
Guest editorial: Blockchain and the multinational enterprise: progress, challenges and future research avenues

Guest editorial

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Introduction

In the past two decades, digital technologies have substantially changed the ways in which individuals and firms communicate and transfer knowledge, with wide-ranging implications for organisations and institutions. From an organisational perspective, the emergence of digital technologies has enhanced the materialisation of new business models (Foss and Saebi, 2017; Rachinger *et al.*, 2019), the personalisation of products and services (Cenamor *et al.*, 2017), the relation of trust between market agents and asymmetries of information (Urena *et al.*, 2019), new products and services (Matt *et al.*, 2015) and the pace of product life-cycles (Seetharaman *et al.*, 2018), to name a few. This digital transformation has far-reaching implications for organisations but is particularly important to multinational enterprises (MNEs) as it allows them to reduce the liability of foreignness (Johanson and Vahlne, 2009), enhance knowledge creation and improve knowledge transfer and learning (Gaur *et al.*, 2019), augment trust-building (Monaghan *et al.*, 2020), build agile global value chains (GVCs) (Kano *et al.*, 2020) and improve the speed of internationalisation (Oviatt and McDougall, 1994). All this results in a reduction of uncertainties and thus lowers the risk perception (Clarke and Liesch, 2017), which impels international commitment decisions.

An important new technology with potential for significant and wide-ranging impacts is blockchain. With this technology it is now possible to, for example, transfer the ownership of physical assets, such as cars and real estate, stocks, bonds and money over the internet through digital contracts (Andreesen, 2014). The changes that blockchain technology brings about leave academics, businesses and governments grappling with the consequences. Academic research has focussed on the economics of blockchains (Evans, 2014; Davidson *et al.*, 2016) and blockchain use cases, especially in the financial, information and communications technology, and public sectors (Böhme *et al.*, 2015; Friedlmaier *et al.*, 2017; Tapscott and Tapscott, 2016). Because blockchain has multiple barriers to widespread adoption (Iansiti and Lakhani, 2017), researchers have explored regulatory barriers to the adoption of cryptocurrencies and smart contracts (Caytas, 2017; Werbach and Cornell, 2017) as well as technical barriers, such as scalability, interoperability, performance and data privacy (Hileman and Rauchs, 2017; Yli-Huumo *et al.*, 2016). Tapscott and Tapscott (2016) argue that blockchain constitutes an institutional innovation, the “cryptoeconomy” – an economic system not defined by geographic location, political structure or legal system, but which uses cryptographic techniques to incentivise appropriate behaviour of participants in place of using trusted third parties (Pilkington, 2016). From this perspective, blockchains are platforms for building economic coordination using distributed ledgers augmented with computational features, such as money (cryptocurrencies), programmable contracts (e.g. smart contracts) and organisations made of software (DAOs, or distributed autonomous



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organisations). Thus, blockchain technology is not only innovative but also is a building block for new forms of economic governance and socio-political order (Davidson *et al.*, 2016).

Despite the critical importance of digital technologies, such as blockchain and organisations' digital transformations, the international business (IB) literature has been slow to unpack the implications for organisations' internationalisation motivations and processes. Furthermore, and more recently, the emergence of fully digital organisations, such as digital platforms (Uber or Airbnb), social media (Facebook or Twitter), e-commerce (Taobao) or financial services (TransferWise), are still very much a black box to IB literature.

With this special issue, we aimed to uncover a small part of the necessary embracement that the IB field needs to achieve to be prepared to perform their societal role of informing managers, entrepreneurs, officials and other agents of change. To do so, we look specifically at the implications of blockchain technology in the IB field. While IB literature is lagging behind in the study of blockchain, MNEs are – and have been for some time – actively exploring blockchain's potential, particularly in the financial (Böhme *et al.*, 2015), compliance (Anjum *et al.*, 2017), healthcare (Mettler, 2016), data protection (Finck, 2018) and logistics (Hackius and Petersen, 2017) contexts. In China alone, by the end of March 2020, a total of 35 MNEs (including Microsoft, Oracle, Mastercard, Sony, Intel and Walmart) applied for 212 blockchain-related patents (Global Times, 2020). As explained elsewhere (Finextra, 2017), banking and finance now account for some 30% of blockchain use cases, and nearly 70% of central banks are experimenting with blockchain technology. Entrepreneurial start-ups and initial coin offerings – a form of crowd funding made possible because of blockchain (Kastelein, 2017) – have been the drivers behind an unprecedented surge of innovation, ranging from new, competing protocols (e.g. Tezos and EOS) to smart contracts on Ethereum, decentralised applications (e.g. Telegram), and new currencies with unique features (e.g. monero and zcash) (Vereckey, 2018). Thus, and more than ever, we need to push the blockchain agenda and investigate its implications for IB. In the following subsections, we outline the key implications of blockchain technology in the context of IB.

Blockchain and its implications for international business

Online transactions, micropayments and cryptocurrencies

One of the most obvious implications of blockchain adoption in IB transactions is lowering transaction costs and facilitating cross-border transactions at unprecedented speed (Cao *et al.*, 2017) without the need for intermediaries. Indeed, one of the most recent technological developments, the Baseline protocol (a consortium between Microsoft, EY and ConsenSys), built on the Ethereum Mainnet, allows transactions to be settled in minutes instead of weeks.

Micropayments (small amounts of money transferred electronically) are an integral part of a variety of industries in the modern global digital economy. Mobile apps, subscription services, e-commerce stores and the Internet of Things (IoT) are just a few examples of products and technologies that benefit from micropayment-enabling technologies (Rhodes, 2019; Lundqvist *et al.*, 2017; Clohessy *et al.*, 2019). Although some MNEs are already using micropayments, it is generally considered more difficult to establish a sustainable business model when relying on these types of transactions because of high transaction costs. However, micropayments are a particularly attractive alternative in relation to collecting royalties for musicians and artists for work distributed online (Wright and De Filippi, 2015; Clohessy *et al.*, 2019). In addition, payments in the IoT-era using the traditional centralised

payment approach do not work (IBM, 2015) – cryptocurrencies are a promising alternative to such micropayment applications.

Cryptocurrencies also appear to be a viable alternative to fiat currencies in developing and troubled economies, such as Argentina and Venezuela, with implications for MNEs from or operating there. These economies, like others in emerging markets, suffer from high inflation rates, financial instability and overregulation of the economy (Haesly, 2016; Cifuentes, 2019). In addition, there are increased risks that make currency control by governments or central banks more hazardous because of the spread of local corruption (Clegg, 2014). Cryptocurrencies open a door as a complementary structure to conventional finance that permits rational individuals to escape the consequences of political volatility. Moreover, cryptocurrencies may provide communities in developing countries with access to a micro and local financial infrastructure that would otherwise be inaccessible (Cifuentes, 2019).

