we have very deep knowledge about crypto space"</i> (Interview with CEO)
Research and development process	b-cube.ai: <i>"The university is exactly paired with the environment we belong to, and the ecosystem that provides us with a lot of infrastructure..."</i> (Interview with CEO)
	CoinCash: <i>"We did a lot of brainstorming, developed whatever we could and educated ourselves"</i> (Interview with CEO)
	Enerhash: <i>"I left my last job in 2018, after which I started working intensively on the idea of Enerhash. By mid-2019, every detail was crystallised"</i> (Interview with CEO)
	IOP: <i>"We have developed and advanced the decentralised technology stack over two years"</i> (Interview with CEO)
Seizing activities	
	b-cube.ai: <i>"You pay only when you make a profit. There are no subscription fees, entry fees, exit fees or any management fees"</i> (White paper)

(continued)



Table 4. Continued

Constructs	Exemplar data
Creation of new products, processes and business models	CoinCash: <i>"We wanted to be a fully-fledged broker. We wanted to serve all possible ways where people can buy or sell cryptocurrencies"</i> (Interview with CEO)
	Enerhash: <i>"This is a trend in the energy sector – namely, the introduction of flexibility instruments. We are flexible with this, but with a unique, completely new solution"</i> (Interview with CEO)
	IOP: <i>"IOP removes the need for a central platform authority (e.g., Facebook). Cryptographically secured identifiers stored on blockchain allow users to control all aspects of their online identity"</i> (Interview with CEO)
Building customer base and establishing partnerships	b-cube.ai: <i>"Our customer base is mainly high net-worth investors. We make a monthly report for them and have face-to-face calls with our clients"</i> (Interview with CEO)
	CoinCash: <i>"Cryptocurrencies are still a short- or long-term investment vehicle for individuals"</i> (Interview with CEO)
	Enerhash: <i>"I made analyses and got in contact with 200 power plants. I sent emails, requests to talk"</i> (Interview with CEO)
	IOP: <i>"To secure the fast growth of the user base, we follow a highly scalable approach: We partner with universities"</i> (Interview with CEO)
Dissemination and legitimising work	b-cube.ai: <i>"We are willing to make a difference by delivering top-quality content that is most relevant for our community and teaching our members"</i> (White paper)
	CoinCash: <i>"Starting a couple of years ago, you started to exchange your experience with others"</i> (Interview with CEO)
	CoinCash: <i>"We [Blockchain Working Group] are checking what the EU agenda is regarding blockchain and cryptocurrencies and what we can do or what the Hungarian government can do to facilitate this area to grow faster"</i> (Interview with CEO)
	Enerhash: <i>"I have already published articles on LinkedIn. I have another article about why it is good for a power plant to buy a container and implement it into production"</i> (Interview with CEO)
	Enerhash: <i>"When leading companies start treating data centres as an additional type of investment beside energy storage units, it will become an industry standard and a prerequisite of competitiveness"</i> (Website)
	IOP: <i>"This time the conference was semi-public, in an open-house environment. It was not widely advertised, but people who heard about the conference were invited to join the sessions and mingle with the developers and ask questions"</i> (Interview with CEO)

Note: Quotations that represent analytical codes.



explained how the opportunity of entering the cryptocurrency market was sensed: “I realised that blockchain is doing much more than just revolutionising financial services, but it has lots of opportunities which one will have to discover in the forthcoming decade. I wanted to invest in Bitcoin, but it was a very painful process in 2016: there was no convenient player on the market with which you could buy Bitcoin or any other cryptocurrencies for Hungarian Forints. So, easy, convenient and understandable services are needed on the market, and that is how the idea of CoinCash came up”.

Having experience both in the energy industry and Bitcoin mining, the founder of *Enerhash* sensed the opportunity of implementing cryptocurrency mining technology into the energy industry and creating benefits for both sides – power plants and cryptocurrency miners. Before starting to offer innovative solutions to the challenges of the energy sector and miners, the CEO of *Enerhash* worked as an energy trader in Switzerland and then Hungary, in parallel becoming interested in Bitcoin mining. This experience led him to understand how blockchain technologies work and can be used in the energy industry. As described by the CEO: “I was hedging options for electricity production, and I saw an opportunity regarding how to implement mining technology into the energy industry because we could provide a fixed-price takeover option and a hedging option for gas deliveries and electricity prices”.

