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Public governance of the blockchain revolution and implications for social finance. A comparative analysis.

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[ABSTRACT]

There is hardly anyone who has not heard of blockchain nowadays, even though an exact idea about what blockchain is and how it exactly works is far from common. The knowledge most of the people seem to have of Nakamoto's original concept is related to cryptocurrencies; to the point that blockchain itself is often referred to as the 'Bitcoin protocol'. The most important and promising uses of this technology, however, lie far beyond sectors as distinct as healthcare, aerospace, energy and education.
The aim of this work is to investigate the potential for blockchain application beyond the monetary system and to compare some of the existing laws that have a direct impact on blockchain as a whole in the context of social finance and social innovation. It shows examples of 'blockchain in action' in different areas and geographic location –the EU, Israel and East-Asia are the selected case-studies—and discusses their unique characteristics.
Their comparative review helps distill what blockchain-friendly regulatory framework would look like, and what the existing challenges are for its implementation on a wide scale, starting from the regulatory framework of reference.

Keywords: blockchain; fintech; social innovation; sustainability; regulatory framework; GDPR.

1 Introduction

There is hardly anyone who has not heard of blockchain, even though an exact idea of what Blockchain is, and how it exactly works, is far from common. The knowledge most people seem to have of Nakamoto's (2008) original concept is related to cryptocurrencies (Doguet, 2013); to the point that blockchain itself is often referred to as the "Bitcoin protocol." The other clear association to blockchain is the Dark Web, since Bitcoins (and other cryptocurrencies) are commonly used for illegal transactions — as is illustrated by the 2015 FBI-led prosecution of the Silk Road (Bearman, 2015). However, Bitcoins are not illegal currencies. In fact, they are now widely used as a monetary exchange in the banking system (Boulton, 2015; Caffyn, 2015), the stock exchange (Nasdaq, 2014), and other financial transactions (Gallippi, 2014).

Blockchain is not a cryptocurrency. Rather, it is a type of promising technology that extends beyond the financial sector and is now being developed for use in sectors such as, energy (EnerChain, 2017), health (Deloitte, 2016), and aerospace (AIA, 2019). The key to understanding its potential is in the way that it functions. Blockchain is essentially "an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable

and permanent way," (Iansiti & Lakhani, 2017, online). It is highly configurable and secure by design. Blockchain will change how sectors of the production and individuals in society interact. Because of its fundamental characteristics and disruptive potential (both positively and negatively, as we explain in this chapter), it is crucial for governments to proactively update regulatory frameworks while considering blockchain. This is crucial and will make this technology either a success or a lost opportunity.

To consider these issues, the aim of this chapter is to highlight the potential that blockchain application has beyond the cryptocurrency and monetary system. We compare some of the existing laws that directly impact blockchain and highlight its potential for social finance and social innovation (as explored in section 2). This is exemplified by the European Union's (The EU) European Innovation Council award. In June 2020, €5 million were committed to blockchain solutions for social innovation (The EU Commission, 2020), the largest to date, but was by no means the only institutional contribution. Opportunities for a more inclusive application of blockchain for social innovation are available to every country. While there is little doubt that emerging economies could greatly benefit from blockchain (Brito & Castillo, 2013), through its ability to foster their internal agendas of social inclusions and innovation, not all of them have at present the necessary technical ability or motivation; but nothing prevents this in the future. A few examples have been offered in this context. Section 3 is the core of this chapter because it considers blockchain's regulatory dimension in a comparative perspective. Its aim is to distill what a “blockchain-friendly” legal framework should look like, to utilize its benefits and highlight the challenges for wide scale implementation.

The geographic areas selected for analysis are the EU, Israel, and East Asia, with reference to the Philippines. The rationale for these choices is as follows: (*i*) the EU is the largest single market in the world, but also the one where the regulatory framework can prove the most challenging for implementing blockchain technology (mainly due to the GDPR, a 2016 regulation entered into force in 2018). (*ii*) Israel is an example of a country with a high digital literacy, a leader in technology start-ups (BBC, 2020, online) and is located in a completely different economic and financial environment. Finally, (*iii*) East-Asia represents the area of the world where blockchain had the most impressive growth in the past decade. One example is Japan, a country with a

sophisticated financial system and an inclination for implementing blockchain on a large scale. It is rapidly emerging as one of the "leading blockchain hubs in Asia, and arguably, the world" (Hackernoon.com, 2019). Another example is the Philippines, which is surprisingly a prominent location for applying blockchain as a social finance tool. Section 4 will offer a few examples of what can be defined as “blockchain in action” –i.e., the current status of the application of blockchain technology, some challenges in implementation, and future possibilities. Section 5 concludes with a few words of caution regarding this new technology

2 Social Finance, Innovation & Blockchain.

A lot has been written both on the technical specifications of blockchain (Casino *et al*., 2019; Crosby *et al*., 2016;) and about the characteristics of privacy, reliability, security, and distributed access (Christidis and Devetsikiotis, 2016; Housley, 2004; Meng et al., 2018), which contribute in making the technology so valuable and flexible when it comes to widespread uses.