Privacy and anonymity

MNEs looking to leverage the peer-to-peer trustless structure of blockchain technology are often confronted with the difficult trade-off between transparency of transactions via public (permissioned) blockchains, such as Bitcoin and Ethereum, and privacy (ConsenSys, 2020). One common argument against public blockchains is that enterprises, particularly those in highly regulated industries such as banking and health care, will face difficulty in complying with regulations. New technologies (e.g. advanced cryptography using zero-knowledge proofs or ZKP) are being developed to allow institutions to transact on public blockchains while still protecting sensitive customer data (Amico, 2019). For example, the current COVID-19 global crisis has led many privacy advocates to point to blockchains as a solution to the privacy problem in relation to individual health data (e.g. patient geolocation and medical test data). As cryptography is the backbone of blockchain technology, a sophisticated encryption protocol (e.g. ZKP) is expected to address the problem of public blockchain privacy and security. Easily implementable protocols for smart contracts pooling transactions together to anonymise transactions can also help address privacy concerns.

Privacy and anonymity will enhance the use of blockchains for compliance and auditing. Indeed, if institutions allow the adoption of blockchain technology for compliance and auditing purposes, MNEs can create a technological base that can be used across different markets with relevant savings and risk mitigation. Compliance and auditing are increasing challenges for MNEs due to the complex structures of crisscrossing intercompany transactions in cross-country jurisdictions (Zhang *et al.*, 2018), and are two of the main risks that senior managers point to (KPMG, 2020). However, there are advanced blockchain solutions that can help solve the compliance and audit problem for MNEs, which work across multiple jurisdictions (Zhang *et al.*, 2018) and that, when privacy and anonymity are secured, can be widely implemented.

Trust

Trust is fundamental to achieving efficient mechanisms in market exchanges or transactions. Institutional trust – the legal, political and social systems that support the monitoring and sanctioning of human behaviour – is perhaps the most important element of trust (Zucker, 1986). The modern global economy is built on compounding layers of trust: we trust tech giants, banks, insurance companies and governments (Samani, 2019). Enormous resources currently go into generating trust, which makes trust-based systems rather expensive (Fairfield, 2014). Given global complexity, detecting abuses of trust has become

more difficult than ever (e.g. recall the Facebook and Cambridge Analytica data privacy breach). For the first time in human history, by using open networks bound by cryptography and free-market economics, specific human behaviours can be incentivised without creating new trust assumptions (Samani, 2019) or relying on expensive trust-based systems.

The magic of blockchain technology is to make certain activities trustworthy without the need to trust anyone in particular (Fairfield, 2014) – creating “trustless trust” and dispensing with costly intermediation and legal enforcement (Werbach, 2018). Instead of trusting banks, courts and governments, it is possible to trust math and computation in the form of open-source cryptographic protocols (Werbach, 2018). Blockchain design will provide individuals with a sense of security and protection from hacking so that trust is implicitly provided (Vaz and Brown, 2018).

Furthermore, all global systemic risk (for example, the risk of an entire financial system collapsing) is built on trust. Systemic risk and the potential for catastrophic failure appear to be, unfortunately, a feature of the large-scale systems enabling modern life. Apart from the systemic financial risks, other systemic risk systems include epidemics, species extinction, power grids and global communication. By creating a world with fewer trust assumptions, particularly compliance with multiple jurisdictions for MNEs, through the use of blockchain, we can reduce systemic risk and ultimately create healthier and more productive economies and societies (Samani, 2019). For example, in the current COVID-19 crisis, if the World Health Organisation had a blockchain where any authorised health worker could deposit information on a new virus, disease or other potential critical hazards to populations, this information would be stored and could be used to more easily and at greater speed not only to trace the origins but also to help understand the potential risks of high spread.

Business processes and business models

MNE business processes, such as new product development and knowledge management, can be a source of competitive advantage (Buckley and Carter, 1999), and several MNEs are today using blockchain to improve their intra- and inter-organisational business processes. For example, global firms routinely spend hundreds of millions of dollars on customer relationship management, enterprise resource planning and supply chain management systems, as well as on other internal record systems. In an effort to drive operational efficiencies, existing processes are simplified and costs are taken out of existing processes by removing intermediaries or the administrative effort of record-keeping and transaction reconciliation (Carson *et al.*, 2018). Other business process improvements include standardisation, increased efficiency and transparency and eliminating errors, fraud, duplication and waste. For example, TradeLens, the global blockchain shipping platform (a consortium which includes IBM, Maersk Line and Standard Chartered), seeks to provide its users with a secure and real-time exchange of supply chain data and paperwork. Initiatives such as these are bound to redefine the nature of the international trade ecosystem, characterised by complex processes, slow turnaround times, manual documentation, mistrust between agents and limited connectivity between the various parties involved (Huillet, 2020).

Even more importantly, blockchain (combined with machine learning) can power new digital business models built on the internet. While the internet started as an open, decentralised network, over time, we saw large centralised digital companies – particularly Google, Apple, Facebook and Amazon – emerge to dominate the internet landscape (Dixon, 2018; Evans, 2019). However, while customers gained access to path-breaking technologies, this stifled innovation and created broad societal tension (e.g. with fake news and state-

sponsored bots) (Dixon, 2018). We are now starting to see the rise of novel business models (community-governed, decentralised digital ecosystems powered by tokens); decentralised finance (DeFi), decentralised computation and decentralised storage are some examples. These tokens, the fifth protocol of the internet, will be used to exchange value, verify contracts and track identity and reputation, among other things (Ravikant, 2014). It is likely that we will see a rise of a new breed of MNEs that may co-exist with centralised platforms.

Contributions to the special issue

We now turn our attention to the three papers that constitute this special issue. Blockchain is, in itself, an emerging topic for firms and business academia. A search of the *Financial Times*' top journals on 14 April 2020, with the word *blockchain* resulted in only 54 items, the large majority being in information systems (17) journals and *Harvard Business Review* (14), with only five manuscripts in academic management journals and none in the IB field. For context, a truncated *artificial intelligence* search resulted in 1,035 items. The relative lack of blockchain research in these journals motivated us to organise this special issue. We were very fortunate with the range of articles we received, and the three papers accepted cover a wide range of perspectives at the intersection of IB and blockchain technology. Before we explore the underlying themes and highlight the future avenues that result from the articles, we first summarise each article's contribution.

