



Malta is at the forefront of blockchain technology.
This is an aerial view of the tourist town of Saint Julian's, at dawn.

8

Blockchain and cryptocurrencies

as an economic development strategy for small island states and territories, with a particular focus on Malta

ABSTRACT

Amid public scrutiny and scepticism of the blockchain technology and the launch of Bitcoin in 2009, with businesses speculating about the technology's capabilities, companies have come to realize that the new technology has untapped potential, and is likely here to stay. Indeed, in the past few years as the

MARIO
ALOISIO

Formerly senior lecturer
in computing,
University of Malta
Junior College

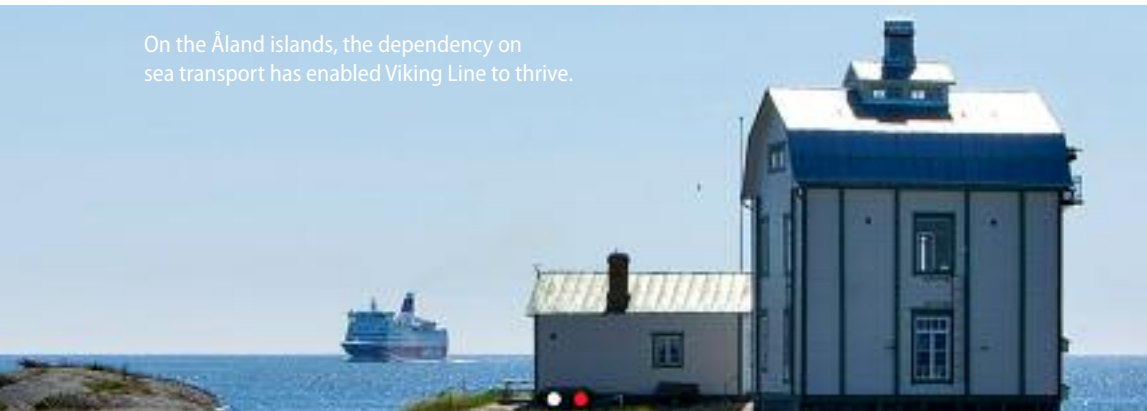


technology proved itself, and applications other than just digital currency have become possible, governments began taking the technology on board, drafting legislation to accommodate it. Several small island states, in spite—or perhaps because—of their smallness, have not shied away from actively launching cryptocurrency (and other) schemes relating to blockchain; they see them as a potential economy booster, with greenfield opportunities on the horizon. This chapter reviews the steps that some island states and territories have followed in order to raise their global profiles via the use of the blockchain technology. In particular, the case of Malta, a small and strategically located Mediterranean island, is considered.

INTRODUCTION

Contemporary empirical research about the socioeconomic development of small island states and territories reveals an interesting, if not an intriguing and surprising, observation: that these islands, in spite of their inherent vulnerability and the challenges this brings, have frequently fared well economically. And—remarkably—they have turned some of the very same, typically negatively attributed characteristics (such as isolation, smallness, lack of scale economies, limited land area, and finite resources) to their advantage (Baldacchino, 2015; Briguglio, 2018). Indeed, some businesses have thrived and expanded their operations by cleverly exploiting some of these islands' intrinsic attributes. To mention some examples: in Åland, the dependency of sea transport enabled one company—Viking Line—to grow considerably since its creation in 1959. In more than one island state, the focus on place-based branding of specially crafted products to counter the lack of scale economies has produced positive results (for example, the internationalization of the cosmetic and body care firm Ligne St. Barth as a global luxury brand in St. Barthélemy); and in some island jurisdictions, the exploitation of tourism by presenting it as a newer form of attraction (for example,

On the Åland islands, the dependency on sea transport has enabled Viking Line to thrive.



casino tourism in Macao, education tourism such as the teaching of English as a foreign language in Malta, and medical tourism in Barbados) has also met with success (Baldacchino, 2015). At the national level, governments have typically encouraged these types of activities. A paradigm shift from a pessimistic ‘model’ for the development of small island states to one which is more positive thus appears to have emerged.

Even so, we are often simultaneously reminded that small island states are fragile and more susceptible to economic shocks (for example, in view of their limited resources and high import dependency) than are big countries (Briguglio, 1995; Briguglio et al., 2009; Easterly & Kraay, 2000). Set against the range of disadvantages, for example, the comparative advantages of smallness and isolation are few (Connell, 2013). Moreover, while the ‘alternative development strategies’ mentioned above have helped islanders gain extra income (for example, by engaging in them at the individual level on a part-time basis), and in many cases even enabled entrepreneurs to start innovative and highly successful schemes, in some island states they may generate little monetary value at the national level when compared to the islands’ gross national incomes. On the other hand, an industry (be it manufacturing or service) based on a sound and robust information and communications technology infrastructure can generate greater wealth. The electronic gaming industry is a case in point: in a number of small island states and territories, including those of Alderney, Antigua & Barbuda,



Investing in electronic gaming has proven lucrative for Gibraltar. This is the Ocean Village marina.

Gibraltar, the Isle of Man, and Malta, it has provided substantial revenues (Aloisio, 2015; Connell, 2014). The point to be made here is that investing in a technology-based industry, if and when one can be identified, can prove very lucrative.

For the reasons just stated, political leaders and policymakers, especially those of small island jurisdictions, must be constantly on the lookout for new economic opportunities. When a new technology manifests itself, for example, political leaders should attempt to understand its positive and potentially negative effects, and create environments and mechanisms to embrace and perhaps even profit from it, even if the technology is disruptive and/or untested. This is not always straightforward, as the blockchain technology epitomizes. Not infrequently, there will be resistance to an early adoption, especially from opposing political factions—as happened, for example, in the Republic of the Marshall Islands when the government there set to pass a bill to produce its own cryptocurrency (Orcutt, 2019)—but sometimes also from private firms. So whilst concerns from the various sceptics should not be ignored, governments would

do well to forge ahead with the implementation of policies and the passing of legislation, provided these have been tabled and thoroughly debated by all the relevant stakeholders prior to becoming law.

The still relatively new technology of blockchain and cryptocurrency is, arguably, another opportunity for countries to tap into. Although still not fully understood by everyone, it is beginning to gain popularity, and many nation states, including some small island jurisdictions, are currently investigating how best to integrate this new technology with existing systems. Indeed, some small island states and territories have already put together appropriate legislation and, in some instances, even started to develop business applications built on blockchain.

The objective of this paper is to review some of these islands' state of play with regard to blockchain and cryptocurrency take-up, and identify how this technology is potentially being used as an economic

development strategy and to what extent it is bearing fruit (although, given the industry's young age, it may still be too early to draw definite conclusions). Apart from the concluding remarks, this chapter is divided into three main sections. The first section gives an overview of blockchain technology, what it promises to achieve, and its advantages and disadvantages. The characteristics of blockchain and cryptocurrency that avoid the vulnerability of small islands (e.g., isolation and high transportation costs) are also discussed. The second section discusses how small island states have

POLITICAL LEADERS AND policymakers, especially those of small island jurisdictions, must be constantly on the lookout for new economic opportunities. When a new technology manifests itself, for example, political leaders should attempt to understand its positive and potentially negative effects, and create environments and mechanisms to embrace and perhaps even profit from it, even if the technology is disruptive and/or untested.

already begun to use the blockchain technology. Their common factors and what distinguishes them is highlighted. The final section gives a fairly detailed examination of how Malta is going about navigating the somewhat uncharted territories of the blockchain technology with a view to boosting the local economy, and what its plans are for the technology's future uptake.