Most of the literature focuses on the economic benefits of cryptocurrency that lowers transaction costs and enables access to capital (Brito & Castillo, 2013). Cryptocurrency facilitates the elimination of third-party intermediaries, making it cheaper for small businesses to transact and lowers the cost of global remittances. It has, therefore, the potential to alleviate global poverty and improve access to capital. Furthermore, it protects individuals against various forms of capital control, and monetary censorship as well as protecting marginalized groups' privacy. However, an aspect less explored is how blockchain can become an enabler for social innovation. Some go further and define blockchain as a "fundamental for forwarding progress in society as Magna Charta or the Rosetta Stone" (Swan,2015, p. 7). What is true is that "the blockchain technology potentially allows individuals and communities to redesign their interactions in politics, business and society at large, with an unprecedented process of disintermediation on large scale, based on automated and trustless transactions," (Atzori, 2016, p. 4), with immediate and fundamental consequences for social innovation dynamics.

In this chapter, we define social innovation as “a complex process of introducing new products, processes or programs that profoundly change the basic routines, resource and authority flows, or

beliefs of the social system in which the innovation occurs. Such successful social innovations have durability and broad impact," (Westley & Antadze, 2010, p.2; also Moore *et al*., 2012; Repetto, 2006;). If this is the case, then blockchain, with its characteristics of being open-source and immediately available for use by various forms of economic operators, private, public and from the third sector, is an ideal candidate for social innovation. Section 4 provides some examples of potential and promising uses of blockchain.

Moreover, all social innovation projects need, as much as any other project, resources (Bloom & Chatterji, 2009; Harding, 2007). Here, the competitive advantage of blockchain lies in the fact that often traditional finance is not immediately available to social aims (Dees & Battle Anderson, 2006; Nicholls, 2010; Nicholls & Young, 2008), while examples in emerging economies show that blockchain applications in the financial sectors can and are currently being used to this extent. In this sense, blockchain for the financial sector can be usefully inserted within the more general category of instruments liable to promote social finance, subjected to the same constraints, and working with the same rules. This is an important point to note, considering that "social finance is more than just the flow of money into social or environmental projects. It is conceived as an ethos about the way money is used . . . social finance can be seen as the discourse around such flows that is developing in concrete terms in the new institutions of supply, intermediation, and demand. This is a discourse in flux with competing perspectives driving the debate" (Nicholls & Pharoah, 2007, p. 6).

While it is unclear how blockchain will affect the context of social finance, some applications provide a glimpse of the potential direction. One is crowdfunding, whereby blockchain tokens are used either as preorders of goods or as ownership shares. This enables businesses to mimic venture capital funding while reaching a much wider audience in comparison to traditional methods (Belleflamme *et al.*, 2014). Another example is the specific blockchain fundraising initiative, ICO (initial coin offerings), that bypass traditional intermediaries in fundraising initiatives (Mollick, 2014) and are more appealing to global investors (Massey *et al*., 2014). Both cryptocurrencies and blockchain tokens can effectively work as crowdfunding enablers, albeit with different modalities that would require setting up smart contracts (Chen & Bellavitis, 2020).

In addition, these are hailed as being potential Shariah-compliant methods for Islamic crowdfunding, which will spur the development of new opportunities (Muneeza *et al*., 2018). Whatever the modality, it has been convincingly demonstrated that blockchain has the potential to enable social innovators in"democratis[ing] entrepreneurship by democratizing the access to capital […] and disrupting traditional venture investments just as social media is disrupting traditional media" (Chen & Bellavitis, 2020, p. 7), tax inefficiency, regulatory hiccups and uncertainty (O'Leary, 2017) notwithstanding. These forward-looking aspects of blockchain technology have been recently taken on board by most international organizations working toward one or more SDGs.[1] Given its complex nature and the limited space available to us, we chose to focus on a selected number of initiatives in a few specific geographic areas (as previously mentioned).

3 Adapting the Regulatory Framework for Blockchain

Given that blockchain technology is being implemented without a clear legal framework, the regulation vacuum is creating friction in both the real and virtual worlds. For example, because blockchain is meant to remove the *Third-Party Verification*[2], creating a virtual alternative market (in which people can directly interact with one another) means that new rules need to develop and be upheld within the virtual world. Furthermore, at least some of the likely conflicts and irregularities in the virtual world could be resolved by real-world interventions (e.g., policing, legal disputes, etc.), in addition to the smart enforcement tools and protocols associated with the relevant transactions algorithms—with the legal dimension possibly being at conflict with algorithmic remedies, and/or with platforms' possibilities of intervention on selected transactions (e.g., to reverse them). A striking example of this tension is the Singapore case *Quoine Pte Ltd v.B2C2 Ltd*, recently decided by the Singapore Court of Appeal, following a first instance judgement delivered in 2019 by the Singapore International Commercial Court.

In this case, the courts had to deal with balancing contract law, unjust enrichment, automated protocols, and human mistakes and the consequent unilateral interventions on a performed

[1] Examples abound here. A good starting point is HSBC 2019 Report Blockchain. Gateway for Sustainability Linked Bonds. (2020). Retrieved 14 October 2020, from https://www.sustainablefinance.hsbc.com/mobilising-finance/blockchain-gateway-for-sustainability-linked-bonds

[2] A process whereby an independent, trustworthy, actor confirms the accuracy and intent of the transacting parties.