Hasan *et al.* (2020) draw on panel data from the Shanghai, Shenzhen and Hong Kong stock exchanges between 2014 and 2018 to evaluate the effect that blockchain technology has had on firms' operational efficiency. Grounding their study in transactional cost analysis (Williamson, 1975) and the problems associated with contracting and the asymmetry of information, the authors were interested in how blockchain could be used to decrease operational costs and, thus, increase operational efficiency, and how an *incremental* versus *big bang* approach to blockchain implementation changes the operational efficiency. Their results show that blockchain implementation has a positive and significant impact on improving firms' operational efficiency and that an *incremental* implementation approach to blockchain has better operational efficiency when compared with a *big bang* approach. These results, and the fact that younger and smaller firms have better operational efficiency results when implementing blockchain technology in their operations compared with older and larger ones, indicate that blockchains require time and openness to new approaches and are easier to implement in less complex organisations.

Hooper and Holtbrügge (2020) used a multitude of sources to build case studies that exemplify how blockchain is being used in MNEs and the main challenges and implications for global governance associated with such blockchain implementation. They were particularly interested in international finance; banking and insurance; international supply chain management and logistics; and international marketing and advertising. Using the functions of global governance as their lens to understand the effect of blockchain application on MNEs, the authors uncovered some intriguing phenomena. The case studies explain how blockchains can be used to improve property rights and data privacy and, at the same time, be used for recordkeeping and reporting. The ability of blockchain technology to impact social welfare, namely, by improving consumers' trust and satisfaction, is another positive result. The authors' results also explain that smart contracts might prevent monopolistic power, which is particularly important for IB literature because multinationals – frequently large and well-resourced – often work with local small and medium enterprises (SMEs) in a non-even power relationship (Buckley, 2009). Regardless of the advantages of blockchain technology, the authors caution against the dark side of blockchain applications and usage. The lack of blockchain standards among industries or

networks, energy consumption and the fact that blockchains can serve to cover up illicit operations should carry weight in global governance decisions. To this end, the important distinction between public and private blockchain technology emerges as it has important implications and considerations for the potential use of blockchains for unethical and illegal operations.

In the final article of this special issue, [Tsiulin et al. \(2020\)](#) build a conceptual framework following a systematic review of the academic and grey literature along with project reviews in shipping and port management. The authors found three main contexts where blockchain is being used: document workflow management, device connectivity and financial processes. For workflow management, the authors found that due to the overall and well-known constraints that GVCs face (namely in terms of lack of trust, miscommunication, information security and data falsification), blockchain technology is indeed a feasible and interesting solution that is already being adopted by several companies. Furthermore, the authors explain that even for internal handling of documents in ports, blockchains can be used to improve trailer and container security and flow, and port gate queuing, among others. For financial processes, the authors discuss the usage of cryptocurrency and the benefits to the industry but also the constraints that they face from institutions. Finally, the authors discuss the implementation of IoT on containers, for example, and how blockchains can be used to trace and improve the security of goods. However, and interestingly, none of the projects analysed used all three contexts. The authors also found that the academic literature, particularly when using blockchains to solve GVC problems, is falling behind industry creation and implementation of blockchain solutions, inviting us to look ahead and explore how academic guidance can be used to inform practitioners and policymakers.

Some common themes emerged from the three papers accepted to this special issue. We used them to frame our next section, which considers future research, as well as to complement the discussion and contributions from each individual manuscript.

Before we move towards a research agenda, it is worth noting that these three articles reflect a multitude of methodological approaches that span from longitudinal panel data, to case studies, and systematic literature and project reviews. This methodological diversity, even within three papers, indicates the broad epistemological approach that blockchain technology is having in the managerial field of academia, which represents an expansion from a very technical field to a broader nature that welcomes qualitative research and abstractive reasoning that might lead to new theories or even fields, as we further discuss below.

International business and blockchain: towards a research agenda

Future of global payments

In 1999, Nobel Prize winner Milton Friedman remarked in an interview that the internet was poised to become one of the major forces reducing the role of government ([Friedman, 1999](#)). The only thing missing, but which would soon be developed, was reliable e-cash, a method whereby one could transfer funds from A to B on the internet without A knowing B or B knowing A. Nakamoto's invention in 2008 made this idea possible. Today, many remain sceptical about digital currencies, citing large energy needs, technological limitations (e.g. scalability, cross-platform integration and security) and regulatory hurdles. Yet, if the growth in blockchain-wallet users continues to mirror that of internet users, then, by the end of the decade, they will number some 200 million – quadruple the current level. This growth will be encouraged by governments, banks, corporates and payment providers who all stand to benefit from the digitalisation of payments ([Deutsche Bank, 2020](#)). As Bitcoin and

other freely floating cryptocurrencies continue to exhibit extreme volatility relative to fiat currencies, there has been a much greater focus on stablecoins (i.e. price-stable coins) – a coin pegged to another cryptocurrency, a fiat currency or a commodity – designed to minimise these price fluctuations (J.P. Morgan, 2020). In late 2019, the Chinese Government stated that the People’s Bank of China would be launching a PBoC digital currency, possibly by the end of 2020, thus becoming the first major economy to use a fully government-backed digital currency (which will most likely be a cryptocurrency, given China’s interest and depth of technological expertise in blockchain). Other central banks may follow to adopt a cryptocurrency, enabling peer-to-peer transactions without intermediaries (commercial banks) and in the absence of trust. In addition, many central banks have started to seriously examine a supranational multi-currency-backed token as a replacement global reserve asset (J.P. Morgan, 2020).

Stablecoins, in particular, seem to be gaining traction, and not only for speedy transfers between exchanges but also for business transactions by e-commerce marketplaces, advertising networks, luxury goods producers, recruiting platforms, digital content markets and software firms. This implies significant global demand from SMEs seeking the safety and utility of digital dollars (De, 2020). Factors that facilitate or hinder adoption of digital and cryptocurrencies as well as stablecoins – nationally and globally – will continue to be a fascinating topic for further research in IB.

Future of global finance

Centralised finance cannot be truly borderless as it is tied to specific geographic locations with specific fiat currencies, so moving capital and value across borders often encounters friction and delay (Chen and Bellavitis, 2020). In contrast, DeFi – access to financial applications in a truly decentralised and censorship-resistant environment – is inherently borderless; hence, transferring value across the globe may become as easy as sending an email (Chen and Bellavitis, 2020). DeFi, at its core, includes infrastructure, markets, technology, methods and applications, enabling the decentralised provision of financial services (Zetzsche *et al.*, 2020). More specifically, it includes open protocols, public smart contract platforms (such as the Ethereum blockchain), decentralised exchanges, stablecoins and decentralised applications (dApps) (Schar, 2020). It is still a niche market (compared to traditional finance) with relatively low volumes, but the value of the market (i.e. reserves locked into smart contracts) has been growing rapidly.

DeFi has unleashed a wave of innovation in the form of trustless versions of traditional financial instruments as well as entirely new financial instruments (e.g. atomic swaps, autonomous liquidity pools, flash loans) built on public blockchains (mostly Ethereum). Schar (2020) believes that DeFi constitutes a paradigm shift in the financial industry and could potentially contribute towards a more robust and transparent financial infrastructure. While neobanks and fintech firms are offering customers more control of their assets, they remain intermediaries to be trusted; by contrast, DeFi infrastructure offers full control of assets due to decentralisation inherent in blockchain technology.