Following his education as computer science expert, the founder of *IOP* studied electronic engineering. Subsequently, he attended Maastricht University to study knowledge engineering, cognitive psychology and AI. At the end of his studies, the founder decided to establish an IT service company. In 2015, he wrote a thesis that defined a vision of a decentralised company. He identified the problems related to users’ privacy of information and sensed the potential of blockchain technology for digital identity management. The founder sketched out all necessary technological components and began to implement these with a team.

4.3.1.2. Market analysis and technology monitoring. All the companies we have talked to operate in emerging fields and thoroughly monitor the markets and their competitors to adopt the best practices in their industries. They constantly tracked the developments of the blockchain world. The CEO of *CoinCash* noted: “We want to be up to date with all of the news which is happening in blockchain and cryptocurrency ecosystem”. *IOP* has been monitoring the news and innovations in the blockchain industry since 2015. The accumulation of deep knowledge about the crypto space enables the *IOP* team to provide the consulting services to other companies.

4.3.1.3. Research and development process. Before introducing the products, the selected firms invested a lot of time and effort into their development. Cooperation with universities and an incubator (*b-cube.ai*), legal and tax advisors (*CoinCash*), power plants (*Enerhash*) and another project of the founder (*IOP*) as well as the receipt of investment support facilitated the creation of the firms’ offerings. In case of *b-cube.ai*, the collaboration with the university allowed the founders to obtain access to the required resources and infrastructure and helped in the development of *b-cube.ai*’s technology, giving the project a better scientific grounding. The CEO of *b-cube.ai* said: “We contacted the quantitative analysis lab and a mathematician whom we now have on our advisory team”. In October 2018, the founders started *b-cube.ai* as a research and development project in partnership with *CentraleSupélec*, a French graduate engineering school of Paris-Saclay University, of which the CTO is an alumnus. Later, it was also incubated at K&H StartIT (Hungary), as the CEO moved to Hungary where he continued developing the



b-cube.ai project of their parent company. As a result, *b-cube.ai* developed a crypto-trading bot platform for trading cryptocurrencies.

Since its founding, *CoinCash* has striven to be a transparent and reliable tax-paying company; however, nobody was able to advise them on how to properly set up the company in Hungary due to the absence of laws and regulations related to blockchain and cryptocurrencies. As there was no legislation or regulation related to the crypto field in 2016, the company had to build its services in a very uncertain area. *CoinCash* managed to reach out to the UK's legal and tax advisors and get recommendations on how to build up their startup and comply with the regulations. London's good reputation for its fintech ecosystem and ongoing communication with local regulators were conducive to incorporating the *CoinCash* start-up in the UK. Transparency and compliance with regulations were extremely important to the company. It sought to engage with regulators through consultation with many legal advisors regarding how to set up the companies and how to comply with legislation and tax rules.

To develop the product (i.e., data centre) and the whole system, the founder of *Enerhash* left his previous job to work intensively on his ideas. He explained: "I started working on the product first and developing the whole system. Then my brother joined me, and we had the first investment round that enabled us to build and test a prototype of a data centre and to work with power plants". The research and development phase of the *IOP* project (the development of the technology stack), took over two years, then the team could present it to market. Within the framework of the *Libertaria* project, the founder and its team conducted research and developed protocols, networks, the backend and standards.

4.3.2. Seizing activities. The seizing activities include the following three processes:

4.3.2.1. Creation of new products, processes and business models. The firms seized the opportunities induced by blockchain via the creation of their products, processes and business models. For example, *Enerhash's* founder started developing the prototype of the mobile data centre, *IOP* built the open-source technology stack, and *b-cube.ai* developed the crypto trading bot platform after two years of the product development work. *CoinCash* enables customers both to purchase and sell cryptocurrencies for local currency. The business model of *CoinCash* is centred around the commission fees it charges per transaction made online or via ATM. To build transparent and accountable services for its clients, *CoinCash* invented its own know-your-customer (KYC) procedures based on the regulation and cryptocurrency best practices by asking for a picture ID, proof of source and address, selfie and the like. The company investigated international players (e.g., *Coinbase* and *Kraken*) to build its own system. As a result, when the related Hungarian legislation came into force, the company quickly adapted to KYC and the anti-money laundering (AML) policies because they were already doing nearly everything that the new regulation required them to do. *Enerhash* is a pioneer locally and globally in connecting decentralised data centres to power generators. Server owners use the capacity of the server to execute high-performance computing operations based on blockchain networks. Power plants benefit from a predictable base load and a stable source of income. *IOP* believes that the centralised approach to personal data and the business practices of the centralised giants (e.g., Uber, Facebook and Amazon) can be changed with a totally new business model which benefits both users and businesses. The CEO noted: "We cannot fight the current system without working alternatives". The company is building a modular technology stack that is expected to create a



restructured version of the internet, whereby data is decentralised among users instead of being centralised on the platform they use.