"smart" transaction which wasn't actually that smart, in the particular case at hand[3]. Policy, law, and technology will, thus, need to adapt to one another accordingly, in all attempts to develop a regulated digital, or digital/real, environment. Which elements will have to adapt to which ones remains to be seen – the answers could vary depending on the different contexts. In the following sections, we examine three different regulatory frameworks and offer some perspectives on the likely key areas of future friction as well as their solutions.

3.1 The EU

The European Union (EU) is the second largest market for blockchain applications (after the US) and yet also the area with the largest barrier for its adoption. The main sticking-point is the in-principle scarce compatibility of blockchain with GDPR rules (i.e., the EU regulation for privacy), which covers two fundamental technical aspects: (i) the encryption that ensures anonymity and decentralization, and (ii) the systemic tracking of all transactions. Interestingly, these precise features are those that make blockchain so attractive and valuable.

The first issue is that GDPR requires at least one "data controller," a legal or personal entity to whom subjects can ask for the enforcement of their rights. However, the very nature of blockchain is that this central authority does not exist, and herein lies the value of the technology. Article (Art) 22 of GDPR states: "The data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her." This is, however, the precise mechanism that underpins blockchain technology. The second issue, touching another fundamental characteristic of blockchain, is its immutability of past transactions to ensure data integrity and the overall trust of the chain itself. This also clashes with GDPR, specifically Art 16 and 17 that require that all data must be subject to modification, or even erasure, when necessary for legal reasons. Art 16 (Rectification) states: "The data subject shall have the right to obtain from the controller without undue delay the rectification of inaccurate personal data concerning him or her. Taking into account the purposes of the

[3] See *Quoine Pte Ltd v. B2C2 Ltd*, [2020] SGCA (I) 02, delivered by the Singapore Court of Appeal following [2019] SGHC (I) 03 by the Singapore International Commercial Court.

processing, the data subject shall have the right to have incomplete personal data completed, including by means of providing a supplementary statement."

Even more stringent is the right to erasure (Art 17), also known as the right to be forgotten, which clearly contradicts one of the basic principles of blockchain technology. This point has attracted a lot of discussion in terms of mitigation strategies (as we discussed below). Additional hurdles are created by the components of personal data and if anonymization techniques like hashing (used by blockchain technology to confirm its state) can successfully transform them, and thus realign and comply with GDPR.[4] Finally, a further complication is the territorial scope of GDPR, as Art 3 clearly states. Even though it is an EU law, it has implications beyond EU borders. For example, whenever EU nationals and their personal data are involved (both as data subjects and data controller), GDPR provisions take precedence. Companies that adopt blockchain internationally must be mindful of this.

There are a few ongoing studies that explore ways to conciliate GDPR and blockchain, tackling one or all the above legal rifts. In most cases, the solution lies within sophisticated techniques that enable data controllers to have a separate treatment of their personal data from the others, as in the case of off-chain storages. This "would enable the rectification and erasure of personal data stored off-chain in appropriate databases in line with Articles 16 and 17 GDPR" (The EU Parliament, 2019, online).[5] Working on the configuration of the distributed ledger would partially address those concerns (Bacon *et al.* , 2018; Berberich & Stainer, 2016; Finck, 2018;).[6] A further approach is the outright destruction of data (e.g., The EU Parlianemt, 2019, online), including the destruction of private keys, as some cases at EUCJ prove (Case C-131/12 Google Spain [2014]).

[4] About this specific point and in general on the anonymization procedures, the debate is still ongoing (Felten, 2012; Acar 2018).

[5] Even though issues would still remain. "An open question in this regard is, however, that of the status of the remaining hash. Indeed, the data in off-chain storage will be linked to the database through a hash, and where the off-chain data is erased, that hash will remain on the ledger. To determine whether this hash remains personal data, the means reasonably likely to provoke identification need to be examined. However, this is an era where confusion reigns as many have expressed confusion as to how this ought to be determined." (The EU Parliament, 2019, online)

[6] Increasingly inventive solutions are currently under consideration, such as state channels for two-party smart contracts, which will share information in the event of a dispute (Butering, 2016), ring signatures hiding key information (European Blockchain Observatory and Forum 2018), and the addition of noise to the data (MIT, 2019).

No matter the specific solutions devised, there is a clear problem that requires correction. The GDPR obstacles are unique to the EU and tougher when compared to other countries with similar regulatory frameworks. For example, regulation in the US is more blockchain-friendly. The only other exception is California, which recently introduced a new regulation (the California Consumer Privacy Act of 2018 – CCPA) that has GDPR-like provisions for the digital sector, and is expected to have a direct impact on blockchain. Legal hurdles and technical obstacles aside, there is certain future for blockchain in Europe. Though GDPR is a major point of friction for blockchain, a friendlier regulatory environment is actively being encouraged in some European jurisdictions, designed to attract investments in this field. For example, Malta and San Marino are in the process of developing an attractive legal framework for blockchain applications. Its aim is to regulate blockchain through official channels, promote supervision and the development of certified best practices, attract global market actors in the field, and incentivize compliance within the growing blockchain market. How well this is going to be achieved in a GDPR-compliant framework remains to be seen.