If the promise of DeFi materialises, then worldwide participation (regardless of social status) will be possible. A particularly exciting topic for IB researchers would be to explore the socio-economic implications of DeFi for the global financial system.

Future of the multinational enterprises

Today, the vast majority of economic activity is conducted via corporations – inventions from the 1400 s. Back then, they were joint-stock companies, and innovations such as capital structures and limited liability followed. The world’s first MNEs started to appear in the

early 1600s and, yet, the fundamental premise of the corporation as the facilitator of economic activity remains largely unchanged (Samani, 2020). Nakamoto's Bitcoin invention was not only a significant technological breakthrough but also an institutional innovation. It became feasible to organise large-scale economic activity and coordinate human behaviour without the need for a centralised corporation (unlike other digital platforms such as Uber or Airbnb). Such collaboration in a trustless environment is possible because of the encoding of consensus mechanisms, incentives (and disincentives) and contracts built into software (Allen *et al.*, 2020; Samani, 2020).

Indeed, many scholars (Davidson *et al.*, 2018; De Filippi and Loveluck, 2016; Allen *et al.*, 2020) consider public blockchains (such as Bitcoin or Ethereum) an institutional technology where management and governance are distributed across a large number of token holders, block validators and developers. The primary effects of institutional technologies such as blockchain are, according to Allen *et al.* (2020), transaction costs of economic coordination and governance within a network of economic agents.

Decentralised networks built on blockchain can and will provide a wide variety of digital services (e.g. storage, computation, applications) similar to those provided by centralised global companies such as Google, Dropbox, Facebook and Amazon. But these networks offer a very different organising model for the provision of these services – more like a mutually owned company, a cooperative or a credit union than a traditional corporation (Grossman, 2018) – with the capacity to do this at a global scale. Does this mean that the explanations of the existence of the MNE from the contractual/transaction, cost-informed governance perspectives and the technology transfer and capabilities perspectives (Teece, 2014) change? We believe that this is an intriguing question, and we welcome both empirical and conceptual research on this issue.

Another important issue for IB relates to blockchain's intersection with entrepreneurship. Many start-ups work on the development of theoretically borderless blockchain technologies, from protocols to consumer-facing applications, having a global footprint right from the start. These new ventures provide fertile ground to study international new ventures (McDougall *et al.*, 1994; Oviatt and McDougall, 1994; Zahra *et al.*, 2000) and born globals (Knight and Cavusgil, 2004; Rialp *et al.*, 2005; Rennie, 1993) in the context of the digital economy with a borderless perspective that is still missing in IB theory. Current theoretical frameworks in IB and international entrepreneurship are grounded in economic research on tangible goods (Zander *et al.*, 2015; Cavusgil *et al.*, 2014), which does not reflect the borderless reality of many digital-born firms. Because of that, there is the opportunity to broaden IB theoretical foundations and empirical research to reflect the realities of the digital world (Zalan, 2018).

Finally, some (Davidson *et al.*, 2016) suggest that blockchains have governance efficiency over firms, markets, networks, relational contracting and governments. Considering that new ventures are experimenting with developing technologies, such as smart contracts, and incentive mechanisms for coordinating human activity across borders through decentralised autonomous organisations, which do not rely on hierarchical governance, some might question (Zalan, 2018) whether these unconventional organisational forms challenge the core assumptions of the very existence of MNEs. Thus, will blockchain be an enabler of new organisational forms? Or will there be new globally scalable business models enabled by blockchain and cryptocurrencies?

Global value chain

As Tsiulin *et al.* (2020) and Hooper and Holtbrügge (2020) in this special issue explain, blockchain technology can be particularly suitable for solving some of the common

problems that MNEs face in GVCs. Frequently being the orchestrators in the GVC (Buckley, 2009) allows MNEs to be in a higher-power position compared to the constellations of firms that supply products or services. However, these power differences might be problematic to GVC sustainability. Thus, it is important to understand if blockchains can help prevent monopolistic approaches and reduce exploitation of suppliers. Thus, more research is needed to understand how blockchains can be used for sustainability purposes and to ensure ethical practices.

Another eminent use of blockchain is for international contracting. Blockchain technology challenges some of the core assumptions underlying the existence and functioning of MNEs. If we think about exporters, the most common form of internationalisation (Cassiman and Golovko, 2011), a critical issue that managers face relates to the asymmetries of information between buyers and suppliers (Williamson, 1975). Even if the buyer locates a supplier who wants to work with them, there are still several risks that each market agent needs to consider, for example, quality control concerning payment issues, logistics, accounting and reporting, among others (Buckley and Casson, 1976). If we consider that currently many MNEs are from developed economies, but their suppliers are often from emerging economies, which implies different legal regimes and thus risks to resolve and contracts to enforce, we can see blockchain's potential to solve some of these issues by reducing the asymmetries of information and potentially reducing the necessity of the middleman (Torres de Oliveira *et al.*, 2018).

Added to this are the ideas that some jurisdictions work in favour of local firms and are not transparent, or the fact that the legal system is not enforced, which are frequently in MNEs' senior managers' minds. Having smart contracts in place provides the potential to mitigate many of these issues. However, and once again, we know very little about what happens with contracts that are immutable, or difficult to alter, when externalities change. We also know little about the risks of smart contracts for the different agents involved. Further still, we know little about what local institutions do to overwrite or terminate smart contracts. From a legal and accounting perspective, do we need to regulate blockchain and cryptocurrencies around the world?

These new frameworks will impact not only large MNEs, the orchestrators in the global factory framework (Buckley, 2009, 2014), but also SMEs – frequently the exporters. More research is needed on both types of firms and also how blockchains will change the dynamics and the mechanisms that enhance their transactions.

Finally, we learned from papers in this special issue that blockchains are particularly useful for simple, routine and not complex operations; thus, some might question where the boundary conditions are for smart contracts being used in complex GVC transactions. Given that one can never predict all possible outcomes and situations, what are the risks to lawyers who draft smart contracts? Should unpredictable situations be moved to formal institutions? Would formal institutions accept smart contracts that are country borderless?

United Nations Sustainable Development Goals and the multinationals. The United Nations published the 2030 agenda for sustainable development by advancing a group of goals relating to peace and prosperity for our planet (United Nations, 2020). Blockchains can play an important role in many of these goals. For example, an important recurrent topic relating to waste is packaging waste. Packaging waste is relevant to at least six of these goals (6, 11, 12, 13, 14 and 15). Considering that blockchains can enhance the traceability, prevent data tampering and verify authenticity, some can argue that, for example, large MNEs can use blockchains to build incentives to enhance recycling of their packaging and thus enhance a truly circular economy. However, several questions remain. How can MNEs create frameworks to enhance a circular economy approach to their products and packaging

using blockchain in practice? How can blockchains be used by end-users to enhance other United Nations sustainable goals, for example by helping to create smart grids for poor regions? Similarly, how can blockchains enhance smart cities and help to improve their sustainability?