It should be pointed out that since the blockchain and cryptocurrency technology is a relatively new phenomenon, scholarly literature is still in its infancy and therefore some of the data presented in this paper may have been obtained from grey literature sources.

AN OVERVIEW OF THE CONCEPTS OF BLOCKCHAINS AND CRYPTOCURRENCIES

In the autumn of 2008, almost 18 years following the publication of the influential blockchain paper by Haber and Stornetta (1991), a person or group of persons by the pseudonym of Satoshi Nakamoto wrote a seminal account in which the digital currency, Bitcoin, was introduced to the world, initially as a concept (Nakamoto, 2008). Just a few months later, a working system was implemented that launched the first units of the Bitcoin cryptocurrency.

The literature about blockchain reveals a bewildering variety of definitions of the term, which is therefore mostly defined informally. According to the Merriam-Webster dictionary, a blockchain is “a digital database containing information that can be simultaneously used and shared within a large, decentralized, publicly accessible network”, or “the technology used to create such a database” (Merriam-Webster, 2019). Given that the first real-world application of the blockchain system was to record financial transactions using a digital currency—called Bitcoin—another definition is “an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way” (Iansiti & Lakhani, 2017, p. 61). Finally, since many definitions limit the scope within cryptocurrencies, in order to extend the Blockchain definition to address a broader context, Viriyasitavat and Hoonsopon (2019, p. 33) prefer to describe it as “a technology that enables immutability, and integrity of data in which a record of transactions made in a system are maintained across several distributed nodes that are linked in a peer-to-peer network.” Other definitions, similar to the ones quoted, may be found in the relevant literature. Some of these texts also use the term ‘distributed ledger technologies’, abbreviated as DLT (Houben & Snyers, 2018).

BLOCKCHAIN IS DESCRIBED as “a technology that enables immutability, and integrity of data in which a record of transactions made in a system are maintained across several distributed nodes that are linked in a peer-to-peer network.”

Whichever definition one adopts, the key characteristics associated with blockchain and cryptocurrencies are:

- *decentralized*, meaning that the database is not held on one central computer system, but instead is distributed among many connected computers with no single computer having overall control (in computer science jargon, a peer-to-peer computer network);
- *publicly accessible*, meaning anyone with access to the system is able to see anyone else's records or transactions (without knowing the actual identity of the person or entity that created the transactions);
- *simultaneous*, meaning that users can concurrently access the same set of records; and
- *immutable*, meaning that the data in a blockchain cannot be changed.

Occasionally, the keyword 'trustless' is used to indicate that with blockchain technology there is no need to trust anyone except the system itself. A built-in mechanism is used to validate blockchain transactions. OECD (n.d.), Sultan, Ruhi, and Lakhani (2018), Tapscott and Tapscott (2018), and Viriyasitavat and Hoonsopon (2019) elaborate further on the above key attributes.

THE REASON WHY THE technology has been called 'blockchain' is that the units of data referred to as 'blocks' are linked together by a set of pointers and so form a 'chain' of blocks. Each block, apart from containing the actual validated data in encrypted form, contains a pointer to the previous block. The blocks are therefore stored in chronological order.

The reason why the technology has been called 'blockchain' is that the units of data referred to as 'blocks' are linked together by a set of pointers and so form a 'chain' of blocks. Each block, apart from containing the actual validated data in encrypted form, contains a pointer to the previous block. The blocks are therefore stored in chronological order. These pointers are 'hash' pointers, encrypted addresses based on the date and time when the blocks were created, as well as on the data itself. The generated hash values are all of fixed-length, thus increasing security since anyone trying to decrypt the hash will be unable to tell how long or short the input is simply by looking at the length of the output. Additionally, each block header contains the hash of the previous

block, and other information such that trying to change even one character from the data of some block will affect how that block is linked to the previous one. Attempting to alter the information of an existing data block in any way is therefore made extremely difficult, not only because of the way these hashes are created (computed mathematically) but also because a copy of the same block is saved on thousands or millions of computers on the network. This makes the blockchain data almost impossible to tamper with. Other advantages include transparency, security, improved

accuracy (by eliminating human involvement in the verification processes), and cost reductions (by eliminating third party verification).

When used for cryptocurrencies, blockchain technology does raise some concerns. In a report prepared specifically for the European Parliament, Houben and Snyers (2018) note its use for illicit activities (such as money laundering, terrorist financing, and tax evasion) primarily as a result of the anonymity surrounding cryptocurrencies. They point out that the existing legal framework is still inadequate to deal with this issue. Other weaknesses are that certain systems, such as cryptocurrency exchanges and wallet providers, could still be (and have been) hacked. Moreover, some systems are still unable to cope with very high transaction rates, apart from the significant technology cost associated with cryptocurrency mining (the process by which transactions are verified and added to the blockchain). Some features of the blockchain technology and digital assets such as the lack of a trusted counterparty, increased anonymity, and ease of cross-border money transfer without any gating or restriction have been at the forefront of debates about money laundering and can present heightened compliance risks (Russel & Wiltermuth, 2019). Valfalls and Egilsson (2016) even speculate that, given a combination of factors, the distributed Bitcoin ledger could become vulnerable to attack (and its trustless nature ultimately destroyed).



The British Virgin Islands (Tortola pictured here) recognizes both Bitcoin and Ether focused funds.

BLOCKCHAIN APPLICATIONS AND CHARACTERISTICS

Apart from cryptocurrencies, the blockchain technology has an almost unlimited range of applications. Its important property of eliminating the need for a third (intermediary) party, hence saving costs, can be used to advantage in other situations. For example, artists can publish their works on blockchain and sell them directly to customers without intermediaries. This example can be extended to the retail industry in general and services in particular, where buyers and sellers are connected via smart contract systems without the need of an intermediary. For less centrally located island states where access to a physical bank is difficult or the transactions are more costly, this characteristic makes it easy for people to transfer money, provided the proper setup is in place.

The security and transparency features of blockchain are likewise applicable to various industries: for example, healthcare providers can securely store their patients' medical records and, with the aid of a digital private key, make them accessible to specific individuals. In the real estate leasing world, customers are demanding more transparency and ideally would want to be able to view properties from different real estate agents simultaneously without having to visit every one of the real estate agents' sites. For large companies, the possibility of using the storage features of the Cloud but in a decentralized manner is also inherently safer.

Kshetri (2017), Parker (2018), and Tapscott and Tapscott (2018) provide several concrete examples of blockchain applications. Koenig (2018) succinctly lists some of the advantages of blockchain for small countries.

CRYPTOCURRENCIES AND THEIR IMPLICATIONS

It has been estimated that by November 2018 there were over 2,500 different cryptocurrencies on the Internet (Bright, 2018). However, the market is exceptionally top heavy: by market capitalization, just 25 of these make up 90% of the market value, with Bitcoin making up for almost 60% of these top 25 entities. Bagshaw (2019) gives a figure of 2,957 for the total number of cryptocurrencies as of October 2019, of which the top 10 represent about 85% of the total market valued at roughly US\$221 billion.