The following issues represent significant legal challenges: the time required for the technology to mature and an indication of where it is heading; and, especially, a significant change in the legal framework as well as a major cultural change in the very mind of legal systems' operators will be required. Domestic laws and the EU normative environment—both European States and the EU certainly having a long-term vested interest in developing both the blockchain economy and tools for its governance, whether hard or soft—certainly add complexity to this picture. The EU appears fully committed to reaping the benefits of blockchain, across various potential applications, even though this poses a challenge and a contradiction towards its own regulatory framework. It recognizes the importance of the blockchain technology in the EU, in fields as different as healthcare, energy, financial market, global-supply chains and agricultures, which are impossible to discuss in the limited space of this chapter. Some examples of recent blockchain development in the EU, both in general and with specific references to social innovation, are provided in section 4.

In terms of institutional support, a lot of recent initiatives show the commitment of the EU to the development of the technology. To this extent, the EU Commission and the European Parliament

launched in February 2018 the Blockchain Observatory and Forum, aimed at the promotion and support of the blockchain initiatives that enable "cross border cooperation on practical use cases, bringing Europe's best experts together and promoting an open forum for blockchain technologists, innovators, citizens, industry stakeholders, public authorities, regulators and supervisors, to discuss and develop new ideas in order to learn, engage and contribute in an open way" (The EU Commission, 2018, online). Since its beginning, the EU Blockchain Observatory and Forum have organized workshops, issued expert reports on different topics, and mapped 700+ global blockchain projects on an interactive map available on the institutional website. The Observatory has also grown in scope together with the European blockchain landscape, both private and public, and it will continue to do so even after 2020 (The EU Commission, 2020).[7] Finally, in terms of financial support, the EU Commission has been funding blockchain projects since 2013 through their framework programmes FP7 and Horizon2020. The funds committed to projects that draw on blockchain technologies is up to €340 million by 2020 and, while details of the next framework programme for R&D are not available yet, they would probably keep rising in the future.

3.2 Israel

Israel is a country known for its high concentration of high-tech technological development. According to a report by Startup Blink (2020), which provides a ranking of the start-up ecosystems among a list of the top 1000 cities and 100 countries, Israel maintains its lead among the top four countries (including USA, UK and Canada). Similarly, Deloitte (2016) reported Israel as the world's second-best entrepreneurial ecosystem.[8] The Israeli hi-tech sector is estimated at around USD 33.1 billion (bln) in 2016 (CBS, 2019) – roughly 10.3 percent of GDP.[9] Within it, Deloitte (2016) estimates that 61 fintech Israeli firms raised USD 0.37 billion (bln) in 2014 and include firms working with blockchain. Recently, SPHINX (2020) focused on the

[7] For example, in October 2019, the EU Commission selected a consortium to operate together with the Forum, composed by a group of operators (INTRASOFT, the University of Nicosia, the Centre for Research and Technology Hellas (CERTH), and a series of subcontractors (including Bitfury Group, OpenForum Europe AISBL, White Research, PLANET S.A.).

[8] Much of Israel's success originates from the military as a technology incubator. Young adults are recruited to various elite cyber units that are responsible for collecting signal intelligence and code decryption. Once these young 18-21 year-olds complete their compulsory army service, they enter the labour market, having already gained valuable and practical skills in IT and R&D. A most well-known example is Unit 8200.

[9] Using annual average Shekel/USD=3.8406 from Bank of Israel, Foreign Currency Department.

narrower sub-sector, *blockchain and Bitcoin,* and estimate the amount of external raised capital at around USD 2.1 bln in 2020. Combining these two points in time is clear evidence that the subsector is growing very rapidly.[10]

As in other countries, blockchain in Israel is most closely linked to the financial intermediation sector and fintech. New developments are mainly focusing on electronic wallets, bitcoin and other crypto digital currencies, and on utilizing initial coin offerings (ICO). But there are also examples of technologies being developed for other sectors, e.g., healthcare record, legal, Intellectual property (IP), contract digitalization, fundraising, community regeneration projects, international shipping, food and product control, and many more applications. These new blockchain applications are either utilizing the open network or developing their own closed network.[11] (SPHINX [2020] collected a comprehensive excel list of blockchain firms in Israel that describes the products being developed, number of employees, and more.)

Even though Israel is a top innovator of blockchain technology, this technology's practical application is very limited. The Israeli consumer does not currently benefit from the social and economic potential. The main reason for this is due to the Israeli market being too small, and high-tech firms prefer to focus their energies on the much larger external markets. So far, the greatest scope for Israeli customers to benefit from blockchain technology has come from private banks and credit card companies who are incorporating fintech technologies to update themselves and move towards a digital business model (BoI, 2019). Yet one Israeli firm, *Colu*, is experimenting with blockchain technology called *colored coins* to associate digital assets with real assets (e.g., stocks, car, land, intellectual property, etc.). Their aim is to use the enhanced security features of bitcoins to trade with non-financial products. Colu provides various applied

[10] The SPHINX (2020) report collects a comprehensive list of 134 blockchain related companies. It finds that all firms are small medium enterprises (SME), i.e., most firms employ 1-10 workers, and only five emply above 50. that employ just under 1,800 workers as a sub-sector. Just above 50% of these firms are funded by outside sources and the rest by private funding. Furthermore, 37% of the firms have released a product to the market, while the rest are at various development stages (either R&D, alpha or beta versions). SPHINX (2020) is the most up-to-date market analysis on the blockchain and bitcoin sub-sector in Israel, commissioned by the Israeli Bitcoin Association https://www.bitcoin.org.il/. The report came out in February 2020 and provides information immediately prior to the Covid-19 pandemic in Israel that begin in March 2020.

