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An Empirical Study on the Adoption of Cryptocurrency E-Payment Systems in Italian Business Platforms

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ABSTRACT

In view of a future financial revolution caused by an increasing adoption of cryptocurrencies as a method of payment, the purpose of this thesis is to analyse the business model, the adoption rate and the advantages and disadvantages faced by Italian companies, in particular those located in the Trentino Alto Adige region, entering the international group of cryptocurrency advocates and accepting Bitcoin payments in their businesses. The first chapter introduces the reader to the world of cryptocurrencies including their classification and main attributes with the aim of creating a clear picture on this new payment system and its instruments. The second chapter is a general overview on electronic payments, taking into consideration drivers, typologies and requirements for successful e-payment systems. Pros and cons are evaluated for each type of electronic payment system, with a special regard for e-cash systems and in particular the cryptocurrency subcategory. The third chapter restricts the research field, passing from an international, to a national and, finally, to a regional examination level of the merchants engaged in Bitcoin payments, studying the interesting cluster of merchants accepting Bitcoin payments formed in the north-eastern Italian region of Trentino Alto Adige. The fourth chapter develops ten case studies of Trentino Alto Adige Bitcoin adopting merchants on the bases of interviews submitted to representatives of the companies object of the interviews, describing their service and product offering, their business model and the perceived advantages and disadvantages in joining the Bitcoin payments acceptance. The fifth and last chapter concludes the work with an analysis and general discussion on the findings of the case studies by outlining a general business model, identifying a Bitcoin technology adoption state and presenting the pros and cons perceived by merchants accepting Bitcoin payments, in order to verify the present and future adoption state of this innovative technology.

Keywords: cryptocurrency, bitcoin, e-payment, e-cash system, digital currency.

CHAPTER 1

Cryptocurrencies, Overview of a Monetary System

1.1 The Evolution of Money

Money. Five letters to identify one of the main actors in our daily lives since the formation of the first social tribes coexisting together. Sometimes underestimated, often neglected, the nature and evolution of money deserve an attentive consideration, because money not only reflects the political, economic, cultural and technological state of our society, but most of the times also shapes it in a continuous interaction among causes and effects.

At the beginning there was no money. First recorded in Egypt in 9000 BC barter of grain and cattle represented the only form of exchange for primitive societies bartering primary goods they owned in excess for merchandise they lacked. Limited to the availability of territorial goods, barter was obviously overcome by other more advanced means of exchange due to its indivisibility, perishability and, above all, the difficulties it presented in finding a common measure of value for the goods bartered[1].

All of these three shortages were healed with the discovery of metal: metal was divisible, durable and allowed for an objective assessment of its value. Its beautiful appearance and ease of transportation facilitated its introduction as the new standard of value. The value of metal was also enhanced by the sectorial know-how required for its extraction and melding, added to the religious appeal this commodity had, since gold was thought to be related to the sun and silver to the moon, leading to the superstitious belief that objects made with these metals were magical. Shaped into different forms and with different weights, the first metal coins carried both the mark of the issuer and their respective value. Created in China in 1000 BC and introduced in present-day Turkey in 600 BC, metal coins fastened everyday transactions by eliminating value identification costs, that were common to barter. Initially exchanged with respect to

[1] Daychopan D., *From Barter to Bitcoin*, Techcrunch.com, 2016.

their intrinsic value, meaning each single coin value was equivalent to its production costs, with the appearance of paper money the situation was reversed, leading to the exchange of metal coins for their extrinsic value[2].

The idea of paper money was the result of a copper shortage in China in 800 CE and was brought to Europe by Marco Polo in circa 1300 after his trips to the Far East, even though it became popular in Europe only after 1661 with the first European banknotes printed in Sweden. Paper money was a further improvement of the monetary system at the time, because it could be mass produced and it was not bound to the availability of raw metals[3].

Checks were the natural consequence of the process of money dematerialisation, followed by the first electronic fund transfer realised by Western Union in 1860 and the release of the first credit card in 1946 by John Biggins. The E-Money ecosystem was later enriched with the first ATM in England in 1967, the starting of mobile banking in 1999 in Europe and the issuing of contactless payment cards in UK in 2008[4].

One year later, the launch of the first digital currency with Satoshi Nakamoto's Bitcoin completed the process of money dematerialisation, introducing an innovative and decentralised monetary system that is still evolving day by day with the creation of new digital currencies racing to reach the top value in a system whose value definition is not depending anymore on the availability and manifacturing of raw metals, but on the implementation of the best protocol[5].

Money was born as a response to a human need and, as all our needs, it evolves with and reflects the changes in our society. Nonetheless it is not to be deceived by the gigantic steps forward technology has been taking since the last century, because our language still recalls our ancestors' habits: the word "capital" comes from the Latin word "capita", meaning "head" and referring to the cattle bartering mentioned previously, and the word "salary" originates from the Latin word "sal", meaning "salt"

[2] Chandrayan P., *A Journey from Barter to Bitcoin*, Codeburst.io, 2017.

[3] Holkar S., *Evolution of Money: from Barter to Bitcoin*, Medium.com, 2017.

[4] Burn-Callander R., *The History of Money: From Barter to Bitcoin*, Telegraph.co.uk, 2014.

[5] Nakamoto S., *Bitcoin: A Peer-to-Peer Electronic Cash System*, Bitcoin.org, 2008.

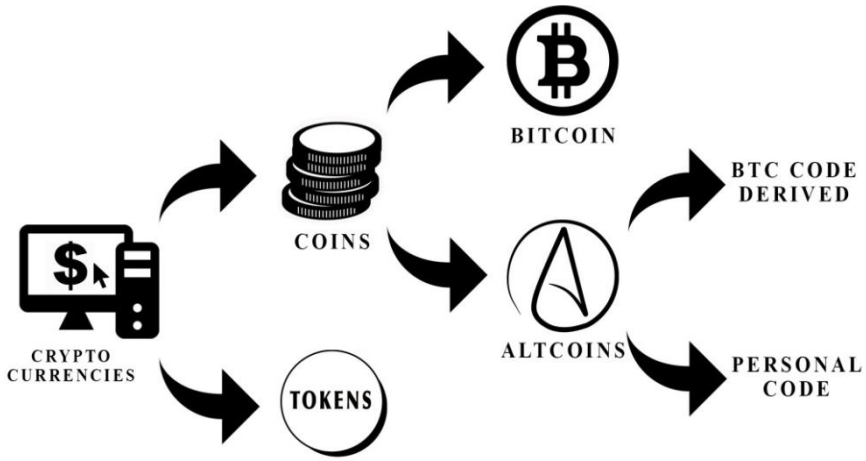
and referring to the ancient Rome custom of rewarding employees with salt, another common commodity money of the past. And if on the one hand economy welcomes new ecosystems, on the other hand Bartercard[6] proposes a retelling of the obsolete barter creating a digital platform for businesses that can exchange services and goods they have a surplus of for others they lack, closing the economic evolution loop.

1.2 Classification of Cryptocurrencies

There are 180[7] current international currencies circulating within and across different countries all over the world, and 1,623[8] cryptocurrencies being traded in this moment[9] worldwide. The second count includes also the three cryptocurrencies, namely MIRQ, Engine and CGC Token, first introduced to the official list this week.

Revolutionary, borderless and disruptive, cryptocurrencies attempt to provide a breakthrough in the firmly already established reality of institutionally recognised currencies, willing to rejoice in the same value identification, but unwilling to be confined to the same limitations.

Figure 1: Classification of Cryptocurrencies



Source: masterthecrypto.com

[6] Bartercard.com.au.

[7] Source https://www.travelex.com/.

[8] Source https://coinmarketcap.com/.

[9] Data last updated on June 11th 2018.

Figure 1 presents an overview of the classification of the "family" of cryptocurrencies. They are distinguished into two macro groups: coins and tokens, being respectively n. 832 and n. 791 at the time of writing[9], where coins are created theoretically as a means of payment, while tokens act as virtual representations of assets. The former ones are employed as value storage units, exactly like common currencies, while the latter ones are the equivalent of shares, used to identify valuable projects among potential future investors. Coins are generally divided into Bitcoins and the numerous alternatives to Bitcoins, called altcoins[10]. On the one hand a subgroup of the altcoins are the result of the modification of the original Bitcoin open source code, while on the other hand another subgroup of the altcoins collects digital currencies relying on their personal code.

The following sections provide examples for each of the cryptocurrency categories mentioned above, in order to get acquainted with the most well-known virtual currencies at the present.

1.2.1 Tokens

As already stated cryptocurrencies can be grouped into tokens and coins.

Tokens, also defined cryptoassets, represent tradable goods and, differently from coins, that exist indipendently of any platform, they exist and operate depending on a preexistent defined platform.

The term "cryptoasset" finds its origin in the field of startups and relative investment funds. Cryptocurrency startup entities usually collect their investment funds through the process of Initial Coin Offering (ICO)[11]. The project development team publishes online the whitepaper presenting the key features, the mission and the duration of the campaign, together with the funds needed to implement the project and the amount of cryptotokens at stake. These cryptotokens virtually represent the shares of the startup and, just like in an Initial Public Offering (IPO), shares are sold to the investors trusting

[10] "Alt" standing for "Alternative" and "Coins" for "Currencies".

[11] To be more precise, the first ICOs campaigns raised funds for the launch of new cryptocurrencies, but nowadays different final aims motivate ICOs, from the proposal of a new web browser to the idea of a decentralised hiring network.

in the future success of the project, who pay for them in traditional or digital currencies[12]. If the minimum threshold is not reached by the operation of funds collection, the project is not launched and the funds are returned to investors. In case the raised funds comply with the economic requirements, the investors will lose or gain money with respect to the project reception by the public: a successful project implicates an enhanced value for the token, while an unsuccessful project corresponds to a loss of value for the token[13].

Similar to IPOs since they both deal with shares' selling to potential investors, ICOs differ from crowdfunding transactions because in the former investors gain profits from their investment in case of successful projects, while in the latter investments are to be considered as simple donations[14].

Table 1: Top 5 Tokens

Rank	Name	Platform	Market Cap. ($)	Price ($)	Volume 24h ($)	Circulating Supply
1	EOS	Ethereum	11,160,400,000	11.16	1,912,890,000	1,000,000,000
2	TRON	Ethereum	3,073,671,621	0.046749	287,591,000	65,748,111,645
3	Tether	Omni	2,513,608,768	1.00	3,216,170,000	2,507,140,346
4	VeChain	Ethereum	1,764,849,572	3.23	104,944,000	547,165,525
5	Binance Coin	Ethereum	1,690,627,913	14.82	79,611,100	114,041,290

Name	ICO
EOS	2017
TRON	2017
Tether	2017
VeChain	2017
Binance Coin	2017

Source: coinmarketcap.com[15]

[12] The following link redirects to one of the major token marketplaces: https://tokenmarket.net/.

[13] Madeira A., *How does an ICO work*, Cryptocompare.com, 2018.

[14] Due to this reason ICOs are also called "crowdsales".

[15] Data last updated on June 11th 2018.

The table above displays the ranking of the top five tokens at the time of writing along with some numeric data like their market capitalisation[16], price, trading volume[17], the ICO campaign date and circulating supply. Almost all of the listed digital assets rely on the Ethereum platform, that excels in the token marketplace with the highest market capitalisation shares. Other platforms make their appearance throughout the tokens' family like Omni Layer, built on top of the Bitcoin blockchain, NEO, the blockchain project working on the "smart economy" concept, Nxt, Omni and more. Each token stands for the platform philosophy it represents: the EOS token market capitalisation value identifies the monetary value recognised by the EOS token investors to the innovation strength introduced by the EOS platform with the development of the EOS software enabling scalable decentralised applications and so on also for the rest of the tokens.

1.2.2 Coins

After tokens, coins constitute the second subgroup of the cryptocurrencies' family. As depicted in the below table, the first place, as far as the ranking of coins is concerned, is occupied by Bitcoin, the most famous cryptocurrency in the market at the present; all the other coins, even though they possess an ecosystem of their own, are usually grouped into the altcoins family. Altcoins can be the result of a brand new code or they can be the outcome of a transformation of the original Bitcoin code.

[16] Market Capitalisation = Price * Circulating Supply

[17] The "Volume 24h" indicator identifies the total amount of buy and sell orders, or in other words, of the outstanding tokens traded in the last 24h time.

Table 2: Top 5 Coins

Rank	Name	Market Cap. ($)	Price ($)	Volume 24h ($)	Circulating Supply
1	Bitcoin	116,234,117,227	6,802.13	4,780,530,000	17,087,900
2	Ethereum	52,239,022,273	522.31	2,025,560,000	100,015,359
3	Ripple	23,110,308,539	0.588883	353,579,000	39,244,312,603
4	Bitcoin Cash	16,092,671,265	936.80	639,533,000	17,178,288
5	Litecoin	6,022,580,911	105.77	340,303,000	56,938,198

Source: coinmarketcap.com[18]

The Bitcoin network structure is built on a system of codes setting the rules and guidelines for the correct functioning of the network and of the main mean of exchange inside the network: the Bitcoin currency. The system of codes constituting the Bitcoin software is free and open-source, implying that anyone can view, study, modify and use it for personal purposes.

The Bitcoin network is a decentralised network functioning according to the rules of the blockchain technology. Since there is no central authority to control and confirm the regularity of the transactions taking place inside the network, this task has to be performed directly by the users of the network, who continuously control and confirm each transaction taking place in the network adding it as a new "piece of block" to the original blockchain. The transactions are validated on the basis of universally accepted and agreed upon rules, so that the final blockchain is a single chain of uniformly validated transactions by all the participants of the network, where every constituent block is a universally recognised piece of information, while any other block not present in the blockchain is of questionable identity.

When the original single blockchain splits into two, it takes place what computer science specialists call a "fork". A fork can be due to a concurrence in the consensus to the validation of a new block or to the modification of the software code[19].

[18] Data last updated on June 11th 2018.

[19] Aziz, *Guide to Forks: Everything You Need to Know about Forks, Hard Forks and Soft Forks*, Masterthecrypto.com, 2017.

The first fork case needs some background information to be fully understood. As previously stated the Bitcoin network functions with respect to transactions relative to the Bitcoin currency. The Bitcoins can be sold and bought to be owned, but there is another way to own them, which corresponds with the way of generating them, since trading Bitcoins is quite normal and comprehensible, but they have to be generated and introduced to the market in some way. The "way" that added the first Bitcoin and all the other circulating Bitcoins in the cryptocurrency market is mining[20]: powerful computing nodes solve complex algorithms in order to get rewards coinciding with new Bitcoin units added to the publicly distributed blockchain. The algorithms solved by miners are the validation blocks to be added to the blockchain. To summarise briefly: miners perform the process of mining in order to validate new blocks to be added to the public blockchain and their reward for this computing task are new issued Bitcoins. The validated blocks take into account all the existing Bitcoins: both the newly issued ones and the ones being traded, so that no Bitcoin risks to be spent more than once.

Going back to the concept of fork due to concurrence divergence, it happens when two miners solve at the same time the same algorithm and consequently attempt to add the same block to the blockchain, incurring in two split chains. Usually this type of fork is only temporary, because the chain adding first the next block becomes the longer one and, as such, the one carrying for first a new validation, thus the most updated and reliable one. The shorter chain gets automatically abandoned, losing visibility and credibility to all the network users.

The second fork case, namely modification of the software code or change in the underlying rules of the protocol, implies a permanent change and includes soft and hard fork types.

A soft fork type occurs when an upgrading of the software takes place due to a modification of the network rules or to the introduction of new enhanced features to the software. Soft forks are not to be considered irreversible from the point of view of network participants, since, even if the software users do not upgrade to the later version of the software, they can still take part in the mining process and be active nodes in the

[20] Initially the process of mining was implemented by the CPUs (Central Processing Units) of traditional desktop computers, nowadays GPUs (Graphic Processing Units) and mining specific hardware have proven to be more efficient in concluding the same processes.

blockchain validation operations. Soft forks do not force users to obtain the newest version of the software, but they are incentivised to do so in order to have access to improved software functionalities.

Also a hard fork type occurs when an upgraded version of the software is released, but in this case network participants not complying with the updated version get excluded from the blockchain mechanism and are not allowed anymore to validate new blocks, being left out from the flow of transactions inside the network. The software update is not compatible with the older versions and the consequence is unidirectional, in that the only solution implying the renewed membership to the community is the shift to the new software. While the soft fork does not lead to a split of the blockchain, given that the older software version is still recognised by the system and the confirmed blocks continue to get added to the same blockchain, the hard fork may lead to a split of the blockchain, because participants that do not upgrade to the new software version and keep using the incompatible older one, create a different chain with the insertion of new blocks. In this way there subsists the risk of a co-existence of both the majority supported and of the minority supported chains.

Hard forks can be planned, contentious or altcoin generators.

Planned hard forks are announced in advance to the community by the team of developers. The community is acquainted with the due change and users are incentivised to implement the software upgrade, to be able to take advantage of the new features and functionalities for a better performance in the network. An example is the double phase planned hard fork of the Ethereum software called "Metropolis" including a first upgrading phase, namely "Byzantium", that was concluded in October 2017 and a second upgrading phase, namely "Constantinople", that will be implemented in 2018[21].

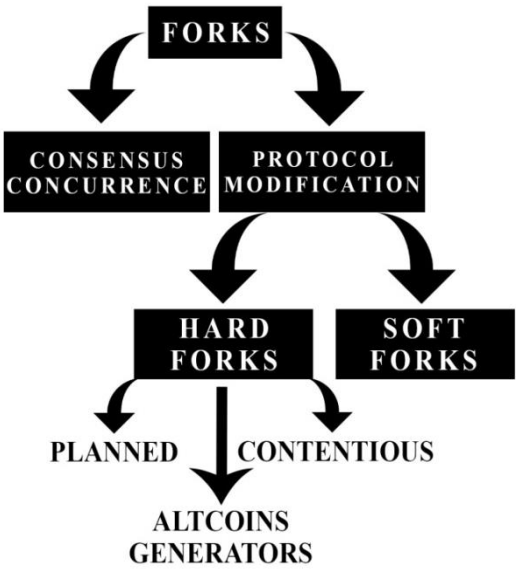
Contentious hard forks occur when a part of the network participants claims a radical change to the software code and the other part does not agree upon this decision. When the code change is implemented to enhance the software features, the disagreement between the two parties is irreconcilable and the blockchain is split into two chains, each of them having its own stream of supporters. Keeping up with the Ethereum

[21] Lagni A., *Ecco cos'è l'hard-fork "Metropolis" di Ethereum*, Criptovalute24.com, 2017.

examples, the Ethereum Classic coin is the direct result of the hard fork the community decided to undertake to suppress the hacker attacks taking place at the time: the part of the network not accepting the hard fork choice and willing to stick to the original blockchain because of ideological beliefs, carried on with the validation of the blocks to the original blockchain causing a second chain with its own supporters to be generated. The original Ethereum blockchain is named Ethereum Classic[22], while the updated one is named simply Ethereum. Another contentious hard fork episode is the one whose outcome was Bitcoin Cash. A group operating in the Bitcoin network decided to change the block size improving scalability, while the rest of the network continued operating in the original network: the original currency remains the Bitcoin, while the newly coded coin is called Bitcoin Cash[23].

As already mentioned, the Bitcoin software is public, free and open-source, giving the possibility to interested individuals to view and modify its codebase for purposes other than improving the software features: this is how the third hard fork type takes place. When the core protocol rules are radically modified, a new coin is generated.

Figure 2: Classification of Forks



Source: masterthecrypto.com

[22] Luongo L., *Ethereum Classic e la Paura di una Nuova Frode*, Trend-Online.com, 2018.

[23] Borgarello A., *Bitcoin o Bitcoin Cash: Meglio le Criptovalute Originali o i Fork?*, Criptovalute.club, 2018.

Before proceeding with the distinction and description of the Bitcoin and personal codebase derived altcoins, a summary of the different forks types is displayed in the above figure 2. Forks of the publicly recognised blockchain can be due to a concurrence in the consensus of a block, provoking just a temporary fork, because with the addition of new blocks the longer one will be officially accepted as the true one. Forks can also be due to changes in the core protocol rules to permit better software funcionality and improve network performance. Forks changing the core protocol rules are distinguished into soft and hard forks: soft forks are software updates still compatible with the software older versions, while hard forks are software updates not anymore compatible with the older versions of the software. Hard forks are in some cases planned by the community and universally accepted, leading to the overall community shift to the new software version, or in other cases generated by a network disagreement with respect to the decision of protocol modification for performance improvement, or even caused by the radical modification of the codebase in order to develop new coin projects with some similar characteristics to the original coin, but mostly with innovative traits making it distinguishable from the original one.

1.2.2.1 Personal Code Altcoins

Since the creation of Bitcoin in 2009, many scholars and cryptoenthusiasts have studied and examined the technology underneath Bitcoin, drawing inspiration from it and making changes to the existing codebase for launching other technologies sharing the same innovative spirit, but serving different fields.

After the market pioneer Bitcoin, Ethereum is the second cryptocurrency with the largest market capitalisation share. The Ethereum project had its development started in 2013 by the young Vitalik Buterin and his team, and almost a year after, the Initial Coin Offering campaign of Ether, the Ethereum token, was launched for the fundraising and sustenance of the Ethereum project and pillars. The crowdsale lasted 42 days, involved

9,000 participants and raised, at the time, the equivalent of 31,591 BTC[24], being recorded as one of the most successful fundraising campaigns in history[25].

Rather than being claimed as the currency of the future, just like Bitcoin does, Ethereum presents itself as a decentralised platform running smart contracts. "Smart Contract" is an expression identifying a technology implementing the exchange among parties of valuable content avoiding the risk of system inefficiencies and third party interferences[26]. A smart contract is an application created when two parties, who are anonymous in the cryptocurrency networks, write a formal agreement, that is converted into a code and added to the public blockchain, executing itself on the basis of the information reported in the code. The Ethereum Virtual Machine (EVM)[27] is the software running in the Ethereum network and innovating the smart contract creation process by making it possible to run different applications written in different programming languages in the same blockchain, without requiring different platforms for each one of them. This mechanism facilitates the sharing of data, while continuing to mantain the network decentralised and the parties anonymous. A traditional network is composed of several servers running each one its own application written in a definite programming language; if one of this communicating nodes ceases its functioning, all the other nodes are affected. In the Ethereum network all the applications are registered in the official public blockchain and all the nodes are able to replicate the registered applications codes, forming a highly efficient network where downtimes and other flaws are utopian. An empirical and intuitive example describing the functioning of the smart contracts mechanism is the IBM and Samsung ADEPT[28] concept of extending the blockchain smart contracts mechanism to the Internet of Things[29]: in this prospect a washing machine fulfilling its own needs by its own without the intervention of a third

[24] From now on the acronym "BTC" will indicate the Bitcoin network coins with respect to their value, while the name "Bitcoin" will make reference to the Bitcoin network, software, codebase, ext.

[25] Avon E., *A Timeline of the Most Successful ICOs*, Coincodex.com, 2017.

[26] Engheim E., *What is a Smart Contract and Why Do We Need Them?*, Medium.com, 2018.

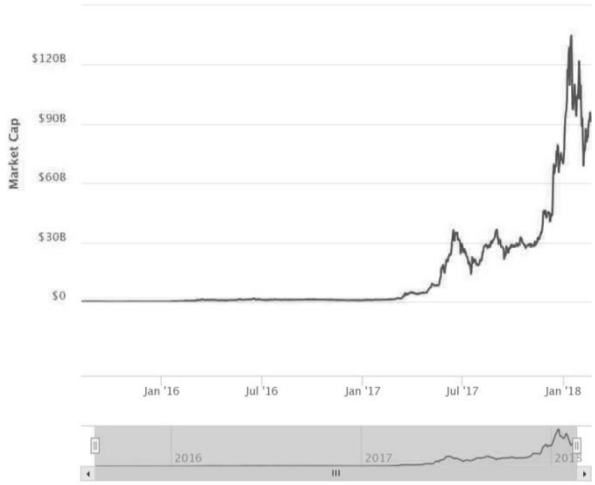
[27] Source https://www.ethereum.org/.