However, we also need to consider the problems that blockchain technology can itself bring in achieving these sustainable goals. For example, what are the consequences of blockchain mining and proof-of-work? How can we become more energy efficient when it comes to blockchain mining and proof-of-work? If we are seeing an increase of blockchain *farming* in developing economies, what are the implications for the United Nations Sustainable Goals? Indeed, relevant blockchain publications primarily focus on the technological and business-related topics (Risius and Spohrer, 2017), but much less is known about other components of well-being, such as economic, environmental, social, cultural, psychological, physical, spiritual and cultural (Newey and Torres de Oliveira, 2019). Thus, future research on blockchain technology should consider different academic perspectives and invite different concepts, theories and fields to inform the potential and limitations of blockchains in a holistic way, considering global sustainable development.

Ecosystem development

Gellman (1996) explains that to increase the efficiency of a socio-economic system we should follow a *disintermediation* strategy. As several articles in this special issue point out, blockchain technology has the potential to cut out the middleman and thus help with a disintermediation strategy (Torres de Oliveira *et al.*, 2018). By cutting out the middleman, market transactions can become more efficient due to fewer asymmetries of information, creating a shorter distance between consumers and producers, which implies several benefits such as co-creation, more efficiency on delivery, better knowledge of consumers' needs and potentially being less costly.

With shortened product cycle times (Ferreira *et al.*, 2017), managers know the benefits of building innovation ecosystems (Verreynne *et al.*, 2020), namely, with their customers (Torres de Oliveira *et al.*, 2019), which need to be efficient to work (Reynolds and Ugun, 2018). However – and even if blockchain technology can enhance mechanisms of coordination between agents – how does this happen in practice? How can blockchain technology be in place to recompensate agents, users or other firms in the network in relation to innovation co-creation processes? How can blockchain technology enhance networks as ecosystems, particularly in cross-country market transactions, to match offers and demands without using monetisation or contracts midway? What is the role of blockchains in bringing trust and traceability to fragile, non-pecuniary, open-innovation ecosystems? How can blockchain technology be used to improve security and trust in crowd sourcing? How can blockchains mitigate interdependence risks for innovation ecosystems? What role can blockchain technology have in decreasing integration risks between innovation ecosystem agents? How can blockchains help to assure that value capture by the ecosystem is fairly distributed across the different innovation ecosystem agents?

Deinstitutionalisation

One of the fundamental issues that blockchains have tried to solve relates to market failures and how institutions could become truly and fundamentally democratised (Torres de Oliveira *et al.*, 2018). As the three papers explain, transaction cost theory (Williamson, 1975) seems to offer a natural lens through which to see potential differences between the use of institutions as the grounding for contracts and mitigation of predatory behaviour, and blockchain as a democratisation of the institutional framework where the transaction cost

theory builds. This movement towards *deinstitutionalisation* of formal institutions using blockchain technology is particularly important for IB due to the constant need for MNEs to cooperate with different institutions, which entails complexity, risk and an increase in the liability of foreignness.

The deinstitutionalisation of formal institutions that will emerge during market transactions might resemble the semi-formal institutional framework (Torres de Oliveira and Rottig, 2018), but with an important difference. The power that the state has in the semi-formal institutional framework will move towards individuals and, thus, will be more connected to societal problems. While much is known about the institutional voids that exist in emerging economies (Oriaifo *et al.*, 2020) and how they impact business and society, the institutional voids existent in developed societies remain a blackbox. However, developed economies suffer from what we call *industrialised institutional voids*. For example, in developed economies, low- or inadequately skilled workers suffer several institutional pushbacks. Thus, such individuals are in a privileged position to realise and tackle industrialised institutional voids.

It is because of these industrialised institutional voids that blockchains and new business models, such as the sharing economy (peer-to-peer) (Schor, 2016) or the collaborative commons movement and business networks based on non-pecuniary open innovations (West and Bogers, 2017; Gentile-Lüdecke *et al.*, 2019), are becoming so popular – they are filling some of these voids. Interestingly, when we merge blockchains and some of these new business models, such as the sharing economy, we need to consider that, in the future, we might have peer-to-peer transactions without the use of any formal institutions (Pazaitis *et al.*, 2017), which potentially can lead to purely goods transactions without monetisation as we know it today. Enterprises like Uber or Airbnb, the so-called market organisers in this new economic arrangement, might well be substituted with a deinstitutionalised platform over blockchains with the help of artificial intelligence and robotics, which will lead to substantial cost reductions and will, arguably, lead to a transition out of capitalism.

The idea of filling the *industrialised institutional voids* with blockchains and new business models opens a large number of questions. For example, are we transitioning from a capitalist system towards a post-capitalist system that is informed by anarchist approaches as some have argued (Gerhardt, 2019), or towards an empowering of formal institutions using other means for the survival of the capitalist system as we know it today (Montalban *et al.*, 2019)? What are the implications of using blockchains with new business models and other technologies, such as artificial intelligence, for IB? Related to that, and if blockchains become truly transnational, how will country differences weigh on consensus outcomes? This is particularly important when ethical and moral dilemmas might be in play. Future research should investigate how these country differences might impact blockchains as well as the associated ethical dilemmas.

Conclusion

The main objective of this special issue is to introduce blockchains to the IB literature and give pace to future research at the intersection of this new technology with a well-established academic field that, at the moment, is falling behind industry practices in terms of technology use. The papers in this special issue and this introduction show that blockchain technology is not only innovative but also a building block with the potential to create new forms of economic governance and to change the socio-political order. That said, it is important to remember that blockchain technology is still a field ripe with unknowns and passions, as some of these quotes expose:

Today, Blockchain – the technology behind the digital currency bitcoin – might seem like a trinket for computer geeks. But once widely adopted, it will transform the world. Ginni Rometty, CEO of IBM (Rometty, 2016).

[Blockchain] is the most overhyped – and least useful – technology in human history [...] has not even improved upon the standard electronic spreadsheet, which was invented in 1979. Nouriel Roubini, Professor at NYU's Stern School of Business (Roubini, 2018).

Using cryptocurrency to tokenise real-world assets will make the web look like a cute experiment, comparatively speaking. Jeremy Allaire, CEO of Circle (Allaire, 2018).