[11] One interesting example is the shipping giant, Maersk, and IBM developed a blockchain network for shipping called TradeLens.

impact case studies to promote their product.[12] One example is the creation of a local currency at the neighbourhood level of Jaffa (part of the Tel-Aviv Jaffa municipality). Its aim is to promote local shopping and regeneration in Jaffa's neighbourhood.[13] The project is being used to demonstrate transferability to other communities across the word, bypasses traditional intermediaries of exchange, and creates growth from the ground up. BoI (2019) provides other examples of blockchain related applications in Israel. They focus on payment apps, virtual banking services that use Artificial Intelligence (AI) and blockchain. These are developed by private banks together with Israeli Fintech Startup firms and academia. One specific application of blockchain is a partnership between *Bank Hapolaim* and *Microsoft Israel* that uses the *Azure cloud-platform.* The platform enables the customer of the bank to become guarantors without the need to physically appear in the bank for validation (Walla, 2017).

Another example is *Bits of Gold.net*[14], an Israeli firm that provides a platform for buying and selling Bitcoins and Etherum. In 2013, it was the first cryptocurrency broker in Israel to receive a license from the Israeli Money Laundering and Terror Financing Authority. Today three firms provide such a service. Bit of Gold is a well-known example that shows the new frictions emerging between incumbent "traditional" private banks, which want to incorporate blockchain technology into their services and yet hinder its adoption by potential non-bank (competitor) entrants. The legal dispute between *Bitsofgold.net* and *Bank Leomi* reveals the need to develop and update government regulation (CCLP and ISOC-IL, 2019; Katsiri, 2019a; Levush, 2018). In 2017, the courts agreed that Bank Leomi is not obliged to accept earnings that originate from profits produced by cryptocurrencies because of the possible illegal activities associated with cryptocurrencies. The outcome barred Bits of Gold from using "real world" current account services that were made in the "virtual world." This would have a serious impact on the abilities of new virtual coin application in entering the financial intermediation sector as alternative products.[15]

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[12] https://colu.com/case-studies/

[13] https://colu.com/case-studies/urban-regeneration-in-tel-aviv-colu-civic-engagement/

[14] https://www.bitsofgold.net/

[15] In 2018, BitsofGold appealed to the Supreme Court, whereby a temporary injunction was issued prohibiting a bank from blocking activities of a company using virtual currency on the basis that the allegations are speculative rather than evidence based (Levush, 2018). In the same year, in a move to legitimize and regulate crypto currency activities, Bits of Gold agreed to declare its heavy cryptocurrency users of above NIS 50K to the Israeli Tax

Like the contradictions between GDPR and blockchain in the EU, Israel's regulators are also grappling with this new emerging technology and its potential positive or negative consequences. In 2016, the *Supervision on Finance Services Law 5776-2016* was introduced in order to provide a licensing requirement for trading in virtual currency.[16] The new law deemed virtual currencies a "financial asset" and required persons providing services in "virtual currencies" (i.e., cryptocurrencies) to obtain a license. To manage control over fiat money, the Israeli tax authority (ITA) declared in January 2018 that virtual currencies cannot be used as official money or as foreign currency, as stipulated by the *Bank of Israel (BoI) Law 2010* and *Order of Income Tax* (ITA, 2018a, 2018b; Levush, 2018)[17]. However, because virtual currencies are none-depreciable assets, their profits are taxable according to income tax rules or as value added tax (VAT) if used as an intermediate payment. In other words, activities that generate profits using virtual currencies are obliged for tax reporting, including mining, payments for services, exchange, and others. In March 2018, ITA also published its new tax rules on Initial Coin Offerings (ICO) that uses blockchain technology, to clarify and close any regulatory leaks (ITA, 2018b).

In a detailed white paper on the emergence of blockchain technology in Israel, CCLP and ISOC-IL (2019) argue that the current regulatory framework in Israel are wide enough to encompass and regulate blockchain development and its use, including other technologies that compete with blockchain. For example, the main law in Israel is the *Economic Competition Law 5748-1988* (GOV.IL, 1988), which aims to protect market competition and the public interests. The law covers three themes: (i) the appropriate conduct of market players so that none impair the other or harm market competitiveness, (ii) the assessment of mergers and acquisitions that could impair competition and the public interest, and (iii) protect against anti-monopolistic behaviour (CCLP and ISOC-IL, 2019). Moreover, the law states the structure and role of the Israeli Competition Authority (ICA), the Director General of ICA, and the Competition Tribunal that deals with cases brought before it. CCLP and ISOC-IL (2019) explain that regulation relating to blockchain is currently reactive and piecemeal. They provide some examples as models that communicate how the Ministry of Finance and Bank of Israel (BoI) provide reactive policy and

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Authority (Milman, 2018). Finally, in 2019, the Supreme Court agreed on the compromise made by both sides that allowed Bits of Gold to continue using Bank Leomi's financial services.

[16] For further details see Library of Congress, https://www.loc.gov/law/help/cryptocurrency/israel.php#_ftn3.