[28] ADEPT is the acronym for Autonomous Decentralised Peer-to-Peer Telemetry.

[29] Higgins S., *IBM Reveals Proof of Concept for Blockchain-Powered Internet of Things*, Coindesk.com, 2015.

party, like calling the repairman in case of malfunction or ordering the detergent when supplies run out, appears as a possibility and not science fiction imaginary, clarifying the futuristic impact of self-executing applications in the everyday life.

Figure 3: ETH Market Capitalisation Chart from August 2015 to February 2018

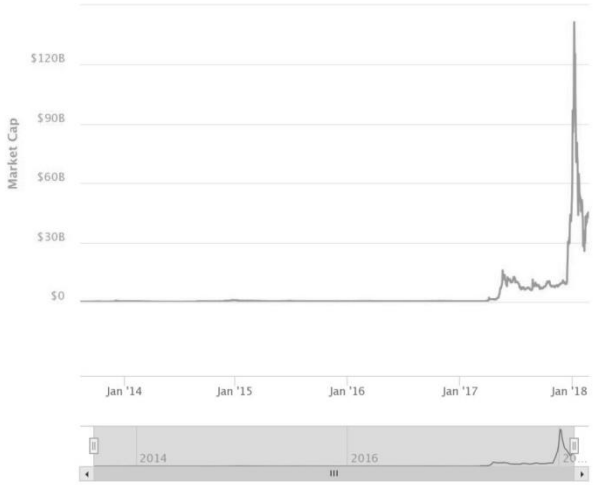


Source: coinmarketcap.com

Ripple[30] is the third listed cryptocurrency with the largest market capitalisation share. Its development started in 2011 with the cooperation among Arthur Britto, David Schwartz and Ryan Fugger. Released in 2012, the Ripple network is a real-time gross settlement system (RTGS) processing payment transactions in real-time and with low operational costs. Supporting any store of value and being backed by banks, payment providers, corporates and digital asset exchanges, Ripple proposes itself as the ideal means of sending money globally without restrictions in time and burdening by fees. A prospect of improved global reach, new customer segments, affordable liquidity requirements and ease in payment transactions, draws constantly new users to the Ripple network, already boasting important names in its list of partners like American Express, Deloitte and the National Bank of Abu Dhabi (NBAD).

[30] Source https://ripple.com/.

Figure 4: XRP Market Capitalisation Chart from August 2013 to February 2018



Source: coinmarketcap.com

Many other names stud the list of cryptocurrencies having their network built upon a native blockchain whose roots go back to the original Bitcoin software project. From Ada, the cryptocurrency featuring the Cardano network, to NEO and Lumen, the cryptocurrencies fuelling the Stellar system, the list seems to be never-ending and it is daily updated with the introduction of new coins and the repositioning of others in the chart with respect to the change in the market capitalisation value indicators. Most of the times not to be considered as Bitcoin's direct competitors, because of the different concepts and aims stated in their whitepapers, this subgroup of altcoins can be taken into consideration by Bitcoin developers, serving as a source of inspiration for enhancing the features of the Bitcoin software.

1.2.2.2 BTC Code Derived Altcoins

Summing up, altcoins are divided into altcoins with a brand new native personal code and altcoins with a code similar to the original Bitcoin code. In spite of everything, both these subgroups share the same main characteristic: reviewing the Bitcoin codebase or writing a new one to modify and improve some unmet aspects for creating new cryptocurrencies with new functionalities to satisfy the requests of new markets and new target customers. The previous section explored the first type of altcoins, the present section introduces and describes the second type of altcoins.

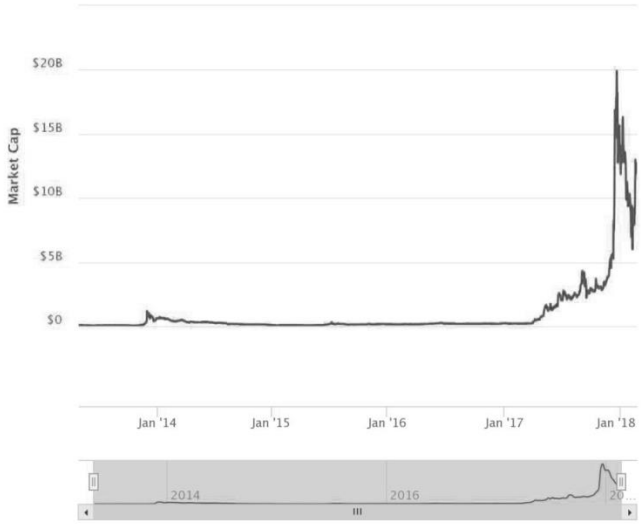
Litecoin[31] is stable in the top five list of coins ordered by market capitalisation ranking. Released in 2011 by the former Google employee Charlie Lee as the "silver alternative to Bitcoin's gold", Litecoin's market capitalisation reached 1 billion euros only two years after its release and nowadays its market capitalisation value is amounting to 10 billion euros[32]. When Litecoin entered the cryptocurrencies market in 2011, the computers mining BTCs were expensive and task-specific. Litecoin was presented as the "silver alternative to Bitcoin's gold" because it was mineable also by more affordable and less specialised computers. Apart from the major innovation brought by the accessibility of its algorithm computability, the development team of Litecoin revolutionised the Bitcoin codebase by modifying other three core aspects of the Bitcoin technology identity. First of all the total amount of coins supply is different: Bitcoin developers have established a maximum amount of 21 million units, while Litecoin developers have established a maximum of 84 millon units; both these cryptocurrencies follow a deflationary trend, since their limited supply is predicted to increase demand and coin value in the years to come. Second, the transaction speeds are different: the Litecoin technology adds one new 1 MB block to the blockchain every 2.5 minutes, as for Bitcoin, the time required to add a 1MB block to the blockchain rises to 10 minutes. The higher transaction speed causes the completion of a major number of transactions, as a direct consequence. Finally, differently from Bitcoin, Litecoin relies on a smaller community, making it more responsive to change.

The possibility of causing forks to the Bitcoin codebase has inspired many other developers, who have introduced in the booming marketplace of cryptocoins Litecoin and other different alternatives like Namecoin (NMC), Peercoin (PPC), Auroracoin (AUR), Dogecoin (DOGE), ext.. Many of them have never constituted an element of interest for worldwide investors, others, after the initial burst, have dropped along with their ranking position, while the early players are still competing in the market both against their historical competitors and the new arrivals.

[31] Source https://litecoin.com/it/.

[32] Source https://coinmarketcap.com/.

Figure 5: LTC Market Capitalisation Chart from April 2013 to February 2018



Source: coinmarketcap.com

1.2.2.3 Bitcoin

Posted in a group discussion on cryptography in 2008, the whitepaper entitled "Bitcoin: A Peer-to-Peer Electronic Cash System" was published by a person or a group of people, this aspect is still to be defined, under the pseudonym of Satoshi Nakamoto[33]. In 2009, the concept expressed in Nakamoto's whitepaper is translated in the Bitcoin software, that is created and usable by the public. Nakamoto mines the first 50 BTCs and also those who want to discover and take part in the newly available electronic cash system can install the software and run it on specialised computers to start participating in the process of mining and updating the public blockchain with a verified and trustworthy series of transactions. In the same year, the first Bitcoin exchange, namely New Liberty Standard, publishes the first BTC-US Dollar exchange rate: one US Dollar is sufficient to purchase 1,309.03 BTCs, just to imagine the massive increase in the BTC price throughout the last nine years, at the present one US Dollar can afford the purchase of only 0.000147 units of BTC. A few days later the first sale of BTCs in exchange for US Dollars takes place, but several months will be awaited for the first

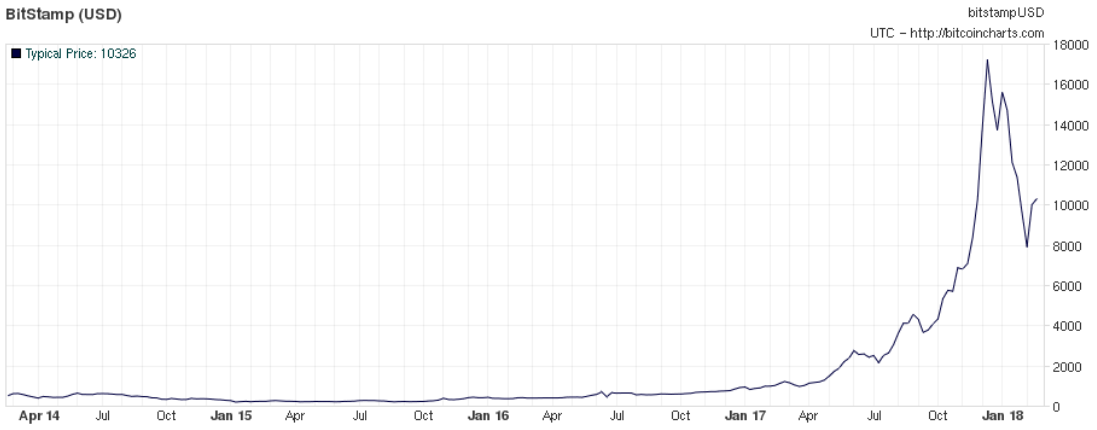
[33] Nakamoto S., Bitcoin*: A Peer-to-Peer Electronic Cash System*, Bitcoin.org, 2008.

purchase in BTC to happen in 2010: two pizzas purchased at the cost of 10,000 BTCs would be now worth almost seventy million US Dollars[34].

From the establishment of the Mt. Gox exchange in 2010, to the foundation of the BTC wallet and exchange provider Coinbase in 2012, passing through the first BTC ATM installed in San Diego in 2013 and the integration of BTC in the Paypal digital money payment and transfer system in 2014[35], Bitcoin has built an active and complete business ecosystem with stakeholders cooperating for the success of the vision endorsed by the Bitcoin community and the mission carried out to revolutionise the traditional monetary system and its relationships with the institutions involved in the centralised ecosystem it is built upon.

Since its start to the present days, the short history of Bitcoin has dealt not only with important achievements, but also with unexptected downfalls, that have caused various shifts in its currency price, which in spite of everything has managed to preserve a rising trend, going from an initial value of less than a penny, to the actual value of almost ten thousand US Dollars.

Figure 6: BTC Price Chart from February 2014 to February 2018



Source: bitcoincharts.com

[34] Prince R., Someone in 2010 Bought 2 Pizzas with 10,000 Bitcoins – Which Today Would Be worth 100 million USD, Businessinsider.com, 2017.

[35] Source http://historyofbitcoin.org/.

The first crack in the Bitcoin community had as its main protagonist the clamour generated by the Silk Road marketplace scandal[36], that was engaged in the illicit traffic of illegal items like drugs, weapons, counterfeit currency, steroids, unlicensed medical supplies and pharmaceuticals, document forgery, stolen credit card details, ATM machines hacking tutorials and even contract killing.

Launched in February 2011, Silk Road was an online black market relying on the Tor software providing anonimous communication and allowing users to visit and interact with the websites being part of its network, without having them and their actions monitored. The working principles of Silk Road were quite intuitive: a buyer exchanges traditional currency in BTC and transfers the exchanged BTCs to his/her Silk Road personal account. The buyer then purchases the illegal items in BTCs, part of which are held by the website as a commission and the rest is transferred to the seller's Silk Road account. The last step of this procedure involves the seller withdrawing the BTCs from his/her account and exchanging them in traditional currency. Silk Road was closed by the FBI in October 2013 and its founder, the young Ross William Ulbricht[37], who was known under the pseudonym of "Dread Pirate Roberts", was arrested. There are some features whose outcome can be of dualist nature and one of these features is "anonimity". Positive and convenient, on the one hand, because it enforces the concept of privacy in a fully and annoyingly traceable world, on the other hand, anonimity is capable of creating a parallel world where it is used to hide dangerous and illicit realities, as in the case of the Silk Road's darknet market.

The second crack in the Bitcoin community was represented by the failure and closure of the most famous and worldwide recognised BTC exchange platform at the time: Mt. Gox[38]. Launched in 2010 with its headquarters based in Tokyo, by 2014 Mt. Gox was leading the BTC exchange market, pioneering the operations for the 70% of BTCs in circulation. From February 2014 to April 2014 the company applicates for its bankruptcy and starts its liquidation procedure. The cause of the breakdown is to be

[36] Norry A., The History of Silk Road: A Tale of Drugs, Extortion & Bitcoin, Blockonomi.com, 2017.

[37] Ross William Ulbricht has been convicted with a life sentence due to his collaboration in illegal items traffic and money laundering.

[38] Norry A., The History of Silk Road: A Tale of Drugs, Extortion & Bitcoin, Blockonomi.com, 2017.

attributed to the disappearance of 850,000 BTCs, corresponding to 450 million US Dollars at the time. First the interruption of BTC withdrawal operations and then the suspension of the BTC trading together with the official platform shutdown, made Mt. Gox succeed in the bitter task of compelling Bitcoin enthusiasts to realise that their vision is coherent and consistent as for the theory, but its implementation presents several flaws when it comes into conflict with the rules and customs of the real world. In the case of Mt. Gox, disorganisation, a considerable security gap and fraud, both internal and exteral to the organisation, play the role of the real world obstacle factors influencing negatively and ruining the harmony of an ideally balanced economic model.

Any type of system when first introduced and bearer of radical innovations incurs in problems and flaws; if not destroyed by the negative impact of its beginning failures, the system will be modified to solve inefficacy and inefficiency problems in order to adapt itself to users' needs, without underestimating and annulling the characteristics distinguishing it from the other services and products. Bitcoin has succeeded in the aim of building the general awareness of an alternative payment system, even though the mass adoption phase is still far from happening. There are different aspects pointing out how Bitcoin has inspired and influenced a new generation: from the creation of the altcoins, to the endorsement of Bitcoin by international companies, banks and institutions, so that the innovation brought by Bitcoin is not destined to perish in the oblivion, but to flourish within a continuously broadening ecosystem.

A perfect example of authorities endorsing Bitcoin is Wikileaks[39], the international whisper-blower non-profit organisation initiated in 2006, publishing state secrets and fighting for press freedom since its foundation, that was the first institution to adopt Bitcoin by accepting donations in BTC since 2010, the year in which the US government forced an illegal banking blockade to all of the major payment technology companies like Mastercard, Visa, Paypal, ext. for all donation transactions addressed to Wikileaks, to attempt stopping the Wikileaks and its determined founder Julian Assange from forging ahead with their unmasking mission. As claimed by Mr. Assange, the BTC price has undergone an important rise in the last eight years, causing the US government decision to obtain the opposite effects it intended to reach.

[39] Source https://wikileaks.org/.

1.3 Cryptocurrencies: Adoption Advantages

This section analyses the reasons why cryptocurrencies have convinced adopters to invest in them, avoiding to be a temporary trend, but quite the opposite, representing an actual thread for the traditional monetary system and those who are involved in it.

As the name itself forewarns of it, *cryptography* is one of the main explanations to the fame and positive reception of cryptocurrencies. A solid and reliable system of encryption and decryption of private and public keys makes these online open source decentralised peer-to-peer networks totally secure[40], verifying who sent a definite transaction and who received it, keeping in the meantime the identities private, but updating the public ledger with the new transactions to avoid double-spending fatal errors.

Cryptography is to cryptocurrency transactions what a signature is to an official document. Authenticable, non-forgeable and non-rejectable are the three adjectives every ideal signature should have. A signature has to be authenticable, because it should be able to demonstrate who is the signatory. Moreover a signature should be non-forgeable, so that no one can copy it causing authentication falsification. Lastly a signature must not be rejectable, meaning that once something is signed by an individual, this individual cannot doubt the authenticity of the signature by pretending that the signature has not been done by him/her, since the authentication feature denies it. Cryptocurrency transactions are signed by means of digital signatures, that are private and public keys used to encrypt and decrypt the algorithms identifying transactions. Cryptography can follow a simmetric or an asymmetric digital signature scheme, depending on the type of keys used for the encryption and decryption of the message: symmetric cryptography uses the same key for the sender to encypt and for the recipient to decrypt, while asymmetric cryptography uses public and private keys to encrypt the message of the sender and to decrypt the message for the recipient[41].

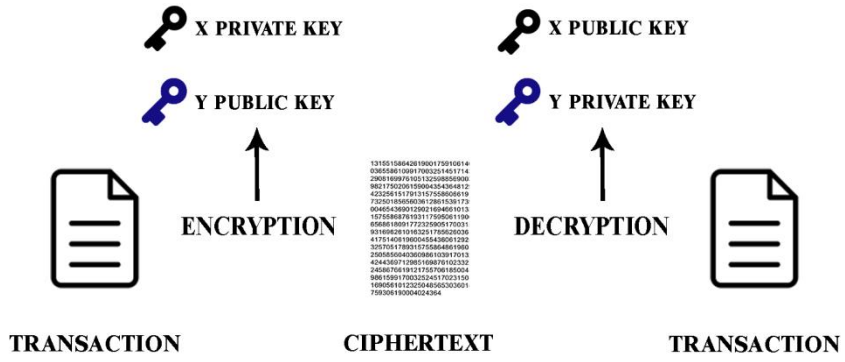
[40] Obviously and statistically any human created and managed system incurs in flaws and problems at some time, even cryptocurrencies, as reported in section 1.2.2.3 with the Mt. Gox case.

[41] *How Does Cryptocurrency Work?* , Cryptocurrencyfacts.com, 2017.

Cryptocurrencies are based on an asymmetric cryptography system. An explanatory example will help understanding how cryptocurrency transactions take place in real world. A first individual, named X, has to give a second individual, named Y, a definite amount of a certain cryptocurrency. It does not matter if the transaction from individual X to individual Y is a gift, a purchase or the reimbursement of an outstanding debt, the only aspect that matters for the example is that the transaction occurs and has to be registered in the blockchain. X has a personal digital wallet where his/her cryptocurrency is stored. To transfer cryptocurrency from his/her wallet to the wallet of Y, individual X must be in possess of his/her private key and of the public key of Y. The public key of Y is a series of alternating numbers and letters identifying the payment address of the cryptocurrency to be received and stored in his/her digital wallet. X can obtain the public key of Y by having it e-mailed or by scanning the QR code corresponding to it from Y's mobile application. Once obtained Y's public key, X can confirm the cryptocurrency transaction by signing the transaction confirmation with his/her private key. The nodes in the network whose task is to analyse and verify valid transactions[42], confirm the transaction once proved that X disposes of the necessary amount of cryptocurrency and add the new block containing the transaction occured to the public ledger, notifying it to all the nodes of the network, including X and Y. Finally, the transaction firstly encrypted by X with his/her private key and transformed into a ciphertext, can, at the final stage of the operation, be decrypted by Y with his/her private key and the public key of X. Y, in this way, verifies whether the cryptocurrency has been received and by whom it has been sent, completing thus the transaction. Figure 7 illustrates the asymmetric cryptography system explained above.

[42] In the Bitcoin network these nodes are called miners.

Figure 7: Asymmetric Cryptography System



Decentralisation[43] is the second term distinguishing cryptocurrencies from other economic systems. While the traditional monetary system is centralised, cryptocurrencies have always claimed to be based on a decentralised system, focused on a peer-to-peer network of transactions, that are verified and displayed to the overall network, so that every participant can be updated and aware of the stream of transactions taking place within the network. At the present a centralised banking infrastructure guarantees security, efficiency and earnings generated by interest rates, by, respectively, storing money in secure wallets, making money available at any time and in any place thanks to a developed and organised network, and providing passive income by applying interest rates to stored money. The dynamics of the present centralised monetary system are not new to the cryptocurrency ecosystem, that relies on cryptography to secure money storage, provides passive earnings on the basis of the price changes of cryptocurrencies and broadens the network of participants to improve the usability and efficiency of cryptocurrency transactions. Time, openmindedness and network commitment will make it possible to stop considering impeccable exclusively a system where all information has to be verified by a central institution, strengthening the impact of a decentralised system, that, supported by the objectivity and infallibility of a digital infrastructure, connects an autonomous peer-to-peer network sharing and verifying information without the interference of a central administrative party.

[43] Young J., *Cryptocurrencies VS Banks: Advantage of Decentralised Financial Systems*, Cointelegraph.com, 2018.

The direct implications of the decentralised mechanisms on which cryptocurrencies are based on, lead to other two important concepts: transparency and fast transaction settlement.

Transparency[44] is given by the availability of the public ledger, also called blockchain, recording all transactions occured, that are constantly monitored by and get added to the public ledger exclusively upon confirmation of all the nodes in the network.

Fast Transaction Settlement is the consequence of the elimination of third parties in cryptocurrency networks. Decentralisation and smart contract mechanisms[45] leap over intermediate actors, reducing the timing of transactions and enhancing network performance.

"Smart Contracts", mentioned previously and whose definition is reported in note 44, deal with another cryptocurrency feature representing a focal point in the choice of cryptocurrency adopters, being anonimity. Convenient when hiding identity traceability in everyday operations, anonimity can be a double-edged sword for the community when used to effectuate unlawful transactions in darknet markets. Even though the identity of every single participant in cryptocurrency networks is not disclosed to the other network actors, the term "anonimity" is not the exact qualification of this mechanism. The most coherent term to be used for describing this mechanism is "*pseudonimity*"[46], meaning that the network actors' personal details like name, surname, address, ext. are not revealed, but all transactions are traced and publicly disclosed to comply with network transparency, creating a perfect balance between respect for the privacy of single individuals and towards the network necessity to be continually updated and accessible to anyone.

There are other pros to cryptocurrency frameworks like *unattainable inflation*, due to the fact that many cryptocurrency units are limited in number and their value is unlikely

[44] Demirors M., Transparency and Ethics in Cryptocurrency Investing, Medium.com, 2018.

[45] Smart Contracts are contracts agreed upon between two parties, whose identities remain anonymous to network participants, written under the form of a code and registered in the public ledger. Smart contracts are self-excecuted on the basis of terms and conditions presented in the contract agreement and for this reason they do not require the intervention of a third party for their implementation.

[46] Murphal, Bitcoin is not Really Anonymous, but Pseudonymous, Totalbitcoin.org, 2016.

to fall with respect to the amount of their available units, *portability*, because it is feasible to store BTCs or other cryptocurrencies equalling the value of millions of USDs in a flash drive or a hard disk, *accessibility* and *ubiquity*, considering that anyone can have access to these systems anywhere in the world and at any time.

Cryptocurrencies do not present only positive aspects. Just as in any discussion field, pros are accompanied by cons, that, in the case of cryptocurrencies, are almost all related to their innovation. Initial distrust, small network and a slow adoption process, all identify with an initial difficulty in market establishment, where common actors have to be acquainted with the new technology mode of operation, before deciding to adopt it. The final negative aspect of cryptocurrency introduction to the real world is that, regardless of its innovation, this system still faces some problems common also to traditional currency, like the possibility of cryptocurrency units being lost or stolen.

Characterised as any other monetary system by pros and cons, the cryptocurrency monetary system is the latest electronic payment trend that is being chosen over other payment methods by a small part of the population for now, but that meets the requirements for settling in the future as the main payment instrument.

CHAPTER 2

The Era of E-Payments

2.1 E-Payments Insight

After the presentation of the cryptocurrency topic and before proceeding with the analysis of the effects of the introduction of cryptocurrencies in the e-payment acceptance systems of the first companies entering this new field of financial operations, this section of the thesis focuses on the present forms of electronic payment systems and their advantages and disadvantages, preparing the ground for the observations of the next chapters dealing with the improvement in the e-payment systems of companies joining the group of cryptocurrency advocates.