Rui Torres de Oliveira

Queensland University of Technology, Brisbane, Australia

Marta Indulska

The University of Queensland, Brisbane, Australia, and

Tatiana Zalan

American University in Dubai, Dubai, United Arab Emirates

References

- Allaire, J. (2018), "Cryptocurrency tech will make web look like 'cute experiment': Circle CEO", Edited by CCN, available at: www.ccn.com/cryptocurrency-tech-will-make-web-look-like-cute-experiment-circle-ceo/
- Allen, D.W.E., Berg, C., Markey-Towler, B., Novak, M. and Potts, J. (2020), "Blockchain and the evolution of institutional technologies: implications for innovation policy", *Research Policy*, Vol. 49 No. 1, p. 103865.
- Amico, J. (2019), "The power of open networks public blockchain adoption in capital markets", available at: <https://medium.com/fluidity/the-power-of-open-networks-public-blockchain-adoption-in-capital-markets-ae66bf1b002d>, (accessed 5 May 2019).
- Andreesen, M. (2014), "Why bitcoin matters", *The New York Times*, available at: <https://dealbook.nytimes.com/2014/01/21/why-bitcoin-matters/>
- Anjum, A., Sporny, M. and Sill, A. (2017), "Blockchain standards for compliance and trust", *IEEE Cloud Computing*, Vol. 4 No. 4, pp. 84-90.
- Böhme, R., Christin, N., Edelman, B. and Moore, T. (2015), "Bitcoin: economics, technology, and governance", *Journal of Economic Perspectives*, Vol. 29 No. 2, pp. 213-238.
- Buckley, P.J. (2009), "The impact of the global factory on economic development", *Journal of World Business*, Vol. 44 No. 2, pp. 131-143.
- Buckley, P.J. (2014), "International integration and coordination in the global factory", *The Multinational Enterprise and the Emergence of the Global Factory*, Springer, London, pp. 3-19.
- Buckley, P.J. and Carter, M.J. (1999), "Managing cross-border complementary knowledge: conceptual developments in the business process approach to knowledge management in multinational firms", *International Studies of Management and Organization*, Vol. 29 No. 1, pp. 80-104.
- Buckley, P.J. and Casson, M. (1976), *The Future of the Multinational Enterprise*, Springer New York, NY.
- Cao, S., Cao, Y., Wang, X. and Lu, Y. (2017), "A review of researches on blockchain", *Wuhan International Conference on e-Business*.
- Carson, B., Romanelli, G., Walsh, P. and Zhumaev, A. (2018), *Blockchain beyond the Hype: What is the Strategic Business Value*, McKinsey and Company, New York, NY, pp. 1-13.

- Cassiman, B. and Golovko, E. (2011), "Innovation and internationalization through exports", *Journal of International Business Studies*, Vol. 42 No. 1, pp. 56-75.
- Cavusgil, S.T., Knight, G., Riesenberger, J.R., Rammal, H.G. and Rose, E.L. (2014), *International Business*, Pearson London.
- Caytas, J. (2017), "Regulatory issues and challenges presented by virtual currencies", *Columbia Business Law Review*, available at: <https://ssrn.com/abstract=2988367>.
- Cenamor, J., Rönnerberg Sjödin, D. and Parida, V. (2017), "Adopting a platform approach in servitization: leveraging the value of digitalization", *International Journal of Production Economics*, Vol. 192, pp. 54-65.
- Chen, Y. and Bellavitis, C. (2020), "Blockchain disruption and decentralized finance: the rise of decentralized business models", *Journal of Business Venturing Insights*, Vol. 13, p. e00151.
- Cifuentes, A.F. (2019), "Bitcoin in troubled economies: the potential of cryptocurrencies in Argentina and Venezuela", *Latin American Law Review*, Vol. 3 No. 3, pp. 99-116.
- Clarke, J.E. and Liesch, P.W. (2017), "Wait-and-see strategy: risk management in the internationalization process model", *Journal of International Business Studies*, Vol. 48 No. 8, pp. 923-940.
- Clegg, A.G. (2014), "Could bitcoin be a financial solution for developing economies", University of Birmingham, available at: www.cs.bham.ac.uk/~rjh/courses/ResearchTopicsInHCI/2013-14/Papers/Alastair.pdf
- Clohessy, T., Acton, T. and Rogers, N. (2019), "Blockchain adoption: technological, organisational and environmental considerations", *Business Transformation through Blockchain*, Springer, New York, NY pp. 47-76.
- ConsensSys (2020), "How is blockchain verifiable by the public and yet anonymous?", available at: <https://consensys.net/blog/enterprise-blockchain/how-is-blockchain-verifiable-by-the-public-and-yet-anonymous/>
- Davidson, S., De Filippi, P. and Potts, J. (2016), "Economics of blockchain", available at: <https://ssrn.com/abstract=2744751> or <http://dx.doi.org/10.2139/ssrn.2744751> (accessed 17 March 2017).
- Davidson, S., De Filippi, P. and Potts, J. (2018), "Blockchains and the economic institutions of capitalism", *Journal of Institutional Economics*, Vol. 14 No. 4, pp. 639-658.
- De, N. (2020), "Circle CEO claims 'explosive' stablecoin demand from everyday businesses", available at: <https://nz.finance.yahoo.com/news/circle-ceo-claims-explosive-stablecoin-023513473.html>
- De Filippi, P. and Loveluck, B. (2016), "The invisible politics of bitcoin: governance crisis of a decentralized infrastructure", *Internet Policy Review*, Vol. 5 No. 3.
- Deutsche Bank (2020), "The future of payments. Part iii. Digital currencies: the ultimate hard power tool".
- Dixon, C. (2018), "Why decentralisation matters", available at: <https://medium.com/s/story/why-decentralization-matters-5e3f79f7638e>
- Evans, B. (2019), "The end of the beginning. Presentation at the a16z tech conference", available at: www.youtube.com/watch?v=RF5VlwDYIjk
- Evans, D. (2014), "Economic aspects of bitcoin and other decentralized public-ledger currency platforms", University of Chicago Coase-Sandor Institute for Law and Economics Research Paper # 685.
- Fairfield, J.A. (2014), "BitProperty", *Southern California Law Review*, Vol. 88, p. 805.
- Ferreira, F., Faria, J., Azevedo, A. and Marques, A.L. (2017), "Product lifecycle management in knowledge intensive collaborative environments: an application to automotive industry", *International Journal of Information Management*, Vol. 37 No. 1, pp. 1474-1487.
- Finck, M. (2018), "Blockchains and data protection in the European Union", *European Data Protection Law Review*, Vol. 4 No. 1, p. 17.