4.3.2.2. Building a customer base and establishing partnerships. We found that all companies had managed to build relationships in new markets. *b-cube.ai* developed its offering in partnership with a French university that had the necessary infrastructure, researchers and environment. While building its databoxes, *Enerhash* started to collaborate with power plants and work on mutual projects with them. The case of *Enerhash* demonstrates how the firm helped its clients (i.e., energy companies) to optimise their process development capabilities by adopting new technologies and applying them to preexisting processes. The *IOP* company partnered with a university in Mexico to develop a customised application for this organisation. *CoinCash* cooperated with its main competitor, *MrCoin*, and other companies to implement a fundraising project and later it acquired rival *MrCoin*.

In terms of customers, the primary focus of *b-cube.ai* is individual cryptocurrency traders. The firm seeks to reach broader markets and address newcomers due to its educational content and a community of over 9,000 people on social media. The company has received acknowledgement from various French and Hungarian organisations and won several awards for its innovations. The project received funding from *Block.IS*, a European-Union-funded blockchain acceleration program. This recognition adds a certain sense of respectability to *b-cube.ai*'s operations. The target audience of *CoinCash* are experts and individuals who consider cryptocurrency to be a short- or long-term investment. The firm has managed to become a visible player on the market. With its motto "Bitcoin made simple" and the largest bitcoin ATM network, *CoinCash* positions itself as the most trusted brand in terms of cryptocurrency exchange in Hungary. In the case of *Enerhash*, the founders first had to win the trust of power plants, as what they are doing is a new type of business in the energy industry. As the CEO noted: "*The energy sector is very traditional – people do not want big changes. If you want to convince investors, you need to prove that power plants are interested*". The CEO had to get in contact with numerous power plants, arrange meetings with the power plants interested in implementing Bitcoin mining in their production, and explain the model to them. *Enerhash* has expanded its network of clients by cooperating with a variety of electricity companies from several countries. In an interview with the *Sesterce Group*, the CEO specified: "*We are present in New Zealand, Australia, Slovakia and Bulgaria, and we are currently working on a project in Sweden as well. The goal is to work anywhere where we can offer a good solution to the power industry*". In the case of *IOP*, partnerships with universities enable *IOP* to secure the fast growth of the user base. Each partner university can add several tens of thousands of users simultaneously, which makes it easy to develop a large user base.

4.3.2.3. Dissemination and legitimising work. Due to the novelty of blockchain technology and the blockchain-enabled services and products, all the companies analysed by us were involved in disseminating knowledge about this technology and their respective markets. The management of the selected firms frequently give media interviews (e.g., *Forbes Hungary*, *Kripto Akadémia*), participate in conferences (e.g., *Blockchaineum conference*, *Blockchain Budapest*), and publish articles about their business activities. The *b-cube.ai* company created the *BCUBE Academy* by providing training and sharing articles and news related to cryptocurrency trading. *IOP* organised blockchain and crypto conferences in Berlin and Budapest. In the early stages,



the *IOP* company represented a movement or DAO with its network of ambassadors from around 80 countries, the involvement of which pushed forward *IOP*'s development. Currently, the broad network of the *IOP* community is spread around the world and the firm keeps distributing its ideas about the *IOP*'s decentralised solutions for identity management and its open-source technology through its growing community on social media. Additionally, formal (e.g., *Blockchain Working Group*) and informal groups (e.g., *Blokklánc Műhely/Blockchain Workshop*) were created to facilitate blockchain development. The industry participants meet occasionally and exchange their experiences regarding the industry and discuss what happens at the international level and how they should develop. The sharing of expertise and opinions about further developments in the blockchain industry and establishing strategic alliances with incumbents contribute to legitimising the blockchain-enabled offerings and enhancing the credibility of the technology.