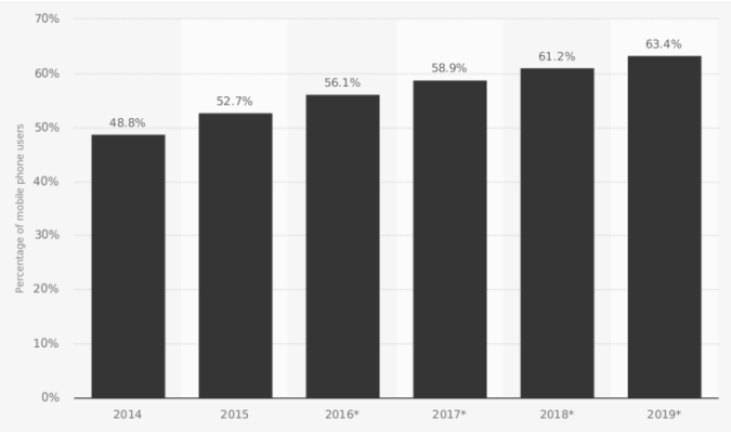
Simply defined as payments for services and products purchased through the use of electronic devices, e-payments represent one of the main innovations in the fintech sector, always widening its area of operations by introducing new means of payment and by enabling new devices for processing e-payments.

The *governmental support* and funding, *fitting economic systems*, an *IT educated society* and the progress in *technological infrastructures*, are some of the primary drivers that have interacted with each other in the establishment of e-payment transactions.

These, however, are not the only drivers influencing the e-payment transactions volume. Another factor playing an important role in the growth rate of electronic payments is the *mobile phone internet user penetration* in the worldwide population. Usage ease, portability, personal needs awareness, increasing income and an online supply of a broad variety of accessible products and services lead mobile phone users to the online and onsite purchase of goods with mobile phone applications. As figure 8 depicts, in 2014 the global percentage of users accessing the internet by the use of a mobile phone was less than 50%, but by 2019 almost the 65% of the worldwide population is forecasted to surf the web with mobile phones, taking into account that the overall

number of smartphone users will reach the amount of 3 billion users after 2020, doubling the quota of nearly 1.6 billion users registered in 2014[47].

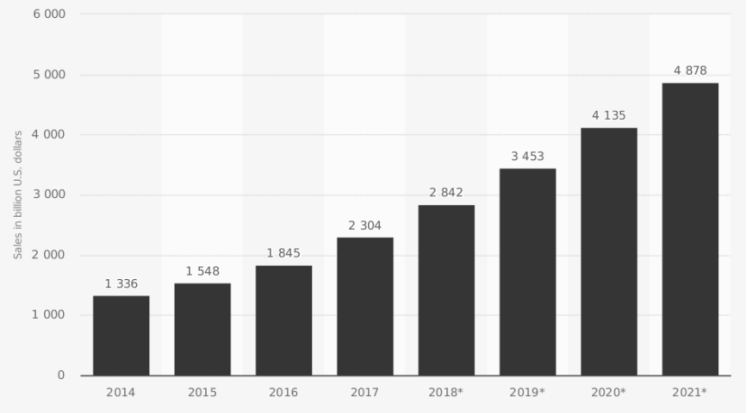
Figure 8[47]: 2014-2019 Worldwide Mobile Phone Internet User Penetration



Source: statista.com

Being e-payments the direct result of the *e-commerce worldwide affirmation* and exponential growth registered in the last years, the e-commerce marketplace is to be considered an additional driver to the e-payments trend, whose growth is not going to cease its pace in the years to come, as figure 9 depicts.

Figure 9[47]: 2014-2021 Global E-Commerce Sales (in billion US Dollars)



Source: statista.com

Last, but not least in this list, some of the e- payment services meeting the needs of the global *unbanked population* have been a major incentive for potential users of digital payments lacking the ownership of bank accounts to get introduced to the world of e-

[47] Source https://www.statista.com/. Asterisks indicate forecasts.

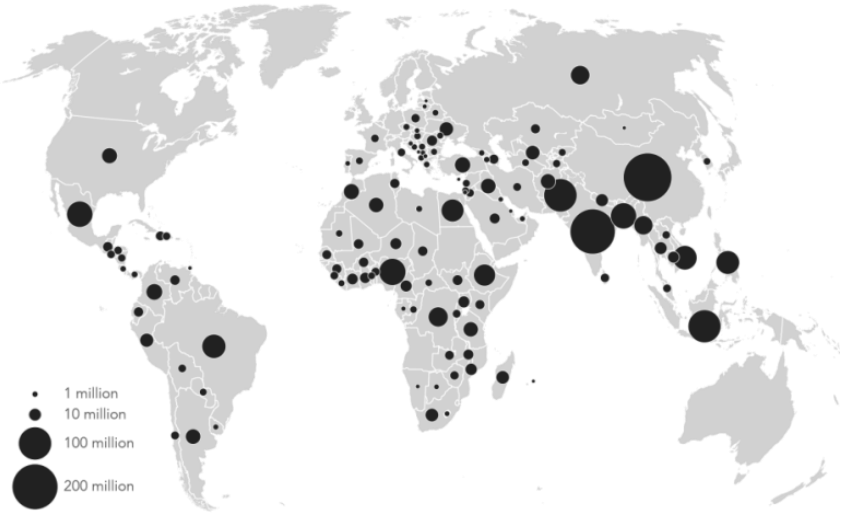
payments. Given that a great share of inhabitants in developing countries and the majority of individuals in underdeveloped nations do not possess a bank account, several wallet services and online local payment platforms give their users the possibility to process digital payments without the requirement of a bank account. Even though the percentage of individuals owning bank accounts has risen from 62% to 69% between the years 2014 to 2017[48], different countries like India and China, that are perceived as being quite IT educated, host a remarkable share of individuals not in possess of a bank account, whose majority are women. The reasons underlying this economy still focused on reception and spending of paper money are confirmed to be low incomes not requiring specific services, lack of information for people willing to create new accounts, not easily reachable financial services institutions and lack of trust in this type of services. This situation is being overcome with the creation of payment services functioning without the requirement of a bank account and allowing individuals without bank accounts to take part in this continuously growing trend.

M-Pesa[49], for instance, is one of the alternative payment services for mobile phone users, launched in Kenya in 2007 to comply with the online payment services shortage in that area and being widespread in other African, Asian and European nations due to its success and fit in the economic systems of developing countries.

[48] Evans S. D. and Pirchio A., *An Empirical Examination of Why Mobile Money Schemes Ignite in Some Developing Countries but Flounder in Most*, University of Chicago Coase-Sandor Institute for Law & Economics, 2015.

[49] Demirgüç-Kunt A., Klapper L., Singer D., Ansar S. and Hess J., *The Global Findex Database 2017*, World Bank Group, 2018.

Figure 10: 2017 Global Unbanked Population



Source: The Global Findex Database 2017

2.2 E-Payments Characteristics

Electronic payment systems are designed to permit users making secure digital payments at any time and in any place.

They share a series of requested characteristics, necessary for measuring the success of their system[50]. While technological issues might seem to be the one and only main aspect ensuring electronic payment recognition, user acceptability constitutes another second fundamental aspect influencing system usability and success, since it is superfluous to focus exclusively on a payment method's technological aspects, when there are no users willing to experiment it and creating a user base necessary to enhance the system with higher transaction volumes and useful feedbacks or suggestions on observed system flaws. These characteristics are the comparison pillars serving as means of judgment on whether the payment system is to be considered efficient or not.

One of the characteristics a well operating system must respect is anonimity. There is no individual worldwide who would be happy knowing that a payment system is not able to protect his/her personal data registered with their payment method. To overcome this obstacle, almost all e-payment systems strive to do their best in building a well

[50] Abrazhevich D., *Classification and Characteristics of Electronic Payment Systems*, Technical University of Eindhoven Center for User-System Interaction, 2001.

organised operational network, where users' anonimity is looked after and users' personal information are made use of only when requested and, moreover, are not disclosed for pointless reasons. Anonimity defence is implemented with a system of digital signatures. Nevertheless, there are some cases in which the cost of the effort to obtain users' personal information is higher than the cost of the information itself, so that in those cases anonimity constitutes still an element of regard, but not enough for the system to invest in its cryptography technology.

Linked to anonimity, security is another fundamental requirement for electronic payments. Every transaction has to be secure and approved by both parties under the transparency concept, concept that ensures total security without threatening for personal user data disclosure. Transparency and its direct effect security are bundled together to permit the transaction verification without necessiting personal information revelation by users and referring only to indispensable information for the transaction to take place, thus minimising the risks of private data to be hacked or misused.

Reliability constitutes the third characterising trait of successful electronic payment platforms, pointing out that successful payment services must rely on flawless technology and economic systems, so that hacker attacks, service breakdowns and scarce maintenance can avoid figuring out as system problems, permitting those payment systems to be qualified as reliable and efficient.

E-payments are being adopted by more people day by day and scalability is that payment system requirement imposing that the service quality should not be affected at any time by the service quantity requested by users. Given that the user acceptability share is continuously growing, it is not implied that, due to the digital payment volume growth, the network can justify contingent inefficiencies because of the higher transaction volume. On the contrary, larger quantities must never affect service quality and have to demonstrate further improvement.

Lastly usability. E-payments conform to usability when a service or a product relies on an intuitive, user friendly and easy to use interface, elementary requirements that, if not respected, might reduce drastically the number of users interested. The more a service is

simpler and intuitive, the more people will be interested in it, widening in this way the user base.

E-payment systems are grouped into two major categories on the basis of necessary time for concluding operations and transaction volume, namely micro and macro online payment systems.

2.3 Micro Online Payment Systems[51]

These types of e-payments facilitate the transfer of small money volumes, as much as US Dollar fractions. In these systems, processing costs have to be low and this feature is achieved thanks to the different, even though still very efficient, security requirements obtained through simpler cryptography mechanisms and offline payment verifications providers use to conform with the security standards.

Since fraud costs are higher than gain costs in micro online payment systems, simple security requirements are sufficient to prevent illegal actions on these e-payment category. Generally used to pay for multimedia, as in the case of iTunes, online games extra features or marketing services, like Google Adwords pay per click campaigns, purchased on the internet, e-micro payment transactions involve clients, payment gateways and service suppliers acknowledging prepaid or postpaid payments, depending on the transaction value being detracted from the money sum already uploaded online or the same value being subtracted from the money sum transferred upon payment request.

Micropayments are based on the concept of paying only the shares of products and services needed, without purchasing the whole package. This formula permits customers to avoid unnecessary expenses and to spend conveniently. They can be distinguished in Service on Demand (SoD), Content on Demand (CoD) and Resources on Demand (RoD) micropayments, based on the typology of goods considered[52]. SoD micropayments take place when there is a monetary exchange of miniservices between

[51] McGrath J., *Micropayments: Final Frontier for Electronic Consumer Payments,* Federal Reserve Bank of Philadelphia Payment Cards Center, 2006.

[52] Oddiraju S., *The not so Micro Potential for Micropayments*, Medium.com, 2018.

parties, like in the case of Earn.com, website allowing its users to contact and ask other network users questions whose answers are paid in small amounts of cryptocurrencies by askers to answerers. CoD micropayments deal with content material and the best example is the iTunes case, giving its users the possibility to purchase single tracks, instead of paying for a subscription or purchasing the entire album. Lastly, RoD micropayments are payments charged on the basis of time usage, as paying for the amount of time one has used Wi-Fi connection in a public space, instead of purchasing a one or two hour time slot for the Wi-Fi connection service, that may be too long compared to the customer needs.

2.3.1 Micro Online Payment Systems Advantages and Disadvantages

The anonimity principle is held only partially in this type of payment system, where merchants take advantage of privacy treatments, while customers avail themselves of a partial anonimity state in favour of the traceability of the transactions that ensures the security and reliability of the system. Interpreted in different ways on the basis of the parties defining it, security in micro online payment systems is identified as the certainty of customers to be in possess of goods paid for and as the assurance of merchants to receive the money compensation relative to the goods sold. Not reaching its higher development in the field of micropayments, security in this category is slightly overlooked because of the small transaction amounts the parties deal with and of the little concern in devising complex security frameworks that would cost more than the effective money loss in possible fraud cases. Considering operational frameworks, reliability constitutes another delicate issue in the functioning efficiency of micropayment systems, depending on weak cryptographic inner workings, whose reliability is in danger because of a commitment spread in companies involved, that prefer developing specific system frameworks for the services they provide without considering the option of cooperating in group for achieving better results. The scalability of transactions does not constitute a problem, considering that this type of payment system is created for operating numerous micro transactions in the most efficient way. From the usability point of view, these payments are effective because they are a valid alternative for users not in possess of other more common payment instruments like card based ones and they are the best solution for processing small

payments when other payment methods are not able to. Practical and convenient when paying small money amounts, micropayments are based on weak security frameworks, limited to serve definite usage fields and do not follow a standard network outline, being customised by single companies they are managed by and requiring the customer to adapt to their interfaces each time they interact with a new micropayment provider.

2.4 Macro Online Payment Systems

Opposing to micropayments, e-macro payments deal with money amounts up to thousands of US Dollars. As in these payments, fraud represents an actual threat, in macropayments security issues are extremely relevant and, for these reasons, cryptographic signature mechanisms are much more complex and transaction verifications are implemented online. Macro online payment systems can be distinguished into card based, e-check, mobile and e-cash payment systems, that are being presented in the following sections.

2.4.1 Card Based Payment Systems

This class of payment systems is divisible in three minor categories: credit card based, debit card based and stored value card based payment systems.

A credit card is a card issued by a financial institution granting the card owner the possibility to borrow preapproved funds on the condition of paying the lender back the borrowed value plus the credit interest rate charge.

A debit card is also issued by a financial institution and enables the card holder to purchase products and services whose price is deducted from the checking account that is related to the debit card.

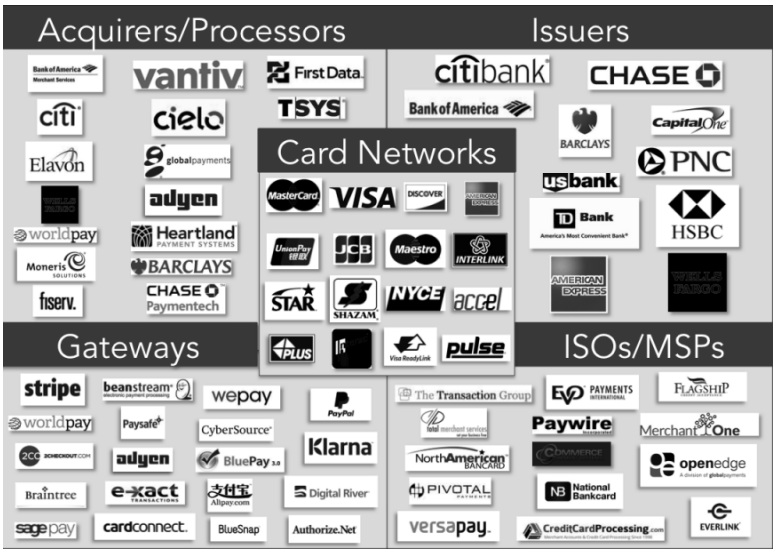
A stored value card is a debit card variation issued by a financial institution, that is preloaded by the user and employed to pay for purchases within the limit of the preloaded value. Differently from the debit card, the stored value card is not linked to a checking account and it can not withdraw additional value from it when the precharged sum is used up.

When card based payment systems are considered, a series of key players dominate the scene as far as the payment processing procedure is concerned. On the one hand the card holder, also called the payer, uses the card payment instrument to purchase a definite good onsite or online. On the other hand the merchant, also called the payee, is represented by the individual or company selling the good and waiting for the payment to take place. The card data, read by the point of sale terminal in case of onsite purchases or entered in the e-commerce form in case of online purchases, are transmitted to the acquiring bank, term identifying the financial institution where the merchant's bank account is registered. Once the transaction data are received by the acquiring bank in an encrypted form, the acquiring bank communicates with the issuing bank, being the financial institution issuing the card to the payer, that confirms the transfer of the transaction value to the merchant's account. The card payment is settled in a cooperation involving not only the card holder, the merchant, the acquiring bank and the issuing bank, but also the card networks, handling the information and fund exchange between the acquiring and issuing bank, the independent sales organisations (ISOs), also named merchant services providers (MSPs), being organisations providing extra services on behalf of acquirers, and the gateway services, whose main task is processing payments[53].

Figure 11 displays a visual classification of the most important international companies participating in the card based payment system processing network.

[53] Bakker E. and Heggestuen J., *The Payments Ecosystem Report: Everything You Need to Know about the Next Era of* Payment *Processing*, Business Insider Intelligence, 2016.

Figure 11: Card Based Payment System Network



Source: The Payment Ecosystem Report 2016 by Business Insider Intelligence

2.4.1.1 Card Based Payment Systems Advantages and Disadvantages

Card based payment systems are the electronic payment system boasting the most significant user base due to their practicality. Although not all of the requirements requested for a payment system to be successful are not satisfied entirely in this typology, card payments still manage to mantain their popularity status worldwide. From the anonimity point of view, this payment category does not offer particular solutions to its users, because, even though only card data are required for the payment to be processed, those data are ascribable to the user's personal data, so that payers do not benefit from anonimity advantages. While the anonimity requirement presents its weaknesses, the security standard in the case of card payment systems is met through the lower loss and theft risks attributable to other payment systems, making them a more secure payment method with respect to paper based ones. Apart from security, card based payment systems provide also reliability advantages for all parties involved, considering that everyone can track down the payer's identity, the payment amount, the object of the payment and the payment time and instrument. Also the scalability requirement is respected, given that the efficiency of card payments is not affected negatively by the amount of payments processed, confirming their resistance to human and technological errors even when large transaction amounts are taken into consideration. Usability advantages complete the picture of card payments and the

reasons of their substantial user base, because of the portability, intuitive usage, sufficiently fast transactions, online available additional services feasible thanks to card payments and always accessible customer support. As far as disadvantages are concerned, the lack of anonimity is not the only disadvantage of card payments, since it is usually accompanied by security and usability problems. Security problems coincide mostly with the fact that the

payer's card data are registered in the merchant payment accepting systems, enhancing the risk of these data to be fenced in hacking attacks or to be misused by merchants at the expense of payers. Usability disadvantages are generated from some card payments limits like inaccessibility from specific population targets, the impossibility to set transaction amount thresholds, the inability to make low price purchases not meeting the minimum transaction requirements and the high transactions fees both for payers and payees. Benefitting from the advantages of a payment system relying on a large user base and hindered by the disadvantages characterising a system presenting privacy and usability issues, card based e-payments are still confirmed at the present as the most popular electronic payment instrument, but are suffering the threat of more innovative e-systems.

2.4.2 E-Check Payment Systems

While some electronic payment systems are totally revolutionary and detached from traditional payment schemes, other forms of electronic payments are the digital translation of real life transactions. This is the case of electronic check payment systems. Reproducing digitally the paper based check money transfer instrument, the e-check settles transactions between payers and payees, signing them with secure and reliable cryptosignatures and requesting an online verification process, qualifying themselves as the perfect substitute to paper check instruments that they overcome in processing and verification time and costs[54]. The electronic check payment mechanism is quite similar to the card based one. The e-check is virtually signed by the payer before being sent to the payee, who virtually signs it in return. Once signed by both

[54] Jacob K., Lunn A., Porter R. D., Rousse W., Summers B. and Walker D., *Digital Checks as Electronic Payment Orders*, Federal Reserve Bank of Chicago, Financial Markets Group, 2009.

parties in sign of transaction approval, the payment is processed by the payee bank that automatically contacts also the payer's bank to verify the reliability of the transaction, that, when confirmed is credited to the payee's bank account.

2.4.2.1 E-Check Payment Systems Advantages and Disadvantages

Like card based payment systems, also electronic check payments do not meet anonimity requirements, and security problems are limited to contingent hacking attacks to financial institutions handling the transactions. Reliability and scalability are respected standards, since the transaction amount along with the parties involved in the transaction can be tracked down and the quantity of the transactions does not affect the e-check payment system functioning. Usability of electronic checks is not different from the one of paper checks, since the first ones are the electronic translation of the second ones with no kind of complications. Limits to this system are the high transaction costs and the long confirmation and payment conclusion times. Distinguished by ease of use and high accuracy to the paper payment system they refer to, e-check payment instruments are devoid of transaction speed and low fees conditions. These lacking qualities restrict them from representing the best e-payment solution at the present, qualifying other instruments as the best eligible ones.

2.4.3 Mobile Payment Systems

As already stated, mobile payments are definitely an established method of payment, born as a result to the mobile devices diffusion, to the population's demand for e-commerce and to the transaction speed and efficiency need both for onsite and online purchases of services and products. These population requests combined to the always improving technological advances of smartphones, have resulted in an ongoing trend of wallet digitalisation, whose process of transferring all the usual physical material contained in tangible wallets to virtual applications downloadable on smartphones is quickly advancing day by day. Among these smartphone applications, there are also payment processing ones, as those easing storage and transactions for cryptocurrency users. Taking advantage of a digitalised channel, mobile payments process monetary value relocation from one account to another with no limits on geographical position, benefitting from the ubiquity characteristic of mobile systems.

There are a series of procedures in the mobile payment processing system that can be distinguished in eight steps[55]. In the first step, the merchant providing goods to final customers, registers on the payment service provider platform receiving in turn a registration number coming handy in subsequent operations. In the second step, the customer of a certain service or product willing to pay by a mobile application, registers in turn on the payment service provider platform, obtaining a unique registration number identifying exclusively his/her person in transaction operations. Following the merchant and user registration steps, the third mobile payment processing stage deals with the merchant's service or product purchase by the user on a mobile application platform through a virtual payment method. The fourth step implies the transaction request reception by the merchant and the operation crediting request by the payee to the payment service provider. The fifth step coincides with the payment service provider receiving the transaction processing request by the merchant and submitting the transaction monetary value amount confirmation to the customer. The sixth step includes the customer verifying and confirming the transaction, usually through the PIN authentication mechanism, and the payment service provider processing the payment and registering it under a specific unique number identifying it. The seventh step deals with the merchant providing the services or products to the customer that has paid for them. The eighth and final step concludes the process by informing both the involved parties of the payment success.

2.4.3.1 Mobile Payment Systems Advantages and Disadvantages

In mobile payment systems, anonymity is an attribute depending on the type of registered payment the transaction is paid with. If mobile payments are backed by card based instruments, anonymity and privacy attributes are ascribable to those already mentioned for card based payment systems, stating that in these payment forms anonymity is not a respected standard. If mobile payments are backed by cryptocurrency wallets, then anonymity is partially respected, creating a form of pseudonimity, where the customer identity is not public, but the transactions related to him/her are disclosed and visible by all network participants. Security problems are

[55] Bourreau M. and Verdier M., *Cooperation for Innovation in Payment Systems: The Case of Mobile Payments*, Télécom ParisTech, 2010.

linked to physical loss or theft of the mobile device and virtual hacking operations, that can be partly managed with the personal identification codes and passwords of the device and its applications respectively. Reliability and scalability are met requirements, since both mobile technology and the relation between number of operations and efficiency are successfully handled in this payment method. Finally, usability, once ignored because mobile paying was not popular and other instruments were preferred to it, now has become one of the mobile payments main distinguishing traits, where portability, practicality and usage intuitiveness attract day by day new users. Leveraging on a large user base and easy to use system, mobile payments are on the way to substitute other electronic obsolete payment methods.