- Finextra (2017), "Sixty-seven per cent of Central banks are experimenting with blockchain technology – study", available at: www.finextra.com/pressarticle/70823/sixty-seven-percent-of-central-banks-are-experimenting-with-blockchain-technology—study
- Foss, N.J. and Saebi, T. (2017), "Fifteen years of research on business model innovation: How far have we come, and where should we go?", *Journal of Management*, Vol. 43 No. 1, pp. 200-227.
- Friedlmaier, M., Tumasjan, A. and Welpel, I.M. (2017), "Disrupting industries with blockchain: the industry, venture capital funding, and regional distribution of blockchain ventures", available at: <https://ssrn.com/abstract=2854756>
- Friedman, M. (1999), "Milton Friedman predicts the rise of Bitcoin in 1999!".
- Gaur, A.S., Ma, H. and Ge, B. (2019), "MNC strategy, knowledge transfer context, and knowledge flow in MNEs", *Journal of Knowledge Management*, Vol. 23 No. 9, pp. 1885-1990.
- Gellman, R. (1996), "Disintermediation and the internet", *Government Information Quarterly*, Vol. 13 No. 1, pp. 1-8.
- Gentile-Lüdecke, S., Torres de Oliveira, R. and Paul, J. (2019), "Does organizational structure facilitate inbound and outbound open innovation in SMEs?", *Small Business Economics*, Vol. 1, pp. 1-22.
- Gerhardt, H. (2019), "Engaging the non-flat world: anarchism and the promise of a post-capitalist collaborative commons", *Antipode*, Vol. 52 No. 3.
- Global Times (2020), "Multinational companies apply for 212 blockchain-related patents in China", available at: www.globaltimes.cn/content/1185109.shtml
- Grossman, N. (2018), "What are cryptonetworks and why tokens are fundamental".
- Hackius, N. and Petersen, M. (2017), "Blockchain in logistics and supply chain: trick or treat?" Digitalization in supply chain management and logistics: Smart and digital solutions for an industry 4.0 environment", *Proceedings of the Hamburg International Conference of Logistics (HICL)*, Vol. 23.
- Haesly, K.B. (2016), "How to solve a problem like Venezuela: an argument for virtual currency", *Law and Business Review Americas*, Vol. 22, p. 261.
- Hasan, M.R., Shiming, D., Islam, M.A. and Hossain, M.Z. (2020), "Operational efficiency effects of blockchain technology implementation in firms", *Review of International Business and Strategy*, Vol. 1.
- Hileman, G. and Rauchs, M. (2017), "2017 Global cryptocurrency benchmarking study".
- Hooper, A. and Holtbrügge, D. (2020), "Blockchain technology in international business: changing the agenda for global governance", *Review of International Business and Strategy*, Vol. 1.
- Huillet, M. (2020), "Standard chartered joins IBM and Maersk's blockchain shipping platform", available at: <https://cointelegraph.com/news/standard-chartered-joins-ibm-and-maersks-blockchain-shipping-platform>
- Iansiti, M. and Lakhani, K.R. (2017), "The truth about blockchain", *Harvard Business Review*, Vol. 95 No. 1, pp. 118-127.
- IBM (2015), "Device democracy- Saving the future of the internet of things", IBM Institute for Business Value, Whitepaper.
- J.P. Morgan (2020), "Blockchain, digital currency and cryptocurrency: moving into the mainstream?".
- Johanson, J. and Vahlne, J.-E. (2009), "The Uppsala internationalization process model revisited: from liability of foreignness to liability of outsidership", *Journal of International Business Studies*, Vol. 40 No. 9, pp. 1411-1431.
- Kano, L., Tsang, E.W. and Yeung, H.W.-C. (2020), "Global value chains: a review of the multi-disciplinary literature", *Journal of International Business Studies*, Vol. 51 No. 4, pp. 1-46.
- Kastelein, R. (2017), "What initial coin offerings are, and why VC firms care", *Harvard Business Review*, Vol. 24, available at: <https://hbr.org/2017/03/what-initial-coin-offerings-are-and-why-vc-firms-care>

- Knight, G.A. and Cavusgil, S.T. (2004), "Innovation, organizational capabilities, and the born-global firm", *Journal of International Business Studies*, Vol. 35 No. 2, pp. 124-141.
- KPMG (2020), "20 Key risks to consider by internal audit before 2020", available at: <https://assets.kpmg/content/dam/kpmg/ch/pdf/key-risks-internal-audit-2020.pdf>
- Lundqvist, T., de Blanche, A. and Andersson, H.R.H. (2017), "Thing-to-thing electricity micro payments using blockchain technology", *2017 Global Internet of Things Summit (GIoTS)*.
- McDougall, P., Phillips, S., Shane, B.M. and Oviatt, (1994), "Explaining the formation of international new ventures: the limits of theories from international business research", *Journal of Business Venturing*, Vol. 9 No. 6, pp. 469-487.
- Matt, C., Hess, T. and Benlian, A. (2015), "Digital transformation strategies", *Business and Information Systems Engineering*, Vol. 57 No. 5, pp. 339-343.
- Mettler, M. (2016), "Blockchain technology in healthcare: the revolution starts here", *IEEE 18th international conference on e-health networking, applications and services (Healthcom)*.
- Monaghan, S., Tippmann, E. and Coviello, N. (2020), "Born digitals: thoughts on their internationalization and a research agenda", *Journal of International Business Studies*, Vol. 51 No. 1, pp. 11-22.
- Montalban, M., Frigant, V. and Jullien, B. (2019), "Platform economy as a new form of capitalism: a regulationist research programme", *Cambridge Journal of Economics*, Vol. 43 No. 4, pp. 805-824.
- Newey, L. and Torres de Oliveira, R. (2019), "Wellbeing as emergent from the leveraging of polarities: harnessing component interdependencies", *Social Indicators Research*, Vol. 144 No. 2, pp. 575-600.
- Oriaifo, J., Torres de Oliveira, R. and Ellis, K.M. (2020), "Going above and beyond: how intermediaries enhance change in emerging economy institutions to facilitate small to medium enterprise development", *Strategic Entrepreneurship Journal*, Vol. 1.
- Oviatt, B.M. and McDougall, P.P. (1994), "Toward a theory of international new ventures", *Journal of International Business Studies*, Vol. 25 No. 1, pp. 45-64.
- Pazaitis, A., De Filippi, P. and Kostakis, V. (2017), "Blockchain and value systems in the sharing economy: the illustrative case of backfeed", *Technological Forecasting and Social Change*, Vol. 125, pp. 105-115.
- Pilkington, M. (2016), "Blockchain technology: Principles and applications", in Xavier Olleros F. and Zhegu, M. (Eds), *Research Handbook on Digital Transformations*, Edward Elgar New York, NY, p. 39.
- Rachinger, M., Rauter, R., Müller, C., Vorraber, W. and Schirgi, E. (2019), "Digitalization and its influence on business model innovation", *Journal of Manufacturing Technology Management*, Vol. 30 No. 8.
- Ravikant, N. (2014), "The fifth protocol", available at: <https://nav.al/the-fifth-protocol>
- Rennie, M.W. (1993), "Born global", *The McKinsey Quarterly*, Vol. 4, pp. 45-53.
- Reynolds, E.B. and Uygun, Y. (2018), "Strengthening advanced manufacturing innovation ecosystems: the case of Massachusetts", *Technological Forecasting and Social Change*, Vol. 136, pp. 178-191.
- Rhodes, D. (2019), "How blockchain is improving micropayments capabilities", available at: <https://komodoplatform.com/micropayments/>
- Rialp, A., Rialp, J. and Knight, G.A. (2005), "The phenomenon of early internationalizing firms: what do we know after a decade (1993-2003) of scientific inquiry?", *International Business Review*, Vol. 14 No. 2, pp. 147-166.
- Risius, M. and Spohrer, K. (2017), "A blockchain research framework", *Business and Information Systems Engineering*, Vol. 59 No. 6, pp. 385-409.
- Rometty, G. (2016), "How blockchain will change your life", *The Wall Street Journal*.