Cryptocurrencies pose real challenges for governments, policymakers, the legal profession, and all those involved in forming regulation and legislation. The implications of introducing cryptocurrencies and making them legal tender are various. For example, how do they affect global anti-money laundering efforts? How should they be regulated? Should the definitions of what constitutes an already well-defined entity (for example, a financial security) be changed to accommodate the new technology? Would an Initial Coin Offering (ICO) qualify as a security given the current definition of this term? How willing would insurance companies be to cover cryptocurrency investments? These are questions governments would need to grapple with; indeed,

they have already begun to do so. Governments also need to discuss perhaps the less obvious, but nevertheless just as pertinent, issues, such as what happens when someone holding cryptocurrency assets dies: what happens to the deceased's estate and how will the deceased's beneficiary be able to access the deceased's digital assets? The recent death of Gerald Cotten (the CEO of Quadriga, Canada's largest cryptocurrency exchange) is a case in point. Finally, many countries (Malta included) impose border restrictions on physically transporting large amounts of cash into or out of the country, so given the nature of digital assets, how would one go about meeting this regulation when a distributed ledger is being used?

It is not the scope of this chapter to delve into these challenges—all of which are discussed elsewhere (Campbell-Verduyn, 2018; Houben & Snyers, 2018; Tapscott & Tapscott, 2018)—rather, it is only to show why it has taken governments so long to pass the relevant legislation.

BLOCKCHAIN AND CRYPTOCURRENCY IN SMALL ISLAND JURISDICTIONS

Although a few small island states and territories, like some large nations, are either against introducing blockchain and cryptocurrencies or adopting a wait-and-see approach, many small jurisdictions are keen to embrace these new forms of technologies, even though in some cases it is not exactly very clear how to proceed. The reasons for, or against, investing in blockchain and cryptocurrency are various, being in most cases politically and/or economically motivated. If properly implemented, small isolated island states, in particular, likely stand to gain from this new technology. Before we focus on Malta, a place that is very keen to be at the forefront of blockchain technology, we first summarize the state of play regarding cryptocurrencies in some small island jurisdictions. The cases of Iceland and the Marshall Islands are revealing and therefore dealt with in more detail.

Many small jurisdictions have been hesitant to introduce cryptocurrencies—some more than others. Among those that have been very cautious, we find Macau and Guernsey. Although the use of cryptocurrencies such as Bitcoin to facilitate deals between private individuals is legal in Macau, the island has completely banned ICOs and has no plans to allow the use of cryptocurrencies for gaming, a sector for which it is world famous (Stradbroke, 2018). Guernsey, a British Crown Dependency, is a low-tax jurisdiction which has taken a cautious approach to cryptocurrencies. It has large

WHAT HAPPENS WHEN someone holding cryptocurrency assets dies?



The recent death of Gerald Cotten, the CEO of Quadriga, Canada's largest cryptocurrency exchange, is a case in point.



The Cayman Islands has been a leading financial centre for years.

financial and online gambling sectors, and the reason it gives for being cautious is the difficulty in complying with international anti-money-laundering standards. The British Virgin Islands recognizes Bitcoin and Ether focused funds, however the primary concern relates to ICOs and Initial Public Offerings (IPOs). The challenge (as with so many other jurisdictions) is how to regulate such offerings. Consequently, the British Virgin Islands is currently studying how this will be achieved (Harbison & Clinton, 2019). Like Guernsey, the Isle of Man is also a British Crown Dependency and a low-tax jurisdiction, yet its stance on cryptocurrencies has been different from that of Guernsey. In fact, the Isle of Man was an early adopter and permits the use of cryp-

to-currencies as a means of payment. The Cayman Islands has been a leading global financial centre for many years, with a good reputation and generally accepted monetary legislation in place. Therefore, like some other jurisdictions with similar experience, it recognized the economic potential of blockchain and cryptocurrencies and therefore has encouraged activity in this space, provided that companies abide by anti-money-laundering (AML) rules. In the same way as government bonds can be sold for funding projects, the government of Antigua and Barbuda allows the funding of projects through government-supported anti-money-laundering (AML) ICOs.

MANY JURISDICTIONS ARE wary of the potential negative effects cryptocurrencies can have on their good financial reputation and therefore frequently allow certain activities only if anti-money-laundering (AML) and Know Your Customer (KYC) rules are adhered to.

As can be seen, many jurisdictions are wary of the potential negative effects cryptocurrencies can have on their good financial reputation and therefore frequently allow certain activities only if AML and Know Your Customer (KYC) rules are adhered to.

ICELAND

An independent nation in the North Atlantic, Iceland once belonged to Denmark and Norway, but in 1918 it gained sovereignty, and then became a republic in 1944. Iceland covers a total area of 102,755 km² yet its population is under 400,000, making it one of the most sparsely populated countries at just 3.4 inhabitants per km². Contrast this with Malta, which has a population density of approximately 1,400. About two-thirds of the population live in or around Reykjavík, the capital city, with the remaining inhabitants settled in other towns scattered around Iceland's coastline. Iceland is not an EU member, but in 1960 it joined the European Free Trade Association (EFTA), and in 1994 became part of the European Economic Area. The currency is the Icelandic Krona (ISK).

Iceland's 2018 per capita GDP of US\$54,753 is relatively high. However, this has not always been the case. Before the Second World War, its economy was rather weak. Unlike the situation in some other countries, the war brought prosperity to Iceland because of an influx of American soldiers and the execution of engineering projects which provided work. The country also benefited from Marshall Plan aid after the war.

Iceland made headlines in 2008 when, as a result of the worldwide financial crisis,



About two-thirds of Iceland's population lives in Reykjavik. In the summer of 2019, Iceland announced the legalization of the use of cryptocurrencies.

the nation's entire banking system failed. This led to an economic depression, political unrest, and the institution of capital controls. It was reported that the Icelandic Krona had declined more than 35% against the Euro in an eight-month period in 2008 (Tatar, 2019). Yet, within about five years, the island has made an astonishing recovery, at least partly because of tourism (Tan, 2018; University of Pennsylvania, 2018). This is an example of how islands can adjust quickly to unfavourable circumstances despite their fragility.

Iceland's connection with blockchain and cryptocurrencies goes back a number of years. Not long after Bitcoin was launched, cryptocurrency miners soon started operating from Iceland. That is because crypto mining uses considerable energy and Iceland has an abundant supply of renewable (geothermal and hydropower) sources. The cold weather also helps to minimize costs for the cooling needed for the computers to run.

Although Iceland has welcomed this type of activity, it still has very strict foreign exchange rules, and cryptocurrency trading was, until recently, prohibited. In 2013, in anticipation of the Auroracoin project—a private initiative that created Iceland's own digital coin with the intention to serve as a mechanism for cross-border transfers in the local economy—the Central Bank of Iceland passed a law, the Icelandic Foreign Exchange Act, which prohibited the use of Bitcoin for foreign exchange trading. However, in the summer of 2019, Iceland's Financial Supervisory Authority announced the legalization of the use of cryptocurrencies (Joshi, 2019). It issued its first licence to Monerium, a Reykjavík-based company founded in 2015. This means that people in Iceland can now legally effect transactions with digital money that involve other countries. It is a move that sees Iceland shifting its focus from merely crypto mining to blockchain.