[17] Also known as the Income tax law.

that a serious effort towards a proactive approach is lacking. The key characteristics that make blockchain incompatible with current real-world laws and regulations are highlighted by CCLP and ISOC-IL (2019). These are like those faced by the EU (e.g., the incompatibility of GDPR and Blockchain, as previously discussed). In Israel, so far, the focus has been on two issues: (*i*) the anonymity of blockchain users that hinders enforcement, and (*ii*) the permanency of blockchain's limits rectifying anti-competitive actions, even when these were identified (i.e., also known as *unstoppable code*). CCLP and ISOC-IL (2019) and Katsiri (2019b) further explain that the lack of clear blockchain regulation in Israel creates a mismatch between short and long-run objectives. In the short run, the vacuum enables firms to save on costs because no regulatory considerations are required. But in the long run, this exposes them to risks because their platforms might not fit (or even oppose) future regulation. This lack of clarity and risk of mismatch hinders new developments from forming as well as limit the adoption of good technology.

Though regulation is undeniably required; it is not a simple task. Institutions such as the BoI, which are crucial for implementing policy, argue that blockchain and the virtual world are simply too new and that it is impossible to proactively develop appropriate regulation without knowing the direction that blockchain is heading towards (BoI, 2018a). However, as much as this makes sense, blockchain is unavoidable, and regulation must find ways to quickly accommodate and evolve. We expect further disruptions to occur, as the legal dispute between *Bits of Gold* and *Bank Leomi* showed—a highly cited example in Israel within the context of blockchain.

3.3 East Asia and the Philippines

After the USA and the EU, East Asia is the area of the world that has witnessed the most impressive growth both in cryptocurrency trading and blockchain technology in general, even though the approach and the regulatory framework of the individual countries are different and quite nuanced. Still, compared to other world regions outside the US and the EU, the entirety of East Asia is one that has enthusiastically welcomed this new technology—by not only th technology-advanced countries (e.g., Japan, South Korea or Singapore), but also by the emerging economies.

For instance, the Philippines is among the Asian countries that is becoming increasingly blockchain-friendly. There are various indicators showing this. One example is the value of cryptocurrency transactions which rose from 189.18 million USD, in 2017, to 390.37 million USD in 2018 – just the following year. There are a few reasons why the Philippines departed from the usual suspicious approach shared by other countries in the region and decided to support the technology. One is, maybe surprisingly, the relative backwardness of the Philippines' financial system. For example, many individuals still do not even have access to traditional banking (i.e., seven in ten, according to some recent estimates; International Finance, 2020). E-currencies provide therefore, an inexpensive substitute (solution) to fill the void. But the largest driver for embracing blockchain comes from the local start-ups and SMEs, and the economic benefits it generates. These capital-starved firms are keen to integrate blockchain because of its cost saving decentralized nature, as discussed in section 2. Compared to its neighboring countries, access to the stock market is limited in the Philippines, which is ideal for Fintech-powered capital market technology to flourish.

In the last few years, the adoption of blockchain solutions has grown parallel to the establishment of crypto exchanges for cryptocurrencies based in different areas of the country to make adoption easier. In addition to the 11 crypto exchanges approved by the central bank with a license to the entire national territories (Bitcoin News, 2018), the government-owned CEZA (Cagayan Economic Zone Authority) authorized 37 crypto exchange operators with a smaller and/or more restricted trading scope. CEZA is an important case in this context: this special economic zone and freeport has been setup in the northeast of the Philippines, specifically to compete with Hong Kong and Singapore as an international financial hub. The authorization of crypto exchanges to operate in the zone signals the government's support of blockchain and its view that this is a "winning" future technology, which will make the country more internationally competitive. There are also additional measures put in place to support the whole fintech sector and blockchain. For a start, the Philippines Securities and Exchange Commission also recently finalized crypto guidelines (Bitcoin News, 2019a) to make their application more transparent. The government has also established what the press dubbed "the Crypto Valley of Asia," (SCMP, 2019) which is a cyber-park that shares the area with the already-mentioned

cryptocurrency and fintech hub in CEZA economic zone. This was created with the participation of the property developer Northern Star Gaming & Resorts Inc., investing 100 million USD over a ten-year period (Bitcoin News, 2019b). As mentioned, the aim is to give the country a competitive advantage compared to the rest of ASEAN countries (e.g., Indonesia or Vietnam) and the rest of East Asia, which might be less inclined to offer such strong support towards the new technology. While Japan has embraced blockchain technology early on and it can be considered the leader of bitcoin transactions in Asia, other important players, like China and South Korea, have demonstrated enthusiasm but also a certain degree of caution.

Finally, there are concerns about blockchain, not only relevant to the Philippines but across East Asia. At the core of blockchain technology is its ability to maintain secure and decentralized virtual transactions, both legitimate and illegitimate. However, without appropriate safeguards, it is prone to be exploited by unlawful operations. For this reason, despite supporting the development of cryptocurrency hubs, the Philippines Central Bank also imposed some legal limits to their activities. First, all single transactions amounting to more than P 500,000 (about 10,000 USD) cannot be made by cryptocurrencies. Instead, the operation needs to be carried out by cheque or through direct credit to the bank accounts. Second, the Central Bank requires all exchanges in cryptocurrencies to adhere to the official guidelines, maintaining all the required records and filing reports on the activities, which, considered the inherent technology, looks quite difficult to achieve.