2.4.4 E-Cash Payment Systems

Belonging to the group of electronic payments, electronic cash payment systems are financial mechanisms transferring financial value through transactions whose main protagonist is an electronic coin storing a predetermined value and serving as the e-cash system financial instrument. Also these types of payment systems are developed on the basis of interactions among three players: a payer, the individual using e-cash to purchase services and products, a payee, the merchant accepting e-cash in exchange for services and products sold, and, finally, a financial network, the ecosystem connecting payers and payees to services offered by other players participating in the network, in order to create a group where everyone's necessities are analysed and fulfilled to always keep up-to-date a self-sufficient ecosystem. Generally an e-cash payment system can be split into three stages: withdrawal, payment and deposit[56]. The first stage consists in the payer withdrawing digitally signed e-cash identified by means of a specific number to be used in future transactions. The second stage involves the transaction realisation between the payer and the payee, stage in which the payee verifies the authenticity of the electronic cash digital signature. The final stage implicates a double verification on behalf of the financial network of the e-cash transferred from the payer's to the payee's account. The transaction is successfully completed if the e-cash units do not turn out to be affected by double spending issues and, in this case, their transfer to the payee's

[56] Georgescu M. and Georgescu I. E., *The Emergence of Electronic Payment Systems for the Growth of E-Business*, International Symposium Economics and Management of Transformation, 2004.

account is approved by the financial network and the e-cash units serial numbers are added to the official database of the financial network to prevent potential future double spending problems.

2.4.4.1 E-Cash Payment Systems Advantages and Disadvantages

Outdoing with respect to the anonymity standard all of the other forms of electronic payments, e-cash systems offer to users decentralised systems not depending on third parties other than the payers and the payees, combined to a high level of privacy and anonimity. Security is ensured by a sophisticated cryptographic mechanism minimising hacking attacks and fraud attempts. Advanced technological hardware and software infrastructures matched to a specialised network of professionals, yield electronic cash payment systems an excellent level of reliability. Scalability is controlled through the public ledger registering all transactions implemented and static hardware and software fixed cost investments, that do not increase on the basis of the number of transactions carried out, but on the performance improvement level the user is willing to reach. Usability is a positive aspect when considering the speed and low fees requested for transactions to occur, but it shifts to a problematic aspect when user experience and governmental acceptance standards are taken into consideration. E-cash payment systems do overcome many limits related to other e-payment systems, but, before being accepted and employed by the population, they have to be recognised officially by governmental institutions and a usage knowledge has to be provided to worldwide users.

2.4.4.2 E-Cash Payment Systems Predecessors to Bitcoin

There have been various attempts to create a successful e-cash system in the previous years and cryptocurrencies, in particular Bitcoin, have managed to get closer to this ambition.

At first, DigiCash[57] was an electronic money concept developed by David Chaum in 1983 and subsequently launched in 1989. Considered the first predecessor to Bitcoin,

[57] Chaum D., *Blind Signatures for Untraceable Payments*, *Department of Computer Science*, University of California, 1983.

DigiCash was implemented on a system of blind signatures that allowed DigiCash payments to prevail over anonimity and security limitations of traditional payment systems. Unfortunately the DigiCash project was too advanced to be introduced in the payment methods of those years, considering that e-commerce platforms were still underdeveloped and that digital payment instruments were less important to the population at the time. Due to these reasons DigiCash Inc. declared bankruptcy in 1998.

A second example of electronic cash systems is represented by e-Gold[58], a digital currency introduced by Douglas Jackson and Barry Downey in 1996. E-Golds are virtual gold units that users purchase online with fiat currency. Once purchased, e-Golds can be used to conclude transactions where gold ownership and monetary value change, while the gold backing does not get transferred to one account from another. In 13 years, the e-Gold network had reached 5 million user accounts, but its activity ceased existing in 2009 due to several cybercrime issues like hacking and fraud problems threatening the security of the network and illegal purchases made with e-gold payments.

A third e-cash system predecessor to Bitcoin was Liberty Reserve[59], a centralised electronic currency based in Costa Rica and created by Arthur Budovsky in 2001, used to register and transfer e-money thanks to an account that could be enabled with a few data that were not even verified by the provider. Counting more than 1 million accounts, Liberty Reserve ended its activities in 2013 after a USA investigation process, since it was charged of money laundering illicit acts.

2.5 The Cryptocurrency E-Cash Payment System

After several attempts in creating a digital payment system, as the ones mentioned in the previous section, in 2008 Satoshi Nakamoto published the paper introducing Bitcoin and inspiring other enthusiasts to develop new cryptocurrency models, that were presented in the first chapter of this work. It can not be known whether these cryptocurrency models will succeed and survive to security, system and usage problems

[58] Dixon J., *The e-Gold Story*, DGC Magazine, 2013.

[59] Trautman L. J., *Virtual Currencies: Bitcoin & What Now after Liberty Reserve, Silk Road and Mt. Gox?*, Richmond Journal of Law and Technology, 2014.

in the years to come, but at the present this innovative framework has developed a network of its own to satisfy users' needs all over the world.

From 2009 to 2018 there are 9 years of cryptocurrency history, few to be compared to previous economic eras, but enough to outline the pillars of a new economic era, where the tangibleness in the customs of the old society is concretely being replaced by the immediacy and dynamism in the efficiency of an era devoted to abstractness and virtuality. During these 9 years different innovations, mindsets and adoption trends have marked the cryptocurrency history path, such that different segments distinguished by definite aspects attributable to particular periods divide the path in the eras reported thereinafter[60].

The *Era of Cryptocurrency Enthusiasts* coincides with the launch, first positive feedbacks and success of Bitcoin in its supporting community of loyal backers. Developers, cryptography upholders, privacy defenders, economic systems decentralisation believers and innovation passionates arrange the perfect portrait of the first cryptocurrency users, whose main motivation is to study and analyse the BTC codebase for developing new features and whose main goal is to witness the success of this new digital innovation in the economic field.

In little time the *Era of Echo Developers and First Movers* takes the place of the era of cryptocurrency enthusiasts. After the BTC launch in 2009, other 2 years are needed before welcoming an alternative cryptocurrency to BTC. Namecoin, introduced in 2011 as the result of a radical variation to the BTC code, is the first altcoin to pave the way for a significant series of other altcoins designed and developed under the innovative and revolutionary spirit introduced by Bitcoin. This backlash effect in cryptocurrency creations broadens, as a direct consequence, the early adopters group, of those who acknowledge the originality and evolution of this new technology, by benefitting also from the market advantages to be taken advantage of in quality of first movers.

Starting from 2016, the era of echo developers and first movers leaves its place to the *Era of Regulations and New Investors*. Apart from an always increasing number of individual investors, cryptocurrencies manage to get the attention of important investing

[60] Rusty R., *The Three Economic Eras of Bitcoin*, Medium.com, 2017.

firms, attracting in this way even more the attention of regulatory institutions. Hand in hand with the growing fame of cryptocurrencies among people, goes the concern and threat of regulatory actions, aimed at dictating coercive rules that, purposely, attempt to trap the independent and decentralised system of cryptocurrencies, making it resemble to the traditional financial management system.

In a short history of up and downs for their market affirmation, cryptocurrencies have experienced the thrill of recognition at user and company level together with the obstacles created by regulatory institutions, preparing for the future unavoidable collision with the reality of governments, awaiting the *Governmental Regulatory Era*, trying to regulate them in some cases and to ban in others.

Published in 2017, the paper headed "Global Cryptocurrency Benchmarking Study"[61] and realised by the Cambridge Centre for Alternative Finance team, analyses the cryptocurrency industry based on type of actors involved and localisation of activities worldwide, starting from a sample of companies belonging to different cryptocurrency application sectors as mining, wallets, exchanges, ATMs, trading platforms and payment gateways. The localisation of participating companies confirms that the majority of companies involved in the cryptocurrency industry have their headquarters in Asia (36%), Europe and North America present similar percentages with Europe owning a 29% share and North America a 27% one, while Latin America precedes the Africa and Middle East region with a 6% share against the 2% share of the latter.

Each business has an own ecosystem involving parties influencing and being influenced by one another in a race to promote and compete for the brand image and success of the service or product the network focuses on. Cryptocurrencies act like any other business reality, relying on ecosystems of their own, continuously improving their features and constantly enhancing their efficiency, to adapt themselves in order to survive to the multifaceted dynamism of their networks. These ecosystems are shaped by internal and external stakeholders, whose variety is getting enriched with the passing of time,

[61] Hileman G. and Rauchs M., *Global Cryptocurrency Benchmarking Study*, Cambridge Centre for Alternative Finance, 2017.

boosting the adoption of this new technology and the increase in the groups of users developing business infrastructures to enlarge these ecosystems.

There are many players influencing the mechanisms in which those digital currencies are evolving through time. *Customers* acquiring cryptocurrencies and storing them as an investment good and/or using them in spending operations in activities enabling cryptocurrency payments. *Developers* studying and scrutinising cryptocurrency codebases in search for new revolutionary findings, *cryptocurrency investing companies*, or in other words businesses trusting in the cryptocurrency market power to the point of investing in digital currencies looking for profit; *cryptocurrency accepting companies*, identifying companies that have fully joined and totally embraced the cryptocurrency vision by endorsing and introducing them to their product and/or service payment systems; *freelancers*, acting just like cryptocurrency accepting companies, but on an individual basis and with more responsibilities to bear, *educational insitutions* designating dedicated research centers to sustain scholars engaged in cryptocurrency development; non profit *associations* like the International Decentralised Association of Cryptocurrency and Blockchain (IDACB) representing cryptocurrency professionals and national foundations, revolving around digital currency matters and working on market regulation by proposing new law drafts on the basis of each country's legal form, and, finally, *cryptocurrency lenders*, because where money exists, lending does too, being single individuals or online platforms like bitbond.com, specialised in lending digital currencies upon previously agreed interest rates. Aside from the already mentioned actors in this field, the main players of the cryptocurrency ecosystem are listed in detail in the following sections.

2.5.1 Miners[62]

Cryptocurrencies can both be mineable and not mineable, meaning respectively that their currency units can be obtained through the process of mining or can be predetermined on the basis of a finished definite number of circulating units.

[62] Sterry D. R., *Introduction to Bitcoin Mining*, BitcoinTalk.org, 2012.

Even though many cryptocurrencies like Ripple (XRP), Cardano (ADA), Stellar (XLM), ext., are not mineable, for those that are mineable, miners represent a fundamental category of stakeholders. Contributing to the network activities in the form of single individuals, mining pools or cloud mining, miners compute and register cryptocurrency transactions into the blockchain, being rewarded with cryptocurrency units for their collaboration.

While *individual miners* bear on their own the economic commitment of the electrical and specific equipment resources necessary for improving computational power, mining pools, on the other side, rely on groups of miners who agree upon sharing both their computational resources and their cryptocurrency rewards, affording, in exchange, diminishing expenses and benefitting of more certain remunerations. Among the most valid and reliable *mining pools* are to be mentioned Slush Pool, the oldest and still running mining pool, Antpool, the mining pool with the highest number of active users at the moment, BTC.com, that has introduced an innovative rewarding system consisting in sharing transaction fees among participating miners, KanoPool, offering relatively higher rewards with respect to other mining pools, F2Pool, whose main distinctive trait is the vast array of cryptocurrencies supported, and so on. Taking into account that both Antpool and F2Pool belong to Chinese companies and that the rest of all of the other mining pools previously mentioned have a significant amount of mining servers located in China, China is the country owning the majority of the computational power, mining the largest number of cryptocurrencies and exporting them to other countries worldwide. The main reason for this specialisation by location of the mining process is due to the low electricity costs countries like China bear.

In case direct individual or pool mining are unaffordable, the cryptocurrency community gives the possibility of mining remotely with specialised mining hardware provided by companies like Crypto Mining Farm, HashFlare and Genesis Mining, operating a *cloud mining* process with fixed costs and secure returns.

Finally, the category of miners would not be complete without the group of *mining equipment providers* like Bitmain and Bitfury, who work on the best solutions and technologies to obtain the highest performing hardware for mining operations.

The mining field is quite accurate in confirming what already mentioned in the present work about the higher quantity of mining activities in China, mostly, because of the low electricity costs borne there. As a matter of fact, the Asia Pacific region dominates the mining market with the 50% share of activities taking place there, second in the list North America with a 33% share and Europe with a 13% share. The mining companies registered in Latin America are only the 4% with respect to the global situation and the Asia Pacific zone holds a null assessment at this level.

Figure 12: Bitmain Antminer Bitcoin Mining Hardware

2.5.2 Wallets

If miners introduce new cryptocurrency units in the market, wallets provide currency storage, allowing the wallet owner to send and receive cryptocurrencies by always keeping under control quantities. Differently from tangible wallets, cryptocurrency wallets do not store real currency, but they digitally record transactions in the blockchain. A wallet is a software program containing the public and private key pair belonging to the user owning the wallet. If individual X owns three types of cryptocurrencies, for example Bitcoin, Ethereum and Litecoin, there will exist at least three different wallets for hosting these cryptocurrencies and the address identifying each wallet will present different characteristics from the ones of the other wallets. For instance a BTC wallet address is an alphanumeric string of 26-35 characters starting with 1, 3 or bc1 as in the following examples:
1BvBMSEYstWetqTFn5Au4m4GFg7xJaNVN2,
3J98t1WpEZ73CNmQviecrnyiWrnqRhWNLy,
bc1qar0srrr7xfkvy5l643lydnw9re59gtzzwf5mdq.

If individual X sends 5 BTCs to individual Y, X must specify Y's BTC wallet address in the transaction form. Y's BTC wallet address identifies his/her public key, with Y's personal identity not being disclosed in the wallet address and the only information registered in the blockchain and visible to the network participants being the BTC quantity transferred from a wallet to another. Once received by Y, the BTCs sent can be spent exclusively by the individual owning the private key corresponding to the public key identifying that specific wallet address, being in this case Y. Y can thus disclose the transaction content by virtually signing the transaction with his/her private key, enabling the possibility of using the BTCs received. When a wallet address is created a key pool of 100 pairs of public and private keys are generated to give the user way of disposing of different wallet addresses to benefit from higher levels of privacy.

There are different types of wallets to choose from, depending on the level of security and practicality desired by the user. Usually they are distinguished in three main categories: paper, hardware and software wallets[63].

Paper wallets provide a high level of security and practicality by allowing the user to literally print the pair of public and private keys in a physical copy, therefore protecting cryptocurrency funds from hacker attacks or hardware and software wallet possible technical inefficiencies. Once exported in a paper copy, the wallet address and the public and private keys related to it are not anymore memorised digitally and for this reason they have to be conserved with great attention. Other users can normally send cryptocurrencies to the public address of paper wallets, but the paper wallet owner will be able to use cryptocurrencies stored in the paper wallet only by inserting his/her private key or scanning the QR code printed, in an online or software wallet to sign exiting transactions, proving in this way that they have been confirmed by the wallet owner. By way of illustration, paperwalletbitcoin.com provides a BTC paper wallet generation service available to anyone and totally free of charge.

Hardware wallets are hardware devices like USBs, storing user's key pairs and transactions offline, yielding an increased level of security and ease in usage by avoiding commitment to third parties and to online or software wallets when

[63] Acheson N., *How to Store Your Bitcoins*, CoinDesk.com, 2018.

implementing exiting transactions. When the user is willing to spend the cryptocurrency units received and stored in the wallets, the USB device is plugged to an internet-connected device and the exiting transactions are authorised through the input and verification of a PIN code. At ledgerwallet.com it is possible to choose from a range of hardware wallets with different features and capacities.

Software wallets are in turn divided in desktop, mobile or online wallets.

Desktop wallets are installed in the user's personal computer and safeguard the private keys in the hard disk memory. The installation of the software for the desktop wallets requires the entire blockchain to be downloaded in the pc. Since desktop wallets are accessible exclusively from the pc they are set up in, they offer an elevated security level, that can show its fragility under the threat of pc viruses, absence of pc entry passwords or lack of wallet encryptions, causes that can put at risk user's funds in case the pc is attacked by viruses or hackers. Wallet backups are recommended for keeping track of keys whether the pc is subjected to irreversible damages. To give an instance, at electrum.org it is available the Electrum software of the most famous BTC desktop wallet.

Mobile wallets are smartphone applications used to receive, store and spend cryptocurrencies easily and in a secure way from the mobile phone. Due to the limited memory space available on smartphones, the blockchain is not entirely downloaded in the case of mobile wallets. Also for this type of wallets, backup is highly recommended to save the key pairs. The Electrum software is available for desktop wallets and also mobile ones, moreover, another well known mobile wallet application is Mycelium.

Online wallets are services offered by websites, memorising private keys in online servers controlled by them. On the one hand the easiness in usage in this last software wallet option is the highest, because of the intuitive and user friendly interface provided by these websites usable from any type of device connected to internet; on the other hand the security level is the most uncertain one, due to the fact that keys are controlled by third parties that are not immune to hacker attacks. Generally online wallets are additional services offered by cryptocurrency exchange platforms like coinbase.com, topic that will be developed in the next section.

Wallet services provider companies are mostly located among European (42%) and North American countries (39%), whereas Latin America and Africa together with the Middle East states have not contributed to the wallet provider list with any of their companies.

2.5.3 Exchanges

Cryptocurrency exchanges represent another way for introducing cryptocurrency units in the market by trading traditional currencies or other types of digital currencies. These online exchange platforms act like market makers considering that they are able to influence the exchange markets by setting the exchange rate for cryptocurrencies and buying and selling a remarkable share of those listed. What is needed to start trading cryptocurrencies is a personal account in one online exchange platform, where the user can transfer fiat currency to begin exchanging it for definite cryptocurrencies. Very often it is necessary to rely on more than one single exchange platform to obtain a certain cryptocurrency: e.g. if individual X creates a personal account in coinbase.com and loads fiat currency to exchange part of it in Bitcoin and the other part in Tronix, the first action can be started and concluded in Coinbase, since the Coinbase platform supports Bitcoin, but the second action requires the introduction of a support platform like binance.com, that, unlike Coinbase, supports Tronix. X thus has to exchange traditional currency in the most exchange rate advantageous and low fee cryptocurrency supported both by Coinbase and Binance, such as Ethereum, and then transfer Ethereum units from Coinbase to Binance. Once on Binance, the Ethereum units will be converted in Tronix and the final cryptocurrency units will be saved by the user in the preferred wallet type.

Exchange companies reach higher density in Europe (37%), followed by the Asia and Pacific region counting the 27% of them, then North America with the 18% of exchange operating companies, Latin America with the 14% and Africa and Middle East reporting the lowest concentration value of 4%.

2.5.4 Automated Teller Machines

Cryptocurrency ATMs depict another alternative for exchanging traditional currencies in cryptocurrencies and viceversa. Even though their appearance is similar to

conventional ATMs, differently from them, cryptocurrency ATMs do not connect the user to his/her bank account, but to an official cryptocurrency exchange.

The first ATM was installed in the Waves Coffee Shop in Vancouver in 2013 and it was a Bitcoin ATM produced by the USA based company Robocoin[64]. Since then the number of active BTC ATMs has never ceased increasing and, at the present, coinatmradar.com counts 2,692 worldwide listed ATMs in 66 different countries and produced by 30 international technological companies.

These devices can be unidirectional, permitting the exchange from fiat currency to cryptocurrencies, or bidirectional, allowing both the buying and selling of cryptocurrencies in exchange for fiat currency. With respect to exchange platforms, ATMs are a faster procedure to trade cryptocurrencies within a few minutes. At first a user verification phase is implemented through an SMS sent code or even through the face and document recognition of the customer, then, the cryptocurrency wallet address insertion phase takes place with the user creating at the moment a new wallet address or with the user scanning the QR code of an already existing wallet; finally, the buying or selling cryptocurrencies phase is fulfilled and the receipt is issued to prove the success of the transaction.

Figure 13: Bitcoin ATM

[64] Peaster W. M., *Guide to Bitcoin ATMs: A Brief Primer on Buying BTC on the Go*, Blockonomi.com, 2017.

2.5.5 Cryptocurrency Trading Platforms

Buying and selling cryptocurrencies is made possible also thanks to official marketplaces like localbitcoins.com, where BTC owners and BTC possible buyers can contact each other in order to exchange BTC units. LocalBitcoins is active in more than 16,100 cities from 248 countries all over the world, contributing in the achievement of online or face to face transactions between the users of the network. These peer-to-peer exchanges, assuring a good privacy level to the users, are quite popular in countries where exchanges do not exist or are subjected to strict regulations. Apart from Bitcoin, also other cryptocurrencies have their own decentralised platforms based on p2p exchanges like localethereum.com, focusing on the buying and selling of Ethereum units, and litecoinlocal.net, whose cryptocurrency of interest is Litecoin.

2.5.6 Cryptocurrency Payment Gateways

This final category presents in detail the payment services used by merchants all over the world to accept payments in cryptocurrencies, topic that will be further analysed in the next chapters at a general international and more specific national level with some case studies on Italian companies using cryptocurrency payment gateway services. Payment gateways are the cryptocurrency ecosystem player creating a dynamic system of interactions between cryptocurrency users and merchants accepting electronic cryptocurrency payments. Cryptocurrency payment processing companies involved in the Cambridge Centre for Alternative Finance research manage to equal their presence percentage both in Europe and in the Asia Pacific area (33%), North America reports a 19% rate, Latin America an 11% rate and Africa and Middle East a low 4% rate. This player represents a focal point in the network, because it concentrates on activities recognising cryptocurrencies as a means of payment, that develop a broader e-cash user base. Moreover, there is a direct proportion between merchants using cryptocurrency payment gateways and the always increasing worldwide cryptocurrency adoption rate.

On the one hand, e-cash payments benefits to payers are portability, accessibility, ubiquity, pseudonimity and security. On the other hand, payees benefit from their digital currency acceptance decision under the following list of aspects[65]:

- the acquisition of *a new segment of customers* that are used to pay in cryptocurrencies;
- the *customer loyalty gain*;
- the *differentiation of the payment instruments offer* to the public;
- the *simplified international transactions* with the elimination of currency exchange rate and fees issues when dealing with international customers;
- the *blockchain transparency*, recording all cryptocurrency transactions and making it almost impossible to incur in double spending and fraudulent problems;
- the *transactions speed*, taking place in a couple of minutes;
- the *secure cryptocurrency storage* due to the computing power of the blockchain technology assuring storage safety with respect to fiat currency storage;
- the *lack of merchant fees*, that is an aspect missing in other electronic payment methods like card payments where the payee incurs in service fee payments, while in this case only the payer pays payment processing fees;
- the *lower customer fees* because of the minor number of intermediaries involved in the transaction procedure compared to other online payment instruments;
- the *absence of periodic payment gateway fees* that are usually applied by other payment service providers;
- the *unlimited transaction volume*;
- the *usability on any type of payment device* of cryptocurrency wallets;
- the *press* and *social media recognition*.

[65] Mulqueen T., "Now Accepting Bitcoin": A Retailer's Guide to Digital Currencies, Forbes.com, 2018.

CHAPTER 3

The Bitcoin Electronic Payment Model in Italy

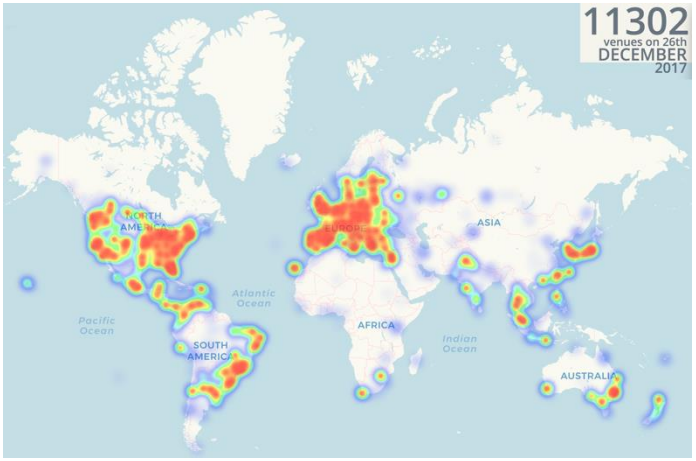
3.1 International Mapping of Bitcoin Accepting Merchants

The world of cryptocurrencies is a vast field of research, where the subjects and the intercommunications among them generate a dedicated interest in scholars engaging in studies analysing causes and effects of the innovative cryptocurrency technology with respect to various economic and social sectors. Besides the ample array of information available on the cryptocurrency topic, it has to be considered also the reliability of this knowledge, since it is worth narrowing the subject quantity in favour of more valid information quality, which may appear to be an evident and easy to apply observation from a generic point of view, but it proves to be feasible with some difficulty, when the cryptocurrency literature is concerned, due to the topic newness and its young lifetime conditioning the literature relative to it to be still underdeveloped and not entirely reliable. For these reasons, from now on, this work is going to focus exclusively on the first and most famous cryptocurrency: Bitcoin. This action will narrow the research field down to Bitcoin and the ecosystem of merchants using it in their everyday businesses, in order to analyse the ways in which Bitcoin has influenced their businesses and its advantages and disadvantages when compared to the other available electronic payment instruments used by merchants and presented in Chapter 2.