5. DISCUSSION

To answer the question how new ventures utilise the potential of external enablers, we first identified three main external enablers (Table 2) of new venture ideas in the context of blockchain-based firms. The combination of those actor-independent factors – namely, the growing popularity of cryptocurrencies associated with the underlying blockchain technology, the characteristics of the technology itself and ideology – triggered the formation of new venture ideas. The major function of the discussed enablers was to entice potential entrepreneurs to create new ventures.

The rapid development of this technology together with ideology and market volatility were found to be the reason why the founders of the discussed companies discovered the potential applications and started building blockchain-based offerings which addressed different customer problems. The emergence of technology was not enough to ensure the successful development of the company, as this was mainly supported by the founders' activities and capacities. Our results reflect those of prior studies (Newbert 2005; Zahra et al. 2006; Corner – Wu 2011) that have also noted the important role of the entrepreneur in a firm's DCs. Those capabilities reside in individuals and/or small entrepreneurial teams at the early stages of firm formation. We observed that the DMCs of the entrepreneurial actors (i.e., entrepreneurs) played a decisive role in activating these external enablers. Further, we examined activities that constitute the shaping of external enablers and new venture ideas by applying the DCs framework. We identified the key microfoundations or microprocesses of sensing and seizing activities (Table 4) which are most salient for integrating the enablers into new business ideas and subsequent venture formation. To explain the relationship between external enablers, entrepreneurs and their activities and new venture ideas, we developed the model in Figure 1. Our model demonstrates the combination of external enablers, DMCs, and sensing and seizing capabilities that led to the formation and development of new ventures.

We contend that a single constituent of external enablers is not sufficient to explain venture formation, as investigated in a prior study (von Briel et al. 2018), and we address the authors' call to study the role of multiple enablers in shaping new venture ideas. Based on our analysis of the selected blockchain-enabled firms, we have contributed to the external enabler theory (Davidsson et al. 2020) by examining the microfoundational work carried out by the entrepreneurs and entrepreneurial teams within these companies. By applying the DMCs perspective



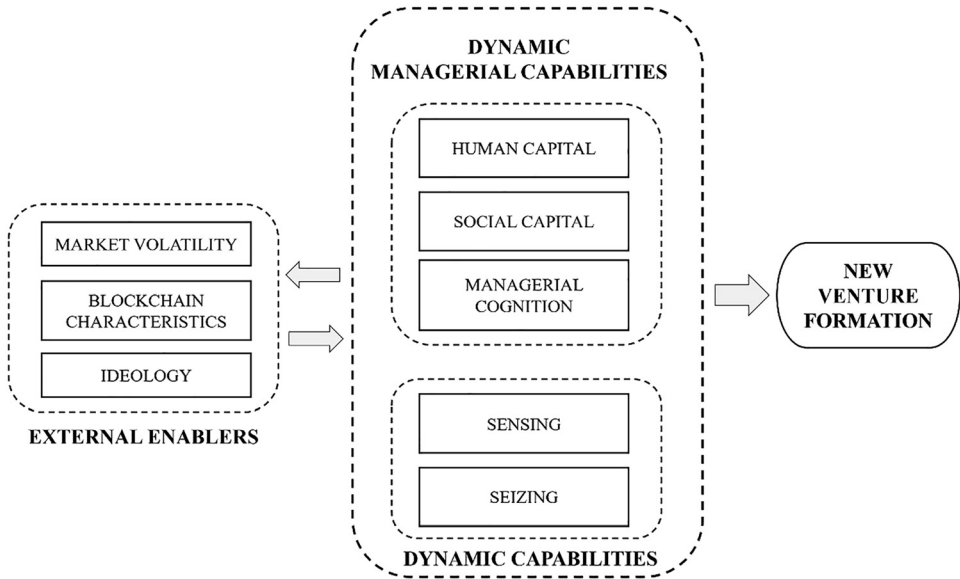


Fig. 1. Model of external enablers, capabilities and new venture formation

(Adner – Helfat 2003), we explained how and why entrepreneurs learn about enablers and manage to integrate multiple enablers into new venture ideas. The analysis of founders' DMCs helped with understanding how entrepreneurs creatively identified and realised the potential mechanisms of external enablers in a variety of ways throughout the venture-creation process. Thus, we incorporated an actor-dependent view of external enablers into an external enabler theory (Davidsson et al. 2020; Chalmers et al. 2021). Although the enablers are conceptualised as objective and actor-independent, we observed that the actors themselves actively contributed to the development of the enablers they aimed to activate.