- Roubini, N. (2018), "The big blockchain lie", Project Syndicate; available at: www.project-syndicate.org/commentary/blockchain-big-lie-by-nouriel-roubini-2018-10
- Samani, K. (2019), "Crypto mega theses", available at: <https://multicoincapital.com/2019/04/24/multicoincapital-investment-thesis/>
- Samani, K. (2020), "Infinite scale".
- Schar, F. (2020), "Decentralized finance: on blockchain- and smart-contracts-based financial markets", doi: [10.13140/RG.2.2.18469.65764](https://doi.org/10.13140/RG.2.2.18469.65764).
- Schor, J. (2016), "Debating the sharing economy", *Journal of Self-Governance and Management Economics*, Vol. 4 No. 3, pp. 7-22.
- Seetharaman, A., Patwa, N., Saravanan, A.S. and Vakhariya, S. (2018), "Disrupting digital future of product lifecycle", *International Journal of Management and Sustainability*, Vol. 7 No. 1, pp. 32-42.
- Tapscott, D. and Tapscott, A. (2016), "The impact of the blockchain goes beyond financial services", *Harvard Business Review*, Vol. 10.
- Teece, D.J. (2014), "A dynamic capabilities-based entrepreneurial theory of the multinational enterprise", *Journal of International Business Studies*, Vol. 45 No. 1, pp. 8-37.
- Torres de Oliveira, R. and Rottig, D. (2018), "Chinese acquisitions of developed market firms: home semi-formal institutions and a supportive partnering approach", *Journal of Business Research*, Vol. 93, pp. 230-241.
- Torres de Oliveira, R., Rottig, D. and Indulska, M. (2018), "Transaction costs, institutions, and blockchains: towards a new paradigm", *Theorising Society in Information Systems – ISF 2018*, ANU, Canberra.
- Torres de Oliveira, R., Indulska, M., Steen, J. and Verreyne, M.-L. (2019), "Towards a framework for innovation in retailing through social media", *Journal of Retailing and Consumer Services*, Vol. 54.
- Tsiulin, S., Hegner Reinau, K., Hilmola, O.-P., Goryaev, N. and Karam, A. (2020), "Blockchain-based applications in shipping and port management: a literature review towards defining key conceptual frameworks", *Review of International Business and Strategy*, Vol. 1.
- United Nations (2020), "Mexico city, a megalopolis' war on plastic bags".
- Urena, R., Kou, G., Dong, Y., Chiclana, F. and Herrera-Viedma, E. (2019), "A review on trust propagation and opinion dynamics in social networks and group decision making frameworks", *Information Sciences*, Vol. 478, pp. 461-475.
- Vaz, J. and Brown, K. (2018), "Cryptocurrencies, institutions and trust", available at: <https://patch.austliancentre.muhosting.com.au/wp-content/uploads/2018/05/FAF4-Fintech-Cryptocurrencies-institutions-and-trust-2.pdf>
- Vereckey, B. (2018), *The Pros and Cons of ICOs for Entrepreneurs*, MIT, Management Sloan School New York, NY.
- Verreyne, M.-L., Torres de Oliveira, R., Steen, J., Indulska, M. and Ford, J.A. (2020), "What motivates 'free' revealing? Measuring outbound non-pecuniary openness, innovation types and expectations of future profit growth", *Scientometrics*, Vol. 1, pp. 1-31.
- Werbach, K. (2018), "Trust, but verify: Why the blockchain needs the law", *Berkeley Tech. LJ*, Vol. 33, p. 487.
- Werbach, K. and Cornell, N. (2017), "Contracts ex machina", *Duke LJ*, Vol. 67, p. 313.
- West, J. and Bogers, M. (2017), "Open innovation: current status and research opportunities", *Innovation*, Vol. 19 No. 1, pp. 43-50.
- Williamson, O.E. (1975), "Markets and hierarchies", New York, NY pp. 26-30.
- Wright, A. and De Filippi, P. (2015), "Decentralized blockchain technology and the rise of lex cryptographia", available at: SSRN 2580664.

-
- Yli-Huumo, J., Ko, D., Choi, S., Park, S. and Smolander, K. (2016), "Where is current research on blockchain technology? – a systematic review", *PloS One*, Vol. 11 No. 10, pp. e0163477.
- Zahra, S.A., Ireland, R.D. and Hitt, M.A. (2000), "International expansion by new venture firms: international diversity, mode of market entry, technological learning, and performance", *Academy of Management Journal*, Vol. 43 No. 5, pp. 925-950.
- Zalan, T. (2018), "Born global on blockchain", *Review of International Business and Strategy*, Vol. 28 No. 1, pp. 19-34.
- Zander, I., McDougall-Covin, P. and L Rose, E. (2015), "Born globals and international business: evolution of a field of research", *Journal of International Business Studies*, Vol. 46 No. 1, pp. 27-35.
- Zetsche, D.A. Douglas, W. Arner, R.P. and Buckley, (2020), "Decentralized finance (DeFi)", available at: SSRN 3539194.
- Zhang, W., Yuan, Y., Hu, Y., Nandakumar, K., Chopra, A., Sim, S. and De Caro, A. (2018), "Blockchain-based distributed compliance in multinational corporations' cross-border intercompany transactions", *Future of Information and Communication Conference*.
- Zucker, L.G. (1986), "Production of trust: institutional sources of economic structure, 1840-1920", *Research in Organizational Behavior*, Vol. 8, pp. 53-111.

Further reading

- Wang, Y., Han, J.H. and Beynon-Davies, P. (2019), "Understanding blockchain technology for future supply chains: a systematic literature review and research agenda", *Supply Chain Management: An International Journal*, Vol. 24 No. 1.

Corresponding author

Rui Torres de Oliveira can be contacted at: Rui.torresdeoliveira@qut.edu.au