A clear picture of the merchants recognising and accepting Bitcoin payments at an international level is given by the official website of coinmap.org. The first few businesses appearing in the map were added to the map in February 2013 and were located in Brasil and the Czech Republic, but by the end of December 2013, the registered merchants had risen up to 1,807 and they were mainly concentrated in North America and Europe, trend that is reaffirmed towards the end of 2014, counting 5,336 listed venues. The year 2015 ends with 7,028 Bitcoin accepting merchants, 2016 closes with 8,115 members and 2017 broadens the network with a total of 11,302 group

components distributed among North America, South America, Europe, Oceania, South Asia and some feeble presences also in Africa as pictured in the figure below.

Figure 14: Bitcoin Accepting Merchants Worldwide Distribution in Dec. 2017



Source: coinmap.org

The worldwide list of Bitcoin accepting merchants includes a variety of companies that operate with respect to different business models, causing the list to consist of local and international based firms, whose customer reach and product lines differ from one another, enriching a network that strives to create an original financial ecosystem, detached from the current one and self-sufficient in the establishment of a new economic system. As far as international companies are concerned, Overstock.com, the well known American online retailer founded in 1997 by Patrick Byrne in Midvale, started accepting Bitcoin payments in January 2014, receiving within the first day more than 800 BTC purchases[66]. A few months later, in June 2014, Expedia, the online travel booking agency launched in 2001 and owned by the Expedia Group, introduced Bitcoin as a method of payment in its platform for hotel bookings[67]. The list of the major international companies that have added the BTC payment method to their businesses goes on with firms like Microsoft, Shopify and many others.

Moving from an international to a national point of view, the situation changes and both the typology and distribution of companies accepting BTC payments is more country

[66] Mile R., *Overstock.com is Now Officially Accepting Bitcoin*, BusinessInsider.com, 2014.

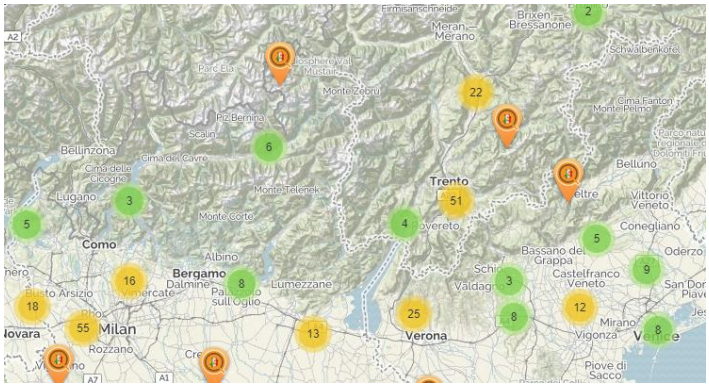
[67] Biggs J., *Expedia Now Accepts Bitcoin for Your Crypto-Vacations*, TechCrunch.com, 2014.

specific and presents some given peculiarities that can be identified in the Italian territory. Apart from coinmap.org mapping worldwide merchants including Italian ones, quibitcoin.it is a specific Italian online platform mapping Italian merchants participating in the Bitcoin network. Counting almost 700 retailers, QuiBitcoin continuously updates its official list by registering new businesses entering this innovative payment field and it represents a useful and practical instrument for Bitcoin users in search of places that are licensed and equipped for processing BTC electronic payments in their online platforms and in their onstore activities with its website and downloadable mobile phone application.

3.2 Italian Distribution of Bitcoin Accepting Merchants

Observing the QuiBitcoin map it is easily noticeable that the majority of BTC e-payments accepting merchants are located in Northern Italy, with predominant activity centers around the cities of Milan and Trento, that can be viewed in the following picture.

Figure 15: Distribution of Bitcoin Accepting Merchants in Northern Italy



Source: quibitcoin.it

While, on the one hand, it is understandable the importance of Milan, as an international metropolis always open to and up-to-date with respect to the latest technological innovations in every field, including the payments one, on the other hand, it is interesting to analyse the causes leading to the strong Bitcoin network created in the region of Trentino Alto Adige. This local network behaves like a small business cluster, where participants interact with each other exchanging sectorial knowledge, information and skills, in order to strengthen the interrelations among the involved parties.

3.3 The Trentino Alto Adige Bitcoin Cluster[68]

As already stated in the previous section, when considering merchants that accept the Bitcoin cryptocurrency as a method of payment from their customers in all of the Italian regions and without making any particular computations with respect to the number of merchants and the population size, the regions of Lombardy, Trentino Alto Adige and Veneto, step up on the podium for being the Italian areas with the higher absolute concentration of Bitcoin accepting merchants as represented below. Trentino Alto Adige hosts a total of 81 merchants welcoming cryptocurrency payments, equivalent to the 11.62% of the overall number of merchants in Italy belonging to this specific category. The reverse podium, corresponding with the Italian regions hosting the lowest number of Bitcoin accepting merchants, includes Valle d'Aosta, with only one merchant, Molise, with two merchants, and Basilicata, with three merchants.

Table 3: Ranking of Merchants per Region

Rank	Region	Merchants	%
1	Lombardy	122	17.50
2	Trentino Alto Adige	81	11.62
3	Veneto	79	11.33
4	Lazio	66	9.47
5	Emilia Romagna	49	7.03

Source: quibitcoin.it

The podium positions change when the population parameter is taken into account. In this case, the three Italian regions hosting the highest number of Bitcoin accepting merchants per 100,000 inhabitants are Trentino Alto Adige, Liguria and Friuli Venezia Giulia, with Trentino Alto Adige making available to its population 7.70 merchants per 100,000 inhabitants as depicted in the chart below. This value is incredibly high if compared not only to the other two regions belonging to the podium, but also to the other regions listed. Liguria and Friuli Venezia Giulia, that both belong to the podium, host respectively 1.95 and 1.87 merchants per 100,000 inhabitants, which stands out in correlation with the Trentino Alto Adige statistics. Referring to Lombardy and Veneto,

[68] The data reported in the present and following sections have been last updated on June 11th 2018. It is important to underline that quibitcoin.it lists the companies that have registered themselves in the quibitcoin.it platform, but there may be other Italian companies accepting Bitcoin as a form of payment, that have not registered themselves on the quibitcoin.it website and do not appear in the map and considered statistics.

the two regions of the podium in the situation not considering the population amount, host respectively 1.22 and 1.60 merchants per 100,000 inhabitants, confirming the fact that Trentino Alto Adige is the Italian region that, offering to its inhabitants a wider range of merchants selection, is to be considered the Italian area where the Bitcoin adoption has been more incentivised than elsewhere.

Table 4: Regional Ranking of Merchants per Number of Inhabitants

Rank	Region	Merchants	Merchants per 100,000 Inhabitants
1	Trentino Alto Adige	81	7.70
2	Liguria	31	1.95
3	Friuli Venezia Giulia	23	1.87
4	Veneto	79	1.60
5	Umbria	13	1.45
6	Sardegna	24	1.44
7	Lombardy	122	1.22

Source: quibitcoin.it

Shifting to an analysis of the Bitcoin adoption by merchants at a province level, the top three provinces with the highest number of Bitcoin accepting merchants are Milan, with 60 merchants corresponding to the 8.61%, Rome, matching Milan with 60 merchants and owning a share of 8.61%, and Trento, with 58 merchants representing the 8.32% share of the total amount of Italian merchants dealing with cryptocurrencies. It is noteworthy the minimal difference between the values of the three provinces, considering also the huge gap existing among the number of inhabitants of these three areas.

As a matter of fact, if the analysis takes into consideration the number of inhabitants of the Italian provinces, the situation on the podium changes. As confirmed by the following table, on the basis of 10,000 inhabitants, Trento is the province having the highest score with 10.82 merchants per 10,000 inhabitants, followed by Verbano Cusio Ossola, located in the region of Piedmont and having 5.58 merchants per 10,000 inhabitants, and Imperia, located in the region of Liguria and having 5.51 merchants per 10,000 inhabitants. Also in this case is quite remarkable the difference in the number of merchants between the first three provinces on the podium: Trento hosts 58 merchants, Verbano Cusio Ossola 9 and Imperia 12. Bolzano belongs to the first five positions of

this chart, making Trentino Alto Adige the only region having two provinces listed in the first positions.

Table 5: Province Ranking of Merchants per Number of Inhabitants

Rank	Region	Merchants	Merchants per 10,000 Inhabitants
1	Trento	58	10.82
2	Verbano Cusio Ossola	9	5.58
3	Imperia	12	5.51
4	Trieste	12	5.09
5	Bolzano	23	4.46

Source: quibitcoin.it

Making a last consideration on the basis of a territorial point of view regarding the adoption of Bitcoin electronic payments by Italian merchants, it is worth mentioning the Italian municipalities hosting the highest number of merchants. The first position on the podium is occupied by Rome, with 52 merchants and a 7.46%, second on the podium is Milan, with 47 merchants and a 6.74%, and third is positioned Rovereto, located in the province of Trento with 25 merchants and a 3.59%. Even though not belonging to the podium, Trento comes after Rovereto, with 18 merchants and a 2.58%.

Table 6: Ranking of Merchants per Municipalities

Rank	Region	Merchants	%
1	Roma	52	7.46
2	Milano	47	6.74
3	Rovereto	25	3.59
4	Trento	18	2.58
5	Trieste	12	1.72

Source: quibitcoin.it

3.4 The Trentino Alto Adige Bitcoin Cluster: Merchant Classification

Turning to another type of analysis on the merchants, it is interesting to examine the business categories they belong to. By having a look at the Italian chart of Bitcoin accepting merchants and the business categories they can be included in, as depicted in the table below, it is clear that the companies accepting cryptocurrency payments are

not large sized ones, but small and micro sized firms[69]. Moreover, these companies are not characterised by complex organisational structures, bureaucracy, labour division, distinction between departments and units, established information channels, management and control taking place through impersonal and formal relations and little flexibility among labour departments and units. Opposed to the highly formalised business environment of large sized companies, in small and medium sized companies the labour organisation is more simple and transparent, does not involve division in departments and units, deals with little or none bureaucracy, can be identified with a single line structure including owners, managers and the other employees having personal relationships between them and working in a more informal business environment, where roles are not a significant limitation to workers that are acquainted with all business operations and have more than one single function in the company, improving in this way the company flexibility from an operational point of view[70].

The Bitcoin e-payments accepting companies are at an international and Italian level mostly Brick and Mortar type of businesses. At the Italian and in particular at the Trentino Alto Adige region, these merchants rarely do offer to their customers the possibility to purchase in Bitcoin on an online e-commerce platform, these type of payments do usually take place at the point of sale.

The following table presents the classification of Italian merchants with respect to their business operations. To give a general idea of the businesses belonging to the listed categories, following some examples. Shop example: computer store, Service example: business consultancy, Tourism example: hotels, Catering example: restaurants, Craftmanship example: air conditioning system installations, Health example: massage centers, No Category example: Compro Euro stores, that will be presented later in the chapter, Transportation example: service stations, Education example: learning courses, ATM example: ATM devices, Sports example: golf clubs, Factories example: specific industry factories.

[69] As with respect to the official Small and Medium sized enterprises (SMEs) classification presented in the European Commisson online platform at the following link: http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en.
[70] Nagy P. and Roóz J., *Small Enterprise Development*, Tankonyvtar.hu, 2014.

Table 7: Classification of Italian Merchants by Business Category

Rank	Business Category	Merchants	%
1	Shops	218	31.28
2	Services	195	27.98
3	Tourism	87	12.48
4	Catering	75	10.76
5	Craftsmanship	33	4.73
6	Health	26	3.73
7	No Category	20	2.87
8	Transportation	15	2.15
9	Education	11	1.58
10	ATM	10	1.43
11	Sports	6	0.86
12	Factories	1	0.14

Source: quibitcoin.it

Table 7 presents all the business categories to whom registered merchants consider to belong to. It is to be noticed the fact that the table includes also the ATM category, that is not to be considered a merchant typology accepting Bitcoin payments, but just a point of service for individuals wanting to purchase Bitcoins.

Making reference to the division in categories of the previous chart, the next chart does the same operation on the Trentino Alto Adige more specific area.

Table 8: Classification of Trentino Alto Adige Merchants by Business Category

Rank	Business Category	Merchants
1	Shops	31
2	Services	15
3	Catering	11
4	Tourism	8
5	ATM	5
6	Craftsmanship	3
7	Health	3
8	No Category	3
9	Transportation	1
10	Sports	1
11	Education	0
12	Factories	0

Source: quibitcoin.it

As clearly visible from the above chart, the majority of merchants recognising Bitcoin payments in the Trentino Alto Adige region are shops, services offering merchants, restaurants and hotels. Moreover, Trentino Alto Adige is the Italian region having the primacy as the region hosting the largest number of Bitcoin ATMs, since 5 out of the total 10 Bitcoin ATMs present in Italy belong to Trentino Alto Adige.

3.5 The Trentino Alto Adige Bitcoin Cluster Formation

It would be easier to think that the creation of the Bitcoin business cluster in the Italian region of Trentino Alto Adige was accidental, but the analysis of the previous section implicitly confirms that the phenomenon is not to be considered random and this section is going to be dedicated to an evaluation of the causes that have generated the prerequisites for the Bitcoin business cluster formation to be developed in Trentino Alto Adige and not elsewhere[71].

The following causes of the Bitcoin cluster formation in Trentino Alto Adige are related to the territorial aspect of the region and are partly deducted from press articles on the region of Trentino Alto Adige and party deducted from the personal considerations of the representatives of the case studies that will be presented in Chapter 4.

- the *location*, that due to its breathtaking natural landscapes and to a broad choice of spare time activities summons lots of international tourists on a yearly basis, who visit Trentino Alto Adige to experience various tours in its mountain trails, lakes, skiing resorts, spa structures, characteristic towns and Christmas markets. Even though many local inhabitants do engage in Bitcoin e-payments, tourists represent an important share of Bitcoin payers in this region;

- the *economic wealth* of Trentino Alto Adige, leading to an overall well-being of the population and to a general open-mindedness and search for innovations that may improve further the economic situation of the region and its population, making the

[71] Cortright J., *Making Sense of Clusters: Regional Competitiveness and Economic Development*, The Brookings Institution Metropolitan Policy Program, 2006.

population of this region more eager and prone to discovering new ways for simplifying and perfecting their everyday actions like Bitcoin e-payments[72];

- the *sociocultural state* of the Trentino Alto Adige inhabitants, who, because of the economic wealth of the households of the region, are driven and manage to complete higher levels of education, that, combined to the society's openess to innovation, cause them to be curious and welcoming to innovative solutions as in the Bitcoin electronic payments case[73];

- the *local demand*, that in the Bitcoin payments case in the region of Trentino Alto Adige, even if not comparable to local demand for other services or products, is still more significant in this region than in other Italian regions;

- the *regional network*, involving a tight series of relationships among universities, research centers, IT companies, merchants and final customers, that develop and promote new solutions thanks to a very efficient system of interrelations, just like it happened in the Bitcoin case[74];

- the *sectorial specialisation* as far as the Bitcoin payments are concerned, creating a continuous flow of knowledge, information and services that interest the population of individuals and firms, arousing in them the curiosity in using this new form of payment.

3.6 The Trentino Alto Adige Bitcoin Cluster Community Pillars

In this section the Bitcoin cluster will be analysed with respect to the regional network of Bitcoin authorities coexisting in Trentino Alto Adige.

3.6.1 Bruno Kessler Foundation

The Bruno Kessler Foundation is a research entity in the autonomous province of Trento, operating in the technological, scientific and human sciences field[75]. Established

[72] *Rapporto PMI Centro-Nord 2017: il Trentino ai Primi Posti per l'Innovazione*, Ufficiostampa.provincia.tn.it, 2017.

[73] Stinghen M., *La Generazione dei Bitcoin tra Curiosità e Tecnologia*, Giornaletrentino.it, 2017.

[74] *Un Giorno nella Bitcoin Valley, a Rovereto: Intervista ad Inbitcoin*, Businessandleaders.it, 2018.

[75] Source https://www.fbk.eu/it/.

in 2007, it dedicates its name in honour of the politician Bruno Kessler from Trento, whose purpose was to create the premises for the foundation of the Trento University, aim that was achieved in 1982, year in which the University born in 1972 was finally recognised by the state authorities. At the present, the Bruno Kessler Foundation concentrates its research initiatives on different scientific and social areas, but the ones that are more interesting to this thesis are the foundation divisions of the Center of Information Technology and the Center for Research and Telecommunication Experimentation for Networked Communities, that have been the divisions where the researchers, graduands PhD students and visiting professors have studied and analysed the Bitcoin technology and the reasons and modalities to introduce it to the community. This research environment was further improved with the foundation's agreement with the European Institute of Innovation & Technology (EIT). Marco Amadori, a technologist working at the Bruno Kessler Foundation was focusing on semantic web and data augmentation studies, when he was given the task of preparing a seminary on the Bitcoin topic. It was the success of the seminar that lead him to go deeper into the Bitcoin technology and inspired him to found Inbitcoin. In this way the Bruno Kessler Foundation build the first connection path in the Bitcoin cluster of Trentino Alto Adige.

3.6.2 Inbitcoin

In 2014, Marco Amadori was appointed the task of preparing the Bitcoin centered seminary and this work inspired him to dedicate a great part of his studies to the Bitcoin topic[76]. In the same year, the Bitcoin topic priority had become so significant in the life of Marco Amadori that he conceived the idea of creating Inbitcoin. This idea came into life when Amadori and other enthusiastic co-founders launched Bitcoin in the municipality of Rovereto, that was indeed mentioned previously as one of the municipalities hosting the highest number of Bitcoin merchants with respect to its population. Basing their services on the skills of the team of professional programmers, researchers, academics and Bitcoin pioneers working at Inbitcoin, the company develops and provides services and products to companies open to the possibility of

[76] *Nasce Inbitcoin, La Prima Azienda Italiana Dedicata al Bitcoin*, Milanoplatinum.com, 2016.

introducing Bitcoin payments. Their services and products include the Altana Bitcoin Wallet, the Bitcoin Card, ECN Services and the Inbitcoin Business Software[77].

The Altana Bitcoin Wallet is an extremely secure and easy to use Bitcoin wallet, making it possible for the user to send, receive and store BTCs in total security with the double signature authentication of the wallet that saves the user's private keys exclusively on the user's device, ensuring that only the device owner is able to manage the BTCs stored. Perfectly integrated in the Inbitcoin offering, the Atlana Bitcoin Wallet represents an optimal solution for individuals looking for a secure wallet to store and manage their Bitcoins.

The Bitcoin Card is an original solution for a special gift, since it combines a traditional special thought to a digital content, so that even not so technological individuals can use BTCs for payments through a traditional prepaid card.

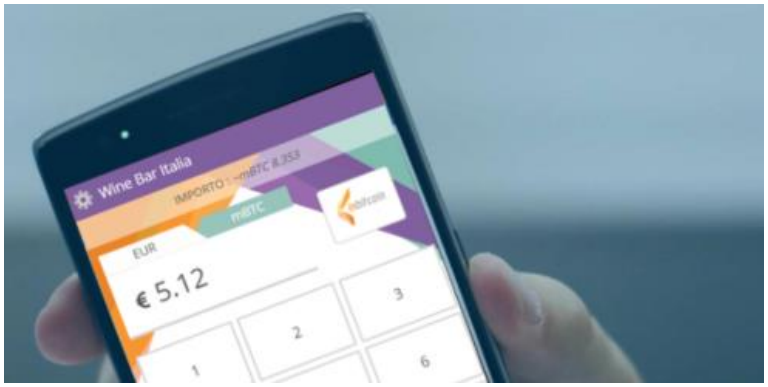
The ECN Services (Electronic Communication Network Services) are a system of services for companies wanting to make available the automated purchase and selling of BTCs in their businesses.

The Inbitcoin Business Software, also called Bitcoin POS, is the simple and intuitive software created by Inbitcoin for businesses that are willing to start accepting Bitcoin payments, as the ones this thesis's topic revolves around. The software is installed in the devices the business will use to process Bitcoin payments and it just needs internet connection to work. When the customer wants to pay in BTC, the cashier responsible for processing BTC e-payments has to digit the euro amount in the device where the software is installed and the euro amount will be automatically transformed into the Bitcoin amount with respect to the Euro-Bitcoin updated exchange rate. Once the BTC amount will appear on the device screen along with a QR code created on purpose for the transaction indicating the Bitcoin wallet address that will receive the payment, the customer will scan the QR code with his/her Bitcoin wallet and the payment will be concluded successfully. Both the payer and the payee will receive a payment confirmation in real time. The BTC amount will be automatically deducted from the customer's Bitcoin wallet, while the business will receive the payment on a weekly basis

[77] Source https://inbitcoin.it/.

from Inbitcoin. All the BTC payments received by merchants flow into the main Bitcoin wallet managed by the Inbitcoin company, that transfers the sums weekly to the merchants Bitcoin wallets or bank accounts, since some merchants prefer to keep payments received by customers in Bitcoin units, while others want to receive the euro equivalent amount, whose exchange from the Bitcoin amount and transfer are made by Inbitcoin. For these services Inbitcoin requires from the businesses that have adopted it an una tantum initial payment and no commission on transactions. Almost all the Bitcoin accepting merchants in the Trentino Alto Adige region use Inbitcoin Business to process their BTC e-payments, and this underlines the huge importance and influence Inbitcoin has had since its foundation on the creation of the Trentino Alto Adige Bitcoin Cluster and the interest of this community for Bitcoin when compared to other Italian regions.

Figure 16: The Inbitcoin Business Application



Source: inbitcoin.it

3.6.3 Compro Euro

Bmanity is the company owning part of the Compro Euro franchising, while the other substantial part is owned by Inbitcoin. Compro Euro is a spin off company that manages the resale of Bitcoin technologies developed by Inbitcoin and provides services related to these technologies[78]. Launched in 2017 in the municipality of Rovereto, Compro Euro is a franchising network that is still developing and expanding its business throughout North-Eastern Italy, making available to its clients Bitcoin ATMs in physical stores, for making possible the purchase of BTCs in loco, and providing

[78] Source https://comproeuro.it/.

technical consultancy for individuals and businesses willing to join the Bitcoin community. The Compro Euro mission is to make locally available the one and only Bitcoin standard, universally recognised among all the other digital currencies. The Compro Euro staff informes and educates, transmitting economic and technological culture and facilitating the Bitcoin purchase in a secure and comfortable environment with the assistance of a qualified, skilled and kind personnel. Compro Euro is thus the first Italian Bitcoin store franchising launched in Trentino Alto Adige to educate in Bitcoin a population that has already showed its interest in the topic.