Further, we extended the DCs perspective to the new entrepreneurial firms and addressed the gap in the research about the role of DCs in entrepreneurial settings, especially in their founding and development stages (Newbert 2005; Zahra et al. 2006; Wu 2007; Corner – Wu 2011; Jiao et al. 2013; Razmidoost et al. 2020). Our study elucidates the role of DCs in new venture formation by specifying these capabilities' nature and function. The sensing and seizing activities of the selected firms were instrumental for discovering the external enablers, shaping them into new business ideas, offerings and products, and their subsequent legitimisation. Due to the novelty of the technology, its controversial nature, and the dynamic environment a high level of both sensing and seizing capabilities was necessary for the formation of new ventures. Our investigated blockchain-enabled firms managed to establish partnerships with incumbents through cooperative methods such as personal contacts or strategic alliances between firms. Allying with universities and established companies helped new firms to access complementary resources and capabilities and signalled the latter's ability to develop valuable products, enhance their legitimacy and attract customers. This finding supports previous research results (Stuart et al. 1999) about the benefits of cooperation with incumbents for young firms, which can



reinforce the latter's market position. In line with the findings of Zahra – George (2002), we confirmed that the network linkages embedded in the new ventures' entrepreneurial teams also facilitated successful internationalisation processes.

The technology of blockchain as a new phenomenon offers many new areas for research (Seebacher et al. 2020). Scholars have agreed on its significance for future applications (Iansiti – Lakhani 2017; Kher et al. 2020). One of the objectives of this study was to explain how value could be created and captured through the incorporation of blockchain and how to build more secure and efficient blockchain-enabled products and services. For example, *Enerhash* has found a solution to addressing the problem of the high electricity consumption of the cryptocurrency mining industry (Chang et al. 2020). This is a win-win situation for energy producers and miners, as *Enerhash's* data centres consume the excess capacity of power plants and make the production of renewable energy more efficient. Another objective of this study was to explain the role of ideology in the formation of entrepreneurial discourses and practices (Chalmers et al. 2021). Thus, we have attempted to understand the formation of blockchain-enabled ventures by combining the theory of external enablers, DCs and DMCs perspectives. Our results are in line with the view of Teece (2007) that entrepreneurship is about sensing and understanding opportunities and getting things started. Having specific knowledge, the participants we interviewed proved their ability to recognise, sense and interpret information about external enablers and to shape them into new venture ideas. Due to the small sample size in our study, caution must be applied as the findings might not reflect all firms' capabilities. More study of the current topic is therefore recommended, and research can be undertaken to investigate the impact of the business environment on the DCs of new ventures. The conditions under which the external enablers might foster entrepreneurship should be also explored.

6. CONCLUSION

The paper shed light on the role of multiple external enablers in the formation of new ventures.

First, we elaborated the enabling mechanisms of blockchain technology that has arisen as a new class of information technology infrastructure with numerous applications. Second, in terms of managerial implications, we indicated that entrepreneurs and entrepreneurial teams play a key role in shaping external enablers and developing the DCs of new ventures. The properties of the technology and its rapid development allowed the entrepreneurs at the discussed case companies to sense such opportunities, resulting in innovative offerings and business models and the shaping of emerging market demand for blockchain-based applications. Besides the creation of products/services, the firms seized these opportunities due to their observation and adoption of best practices, and the internationalisation and establishment of relations with different stakeholders.

Our results will be of interest to companies that are considering the implementation of blockchain technology, and to individuals who have identified areas where incorporating blockchain will help solve problems. We advise established companies to cooperate with the blockchain start-ups in order to boost their DCs by utilising their expertise in fast-evolving blockchain and related DLTs. The study has important implications for managers regarding how their organisations can deal with a high degree of environmental uncertainty and ensuing challenges. A company's DCs and founders' DMCs should be considered relevant factors in any



assessment of the quality of start-up companies. The outcomes of our research should be useful for policymakers, as a deeper understanding of the origins and evolution of companies' capabilities may assist in predicting likely business responses to policy changes. Policymakers should increase the sophistication of legal regulations to strengthen those fields which belong to the high value-added ICT services branch of diversified economies, with the option of better safeguarding them during downturns.

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