As mentioned, Iceland has been a haven for cryptocurrency mining companies. According to Styrmir Hafliðason, who runs a large data centre south of Reykjavík, multiple requests per week are made to his company by crypto miners to set up a base in Iceland (Moskvitch, 2018). The cryptocurrency miners' hardware is consuming so much energy that serious concerns are being raised. Environmentalists are worried that, given that it is now more difficult to mine bitcoins, considerable damage is being done to the country as more and more geothermal power plants are built over natural hot spring areas, ruining the landscape (Bjarnason, 2019). Even the power from hydroelectric dams is not so 'green' since these sink untouched land under water and alter rivers and waterfalls. Yet, it appears that the Icelandic government is doing little in this regard.

Apart from the environmental impact, the Icelandic government is also worried that this technology could severely damage its economy if the crypto mining boom ends in a bust (Joshi, 2019; Billing, 2019). Whilst projects like this, which involve large farms of data centres, provide economic returns for energy providers, it would be especially devastating for the country that has only recently recovered from the 2008 financial crash if this were to happen.

THE MARSHALL ISLANDS

The Republic of the Marshall Islands (RMI) is a small Pacific jurisdiction with a population of just over 58,000 spread out over many atolls (World Bank, 2019). It is a sovereign state in a free association with the United States which provides defence and financial assistance. The Compact of Free Association (with the US) also allows the Marshallese to freely relocate to the US to work there. The monetary currency is the US dollar.

Located almost 4,000 km northeast of Cairns, Australia, the RMI is hampered by logistical challenges but also by climate and health issues. It is not uncommon for big storms to hit the Marshall Islands with devastating effects (Pacific RISA, n.d.); regarding health, it will be recalled that between 1948 and 1956 America carried out considerable nuclear testing at the RMI's Bikini Atoll with the consequence that some of the islanders there still suffer from the terrible aftereffects of radioactivity (Geggel, 2019; Raj, 2019).

Economically, the RMI's 2018 GDP per capita was US\$3,449.00 (UN, 2019), with most of its revenue being derived from US aid (60% of the annual budget), and 30% of the workforce being employed by the Marshallese government. The rest of the economy is linked to a subsistence economy of fishing and agriculture (CIA, 2019; GlobalEdge, n.d.). Marine resources (fishing and aquaculture), tourism, and agriculture have been the top government development priorities, including selling fishing rights to other nations and offering ship registrations under the RMI flag (Société Générale, 2019). Recently, the Marshallese government has taken a step towards introducing cryptocurrency.

Of the small island states and territories that are using blockchain, the RMI is perhaps the first to create its own digital blockchain currency. To be called the Marshallese sovereign (SOV), this currency will eventually be made legal tender along with the US dollar. First announced in February 2018, it was quickly followed by a law that launched the digital currency project (Ossinger, 2019; TRMI Sovereign Currency Act, 2018). A non-profit institution called the SOV Development Fund was established to maintain the digital currency system. Not everyone in the RMI approved of the project. Indeed, political opponents of the RMI's President used the issue to force a vote of no confidence in November 2018, which the President marginally won, and the US Treasury Department as well as the International Monetary Fund (IMF) have also expressed serious concern (Orcutt, 2019).

In spite of this scepticism, the RMI government was adamant about its cryptocurrency policy and, in September 2019, after months of silence (during which consulta-

OF THE SMALL ISLAND STATES and territories that are using blockchain, the Republic of the Marshall Islands (RMI) is perhaps the first to create its own digital blockchain currency. To be called the Marshallese sovereign (SOV), this currency will eventually be made legal tender along with the US dollar.

tions with blockchain experts, US officials, and United Nations personnel were taking place), it announced at the Invest: Asia 2019 cryptocurrency forum held in Singapore its intention to press ahead with the project. Once introduced, the SOV will circulate as legal tender in parallel with the US dollar.

As would be expected of such an important and delicate project, many stakeholders are involved, from blockchain experts (including Steve Tendon who also happens to be on Malta's National Blockchain Task Force) to US and IMF diplomats and consultants. Interestingly, the SOV will be introduced to the market gradually through a Time Release Monetary Issuance (TRMI) rather like a token pre-sale (Ossinger, 2019). Because of this and since many of the finer details still have to be worked out, it will

not be the SOV that people will be buying initially, but units (in the form of Initial Coin Offerings) that would later be exchanged for it (by the public having access to software to effect transactions) (Comben, 2019).

According to Steve Tendon, who was interviewed in September 2019 by Christina Comben of Coinrivet (Comben, 2019), another reason for the TRMI (which is anticipated to span 18 months) is to keep the speculators out and ensure that only long-term investors

participate in the project. The intention is to issue the SOV on a specially developed blockchain that has built-in compliance features: it is algorithmically programmed to grow at a fixed rate (set at 4%) per year, and government will not be able to interfere and increase the supply, which would thereby devalue the currency.

A prime motive for proceeding with this project of creating a digital currency and making it legal tender instead of issuing a central bank digital currency has to do with resilience and sustainability. In the event of a major catastrophic event in which the RMI's inhabitants would need to settle elsewhere, the citizens would still have their digital legacy and information safeguarded on a blockchain. This may seem to be a remote scenario, but it is not inconceivable. In fact, the RMI's cryptocurrency policy states that a percentage of the issuance of the SOV digital currency will be designated to predetermined funds in a bid to help the RMI deal with the possible multiple environmental disasters (TRMI White Paper, 2019). Another motivation is to not remain completely dependent on the US dollar, especially when the financial aid the country receives from the US government may come to an end in 2023 (Asian Development Bank, 2019; Ossinger, 2019).

In brief, the intention is for the SOV to leverage innovation in digital currency and sustain the islands' future. By placing the bulk of the proceeds from the sale into a trust, the government hopes to become more resilient to the consequences of climate change and dependency on the US government.



Majuro Atoll, Marshall Islands.

THE CASE OF MALTA

The small Mediterranean island of Malta, which at the end of 2018 had a population of just under half a million (National Statistics Office, 2019), has an interesting political and socioeconomic history.

After a brief occupation by the French during the time of Napoleon Bonaparte, Malta was taken over by the British and officially became a British subject in 1814. Owing to its strategic location and because Malta was still under colonial rule, it was heavily bombed by the Axis powers during the Second World War and suffered extensive damages as a result. Following the war, the island went through a slow process of economic recovery. Poverty was widespread, and in the 1950s when jobs were scarce many Maltese emigrated to Australia, Canada, the United Kingdom, and the United States.

Following Independence in 1964, a number of socioeconomic programs were drafted and carried through to improve the well-being of the islanders and increase wealth. These programs ranged from building state housing and introducing children's allowance and a national minimum wage, to upgrading the telecommunications system and building new hotels. An effort was made to also develop the manufacturing sector by encouraging foreign firms to operate from Malta, provided they employed Maltese personnel. To this end, a number of industrial estates were made available for factories to operate from. The textile industry, in particular, had a prominent presence through-



Night life in Valletta town streets, Malta.

out the 1970s and 1980s, employing a sizeable chunk of the low-skilled workforce.

In small island states, especially those that are geographically well-placed, tourism has always been given the importance it deserves as a means of generating income, and this is no exception with Malta. The figures speak for themselves. From a mere 28,000 tourists annually in 1960 to almost 236,000 in 1970, 1.3 million in 2010, and over 2.5 million in 2018 (Boissevain, 2000; Malta Tourism Authority, 2019, p. 8), the contribution from this services industry to the GDP has been substantial: in 2018, tourist expenditure amounted to EUR 2.1 billion, equivalent to EUR 809 per capita and 17% of the GDP.