3.6.4 Bcademy

Although Bcademy has been founded recently in the city of Pordenone in the region of Friuli Venezia Giulia, one of the cornerstone authorities standing at the basis of its founding is Mr. Marco Amadori, who has been part of the Bruno Kessler Foundation and the founder of Inbitcoin[79]. Bcademy is the first Italian Bitcoin Academy whose aim is to make the Bitcoin technology more accessible and appreciated in our society. This aim is implemented with the organisation of different educational courses for single individuals and companies that are usually grouped in three categories: the first one includes workshops lasting 1 to 3 days addressing professionals, like lawyers and accountants, that need to be informed on how to treat cryptocurrencies from the legal and tax point of view, the second category includes customised services and products for companies, often operating in the information technology sector, that want to educate their staff and engage in Bitcoin specific operations, as startups searching for investments through ICOs, while the third and last category includes 3 to 9 months lasting masters addressing individuals with programming skills that want to study the Bitcoin technology and learn how to create other technologies starting from it[80]. Offering Bitcoin education, but from a professional point of view, Bcademy offers Bitcoin specific courses to students, professionals and companies that want to be updated on the society trends.

[79] Donadio G., *A Pordenone La Prima Academy del Bitcoin*, Cryptonomist.ch, 2018.

[80] Source https://www.bcademy.it/.

CHAPTER 4

Case Studies of Bitcoin Accepting Merchants from the Italian Bitcoin Valley

4.1 Study Aim

The final aim of this thesis is to consider the cryptocurrency, and, in particular, the Bitcoin technology not only from a theoretical, but also from a practical point of view. The first chapter introduces the reader to the cryptocurrency technology, the second chapter presents an overview on the cryptocurrency ecosystem and the key players operating in it and the third chapter focuses on the Bitcoin cluster created in the region of Trentino Alto Adige, analysing the causes of the creation and the characteristics of the cluster. Since the practical purpose of this dissertation is to understand why Bitcoin payments are adopted by companies and how they influence the businesses adopting them, the selection of the Trentino Alto Adige area, supporting and fostering Bitcoin adoption, is to be matched to case studies on some businesses belonging to the region, whose study is oriented in building a picture on the causes and effects these companies have experienced with the Bitcoin adoption and the advantages and disadvantages these companies recognise in the introduction of Bitcoin. The case studies that will be presented after this initial introduction aim to investigate on the economic and social impact perceivable in a society where tradition co-exists with innovation and the population is in part curious to experiment a new technology and in part skeptical in opting for a technology that relies in a network that undoubtedly does not receive the governmental and societal trust and support enjoyed by traditional monetary systems. This specific section will try to figure out if in the Trentino Alto Adige area, considered the Italian Bitcoin Valley, the Bitcoin technology and Bitcoin payments are judged as the monetary system of the future or are seen just as a temporary trend and additional payment option to offer to the customers, whose adoption can increase the customer base, be considered as an extra service for the buyers or even as a marketing decoy, but not as the money of the future.

4.2 Applied Methodology

The research is implemented through the analysis of ten case studies, each of them conducted on Trentino Alto Adige based merchants that accept Bitcoin payments from their customers. Subsequently to the first part of the case study summing up a brief schematic overview of the case study, the second part of the case study presents a company description and is followed by a third part of the study that examines the business model of the company with the Porter's Five Forces Analysis[81]. Lastly, the case study is concluded with the considerations of the business on the advantages and disadvantages their company has experienced after the Bitcoin adoption. All of the case studies are based on data assimilated from 15 up to 30 minutes lasting interviews[82] conducted by telephone and approved by the company representatives interviewed.

The ten companies chosen for the case study analysis have been selected from the official Quibitcoin.it list of merchants, that distinguishes in the region of Trentino Alto Adige the companies located in the province of Trento from the ones located in the province of Bolzano. Since the province of Trento and in particular the municipality of Rovereto located in its province host the majority of the merchants accepting Bitcoin payments in the region of Trentino Alto Adige, the case studies involve mainly companies belonging to these municipalities and few companies from the Bolzano province are taken into consideration. Another criterion used in the selection of merchants is the Bitcoin ATM ownership, leading the research to consider in first place the merchants making available the Bitcoin ATMs in their locations. This criterion was used because a retailer that, apart from using a Bitcoin payment gateway, is also interested in hosting a Bitcoin ATM to attract customers needing its services and to display publicly its support towards the Bitcoin philosophy is certainly a retailer that is more interested in the Bitcoin technology and deals with more customers benefitting from the services it offers. All merchants in both provinces hosting Bitcoin ATMs were interviewed, aside from "Pollock Art", a digital printing company that makes available a Bitcoin ATM, but has not received any Bitcoin payments, fact that does not make it

[81] Porter M., *How Competitive Forces Shape Strategy*, Harvard Business Review, 1979.

[82] The interview outline of the case studies is reported in Appendix A.

suitable for the research. Just like "Pollock Art", also other companies, not hosting Bitcoin ATMs, were excluded from the research, since their representatives confirmed that, although they were accepting Bitcoin payments, at the moment of the research they had not received any Bitcoin payment from their customers. Leaving aside merchants hosting BTC ATMs, the other retailers that participated in the case studies were selected on the basis of press references on the most important merchants accepting Bitcoins in Trentino Alto Adige available online and from a consultation on the most interesting Bitcoin accepting merchants to interview with Alessio Salvetti, co-founder of Inbitcoin and Bcademy, who was also interviewed as the Impact Hub Trentino representative in the relative case study that will be presented later in the chapter. A last criterion was choosing companies belonging to different business categories in order to depict a more variegated picture of the situation, criterion that was limited by the fact that not all businesses had received BTC payments, so that it was useless to interview businesses belonging to different categories neglecting the fact that they had not experienced BTC payment operations. Each company from the selected ones on the basis of the previously mentioned parameters accepted to collaborate for the case study, apart from two of them, namely Area di Servizio Petrol-Airport and Studio Bellezza, that did not manage to be part of this thesis due to busy business schedules. Following, the ten case studies of those merchants who contributed in the realization of this research.

4.3 "Batzen Bräu" Case Study

Merchant Name	**Batzen Bräu**
Interview Representative	Sabine Demetz
Active Since	2003
Location	Bolzano
Merchant Category	Catering
Employees	50
Year of Bitcoin Adoption	2017
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	Mostly Local, Curious to test the functioning
Main BTC Advantage	Reflects the Innovative Spirit of the Company
Main BTC Disadvantage	Lack of Physical Receipts for Payments

The Batzen Bräu case study was developed as a result of an interesting interview done with Sabine Demetz, the Batzen Bräu representative, that, after a general overview on the Batzen Bräu business activities, opened up on the company's experience with the introduction of Bitcoin payments, stating pros and pointing out cons with an always enthusiastic undertone on the concept of Bitcoin, an innovation that she claims to be not only important under the financial point of view, but also under the cultural one.

4.3.1 "Batzen Bräu" Company Overview

The location where the current Batzen Bräu is placed dates back to almost five centuries ago, when the old site hosted a typical inn that continued to provide catering services up to fifteen years ago, time that coincided with the ownership and management change. The new administration took over the site and pursued an improvement mission, that reached its peak five years ago with the location enlargement, thanks to the construction of a brand new business area, hosting the production site of Batzen Bräu's microbrewery[83].

Being the lunch break, dinner time and nightlife meeting place in the small city of Bolzano, Batzen Bräu does not appear to have suffered the negative effects of the economic crisis, and manages its 400 always occupied seats with the help of a close-knit staff, including 15 permanent and 35 job-on-call contract employees, working 364 days a year from 11:00 am to 01:00 am with the purpose of satisfying each customer's needs.

Serving its clients traditional meals from the Trentino Alto Adige region and some fast food dishes, Batzen Bräu enriches its product offering with a selected range of handcrafted beers, aspect representing the distinctive trait of this restaurant pub. The handcrafted beer production segment is not limited to the mere beer sale to customers in the restaurant. This core competence is reinforced through the sale of bottled handcrafted locally produced beer to severely selected partners and in the online e-commerce platform of the company, and, moreover, through the guided tours organised to the microbrewery, where participants have the possibility to witness the beer production process, from the selection of raw materials, to the production process and to the beer tasting tests, guided by the three Batzen Bräu brewmasters.

[83] Source http://www.batzen.it/it/.

The mission of the company is to be considered as the reference point of the city from the catering and spare time activities point of view. Counting on a young and talented staff, Batzen Bräu welcomes innovation and curiosity, willing to maintain the pace of the hectic generations and to always be updated on the latest trends. Not without reason, the person that introduced Bitcoin in the family business of Batzen Bräu was the young son of the owner, whose passion for the world of cryptocurrencies, was translated into a new challenge for the rest of the staff.

4.3.2 "Batzen Bräu" Business Model

Bargaining Power of Suppliers

When considering the Batzen Bräu company and the product they offer to its guests, the bargaining power of suppliers is to be considered weak because of different aspects. First of all, Batzen Bräu is a successful activity that every week is chosen by lots of local and foreign people, fact that leads the company to rely on suppliers for great amounts of goods. This aspect, that may appear to favour suppliers at a first glance, does not so, since the bargaining power of a supplier diminishes as the demand for products it supplies increases. The reason of this trade dynamic is that Batzen Bräu can nullify the collaboration or decrease the supply demand, damaging in this way the supplier's profits, if the supplier tries to modify the cooperation agreements in its favour, especially when the goods taken into consideration are easily available common products, as in the case of Batzen Bräu, offered by many other suppliers and not specific uncommon products, that can be found exclusively in the product offerings of rare companies. A great variety of suppliers and a high volume supply demand, cause the bargaining power of suppliers in the Batzen Bräu company case study to be weak.

Bargaining Power of Buyers

As for the bargaining power of buyers, in the Batzen Bräu case it is important to take into account the fact that the company does not limit itself to offer exclusively meals and standard beverages, but it gives its customers the possibility to taste their special handcrafted beer, representing the Batzen Bräu company trademark. Although Bolzano is considered the Italian capital city of handcrafted beers, the product offering peculiarity, makes Batzen Bräu a unique company, creating beers that are specific to the

raw materials and production processes used at Batzen Bräu, making it possible for the company not to face the risk of being substituted by other providers and their products and causing its customers to face moderate switching costs, given that changing provider will not guarantee them tasting the same handcrafted beer elsewhere. Following this reasoning path, the Batzen Bräu product value is very important to buyers, that would be potentially ready to pay for it even more than its actual price. Moreover, the customers' affection for the Batzen Bräu products, creates an inclination towards customer loyalty. To the importance of the product to buyers, a second aspect regarding the number of customers is to be added, since, when a company deals with a large number of clients, the individual bargaining power of each client weakens. Considering the presence of other microbreweries in the same area opposed to the product specificities and its importance to customers, the bargaining power of the buyers in the Batzen Bräu company case study is to be considered moderate.

Threat of New Entrants

New entrants have to face several costs when entering a new business. One of these costs are the capital ones, that correspond to the physical establishment costs of the land, construction, building and equipment necessary to the company for starting the business activities. In the case of new entrant companies in the Batzen Bräu business category, the costs are contained, since small to micro sized companies are the protagonists. In addition, new entrants have to afford the initial inefficiencies of economies of scale and distribution costs, that in the case of Batzen Bräu similar businesses are not very expensive and easy to overcome. What may limit the threat of new entrants are the brand awareness and customer loyalty aspects, factors that can change as the new entrant product offering confirms buyers' expectations. Due to the expressed reasons, the threat of new entrants represents a moderate force for the Batzen Bräu business model.

Threat of Substitutes

As already stated, Batzen Bräu is not the only microbrewery in the city of Bolzano. This area hosts other restaurant pubs that produce their beers onsite, even though each type of beer has its own characteristics and suits different customer tastes. Buyers that have

to choose between Batzen Bräu and other providers offering substitute products, have a fairly extended choice list, adding also the possibility of going to traditional restaurants, pub lacking beer production sites, fast food restaurants, ext.. The only aspects leveraging in the customers' choice are product quality and customer loyalty. Since Batzen Bräu can count on a large loyal client base, even if there are similar providers offering similar products, the threat of substitutes remains moderate.

Competitive Rivalry

The microbrewery industry has not still reached its market saturation point and, due to this fact, microbreweries in the area of Bolzano and Trentino Alto Adige, that can not be considered rare, but neither a common choice for a meal, face moderate competitive rivalry forces, since they represent a small number of participants in a slowly growing market segment, that create products distinguished by their own attributes and do not feel obliged to threat the market share of other companies, in order to increase their own business reach.

Facing one weak force from suppliers and four moderate forces from the other parties, Batzen Bräu is a business that distinguishes itself with a particular customer offering and has enriched it even further with the introduction of Bitcoin payments, that contribute in strengthening its brand identity.

4.3.3 “Batzen Bräu” Bitcoin Introduction Pros and Cons

The concept of cryptocurrencies and, in particular, Bitcoin was introduced at Batzen Bräu during the summer of 2017 by the young son of the owner, whose curiosity had lead him to discover this new financial instrument. The passion that followed the initial curiosity resulted in the introduction of Bitcoin as a payment method in the company. A year after the Bitcoin integration in the electronic payment alternatives at Batzen Bräu, this payment method counts on a scarce number of users and does not exceed more than 1% of the company's turnover, but it has brought into the company that breath of fresh air Batzen Bräu's mission claims to pursue, to the point that, from being just an interesting experiment, the Bitcoin e-payments are now a distinguishing trait of the company, along with the onsite beer production. At Batzen Bräu, a guest can not only just pay in BTCs, but he/she can also exchange fiat currency in BTCs at a Bitcoin ATM

available in the location, apart from receiving the help of a prepared and educated staff on cryptocurrency matters. This unexpected change in the business operations at Batzen Bräu, has generated several positive consequences. In the first place, it respects the company's mission of being young-oriented and up to date with current worldwide trends. Then, it has stimulated the curiosity of the employees, to the benefit of the company, that, informed on the concept of cryptocurrencies and trained in the usage of the specific BTC devices, have joined the group of Bitcoin users, by purchasing some of them to test their functioning. The same situation has taken place also with previously Bitcoin unaware customers, that, attracted by the Bitcoin ATM, have broken down their personal skeptical barriers, acquiring BTCs and using them for purchases. Moreover, BTC e-payments have been the cause to a new customer segment acquirement by Batzen Bräu, since local and foreign individuals using BTCs and searching for BTC accepting merchants on applications like quibitcoin.it, represent a brand new and customer loyal segment for the company, given that the merchants offering this type of service are rare and that the possibility of choice is thus quite restricted. Next to these pros, the only con reported by the Batzen Bräu representative is a technical problem. In a few words, once the customer has paid in BTCs, the Bitcoin POS device does not issue any type of receipt, useful for the customer to keep physical track of the BTC payments made and for the cashier to present at the end of the evening at the cash register closing phase, along with the overall cash and card payments summary receipts relative to the closing financial day. The payment confirmations are only electronic, being the amount subtraction from the customer’s BTC wallet and the same amount’s addition to the company's BTC wallet. The only receipt the customer receives at the end of the transaction is a bill of sale with the relative euro amount of the BTC payment. Despite everything, the final opinion on Bitcoin e-payments by Batzen Bräu is a positive one and the company will continue making this alternative payment method available to its customers.

4.4 “Mani al Cielo 2.0” Case Study

Merchant Name	Mani al Cielo 2.0
Interview Representative	Giampaolo Rossi
Active Since	2014
Location	Rovereto (province of Trento)
Merchant Category	Catering
Employees	6
Year of Bitcoin Adoption	2015
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<3% Turnover
Bitcoin Customers	35-50 years old, Educated, Income Possessors, Curious, Willpower to get informed
Main BTC Advantage	Low Fees for Merchants and Press Recognition
Main BTC Disadvantage	None

The "Mani al Cielo 2.0" case study is the analysis of objective facts and personal opinions expressed by Giampaolo Rossi, the company representative, during the educational interview, in which a mutual exchange of views drew up the picture of the "Mani al Cielo 2.0" business model, and the company's obstacles and hopes on the technological, economic and social innovation brought by the Bitcoin framework, regarded by the company as the catalyst for change and the improvement driver in our society.

4.4.1 “Mani al Cielo 2.0” Company Overview

The new management of the location guided by Giampaolo dates back to August 2014, month in which the launch of the Mani al Cielo 2.0 wine bar took place. The place is a classical bar, proposing to its guests a variety of non alcoholic and alcoholic drinks, without entering the field of meals providing and narrowing, in this way, the company product and service offering, that, although limited in choice, has an excellent quality, because the attention and passion of the owner and employees are all channelled in one unique aim and direction[84].

Active 365 days per year, Mani al Cielo 2.0 has its business operations implemented by a restrained staff of 6 people, some full-time and others part-time employed. The

[84] Source http://manialcielorovereto.com/.

location reflects a modern design, that is not represented only in the physical aspect of the building, but also in the business philosophy of the owner and his staff.

The mission of the company is representing a meeting point in Rovereto, the town the building is located in, for locals and tourists by gaining customers and securing their loyalty to the brand. This purpose is achieved through the use of various expedients. One of them is the company smartphone application, where clients can register themselves and have access through their personal account to an online e-commerce platform for purchasing and paying, also in Bitcoin, the acquired products and collecting a series of bonuses for their purchases, that give them the possibility to receive a gift on the basis of the bonus points collected. Another expedient is the launch of Bitcoin e-payments, an aspect that has not only caused Mani al Cielo 2.0 to gain a new customer segment using Bitcoins, but also a second customer segment not using Bitcoins, but curious to see how they work.

4.4.2 “Mani al Cielo 2.0” Business Model

Bargaining Power of Suppliers

Suppliers providing the company the necessary products exercise a weak bargaining power, representing the effect of some dynamics in the suppliers’ partnerships with companies. In the market segment Mani al Cielo 2.0 belongs to, the goods used by the company are usually always available and traded by different suppliers. Since the company's switching costs from a supplier to another are low, it is very simple for a company to move from a partner to another, if the former has operated negatively in the business relationship. Furthermore, due to the successful business affairs at Mani al Cielo 2.0, the company orders large volumes of products to suppliers, whose bargaining power is reconfirmed to be weak, because, even in this case, suppliers can not risk to have the partnership concluded, due to the high costs they would face in case the business relations ended.

Bargaining Power of Buyers

In the Mani al Cielo 2.0 case, clients exercise a strong bargaining power. Even though the bar deals with a large number of customers, whose quantity influences the

bargaining power intensity, in the sense that many customers limit the bargaining power that can be exercised by the single individual, the ability of this category of the Mani al Cielo 2.0 business ecosystem to condition the company's commercial behaviour stays high. This happens because the type of product under consideration is not essential for the buyers and customers do not require any kind of particular specialisation of the product, making it a not indispensable and a customisation-free product, that, apart from being proposed by other businesses, deals with the threat of many substitute products.

Threat of New Entrants

New companies entering the Mani al Cielo 2.0 industry segment represent a moderate force the company has to address in its business strategies. The business establishment initial costs added to the starting small economies of scale losses position themselves in a scale of investments corresponding to the ones borne by small and micro sized firms and for this reason considered to be still affordable with respect to large entity investments. The business aspects limiting the threat of new entrants for Mani al Cielo 2.0 are the ones related to brand development and customer attraction, areas in which Mani al Cielo 2.0 has managed to reach and protect a stable and flourishing position, but that can be jeopardised by new entries investing and working hard on brand development and a loyal customer base creation.

Threat of Substitutes

Substitute products have to occupy the main position in the priority list of industry threats addressed by Mani al Cielo 2.0 because of the strong force exercised by them in the company's affirmation matters. The causes easing this threat are the availability in the market of a great variety of potential substitutes to the Mani al Cielo 2.0 products, the low costs of these substitute products and the low switching costs the customers are subjected to when moving on to products offered by companies making affairs difficult for Mani al Cielo 2.0. It is sufficient to think of the numerous restaurants, pubs, supermarkets, shopping centres and vending machines, that, despite not being positioned in the bar category, sell to the same segment of buyers the same and/or similar products at competitive prices. It is clear that, in this picture, customers are

subject to low switching costs and their final choice depends mainly on the distance convenience and atmosphere the client is in search for.

Competitive Rivalry

Competition is one of the strong forces Mani al Cielo 2.0 has to face. The great array of business categories involving a large number of participant companies with different sizes, strategies and specialities that propose to buyers alternatives to the Mani al Cielo 2.0 product offering, represent a highly competitive environment the firm has to deal with daily. The low switching costs making the customer shift from a business to another an affordable action added to the slow growth rate of the industry forcing companies to make profit by stealing market share to other network members, transform competitive rivalry into one of the most dangerous threats in the Mani al Cielo 2.0 road to success.

With three strong forces threatening its business ecosystem represented by buyers, substitutes and rivalry, the moderate force of new entrants and the weak force of suppliers, Mani al Cielo 2.0 operates in a risky business environment, where the only way to reach success is assuring customers a personalized atmosphere and specific services whose aim is to ensure to the company customer loyalty, purpose that is fulfilled at the present with the help of a distinguishing atmosphere of the location, a mobile phone application recognising bonuses to loyal customers and the introduction of the additional service of Bitcoin payments.

4.4.3 “Mani al Cielo 2.0” Bitcoin Introduction Pros & Cons

The Mani al Cielo 2.0 company owner and official representative Giampaolo Rossi was introduced to the world of cryptocurrencies in the beginning of year 2015 and, a few months later, in January 2015 decided to incorporate Bitcoin in the payment system of the business, as confirmed by him, partially for curiosity and partially for fun. Trading in his private life also other cryptocurrencies, Giampaolo Rossi works exclusively with Bitcoin in his business and is not inclined to embed other altcoins as far as the Mani al Cielo 2.0 electronic payment methods are concerned, since Bitcoin is regarded by him as the currency of the future and there is no other currency at the moment that can compare to it.

Registering almost the 3% of its income in BTCs, Mani al Cielo 2.0 is to be considered one of the most efficient businesses when taking into account Bitcoin payments, situation that is in part owed to the fact that the business run by Giampaolo Rossi was one of the first companies to adopt Bitcoin and to profit from all the advantages early adopters benefit from. In the last months the Bitcoin transactions have slightly decreased in number, due to the significant Bitcoin price downfall that has lead users to avoid Bitcoin spending and consider the cryptocurrency as an investment asset, more than a payment instrument, situation equally perceived also by other merchants presented in this section[85]. The wine bar owns also a Bitcoin ATM where customers can exchange traditional currency for BTCs and offers its clients the possibility to pay for products purchased in BTCs, both online, through a downloadable application including an e-commerce platform, and onsite, through a payment software installed in every POS device registering the payment in the buyer's and business's Bitcoin wallets and sending confirmation receipts by e-mail and by Telegram. As in the Batzen Bräu case, customers receive a bill of sale stating the purchase amount in euros in respect of tax regulations. A rather interesting fact is the company sometimes paying in BTC invoices to its suppliers and offering a 20% discount to customers choosing to pay in BTC to promote this new type of payment method.

At Mani al Cielo 2.0, Bitcoin is considered an authentic revolution under three points of view: the technological one, the speculative one and the philosophical one, making it possible for Bitcoin users to benefit from the use of an innovative technology, to take advantage from the price volatility of the currency by controlling the currency's private trading in order to gain profits from coin exchanges, and to join an avant-gardist community that is trying to overturn the present centralised rigid financial system. Based on the power of advanced technology and human mind, Bitcoin, differently from other monetary systems, creates an infinite number of potential situations, where probabilities of a situation to take place with respect to another one depend on the use the single individual makes of his/her Bitcoin units.

[85] Kharpal A., *Over $60 Billion Wiped Off Value of Cryptocurrencies as Bitcoin Drops Below $8,000 Again*, Cnbc.com, 2018.

The population segment mostly using BTCs in this company is aged between 35-50 years of age, including individuals who are employed and in possess of a disposable income to invest in cryptocurrency trading and not only with a good education background, but also with a lot of curiosity and willpower to get informed and involved in the trading of this original currency. Not mentioning any business disadvantage with respect to the adoption of Bitcoin, Mani al Cielo 2.0 has exclusively run only into advantages with the introduction of Bitcoin, such as the economic advantage of bypassing third party authorities and saving on merchant fees, since in the BTC transactions the fees are paid only by the payers and not also by the payees as in other payment systems, and the press recognition with Mani al Cielo 2.0 being protagonist of different national and international several media reports published on newspapers and magazines and aired on television channels like Rai 3 and Italia 1. The last 3 years of Bitcoin payments acceptance, have brought mutual benefits both to Mani al Cielo 2.0 and to BTC users, in a network, still resisting to a universal adoption process and accusing prejudices just as in the first era of internet adoption, where curiosity and a constant search of information are the community's vital aspects, while laziness and illicit use represent the void where the innovation of this technology may disappear into.