If the past is any guide, if not supervised and correctly configured with the right mix of checks and balances, the wide-scale adoption of the technology could also be used for money laundering and terrorist financing, enhancing security issues that currently exist everywhere in the world.

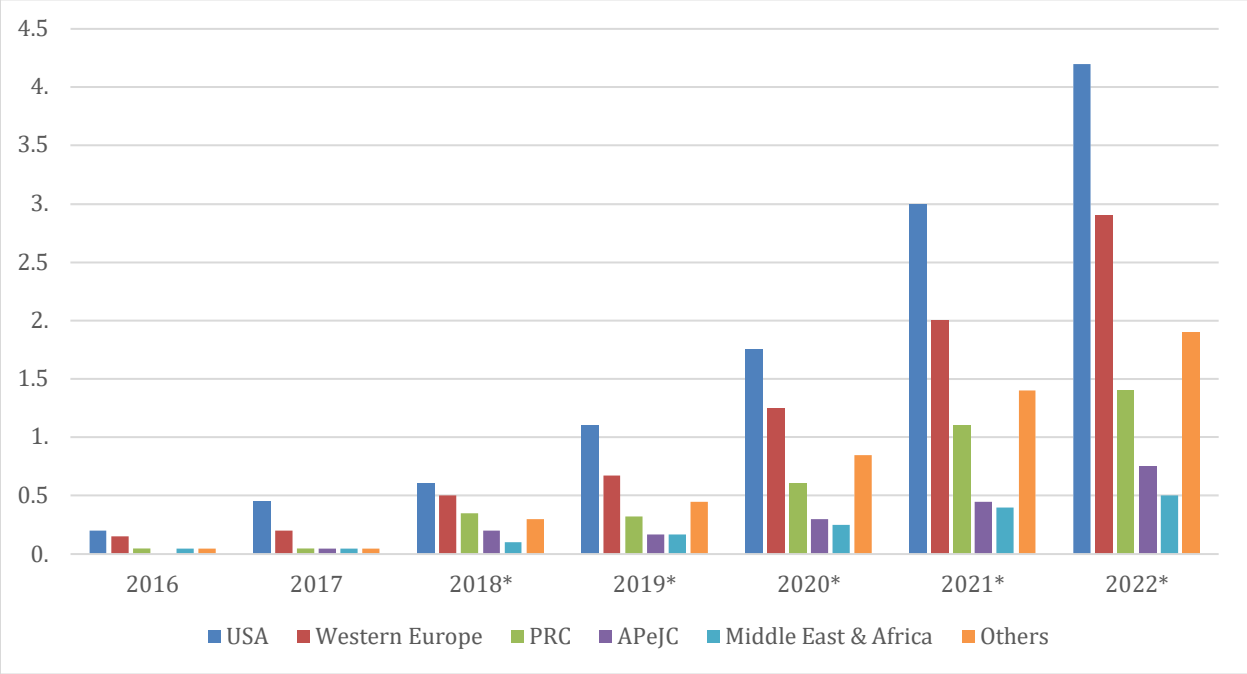
4 Blockchain in Action

Blockchain does not consist of just cryptocurrencies, but cryptocurrencies still represent the bulk of blockchain applications so far. The entire cryptocurrency sector has boomed since Bitcoin's appearance in 2009 and, as of April 22, 2020, approximately 5,392 cryptocurrencies are being traded with a total market capitalisation of 201 billion USD around the world. Revenue from blockchain technology overall, beyond cryptocurrencies, are projected to continue growing to

over 39 billion USD by 2025. Regional spending on blockchain solutions has been rising steadily since 2010, and the world's outlook is impressive both in sheer value and in growing trends. In 2022, the forecast for US spending on blockchain technology is about 4.2 billion USD, still the single largest country in terms of value.

As Figure 1 shows, other regions have been gaining momentum, especially the EU and Asia-Pacific. As much as the cryptocurrencies are the lynchpin of blockchain applications, the financial sector represents its core, even though the technology, as mentioned before, is rapidly expanding.

Figure 1: Worldwide spending on blockchain solutions from 2016 to 2022, by region
(in billion U.S. dollars)



(Source: Authors' elaboration on IDC and Statista data, 2020; PRC refers to Mainland China here, while ApeJC is the Asia-Pacific. Conclusive data still not available for 2018 and following years. Latin America is not present as a separate region in this article for a reason: it is one of the areas where the introduction of blockchain technology proved the slowest, with countries such as such as Bolivia and Ecuador banning the use of cryptocurrencies as means of payment.)

The focus, so far, has been on private firms pushing to develop and integrate blockchain. But key state institutional players are also involved. For example, countries' central banks are considering the adoption of Distributed Leger Technology (DLT) using Blockchain. Countries such as South Africa, Canada, Japan, Thailand and Singapore are already testing a wholesaler digital coin for the financial and payment system (WEF, 2019). The aim is to improve the efficiency of interbank transfers and loans, and as a proof-of-concept before the introduction of a public e-currency for retail use. The Bank of Israel (BoI) had also deliberated on this in the working group that discussed the introduction of a digital e-Shekel. Ultimately, they decided against it for the time being due to the risks outweighing the gains. A similar conclusion was reached by the Central Bank of Denmark (BoI, 2018a).