The manufacturing industry continued to be strengthened in the late 1980s when a number of industrial development laws were enacted to incentivize primarily export-oriented companies. At the same time, it was realized that in order to sustain the economy it was necessary to also concentrate on the services industries, for which an all-encompassing infrastructure had to be in place. Therefore, in the 1990s the telecommunications network, in particular, was further upgraded so that the hospitality sector, financial institutions, and software firms, among others, would be in a better position

to conduct business. The dot-com boom of the mid-1990s created new business opportunities, new jobs, and enabled software companies to grow (Aloisio, 2015). Tertiary-level education was also heavily invested in. A combination of factors that include a mild climate, political stability, a well-educated workforce, and a sound ICT infrastructure, apart from favourable business incentives, has been frequently advertised by government to attract foreign companies, i-Gaming firms included. The latter performed exceptionally well, with the i-Gaming industry now accounting for 12% of the GDP (Anastasi, 2018).

GIVEN THE SUCCESS OF THE electronic gaming industry in Malta, it was perhaps only natural for the Maltese government to consider the relatively new technology of blockchain and cryptocurrency as the island's next means of potential economic development.

EMBRACING THE BLOCKCHAIN

Given the success of the electronic gaming industry in Malta, it was perhaps only natural for the Maltese government to consider the relatively new technology of blockchain and cryptocurrency as the island's next means of potential economic development. After all, the i-Gaming and financial technology (“fintech”) sectors were built on an existing and robust ICT infrastructure and a supply of an already skilled workforce of ICT engineers, software developers, consulting firms and experts in the legal and financial professions. Likewise, the appropriate financial and telecommunications regulations and the legislative framework relating to finance, telecommunications, intellectual property, electronic gaming, and information technology in general

were already in place. Regulatory bodies such as the Malta Financial Services Authority (MFSA), the Malta Gaming Authority (MGA), and the Malta Communications Authority (MCA) had, likewise, been established for a number of years. All this augured well for pursuing the new technology of blockchain; the foundation for establishing this industry onboard already existed.

The beginnings of blockchain in Malta go back to the summer of 2016 when, at the request of the Minister for the Economy, Dr. Chris Cardona, a draft version of the Malta National Blockchain Strategy (MNBS) was prepared for eventual approval by cabinet. This document outlined a plan to implement blockchain technology not just in finance but across multiple sectors. It was presented to cabinet and approved by the Cabinet of Ministers in April 2017, following which the Prime Minister, Dr. Joseph Muscat, formally announced this strategy (*The Malta Independent*, 2018). The MNBS was to be headed by Silvio Schembri, a parliamentary secretary, later the Junior Minister for Financial Services, Digital Economy and Innovation within the office of the Prime Minister.

At a press conference in February 2018, another consultation document (“The Establishment of the Malta Digital Innovation Authority; the Framework for the Certification of Distributed Ledger Technology Platforms and Related Service Providers; and a Virtual Currency Act”) was released. This document proposed three independent but related bills, plans for the creation of an appropriate supervisory authority, creation of a law relating to DLTs, and creation of a law relating to virtual currencies. Following a period of consultations, the three proposed bills became law in November 2018. These Acts are described in more detail below:

The Malta Digital Innovation Authority Act

Purpose and Objectives: Establishes the Malta Digital Innovation Authority (MDIA) to “promote and develop the innovative technology sector in Malta by means of proper recognition and regulation of relevant innovative technology arrangements and related services” (MDIA Act, 2018, p. 4). A main objective is to promote government policies that favour technical innovation, particularly with reference to digital ledger technology and its adoption by the government in systems of public administration. Other objectives include the promotion of education on ethical standards and legitimate exploitation of innovative technology, and maintaining Malta’s reputation as well as protecting consumers.

Innovation Technology Arrangements and Services Act

Purpose and Objectives: Establishes a regime for registering technology service providers and provides for the certification of certain technology arrangements (ITAS Act, 2018). This regime covers distributed ledger technology platforms and related contracts. The objective is to have companies that provide services for any DLT platform in or from Malta to be certified by the MDIA.

Virtual Financial Assets Act

Purpose and Objectives: Establishes a framework to “regulate the field of Initial Virtual Financial Asset Offerings and Virtual Financial Assets and to make provision for matters ancillary or incidental thereto or connected therewith” (VFA Act, 2018, p. 1). The law thus provides for the regulation of those providing services relating to cryptocurrencies, such as brokers, wallet providers, and DLT exchanges. The objective is to ensure that any offerings by an issuer meet the transparency requirements.

The above legislation essentially provides a comprehensive regulatory framework to govern cryptocurrency, blockchain, and ICOs, and has been written in such a way as to prevent the laws from becoming rapidly obsolete, or from stifling technological development (Parliamentary Secretariat for Financial Services et al., 2018). The

response from various industries, particularly legal firms, was generally positive. The Virtual Financial Assets Act makes reference to a “VFA agent”, one authorized by the MFSA (hence VFA certified) to carry out certain duties such that the agent would be in a position to assist potential ICO issuers and crypto exchanges to themselves obtain the necessary licensing. This VFA agent would typically be a firm of advocates, accountants or auditors, or corporate services providers (VFA Act, 2018). In effect, some of the work that would otherwise have been done by the MFSA is now relegated to these VFA-certified agents, mostly legal organizations. As of October 2019, 17 VFA agents and 5 system auditors have been certified by the MFSA (Galea, 2019).

FROM 2017 TO THE PRESENT, Malta saw substantial activity in the blockchain and cryptocurrency space. A number of blockchain businesses have been established in Malta, including Binance (which relocated to Malta from Hong Kong) and OKCoin, two of the world’s largest fiat-to-crypto exchanges.

BLOCKCHAIN-RELATED EVENTS AND OTHER INITIATIVES IN MALTA

From 2017 to the present, Malta saw substantial activity in the blockchain and cryptocurrency space. A number of blockchain businesses have been established in Malta, including Binance (which relocated to Malta from Hong Kong) and OKCoin, two of the world’s largest fiat-to-crypto exchanges. In September 2017, the Ministry of Education and Employment announced a project whereby education and academic records would be put on blockchain. Involving educational institutions such as the Institute of Tourism Studies, the MCAST, and the National Commission for Further and Higher Education, as well as the Education Ministry itself, which effectively is its Manager, this pilot project called BlockCerts is now well under way (Camilleri, 2019). Also under way is the placing of the registry of rents on blockchain and, similarly, the Registry of Companies data held at the Malta Business Registry office, a task that would help, for

example, compare signatures on documents that are needed for the submission of applications.

An early initiative, mentioned in the Budget for 2018, was that of setting up a Blockchain Laboratory and a Blockchain Startup Hub (Scicluna, 2018). The Blockchain Lab aims to train civil servants to become acquainted with the use of blockchain technology, whereas the Blockchain Hub is targeted at startups and investors of this technology. These projects come under the remit of the Malta Information Technology Agency (MITA), Malta's national ICT organization.