4.5 “Impact Hub Trentino” Case Study

Merchant Name	Impact Hub Trentino
Interview Representative	Alessio Salvetti
Active Since	2010
Location	Trento
Merchant Category	Services
Employees	10
Year of Bitcoin Adoption	2015
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	Philosophically Concerned, Curious, Leveraging on Price Volatility
Main BTC Advantage	Broader Customer Base
Main BTC Disadvantage	Future Possible Retroactive BTC Regulation

The Impact Hub Trentino case study is based on the interview conducted to Alessio Salvetti, partner and board member of Impact Hub Trentino representing it in this research section and one of the most important authorities in the Italian Bitcoin network, being co-founder and board member of Bcademy, the Italian Bitcoin Academy offering educational courses for companies and institutions entering the Bitcoin ecosystem, and co-founder of Inbitcoin, the Rovereto headquartered company developing services and products for entities accepting Bitcoin payments. Being with no doubt a Bitcoin enthusiast, Alessio Salvetti describes the Bitcoin introduction effects on Impact Hub Trentino, analysing the pros and cons of the technology and making assumptions on the Bitcoin state in the near future.

4.5.1 “Impact Hub Trentino” Company Overview

Founded in 2005 in Vienna, Impact Hub is an international network of community centers widespread in more than 100 different locations across global countries and counting almost 17,000 members whose mission is to promote startup initiatives, drive business development and offer co-working spaces in order to improve business concepts and foster entrepreneurship.

The Trento based hub, being the one taken into consideration in this case study, was launched in 2010 and is managed by a fixed staff of 10 employees, relying on the support of other collaborators when needed[86].

The company focuses on three distinguished business fields, controlled by different staff members. The first field is supervised by the vice president of the company and coincides with the business area dedicated to the modern and comfortable open space rental operations in favour of single individuals, firms, institutions and associations requiring locations for co-working purposes. The second field is monitored by the company president and concentrates its activities in the development of the Impact Hub network in the Italian territory, where municipalities willing to join the network have to make available the locations and the Impact Hub Trentino staff members have to provide training courses to the newly launched hubs so that they can perfectly work independently once the training will be ended. The third field is managed by the interviewee and includes all the operations dealing with business training and consultancy for entrepreneurs searching for advice on how to collect funds and fulfill the project of creating a startup and for companies facing a difficult financial crisis and trying to understand the reasons behind it in order to solve them and go ahead with their business objectives.

Covering a wide array of business areas from educational courses for entrepreneurs, startups and up-to-date companies, to co-working office rentals to optimise the use of space and foster cooperation among brilliant minds, and consultancy activities for struggling companies and firms willing to innovate, Impact Hub Trentino masters its business operations both on a B2C and on a B2B level, with the aim of fostering an always informed and original business environment.

4.5.2 "Impact Hub Trentino" Business Model

Bargaining Power of Suppliers

The core business of Impact Hub Trentino is a relatively new form of business that revolves around the concept of sharing economy, which has become popular in the last years with the success of companies like Airbnb, renting accomodations owned usually

[86] Source https://trento.impacthub.net/.

by private individuals, and Uber, a private car transport service. When dealing with Impact Hub Trentino, the companies supplying pieces of furniture for the spaces inside the location represent a weak force in the list of parties to address to in the company's business strategies. This is due to the fact that the goods provided are long-term lasting ones not needing to be replaced often and not requiring any particular specificities, making Impact Hub Trentino a business relying very little on external suppliers.

Bargaining Power of Buyers

Buyers requiring services and products offered by Impact Hub Trentino exercise a moderate force to be addressed in the strategies of the company, due to the final observations settled by the analysis of the customers' bargaining power considering the distinction of the company's services into two different segments: a first one proposing training and consultancy courses and a second one making available modern spaces for co-working sessions. In the first case, buyers face relatively low switching costs, because of the existence of other substitute products, while in the second case, the clients face high switching costs, because of the limited suppliers and substitute products available in the market and the importance the service and/or product exercises on the customer, making it more difficult for buyers to switch from one option to another without losing out.

Threat of New Entrants

New entrants joining the business area Impact Hub Trentino belongs to, engage firstly in business space and equipment costs, that are affordable in the case of small to micro sized companies like Impact Hub Trentino. Secondly, apart from initial network distribution and inefficiency of economies of scale issues, another cost category that interests the new companies planning to enter the market is the brand development one, since buyers tend to be related to a sentiment of brand loyalty and when the product differentiation concept is dear to customers, switching costs decrease with an inversely proportional trend with respect to service quality and brand development standards the company works upon. For those reasons, the force characterising the threat of new entrants in the Impact Hub case is moderate.

Threat of Substitutes

Impact Hub Trentino offers to its clients a complete bundle of services and products that range from the space rental services for hosting business meetings, to educational and professional advice services available for businesses in need of external help. There are several alternative services that can be substituted to each of the single services proposed by the Trento based company, but almost none of them is able to provide the full package to the final customer. This fact makes the Impact Hub Trentino offering a differentiated one, that may be valued economically more than other solutions due to the service quality and limited quantity number of substitute products it bears. Buyers will then have a broader choice when searching for substitutes to educational and professional advice services, but a limited choice when it comes to space rental services, turning the force relative to the threat of substitutes in this company case into a moderate one.

Competitive Rivalry

The intensity of the existing rivalry represents a moderate force in the Impact Hub Trentino case, as a result of two distinguished business aspects. When considering the business training and consultancy services, the company is subject to the competition of several other firms, including the Big Four ones, that occupy a definite position in the moderately large industry segment speeding up its growth rate, but making it difficult for participants to increase their market share because of the important brand awareness standard and more well-known companies rely upon. When considering the space rental services, Impact Hub Trentino does not suffer the competition of many other firms, because of the small number of potential companies competing in the same business category. Even though in this business field the industry size is still small and the industry growth rate can not be considered fast, Impact Hub Trentino still manages to develop its customer base in a low competition business environment, leveraging on the absence of other companies offering the same and/or closely similar services and products and confirming, in this way, itself as a market leader. Mixing up the two business aspects at Impact Hub Trentino, it can be concluded that the overall competitive rivalry intensity is a moderate force the company has to address.

Being subject to the weak force of suppliers and to the moderate forces of the other participants in the business network, Impact Hub Trentino leverages on its complete service and product package that includes different option bundles able to cover a varied customer base, including not only Bitcoin payers, but mostly Bitcoin believers, as in the case of the Inbitcoin company, that used to organise meetings with partners at one of the Inbitcoin dedicated halls on rental, as referred by Alessio Salvetti.

4.5.3 “Impact Hub Trentino” Bitcoin Introduction Pros & Cons

Bitcoin was introduced in Impact Hub Trentino in 2015 and it has since then been used by customers to pay for small amount purchases as printing and food and beverages vending machine services placed onsite. Aside from the individual amount entity of these transactions, also the overall number of transactions occurred is confirmed to have been low, representing a minimal part of the yearly final income of the company. In addition to the point of sale Bitcoin customised devices, Impact Hub Trentino once owned a Bitcoin ATM, that was given back to the Inbitcoin company, which in turn placed it into one of the different Comproeuro stores, belonging to the Comproeuro franchising network and supplying individual and company services to those who want to get introduced to the Bitcoin world. Alessio Salvetti, just like Giampaolo Rossi from the "Mani al Cielo 2.0" case study did, compares the Bitcoin technology to the Internet one in its first years of adoption, when the majority of the population felt suspicious about this new technological innovation and wrongly claimed it was used exclusively for illicit and immoral purposes, but it soon turned out to be one of the most mind-blowing technological revelations the world could have ever known and nowadays it is not even imaginable a world without the Internet. Bitcoin using customers at Impact Hub Trentino are described by the interviewee as individuals who are aware of the current political and economic situation and want to reinforce the Bitcoin ecosystem as a response. Even though a part of Bitcoin users is more responsive to political and economic matters, another one includes those Bitcoin users that are curious and attracted by the originality of its technology and want to experiment how it works. Lastly, there is a part of Bitcoin users that spend them to benefit from the value increase BTC has been subject to in the past. While one of the most important Bitcoin advantages for buyers is the privacy level ensured by its software, the most important

advantages merchants accepting Bitcoin e-payments benefit from, as expressed by Alessio Salvetti, are the increase in the customer base with the entrance in the system of new members that would not have been customers of Impact Hub Trentino if it had not been for Bitcoin, and, apart from the marketing reason already explained, the conversion in the functionality of the Bitcoin cryptocurrency from an investment asset to an official method of payment, even though the overall impact of Bitcoin transactions on the final company turnover is still low and static, due to the limited Bitcoin user base caused by the lack of general consensus of international and national governmental authorities towards this technology. In the optimistic view of the Bitcoin ecosystem the interviewee trusts in, in opposition to the numerous advantages, the only disadvantage a merchant could suffer from is a contingent retroactive Bitcoin-centered legislation trying to regulate the cryptocurrency at the expense of the Bitcoin community.

4.6 "Fabbrica di Pedavena Levico" Case Study

Merchant Name	**Fabbrica di Pedavena Levico**
Interview Representative	Carlo Alberto Nardelli
Active Since	2015
Location	Levico Terme (province of Trento)
Merchant Category	Catering
Employees	37
Year of Bitcoin Adoption	2017
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	25-40 years old
Main BTC Advantage	Bitcoin Price Revaluation
Main BTC Disadvantage	None

This case study is based on the interview submitted to Carlo Alberto Nardelli, the entrepreneur at the head of Fabbrica di Pedavena Levico. The interview questions are structured in order to present a picture on the general information of the company, on the relationships of the company with its suppliers, buyers, competitors, new entrants and substitute services and products, and on the pros and cons the business has encountered from the Bitcoin embedment in its payment system.

4.6.1 "Fabbrica di Pedavena Levico" Company Overview

Fabbrica di Pedavena Levico is one of the branches belonging to the Fabbrica di Pedavena brand located in the municipality of Levico Terme. The parent company controls a franchising owning more than 12 Fabbrica di Pedavena locations in Northern Italy and the one taken into consideration in this case study was founded in 2015[87].

The company seems to be strictly related to the catering aspect of the business, but the same location hosts also a hotel, creating in this way a complete and convenient product offering for local residents, tourists visiting the area or travellers making a stop and searching for a place to stay overnight during a longer journey. Confiding in the devoted collaboration of a total number of 37 employers, Fabbrica di Pedavena Levico offers to its clients an alehouse and pub in the ground floor of its building, where customers can taste fast food and traditional regional cuisines, a hotel with 45 rooms build upon the pub, conceived for travellers visiting the region of Trentino Alto Adige, and night entertainment in some days of the week, as an alternative to the other few options in the nightlife activities of the area.

4.6.2 "Fabbrica di Pedavena Levico" Business Model

Bargaining Power of Suppliers

The suppliers' force in influencing the business relationship with the company requiring their services and products is weak in the case of the suppliers of Fabbrica di Pedavena Levico. The goods the company requests are provided by many other suppliers and are goods that do not have specific characteristics, but are easily findable in the market. These factors tend to reduce the commercial power of suppliers in the business agreement with the company, that can be undermined due to the low switching costs Fabbrica di Pedavena Levico would face if it decided to change supplier.

Bargaining Power of Buyers

Buyers benefitting from services and products offered by Fabbrica di Pedavena exert a moderate force in the business ecosystem of the company. When talking about the hotel

[87] Source http://www.fabbricadipedavenalevico.it/.

and pub services, buyers have the possibility to choose from a considerable range of similar proposals in the same area, but, when it comes to the night entertainment products, the area does not offer much choice in the matter and the nightlife offer of Fabbrica di Pedavena Levico is placed in the first choice positions of buyers. It is also to be taken into account the fact that the company proposes to its potential customers a full package product, with the hotel, pub and night area all located in the same building and, thus, representing a very comfortable choice for more demanding clients. Strong, when considering the hotel and pub products, the bargaining power of buyers turns out to be weaker, when the nightlife and full package service products are concerned, channelling the buyers' choice into the Fabbrica di Pedavena Levico business proposal.

Threat of New Entrants

Establishing a successful business in the hotel and catering market is expensive if the new entrant wants to place itself in the high-end market segment, but, if the new entrant settles for a more modest placement, the costs of doing business are cheaper and more affordable. What makes the difference in this situation is the ability to create and develop a strong brand, whose task will be to identify and distinguish the new entrant from other companies that have joined the network many years before and lead an affirmed business also thanks to their longer time existence. New entrants, therefore, may represent a moderate force in a market in which entrance costs can be offset by the economic advantages of a strong brand identity.

Threat of Substitutes

Substitutes are difficult to be identified when the night enternainment and full product package of Fabbrica di Pedavena Levico are concerned, but, when the hotel and catering products are analysed individually, substitute products are more common than in the first case. Mixing up the two aspects of the threat in question, it can be concluded that the final threat substitute products are causing to the company is a moderate one.

Competitive Rivalry

Leaving aside the nightlife options given by the company, the competitive rivalry is a strong force that Fabbrica di Pedavena Levico has to address in its everyday business

operations, trying to customise and improve the quality of its products and to build a significant brand loyalty sentiment in its customers in order to be able to challenge competitiveness in an extremely touristic area where hotels, restaurants and pubs struggle to gain market share.

In the case of Fabbrica di Pedavena Levico, the moderate forces exerted by buyers, new entrants and substitute services and products, are combined with the weak force of suppliers and the strong force of competitive rivalry in a business context where diversification is necessary to be distinguished and preferred to competitors and Fabbrica di Pedavena Levico manages to reach this objective by not limiting business operations exclusively to the catering service, but extending them also to the hotel one, matching to these distinctive products also the extra service of Bitcoin payments offered to customers.

4.6.3 "Fabbrica di Pedavena Levico" Bitcoin Introduction Pros & Cons

The Bitcoin philosophy was embraced by the Fabbrica Pedavena Levico staff in 2017, two years after the branch establishment. From a personal interest of the owner, who had become acquainted with the Bitcoin technology and had started trading cryptocurrencies, the inclination to Bitcoin turned out to be more than an individual curiosity, when Bitcoin payments, combined with other less preferred altcoin payments, started being recognised by the company. Although accepted as a form of payment in all of the company's activities, being pub, hotel and night entertainment, the Bitcoin payment method has been used only by the pub attending clients. The Bitcoin transactions at Fabbrica di Pedavena Levico since its introduction in the payment system of the company are not numerous if compared to standard transactions: in the last two years the business refers to have received more or less 40 transactions in BTC. The Bitcoin e-payments user base is very diverse and, apart from the typical user base age that is confirmed to be placed between 25 to 40 years of age, there are no common characteristics under which clients can be grouped. Joining the Bitcoin merchant community permits participants not only to receive BTC payments, but also to make them, as in the case of Fabbrica di Pedavena Levico that sometimes pays its suppliers in Bitcoin, as in the case of DJs being given their cachet for night entertainment evenings in BTC. The most important advantage regarding Bitcoin payments for the merchant

taken into account is the currency revaluation, fact that constitutes a real benefit for the company when the Bitcoin price increases, rising the merchant's BTCs owned monetary value, that may have had a value x the day before, when the customer purchased the company's goods, but that will have a value x+y when the currency price will go up, always considering the situation in which the company holds the Bitcoin units received in its wallet, without transforming them in euros. Fabbrica di Pedavena Levico does not mention disadvantages merchants could face with the adoption of Bitcoin, but, it steps into customers' shoes to analyse possible disadvantages they may encounter, concluding that the major problem is related to the high fees buyers have to pay when making micropayments, since the fees are not very different between a micro and a macro payment, making it inconvinient to use BTCs for processing micropayments. Even if doubtful on the future of Bitcoin, Fabbrica di Pedavena Levico confirms it will continue in its path of support and use of the Bitcoin technology, hoping that in the future it will be seen less as an investment asset and more as a normal currency.

4.7 "Golf & Country Südtirol" Case Study

Merchant Name	**Golf & Country Südtirol**
Interview Representative	Ruppert Giuliani
Active Since	2015 (golf fields) and 2017 (hotel and restaurant)
Location	Appiano sulla Strada del Vino (province of Bolzano)
Merchant Category	Sport, Tourism and Catering
Employees	50
Year of Bitcoin Adoption	2017
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	Mostly Tourists
Main BTC Advantage	Broader Customer Base and Greater Visibility
Main BTC Disadvantage	Bitcoin Price Volatility

The Golf & Country Südtirol representative Ruppert Giuliani, made a valuable contribution for this thesis with his participation in the case studies initiative and the important information he gave on a generic and company specific point of view regarding the Bitcoin topic, ranging from internal and external company dynamics to the speculative and financial aspects of Bitcoin.

4.7.1 "Golf & Country Südtirol" Company Overview

The Golf & Country Südtirol is a facility located in the municipality of Appiano sulla Strada del Vino in the Bolzano province. In 2015 the location inaugurated the Eppan and Carezza Golf Clubs and in 2017 the company enriched its service and product offering to its customers with the opening of the Lodge Hotel, Grill House Restaurant and Wine Bar[88]. The company succeeds in satisfying the needs of its customers with the fundamental help of its 50 employees and deals both with individual clients visiting the location during leisure trips and company clients choosing the location to organise conferences, meetings and conventions in its Conference hall. The main aim of Golf & Country Südtirol is to offer its customers all the necessary services for a trip to its golf field. Moreover, the company extends its product offering with the Conference Hall equipped with all the necessary services for hosting professional conferences, including in its customer base not only a B2C type of business, but also a B2B one.

4.7.2 "Golf & Country Südtirol" Business Model

Bargaining Power of Suppliers

Suppliers' bargaining power in the case of Golf & Country Südtirol is a weak one due to the fact that the goods they supply to the company are common ones and that the suppliers have to adjust their contract requirements in respect of the company's needs and requests because of the competition they face in the field and the low switching costs the firm would face in case it decided to consider changing supplier.

Bargaining Power of Buyers

The region of Trentino Alto Adige hosts different golf clubs and this reason influences the strength of the bargaining power buyers have for Golf & Country Südtirol, because of the sufficient range of available alternatives they can choose from. By the way the product category taken into consideration is a specific one that has a significant value for the customer and the client may prefer one location with respect to another due to the product quality the company offers and considering the high product quality at Golf & Country Südtirol, the bargaining power of buyers is a moderate strength.

[88] Source https://golfandcountry.it/.

Threat of New Entrants

Entering the Golf & Country Südtirol business field is a not insignificant financial commitment a company has to face, that added to the brand establishment prerogative consitutes an important financial investment the company undertakes and for this reason the threat of new entrants is a weak one.

Threat of Substitutes

There are different sport alternatives in the region of Trentino Alto Adige, but a buyer enthusiastic about golf is not inclined to opt for other alternatives, neither golf related ones, since he/she gives a high importance to the product quality and is completely aware of the most suitable location for his/her needs. In this case the threat of substitutes is moderate. When leaving aside the golf facility and considering the restaurant one, the threat of substitutes the company faces is strong, since customers may choose other restaurants, pubs or fast foods able to satisfy the same needs in the same area.

Competitive Rivalry

As previously stated, there are different golf facilites in Trentino Alto Adige that are competing with Golf & Country Südtirol in the same business sector. This rivalry is partially cushioned by the fact that a customer choosing a golf structure does not opt casually for it, but values the service quality each structure offers. This fact softens the competitive rivalry force making it moderate for Golf & Country Südtirol.

Suppliers and new entrants have a weak bargaining force in the business environment Golf & Country Südtirol operates in, that is added to the moderate forces of buyers, competitors and substitute services, in a field where product quality is highly valued by customers and where the company offering a complete range of services to demanding customers, including Bitcoin payments, is preferred to other companies operating in the same sector.

4.7.3 "Golf & Country Südtirol" Bitcoin Introduction Pros & Cons

Golf & Country Südtirol accepts at the present three types of cryptocurrency payments: Bitcoin, Ethereum and Litecoin ones. These new methods of payment were introduced in the company in 2017 and can be used by customers to pay for services and products in the hotel, restaurant and golf facilities of the company. The introduction of cryptocoin payments at Golf & Country Südtirol was an initiative and decision of the company director that, fascinated by the blockchain technology and having invested in Bitcoins and other altcoins previously, chose to insert this payment option in his company to fulfill his vision on cryptocurrencies and give the customers an additional alternative for processing their payments. The company not only accepts these alternative payments, but also owns a Bitcoin ATM in the location, where individuals can purchase BTCs or at least get interested in the Bitcoin world by becoming curious on the sense of the device. Buyers paying in cryptocurrencies at Golf & Country Südtirol, usually choose the Bitcon option and do not have any particular distinctive common traits apart from the fact that they are mostly turists and not local residents. The number of cryptocurrency transactions processed by the company does not reach the threshold of 100 and, although they do not represent a significant share of the company income, they play the role of an important step in the process of the Bitcoin philosophy acquisition in the Trentino Alto Adige society. At Golf & Country Südtirol the Bitcoin transactions reached their peak during Christmas holidays, when the peak of tourists visiting the region matched with the peak in the Bitcoin price, but at the moment, after the Bitcoin price heavy decline, Bitcoin transactions continue to take place, but sporadically. The advantages brought by Bitcoin in the company are a new customer base acquisition and greater visibility due to the fact that the company name is present in many platforms listing companies that accept cryptocurrency payments, apart from the fact that this new payment method can be considered an alternative customers can choose from for their payments. Another advantage for Golf & Country Südtirol due to their participation in the Bitcoin community is represented by companies and associations organising meetings on the Bitcoin topic choosing the Golf & Country Südtirol Conference Hall to host them, because they are aware of the fact that the company has embraced the Bitcoin philosophy and want to award it, sometimes even paying for the services in BTCs. The only disadvantage caused by Bitcoin payments at

Golf & Country Südtirol was the volatility in the Bitcoin price that mattered once, when BTC payments received by customers were not converted in euros by the company and a total payment of x euros cashed in a definite day, could have an x-y value the day after, with y representing the decrease in the Bitcoin price. Recently, the company has decided to convert Bitcoin payments cashed in euros, so this disadvantage does not represent a threat anymore. As from the point of view of the customer, once the transaction is concluded, he/she receives a bill of sale with the equivalent amount in euros. Introduced in the company because of the passion for the world of cryptocurrencies of the company representative, at the present Bitcoin transactions have not yet had the possibility of gaining the largest share of public's interest, but the direction team at Fabbrica di Pedavena Levico hopes this aspect will be solved in the future, so that Bitcoin will stop ceasing to be just an aspiration, and will become a certain matter of fact.

4.8 "Ristorante Il Doge" Case Study

Merchant Name	**Ristorante Il Doge**
Interview Representative	Giancarlo Cipriani
Active Since	2011
Location	Rovereto (province of Trento)
Merchant Category	Catering
Employees	5
Year of Bitcoin Adoption	2017
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	Mostly Tourists
Main BTC Advantage	Extra Service for the Customer
Main BTC Disadvantage	Bitcoin Price Volatility

The Ristorante Il Doge case study starts with an overview on the services and products the company offers to its customers and continues with an analysis of the business model of the firm based on the bargaining power strength its suppliers, buyers, possible new entrants, substitutes and competitors exercise on the company. Subsequently the topic on the acceptance of Bitcoin payments is considered along with the advantages and disadvantages it has generated in the company's dynamics. This study has been

made possible thanks to the interview with the director of the Ristorante Il Doge Giancarlo Cipriani.