The BoI's decision was based on various considerations: They looked at the current international experience and developments toward Central Bank Digital Currencies and concluded that it is still too early in its development and has an unclear future.[18] For example, it is unclear whether digital currencies can uphold the essential elements of acting as money, i.e., (*i*) being a unit of account, (*ii*) a means of payment, and (*iii*) store value. Together, these three create the framework of "Trust" necessary for exchange and a type of public good. But in the current environment, digital currencies do not fulfill all these requirements for the following reasons: First, volatility means that people will be hesitant to use them as a means of exchange.[19] Second, the role of the central bank is to provide a properly governed infrastructure for wholesale and retail payments and thus will need to make adaptations before a digital currency is usable (BoI, 2018a, 2018b, 2018c).

Finally, the aim of central banks is to create a price-stable environment, supervising private banks so that they maintain resilience with enough capital and generate good governance with Anti Money Laundering and Finance Crime Protection. However, blockchain is currently incompatible with these. The risks and uncertainties inherent within digital currencies are still too large. Regulation and legal barriers must first be clarified before adoption (e.g., the

[18] BoI reviewed the experiences of the other central banks that have been testing a wholesaler digital coin for the financial and payment system.

[19] For example, people will hold-on-to them if prices are expected to rise, while others will not accept them when prices are expected to fall.

anonymity of cryptocurrency users opens it up to money laundering, tax avoidance and unclear legal disputes).

However, countries and institutions recognize that the potential of blockchain for social innovation is beyond financial intermediate—as discussed in section 2. They, therefore, are willing to go to the extent of offering substantial institutional support. A telling case is the EU. Despite GDPR-related hurdles, the EU Commission has shown a clear intention to support blockchain when geared towards social innovation initiatives. For example, in June 2020, the EIC (European Innovation Council), awarded a €5 million prize to six institutions that use blockchains for 'Social Good'. The aim is to identify a series of high-impact and workable blockchain solutions to address societal challenges (the EU, 2020, online). In line with the original philosophy that inspired Bitcoin, an open-source protocol was one of the proposal requirements, to make sure that access to the developed solutions was extended and available to a wide platform of users. The focus of the six winning proposals includes: solutions for fair trade, contribution to financial inclusion, circular economy, transparency in procurement and public work, management of public records, and renewable energy, each of which will receive €1 million (EnterpriseUk.com, 2020).

The six winners were the Dutch WordProof (quality content), the UK-based PPP (traceability and fair trade), GMeRitS (financial inclusion) by the Finnish University in Aalto, UnBlocked Cash Project OXBBU (aid and philanthropy) developed by the British Oxfam and the French start-up Sempo, CKH2020 (decentralised circular economy) by the French company Klero, and the Italian PROSUME (energy).

Beyond the EU Commission itself, there are further examples of several European start-ups that have focused on utilizing blockchain technology for social innovation. For example, the London-based Coinfirm, which since 2015, has developed an anti-money laundering (AML) system for virtual currencies to allow financial institutions and regulators to safely engage with the crypto world (Coinfirm, 2020); the Swiss Odem, which applies blockchain to education and training accessible to everybody (Odem, 2020); and the Estonian Solve.Care. Since 2017, Care has raised

€26.7 million to bring transparency and a more agile bureaucracy in the world healthcare systems (Solve.Care, 2020).

5 Conclusions

Twelve years after Nakamoto's paper, blockchain technology is booming, and the most widespread and comprehensive applications, like IoT (internet of things), are still in their infancy. In one of the most likely scenarios, in ten years from now, we will live in a world where so much more will be powered by highly sophisticated, anonymous, encrypted, and distributed ledger.

As for any technology, it is important to understand how things can go wrong before they can be used for good. If anything, the early issues with Bitcoin and its utilization on the Dark Web and lending blockchain a dubious reputation, also alerted all perspective users about its inherent dangers. This is, however, a good thing at the end of the day. Because the real challenges with blockchain are not the technology, but "the issues involved relating to implementation, organization and trust" (Werbach, as cited by WEF, 2018*)* a lot still remains to be done. If anything, a snapshot of the 2020 global outlook presents a quite diverse landscape (Chohan, 2017) when it comes to the regulatory framework and blockchain adoptions, and for countries that still ban the use of cryptocurrencies as means of payments, there are others that have provided a friendly and supportive environment.

Still, one point that clearly emerges from this synthetic overview is that countries and realities as different as Israel, EU, and East Asia are all dealing with similar issues when the adoption of the blockchain technology is scaled up for everyday use. The hurdle to overcome is the reconciliation and integration with the existing regulatory framework that exists to protect citizen rights and public interests in a fast-changing digital world. The stronger the rule of law and the protection granted to those rights, the more challenging it is to integrate blockchain, as the EU case illustrates.

But solutions do exist. What matters the most is the political will to adopt the technology and use it in the most inclusive way possible. Blockchain can not only dramatically alter our economic

and technological landscape; it can be a force for good and social innovation, as our chapter demonstrates. This will likely pass for a necessary, and in some cases, overdue reflection on how to address the problematic points raised by regulations such as the GDPR and together make sure the technology is as inclusive and forward looking as it can possibly be.

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