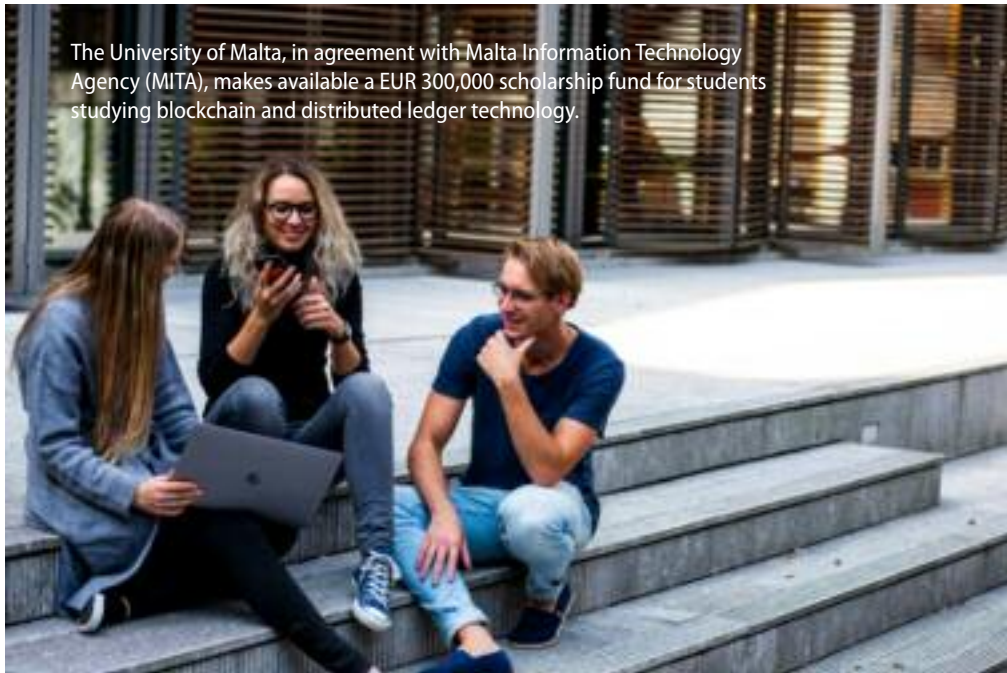
In October 2018, the first edition of the Delta Summit—the Maltese Government's official blockchain and innovation event—was held in the tourist town of Saint Julian's, an event that brought together hundreds of experts from all over the globe. This was followed in November by the first ever Malta Blockchain Summit in which an estimated 8,500 participants were reported to have attended, with over 400 companies showcasing their products (The Malta Independent,



The Delta Summit is Malta's official blockchain and innovation event.

(The Malta Independent, 2018). It was an event in which the attendees could learn and network via workshops, keynote speeches, and first-hand encounters with the exhibitors. These two events were repeated in 2019 with equal success.

At roughly the same time, the University of Malta (UOM), in agreement with MITA, made available a EUR 300,000 scholarship fund for students studying blockchain and distributed ledger technology, in the hope that Malta would maintain its place as an international hub for the development of skilled professionals in the fintech industry (Welcome Centre Malta, 2018). A review of the law, finance, and ICT degree programs was also being carried out by the UOM in order to support the government's strategy of promoting Malta as 'The Blockchain Island'. Similarly, the MFSA, sometimes in collaboration with institutions such as the Malta Institute of Management and the Institute of Directors, also organized a series of training courses and seminars for the purpose of updating employees on new developments in blockchain technology. As a



The University of Malta, in agreement with Malta Information Technology Agency (MITA), makes available a EUR 300,000 scholarship fund for students studying blockchain and distributed ledger technology.

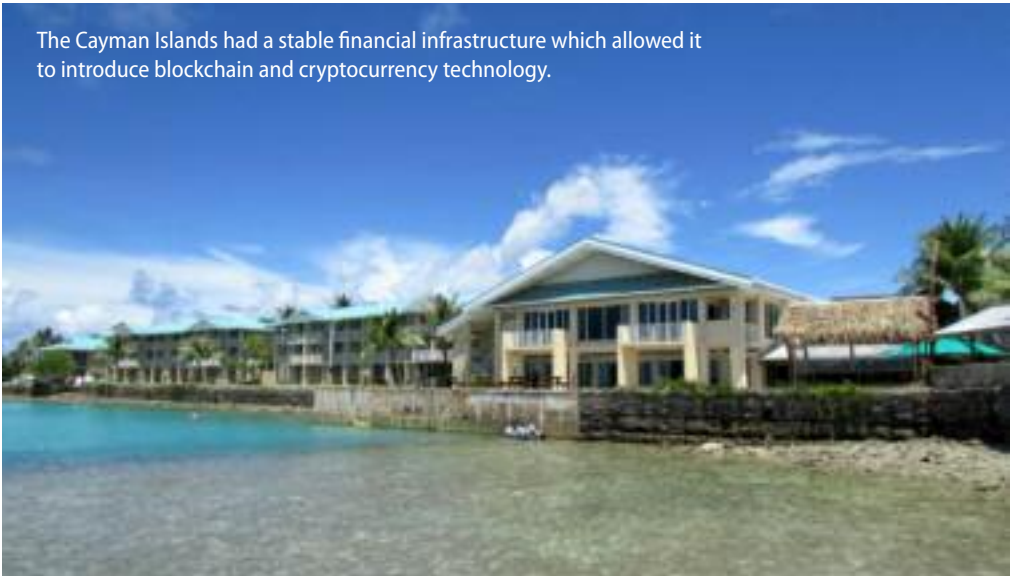
fintech regulatory body, the MFSA has also been instrumental in educating the public about the possible risks of cryptocurrency investments and, conversely, about the opportunities provided by the blockchain technology.

Another government initiative in collaboration with the Malta Chamber of Commerce, Enterprise, and Industry, announced in the Budget for 2019, is Tech.mt, a private-public partnership foundation aimed at assisting technology companies based in Malta in exporting their information and communications technology beyond Malta's shores. This was to be accomplished by actively promoting Malta in foreign fairs, conferences, and educational institutions (MaltaChamber, 2019). The Tech.mt portal provides comprehensive details of what this foundation has to offer.

CONCLUDING REMARKS

As the blockchain and cryptocurrency technology has been expanding and establishing itself, jurisdictions worldwide have taken different positions, with some banning it outright, others opting for a wait-and-see approach, and yet others embracing it. Small island states and territories, in particular, have been conscious of the technology's potential, seeing it as a new economic development strategy. The circumstances which have led to the technology's uptake in some small jurisdictions have, in some cases, been different. Like Malta, for example, the Cayman Islands already had a stable financial infrastructure (including its regulatory frameworks) to be in a favourable position to introduce the technology. This is not the case with other jurisdictions (for example, those of the Comoros and Solomon Islands) which may lack the same reputation in legal, financial, and telecommunications infrastructure and regulation.

The Cayman Islands had a stable financial infrastructure which allowed it to introduce blockchain and cryptocurrency technology.



An overarching goal of any nation wanting to adopt blockchain and cryptocurrency technology is to increase its economic wealth. Again, how this is achieved, the extent of government involvement, and the reasons given for investing in the new technology have varied significantly from country to country. The Marshall Islands' rationale for creating the SOV is its remoteness, its dependency on the US dollar, and its potential risk from environmental disasters and financial instability. Iceland's generally positive attitude to blockchain (but initially not to Bitcoin per se) has been quite different. The Icelandic government, wary of a possible repeat of the 2008 financial crisis and conscious of the advantage it possesses in the energy supply—an important asset for cryptocurrency mining—took a stance whereby these companies were welcomed. Both

islands are proof that distance is not a barrier to this kind of technology, a feature that is potentially attractive to jurisdictions facing high goods transportation costs. The peninsular territory of Gibraltar has regulation for DLT services firms to be licensed provided they comply with AML requirements and pay an annual fee of £10,000.

As for Malta, there has been substantial economic growth over the past few years and the government intends to continue this trend by diversifying into new niche sectors, including blockchain and cryptocurrency. While major economies have been reluctant in regulating this technology, Malta has adopted a remarkably progressive stance towards cryptocurrencies and blockchain technologies. The island has moved quickly to establish itself as an international blockchain hub by introducing legislation to bring virtual assets and DLTs into the regulatory fold. Indeed, it has been argued by Christopher Buttigieg, the MFSA's chief strategic officer, that under the VFA framework

WHETHER OR NOT cryptocurrencies and blockchain technologies are primarily utopian dreams remains to be seen. It is only now that blockchain's many applications are becoming apparent and these are creating new ways of doing business, ways which make it possible to operate more efficiently and competitively.

Malta has imposed requirements which go beyond the EU's Fifth AML Directive (Attard, 2019). However, the Maltese government is not stopping there. Noting the spillover effect of companies from the i-Gaming industry now producing products supported by blockchain technology, and overseas firms relocating to, or opening an additional branch in, Malta, the government has recently announced new strategies for AI, video games development, and eSport (Malta.AI, 2019). With a framework that provides legal certainty and a digital infrastructure that promises to be cybersecure, companies will be in a better position to operate locally on a variety of innovative digital projects. The challenge is perhaps that of finding sufficiently skilled and qualified local personnel, since the number of

graduates properly trained in the relevant disciplines does not seem to match the demand for these employees in the digital industry.

Whether or not cryptocurrencies and blockchain technologies are primarily utopian dreams remains to be seen. It is only now that blockchain's many applications are becoming apparent and these are creating new ways of doing business, ways which make it possible to operate more efficiently and competitively. Many firms are incorporating some of their business functions into the distributed blockchain ledger. Industry giants like Google, Microsoft, IBM, and Amazon, among others, have already invested heavily in AI and blockchain-related projects. If governments fail to follow in the same footsteps, they risk falling behind, economically and socially. Blockchain may not be a utopian strategy for all small island states and territories but, given the above, they would do well to investigate the possibilities, if they have not already done so.

REFERENCES

- Aloisio, M. (2015). Software and electronic gaming industries in Malta. In G. Baldacchino (Ed.), *Entrepreneurship in small island states and territories* (pp. 235-250). Oxford & New York: Routledge.
- Anastasi, R. (2018, June 23). *How much is the iGaming industry in Malta really worth?* The Malta Chamber. Retrieved from <https://www.maltachamber.org.mt/en/how-much-is-the-igaming-industry-in-malta-really-worth>
- Asian Development Bank. (2019). ADB's work in the Marshall Islands. Retrieved from <https://www.adb.org/countries/marshall-islands/overview>
- Attard, C. (2019). Malta finance: Risk on or off? *BLOCK*, 3, 40-44.
- Bagshaw, R. (2019, October 8). *Top 10 cryptocurrencies by market capitalisation*. Yahoo Finance. Retrieved from <https://finance.yahoo.com/news/top-10-cryptocurrencies-market-capitalisation-160046487.html>
- Baldacchino, G. (2015). Editorial—Small island states and territories: Vulnerable, resilient, but also doggedly perseverant and cleverly optimistic. In G. Baldacchino (Ed.), *Entrepreneurship in small island states and territories* (pp. 1-28). Oxford & New York: Routledge.
- Billing, M. (2019, July 3). *Can Iceland handle the repeated boom and bust of Bitcoin mining?* Sifted. Retrieved from <https://sifted.eu/articles/cryptocurrency-mining-in-iceland>
- Bjarnason, E. (2019, April 15). *Iceland is a bitcoin miner's haven, but not everyone is happy*. Al Jazeera. Retrieved from <https://www.aljazeera.com/indepth/features/iceland-bitcoin-miner-haven-happy-190414191134345.html>
- Boissevain, J. (2000). Changing Maltese landscape: From utilitarian space to heritage? In C. Vella (Ed.), *The Maltese islands on the move* (pp. 1-13). Malta: Central Office of Statistics.
- Bright, J. (2018, November 28). *How many cryptocurrencies are there?* Coin Rivet. Retrieved from <https://coinrivet.com/how-many-cryptocurrencies-are-there>
- Briguglio, L. (2018). The relation between economic resilience and competitiveness in small island states. In J. Randall (Ed.), *The 21st century Maritime Silk Road Islands Economic Cooperation Forum annual report on global islands 2017* (pp. 83-98). Charlottetown, PE: Island Studies Press.
- Briguglio, L. (1995). Small island states and their economic vulnerabilities. *World Development*, 23(9), 1615-1632.
- Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2009). Economic vulnerability and resilience: Concepts and measurements. *Oxford Development Studies*, 37(3), 229-247.
- Camilleri, C. (2019). Blockchain and education: Is Malta's workforce prepared for the industry? *Blockchain Island, Winter 2019/2020*, 85-93.
- Campbell-Verduyn, M. (2018). Bitcoin, crypto-coins, and global anti-money laundering governance. *Crime Law and Social Change*, 69, 283-305.
- CIA. (2019). The World Factbook—Marshall Islands. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/rm.html>
- Comben, C. (2019, September 22). *The Marshall Islands' national cryptocurrency is fascinating in so many ways*. Coin Rivet. Retrieved from <https://coinrivet.com/the-marshall-islands-sov-cryptocurrency>
- Connell, J. (2013). *Islands at risk? Environments, economies and contemporary change*. Cheltenham: Edward Elgar.
- Connell, J. (2014). Alderney: Gambling, bitcoin and the art of unorthodoxy. *Island Studies Journal*, 9(1), 69-78.

- Easterly, W., & Kraay, A. C. (2000). Small states, small problems? Income, growth and volatility in small states. *World Development*, 28(11), 2013–2027.
- Galea, A. (2019, October 27). 154 blockchain companies chosen for Malta; ‘We want quality not quantity’—Silvio Schembri. *The Malta Independent*. Retrieved from <https://www.independent.com.mt/articles/2019-10-27/local-news/154-blockchain-companies-chosen-for-Malta-we-want-quality-not-quantity-Silvio-Schembri-6736215333>
- Geggel, L. (2019, July 16). *The Marshall Islands are 10 times more 'radioactive' than Chernobyl*. Live Science. Retrieved from <https://www.livescience.com/65949-marshall-islands-more-radioactivity-chernobyl.html>
- GlobalEdge. (n.d.). Marshall Islands: Economy. Retrieved from <https://globoledge.msu.edu/countries/marshall-islands/economy>
- Haber, S., & Stornetta, W.S. (1991). How to time-stamp a digital document. *Journal of Cryptology*, 3(2), 99–111.
- Houben, R., & Snyers, A. (2018). Cryptocurrencies and blockchain—Legal context and implications for financial crime, money laundering and tax evasion. Retrieved from <https://www.europarl.europa.eu/supporting-analyses>
- Iansiti, M., & Lakhani, K.R. (2017). The truth about blockchain. *Harvard Business Review*, January–February, 3–11. Retrieved from https://enterpriseproject.com/sites/default/files/the_truth_about_blockchain.pdf
- ITAS Act. (2018). *Innovative technology arrangements and services act, 2018*. Act XXXIII of 2018, Chapter 592 of the Laws of Malta.
- Joshi, M. (2019, July 3). *Iceland begins its blockchain venture by legitimizing cryptocurrency use*. Cryptopolitan. Retrieved from <https://www.cryptopolitan.com/iceland-begins-its-blockchain-venture-by-legitimizing-cryptocurrency-use>
- Koenig, R. (2018, August 3). *Blockchain technologies for small countries*. Crypto Digest News. Retrieved from <https://cryptodigestnews.com/blockchain-technologies-for-small-countries-f5a00fc9108f>
- Kshetri, N. (2017). Can blockchain strengthen the internet of things? *IEEE IT Professional*, 19(4), 68–72. Retrieved from https://libres.uncg.edu/ir/uncg/f/N_Kshetri_Can_2017.pdf
- Malta Tourism Authority. (2019). Tourism in Malta—Facts & figures 2018. Retrieved from <https://www.mta.com.mt/en/file.aspx?f=32328>
- Malta.AI. (2019). *Malta: The ultimate AI launchpad—A strategy and vision for artificial intelligence in Malta 2030*. Malta: Parliamentary Secretariat for Financial Services, Digital Economy and Innovation and Malta.AI.
- MaltaChamber. (2019, March 26). TECH.MT LAUNCHED. Retrieved from <https://www.maltachamber.org.mt/en/tech-mt-launched>
- MDIA Act. (2018). *Malta Digital Innovation Authority Act, 2018*. Act XXXI of 2018, Chapter 591 of the Laws of Malta.
- Moskvitch, K. (2018, June 27). The cryptocurrency boom risks crashing Iceland's economy. *Wired*. Retrieved from <https://www.wired.co.uk/article/cryptocurrency-iceland-economy-bitcoin-data-centres>
- Nakamoto, S. (2008, October 31). Bitcoin: A peer-to-peer electronic cash system. Retrieved from <http://www.bitcoin.org>
- National Statistics Office. (2019, July 10). News release. Retrieved from https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C5/Population_and_Migration_Statistics/Documents/2019/News2019_108.pdf

- OECD. (n.d.). Blockchain primer. Retrieved from <https://www.oecd.org/finance/OECD-Blockchain-Primer.pdf>
- Orcutt, M. (2019, September 5). A tiny Pacific Island nation is about to issue its own cryptocurrency. *MIT Technology Review*. Retrieved from <https://www.technologyreview.com/f/614271/a-tiny-pacific-island-nation-is-about-to-issue-its-own-cryptocurrency>
- Ossinger, J. (2019, September 11). *Tiny Pacific nation is making a go of its own digital currency*. Bloomberg Quint. Retrieved from <https://www.bloomberquint.com/technology/tiny-pacific-nation-is-making-a-go-of-its-own-digital-currency>
- Pacific RISA. (n.d.). Marshall Islands. Retrieved from <https://www.pacificrisa.org/places/republic-of-the-marshall-islands>
- Parker, A.G. (2018, December 19). *Blockchain, bitcoin and the rise of new money*. BCS. Retrieved from <https://www.bcs.org/content-hub/blockchain-bitcoin-and-the-rise-of-new-money>
- Parliamentary Secretariat for Financial Services et al. (2018). Malta: A leader in DLT regulation. Malta: Office of the Prime Minister. Retrieved from https://meae.gov.mt/en/Public_Consultations/OPM/Documents/PS%20FSDEI%20%20DLT%20Regulation%20Document%20OUTPUT.PDF
- Raj, A. (2019, November 10). In Marshall Islands, radiation threatens tradition of handing down stories by song. *LA Times*. Retrieved from <https://www.latimes.com/projects/marshall-islands-radiation-effects-cancer>
- Russell, A., & Wiltermuth, D. (2019). *Cayman Islands blockchain and cryptocurrency regulation 2019* (1st ed.). Retrieved from https://www.careyolsen.com/sites/default/files/CO_CAY_Blockchain-and-Cryptocurrency-Regulation-2019-1st-Edition_1-19.pdf
- Scicluna, E. (2017). *Budget speech 2018*. Malta: Ministry for Finance.
- Société Générale. (2019). Marshall Island: Country risk. October. Retrieved from <https://import-export.societegenerale.fr/en/country/marshall-islands/economy-country-risk>
- Stradbroke, S. (2018, May 16). Macau regulator says no plans to okay cryptocurrency gaming. Retrieved from <https://calvinayre.com/2018/05/16/bitcoin/macau-regulator-cryptocurrency-gaming-not-okay>
- Sultan, K., Ruhi, U., & Lakhani, R. (2018, April 14-16). *Conceptualizing blockchains: Characteristics & applications* [Conference paper]. 11th IADIS International Conference Information Systems, Lisbon, Portugal. Retrieved from <https://arxiv.org/ftp/arxiv/papers/1806/1806.03693.pdf>
- Tan, G. (2018, January 15). *The 10 year recovery, and lessons from Iceland*. Policy Forum. Retrieved from <https://www.policyforum.net/10-year-recovery-lessons-iceland>
- Tapscott, D., & Tapscott, A. (2018). *Blockchain revolution—How the technology behind BITCOIN and other CRYPTOCURRENCIES is changing the world*. London, UK: Penguin Business.
- Tatar, J. (2019, June 25). *Iceland—Time to free bitcoin!* The Balance. Retrieved from <https://www.thebalance.com/iceland-time-to-free-bitcoin-4030896>
- The Malta Independent. (2018, November 13). Malta and blockchain. *The Malta Independent*. Retrieved from <https://www.independent.com.mt/articles/2018-11-13/business-news/Malta-and-Blockchain-6736199256>
- TRMI Sovereign Currency Act. (2018). Declaration and issuance of the Sovereign Currency Act, Pub. L. 2018-53. Retrieved from <https://sov.foundation/law.pdf>
- TRMI White Paper. (2019, September 10). The Marshallese Sovereign (SOV): Fair, sustainable money. Retrieved from <https://docsend.com/view/nvi59vw>

- United Nations (UN). (2019). *Marshall Islands–Country profile*. Retrieved from <http://data.un.org/en/iso/mh.html>
- University of Pennsylvania. (2018, September 12). *How Iceland dealt with a volcanic financial meltdown*. Knowledge@Wharton. Retrieved from <https://knowledge.wharton.upenn.edu/article/icelands-economic-recovery>
- Valfells, S., & Egilsson, J.H. (2016). Minting money with megawatts. *Proceedings of the IEEE*, 104(9), 1674-1678.
- VFA Act. (2018). *Virtual Financial Assets Act, 2018*. Act XXX of 2018, Chapter 590 of the Laws of Malta.
- Viriyasitavat, W., & Hoonsopon, D. (2019). Blockchain characteristics and consensus in modern business processes. *Journal of Industrial Information Integration*, 13, 32-39.
- Welcome Centre Malta. (2018, September 14). *€300K cryptocurrency scholarship launched by the University of Malta*. Retrieved from <https://www.welcome-center-malta.com/e300k-cryptocurrency-scholarship-launched-by-the-university-of-malta>
- World Bank. (2019). *Population, total*. Retrieved from <https://data.worldbank.org/indicator/sp.pop.totl>