4.8.1 "Ristorante Il Doge" Company Overview

Ristorante Il Doge started its business in 2011 in a peculiar and exclusive location built in the crypts of the Church of the Redeemer, dating back to 1654, in the municipality of Rovereto[89]. The company, relying on the collaboration of 5 employees, is a successful restaurant with a capacity of 50 seats that focuses its core business on the premium quality of the ingredients used in the preparation of the meals. Making available its services for the clients both on the lunch and dinner time, Ristorante Il Doge gains its customer loyalty with an attentive service and its fresh and unique dishes from meat, fish or vegetarian based cuisines. If "fresh ingredients" is a frequently used locution by caterers, in the case of Ristorante Il Doge it is an attested reality, since the company works exclusively with small framed refrigerators, so that ingredients can not be preserved for more than a 24 hours time lapse. Despite these assumptions, the customer base of Ristorante Il Doge does not have necessarily a high-end positioning, since the company is chosen also by medium-end customers, usually tourists for the 70% and locals for a share of 30%, with the common desire of tasting premium quality food in a particular location.

4.8.2 "Ristorante Il Doge" Business Model

Bargaining Power of Suppliers

Just like in the other case studies involving companies working in the catering business segment, also in this case the bargaining power of suppliers is weak, because the products supplied are easily available and offered by many other suppliers operating in the catering field, so that a company not satisfied with the services offered by its present supplier, can easily shift to other collaborations with new suppliers without facing significant costs.

[89] Source http://www.ristorantedoge.it/.

Bargaining Power of Buyers

In the case of Ristorante Il Doge, buyers have a weak bargaining power, since customers requiring the product typology proposed by this company may not be able to find it easily also in other locations. Other alternative options that could compete with the product offering of Ristorante Il Doge have to pay great attention to the freshness and quality of ingredients used and to include in the product offering also vegetarian cuisine, duo that is not commonly adopted by a wide range of restaurants.

Threat of New Entrants

The initial capital investment required in joining the medium-end catering field is not a heavy financial commitment and can be faced with a not impossible effort by small to micro sized companies willing to engage in the catering business segment. Aside from the investment costs and the initial difficulties in establishing a successful process of operations avoiding heavy losses due to the sunk and economies of scale costs, the new entrants have to concentrate also in the brand development and customer loyalty acquisition aspects in order for their businesses to improve their incomes and be preferred to other substitute options for the quality of the products they offer. For the previously mentioned reasons, the threat of new entrants in this case is moderate.

Threat of Substitutes

Recalling the reasons stated to justify the weak bargaining power of buyers in the Ristorante Il Doge business model, the threat of substitutes equally represents a weak force for this company, since the services and products offered by the company are not adopted by many other businesses operating in the catering field and the customers' switching costs may be relatively high when switching to other catering services, because of the high value buyers are used to associate to particular products like the ones proposed by Ristorante Il Doge.

Competitive Rivalry

As already mentioned in the analysis of the bargaining power of buyers and the threat of substitutes, the competitive rivalry faced by Ristorante Il Doge is a weak one, because

of the scarcity of businesses offering to buyers the vegetarian and ingredients' premium quality options the company taken into consideration in this section does.

Dominating the specific catering category it operates in, Ristorante Il Doge is weakly threatened by the suppliers', buyers', substitutes' and competitors' parties and it is subject to the moderate force of new entrants, in a business segment that requires high level quality of ingredients and an attentive service to customers, enhanced with the acceptance of Bitcoin payments in this case, in order to satisfy clients' needs.

4.8.3 "Ristorante Il Doge" Bitcoin Introduction Pros & Cons

Ristorante Il Doge became acquainted with the Bitcoin reality in 2017, when the company director was introduced to the cryptocurrency world by the Inbitcoin company representatives that were promoting their Inbitcoin Business software to potentially interested merchants that may have integrated this new technology in their business operations to offer their customers an innovative solution with respect to the traditional payment methods. Giancarlo Cipriani was convinced by the Inbitcoin Business software presentation and decided to absorb it in the accepted payment options of the company from July 2017. Since then, Ristorante Il Doge has counted more or less 50 Bitcoin transactions by different customers having little in common with each other apart from their Bitcoin interest. Not interested in accepting payments in other cryptocurrencies, the company confirms it will continue recognising Bitcoin payments also in the future. When asked about advantages and disadvantages its business has encountered with the adoption of the new form of payment, the company representative affirms the major pro aspect is the additional possibility the company gives its customers regarding the payment options, while the main con remains the Bitcoin price volatility, that does not affect heavily Ristorante Il Doge, since the firm automatically converts the Bitcoin payments received in its bank account in the euros equivalent sum. This case study shows how a concentrated Bitcoin cluster can expand its coverage also to individuals and companies that were not involved in the Bitcoin network previously, but joined it as a result of Bitcoin related services and products' promotion, as in the case of Inbitcoin and Ristorante Il Doge. The restaurant director became interested in Bitcoin and embraced its technology exclusively for business purposes and his willingness in offering the clients the most complete range of payment options available at the present

in order to enhance customer experience at Ristorante Il Doge is demonstrated by the effort the direction team has put in promoting this new payment option, recognising also a 10% discount to those who choose to pay in BTCs.

4.9 "L'Orto di Pitagora" Case Study

Merchant Name	L'Orto di Pitagora
Interview Representative	Igor Bontadi
Active Since	2013
Location	Rovereto (province of Trento)
Merchant Category	Catering
Employees	3
Year of Bitcoin Adoption	2014
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	No Specificities
Main BTC Advantage	Low Fees for Merchants
Main BTC Disadvantage	Bitcoin Price Volatility

This case study focused on the interview with Igor Bontadi, the director of the restaurant L'Orto di Pitagora, briefly analyses some considerations on the causes and effects of the adoption of Bitcoin payments in the company. Located in the region of Trentino Alto Adige and part of one of the most Bitcoin influenced municipalities of the region, L'Orto di Pitagora represents a perfect example of the business typology the Bitcoin payments have resulted to be most suitable for.

4.9.1 "L'Orto di Pitagora" Company Overview

L'Orto di Pitagora is a restaurant specialised in vegetarian and vegan cuisine and located in the historical center of the town of Rovereto in the province of Trento, that started its business in 2013. Counting only 3 employees apart from the direction team, this micro sized company is the only restaurant within 30 kilometers in the area of Rovereto to offer to the public a well-finished and top quality cuisine for tourists and residents fond of vegetarian and/or vegan cuisines and another part of the public just curious to taste them.

4.9.2 "L'Orto di Pitagora" Business Model

Bargaining Power of Suppliers

L'Orto di Pitagora is not a normal restaurant proposing traditional regional or internationally recognised dishes to its customers. The company is specialised in the preparation of vegetarian and vegan dishes, a type of cuisine that requires commercial collaborations with qualified suppliers and farmers providing respectively packaged and fresh ingredients. The suppliers able to provide these premium ingredients are limited in number and this fact causes their bargaining power to be strong in the business relations with the company. What contributes to strengthen even more their position are the low quantities of the goods requested by the small sized L'Orto di Pitagora, that tend to weaken the company's bargaining power with respect to its suppliers.

Bargaining Power of Buyers

Buyers choosing L'Orto di Pitagora over other restaurant alternatives are customers that eat exclusively vegetarian and/or vegan cuisines and people willing to taste new cuisines for curiosity. For these type of clients, the company's product offering has an extremely high value and is not easily substitutable with other products, unless they are other restaurants offering vegetarian and vegan dishes. The importance the product taken into account has for the customers and the limited choice buyers have in regard to this catering category, cause their bargaining power to be weak in favour of the company's decision-making strength.

Threat of New Entrants

The threat of new entrants is a moderate force in this specific business category. On the one hand, to enter the market, new competitors have to deal with the several initial costs of doing business, ranging from the investment ones to the ones relative to the different inefficiencies a new business encounters in the establishment path. Besides this, these costs are not heavy ones and are totally affordable by small to micro sized companies. On the other hand, the potential costs of creating a loyal customer base and a strong brand image may be more arduous to afford and the company desiring to enter the

market must be well aware of the service and product quality it is able to offer to its customers.

Threat of Substitutes

In the case of vegetarian and vegan restaurants, substitute products are not easy to find. The restaurants proposing this type of cuisines, although having become more popular in the recent years, are not yet numerous and the only available alternative for an individual wanting to dine with a vegetarian or vegan cuisine at l'Orto di Pitagora is to find another similar restaurant in the area or to buy these type of products at the supermarket and cook them by him/herself, situation that is not to be considered a perfect substitute to having a dinner out. The limited choice in valid substitutes, the high level of product differentiation taken into consideration and the generally low quality of substitutes, make the threat of substitutes for L'Orto di Pitagora relatively weak.

Competitive Rivalry

Although the industry size of restaurants specialised in vegetarian and vegan cuisines is not large, the industry growth rate is growing year by year with always more community members joining the vegetarian and vegan philosophies, even if their competitive rivalry remains at the moment weak, but it is forecasted to strengthen its force in the years to come with more people becoming vegetarian and vegan and more businesses trying to acquire a larger customer share in the market.

Being threatened by a strong suppliers' and a moderate new entrants' force, l'Orto di Pitagora counts on a customised service and product offering range, that includes the Bitcoin payment option, to weaken the influence power of buyers, substitute products and rivalry, and to establish itself in the catering business category.

4.9.3 "L'Orto di Pitagora" Bitcoin Introduction Pros & Cons

The director of L'Orto di Pitagora has always been interested in the cryptocurrency technology and, subsequently to the presentation of the Inbitcoin Business software by the Inbitcoin company, decided to introduce Bitcoin in the L'Orto di Pitagora payment options. This happened in 2014, making L'Orto di Pitagora one of the first merchants recognising Bitcoin as a method of payment. Counting more than 100 BTC transactions

from a diversified group of customers, L'Orto di Pitagora identifies in the Bitcoin technology an incredible innovation that manages to put aside the banking system and limits the exchange of financial information exclusively between the two parties involved in the business exchange, namely payers and payees. Although the company has been one of the Bitcoin e-payments first adopters, unlike Mani al Cielo 2.0, l'Orto di Pigatora has not managed to reach the same share of Bitcoin transactions with respect to the overall company turnover, probably because of the absence of a Bitcon ATM device in loco, that is proved by merchants hosting this type of device in their locations to be an authentic catalyst for potential Bitcoin users, and, by not being available at the merchant's location reduces the general number of customers paying in BTCs at l'Orto di Pitagora. This technology, that reduces drastically the cost of commissions when compared to the traditional card payment systems, represents a profitable advantage for the merchant, as confirmed by Igor Bontadi. The cons of the Bitcoin technology are the high price volatility of the cryptocoin, considering that L'Orto di Pitagora does not convert the proceeds in euros, and the longer time required to process payments when there is a significant financial movement in the cryptocurrency market due to substantial price changes. L'Orto di Pitagora accepts only Bitcoin payments and confirms its willingness to continue being part of the Bitcoin accepting merchants network in the region of Trentino Alto Adige also in the future, because it sees Bitcoin as a major value added to its business.

4.10 "Macelleria Equina Zenatti" Case Study

Merchant Name	**Macelleria Equina Zenatti**
Interview Representative	Massimo Zenatti
Active Since	1958
Location	Rovereto (province of Trento)
Merchant Category	Shops
Employees	3
Year of Bitcoin Adoption	2015
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	20-35 years old, Passion for Innovative Technologies
Main BTC Advantage	Extra Service for the Customer
Main BTC Disadvantage	Bitcoin Price Volatility

The interview to the founder and legal representative Massimo Zenatti of the Zenatti Equine Butcher Shop on a general overview of the company and an examination of the consequences the Bitcoin e-payments have generated since their introduction in the firm's business model, portray the variety in the typology and activity fields of the merchants that have joined the Bitcoin Cluster in the region of Trentino Alto Adige, ranging from simple butcher shops to more complex structures as in the case of the previously analysed Golf & Country Südtirol.

4.10.1 "Macelleria Equina Zenatti" Company Overview

Boasting a 60 years old history, the Zenatti Equine Butcher Shop is a Rovereto based family-operated business. It is the only butchery selling equine meat in the region of Trentino Alto Adige and it perfects this market advantage by providing first quality ingredients thought for all possible consumer groups from funny framed meat varieties intended for children to the smoked equine meat belonging to the Slow Food Ark of Taste, selecting small-scale quality productions worldwide[90]. Working both on a B2C and a B2B business level, the company intertwines commercial trade collaborations with individual customers, restaurants, pubs and cafeterias, creating a small-size market in the region of Trentino Alto Adige for the sale of premium quality equine meat.

4.10.2 "Macelleria Equina Zenatti" Business Model

Bargaining Power of Suppliers

The bargaining power of suppliers in the case of the Zenatti Equine Butcher Shop is strong, since the number of suppliers able to provide high quality equine meat in the region of Trentino Alto Adige is limited and the company could face high switching costs in case it switched from a certain supplier to another.

Bargaining Power of Buyers

Buyers exercise a weak bargaining power in this case, since the business run by the Zenatti family is a unique one in the region of Trentino Alto Adige and consumers requiring this specific meat variety are obliged to refer to the Zenatti Equine Butcher

[90] Source http://www.macelleriazenatti.it/.

Shop. The choice of the buyers is thus limited and so do also the number of companies selling the product requested and making available substitute products.

Threat of New Entrants

The threat of new entrants in the Zenatti Butchery case is weak, since the demand for high quality equine meat is not high, causing the industry size to be small and the industry growth rate to be static, having as a direct consequence a lack of interest in entering the market by new competitors, even though the investment costs of doing business are affordable ones.

Threat of Substitutes

Buyers eating different meat types and qualities can opt for several substitute products that can be purchased in other butcher shops or at the supermarket, thus, the threat of substitutes in this case for the Zenatti Equine Butcher Shop is strong. It is a different matter when buyers preferring high quality equine meat consumption are concerned, since, in this case, the threat of substitutes for the company is weak, given that it is the only butchery shop providing equine meat in the region of Trentino Alto Adige and its customers have little choice for potential provider switching decisions.

Competitive Rivalry

As already stated in the threat of new entrants analysis, the equine industry is a small industry whose size increases at a static growth rate and this is represented by the existence of a unique equine butcher shop providing equine meat to the Trentino Alto Adige population. Competitive rivalry in this specific business segment is almost null, but if other more generic butcher shops are considered, the companies' struggle to enlarge the market share and customer base becomes more relevant along with the competitive rivalry force that strengthens, qualifying as a moderate one.

Relying on a weak bargaining power when buyers, new entrants, substitutes and competitors are considered and on a strong bargaining power when suppliers are taken into account, the Zenatti Butchery focuses its business on providing its customers top quality ingredients and a complete range of services, also from a payment point of view with the adoption of Bitcoin e-payments, to distinguish itself from the other companies

operating in the same business category and leveraging on the customer loyalty sentiment of buyers and in the impossibility of other new entrants, substitutes or competitors to match its characteristic product offering.

4.10.3 "Macelleria Equina Zenatti" Bitcoin Introduction Pros & Cons

The company founder used to participate in some of the meetings organised by the Bruno Kessler Foundation in 2015, where interesting innovative technologies that may have changed the course of the future were presented and explained to the participants in the meetings. Bitcoin was one of the technologies whose possible effects were exposed in those meetings, that represented the first occasions where Massimo Zenatti started becoming acquainted with the Bitcoin topic. The breakthrough of the situation coincided with one of the participants of those meetings taking part in the foundation of the Inbitcoin company, who later explained the Zenatti Equine Butcher Shop legal representative the way the Inbitcoin Business software worked, convincing him to experiment the Bitcoin technology in his own business. Massimo Zenatti accepted the challenge and adopted this new payment instrument at the Zenatti Butchery, curious to see if it would have been used and the newness it would have brought with it in the company. Being not as popular as other more traditional and universally recognised and accepted payment methods, in this company Bitcoin e-payments usually take place twice a week and are preferred by a young population segment between 20-35 years of age and fond of information technologies. This aspect of Bitcoin electronic payments taking place at the Zenatti Butchery is related to one of the advantages the new technology has brought to the company, as confirmed by Massimo Zenatti, being the availability of a new payment instrument to customers and the possibility to attract a younger customer base, since, as stated above, at the Zenatti Butchery those who pay in BTCs are usually a young public. The only disadvantage of this innovative form of payment, as mentioned also by other merchants in this thesis, is the Bitcoin price volatility, that affects in particular this company, since the decision of the founder is to keep payments received unconverted and store them in the company's Bitcoin wallet, causing the total amount stored to change on the basis of the Bitcoin price changes. Not interested in introducing other cryptocurrencies as forms of payment in the business, the

Zenatti Equine Butcher Shop reconfirms its interest in proceeding the experiment undertaken in 2017 with Bitcoin also in the future.

4.11 "100-ONE" Case Study

Merchant Name	100-ONE
Interview Representative	Fabio Degasperi
Active Since	2001
Location	Rovereto (province of Trento) and Trento
Merchant Category	Shops
Employees	8
Year of Bitcoin Adoption	2017
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	No Specificities
Main BTC Advantage	Extra Service for the Customer
Main BTC Disadvantage	Limited Customer Base

The 100-ONE case study is based on the interview with its legal representative Fabio Degasperi, starting with the description of the company business model and product offering and ending with a discussion on how the Bitcoin technology was introduced in the company and the advantages and disadvantages 100-ONE has recognised in the acceptance of Bitcoin electronic payments along with future projects the company has for this technology.

4.11.1 "100-ONE" Company Overview

100-ONE is an Italian company founded in 2001, whose core business consists in selling sport equipments and streetwear. The company manages its business in different locations, since it owns a first shop in Trento, a second shop in Rovereto, an outlet in Rovereto, and it sells its 100-ONE private label products also in a shop located in Folgaria, in the province of Trento, and in Malcesine, in the province of Verona[91]. Selling both its private-labelled products and other goods purchased from salesmen representing European companies and national importers operating in the same business segment, 100-ONE directs its locations with the help of 8 employees and satisfies the

[91] Source http://www.100-one.it/.

needs of customers belonging to three different generations and whose ages range from 6 to 60 years old.

4.11.2 "100-ONE" Business Model

Bargaining Power of Suppliers

Suppliers in the 100-ONE business model case exercise a moderate bargaining power due to the specific quality products the company needs and the limited number of suppliers offering this type of products both at an international and at a national level.

Bargaining Power of Buyers

Potential buyers represent a moderate force for the 100-ONE company, since the sport equipments and streetwear industries are populated by industry giants pointing more on lower prices, rather than high quality products and may be preferred by part of the possible 100-ONE potential customer base. Despite that, the other possible part of the 100-ONE customer base, that is more sensitive to product quality, would not switch to more affordable brands, because of the high value they place on the quality of the goods to purchase.

Threat of New Entrants

More than investment costs, new entrants have to work on brand development and try to overcome other companies belonging to the same business area by attracting the customer base with a brand identity evoking quality and originality. Their threat thus represents a moderate force for 100-ONE.

Threat of Substitutes

As already stated, 100-ONE deals with the threat coming both from large sized companies producing and selling sport related products and from small sized companies more similar to itself. Despite everything, substitute products moderately threaten 100-ONE, since the customer base of the latter values very much product quality and is not keen on switching merchant, without being sure that the alternative will not keep the standards of the present provider.

Competitive Rivalry

The growth rate of the sport equipments and streetwear industries is slowly increasing in the last years, causing more competitors to face each other and managing to prevail on one another. What makes the competitive rivalry force moderate are the customer need and preferences on some specific products with respect to others, preventing companies from confronting each other on the same level.

Operating in a business environment where the five Porter forces equally exert a moderate bargaining power, 100-ONE continues to develop its brand identity through different initiatives, including the creation of a new online e-commerce platform allowing buyers to purchase the company's products online and the adoption of Bitcoin as an accepted payment instrument for onsite, and soon also for online purchases, in order to be recognised and chosen over other competitors by buyers.

4.11.3 "100-ONE" Bitcoin Introduction Pros & Cons

100-ONE joined the Trentino Alto Adige Bitcoin Cluster in November 2017 and at the present it registers 2 Bitcoin transactions every 100 traditional ones. The decision to adopt Bitcoin electronic payments was an idea of Fabio Degasperi, who had always have an interest in the Bitcoin technology and chose to experiment this new type of payment in all of his stores using the Inbitoin Business software provided by the Inbitcoin company. Soon, 100-ONE will also launch its new online e-commerce platform, where it will be possible to purchase products and pay for them in BTCs. Having identified in Bitcoin the advantage of an additional payment service to offer to its customers, 100-ONE sees in Bitcoin the only disadvantage of newness, that, at the beginnings of the affirmation of a new technology, represents an obstacle to customer acquisition and loyalty, while, later in time, transforms into one of the main positive aspects. At 100-ONE, like in other areas that have become acquainted with Bitcoin in the Trentino Alto Adige region, Bitcoin is considered as the present equivalent of Internet in the '90s, driving people to believe in its adoption not only as an investment asset, but mainly as the basis of a new monetary system, that, at the moment, is not obtaining a fast public consensus, but in the future will replace the traditional monetary systems, in a certain way in parallel with the Internet adoption path that took place in

the '90s, when Internet was at first considered an online reality used to undertake illicit actions, and a few years after became an irreplaceable instrument at a global level.

4.12 "Forsterbräu Trento & Niky's" Case Study

Merchant Name	Forsterbräu Trento & Niky's
Interview Representative	Nicola Malossini
Active Since	2012 (Nicola's management at Forsterbräu Trento) and 1992 (Niky's)
Location	Trento
Merchant Category	Catering
Employees	40
Year of Bitcoin Adoption	2016
Bitcoin Payment System Provider	Inbitcoin
Bitcoin Transactions	<1% Turnover
Bitcoin Customers	No Specificities
Main BTC Advantage	Extra Service for the Customer
Main BTC Disadvantage	Relatively Longer Deposit Timing from the Provider

The last case study involves two different merchants, namely Forsterbräu Trento and Niky's, sharing the same director: Nicola Malossini. After a description of both the restaurants from the point of views of service and product offering and company mission, the two merchants will be analysed on the basis of the advantages and disadvantages they have experienced after the Bitcoin e-payments introduction. Although different in the location, product offering and customer base, the two companies share several aspects with respect to the reasons leading to the adoption of Bitcoin payments and the pros and cons they expected from their adoption, fact attributable to the same director managing these businesses.

4.12.1 "Forsterbräu Trento & Niky's" Company Overview

The partnership between the Forst and the Spiller groups has as one of its main purposes the expansion of this network with the establishment of Forst and Spiller restaurants located in Italy, mostly Northern Italy. The single restaurants are owned by Forst and Spiller, but are managed by local directors that have the qualities to engage in this important task. Initially created to promote the Forst beer brand, these restaurants offer to their customers a varied choice of traditional local cuisine, as in the case of

Forsterbräu Trento. Forsterbräu Trento exists since 1906, but the new management of Mr. Nicola has come into force only in 2012. With 150 seats available, Forsterbräu Trento is one of the most well-known and succesful restaurants of the city, being chosen daily not only by locals, but also by tourists willing to taste the traditional cuisine of Trentino Alto Adige[92].

Niky's Vintage Food & Champagnerie is a Trento based restaurant, just like the above Forsterbräu Trento, established in 1992 and soon to move into another more spacious location with respect to the present 70 seats[93]. It proposes to its customers pizza, meat, fish, vegetarian and vegan based menus, all of them prepared with biological ingredients produced mostly in the Trentino Alto Adige production chain. Moreover Niky's belongs to the EcoCatering Trentino Alto Adige association, that groups all the restaurants operating in respect of the environment by using first quality local ingredients and reducing food waste.

Both the restaurants collaborate with more than 40 employees that help the companies to their business missions of offering customers top quality products by, in the meantime, respecting the environment and working with the help of a young and dinamic team always open to innovation.

4.12.2 "Forsterbräu Trento & Niky's" Business Model

Bargaining Power of Suppliers

Suppliers' bargaining power is weak when supplies for Forsterbräu Trento are concerned, given that there are many suppliers offering the same products and the ordered product quantities are so significant that suppliers' force is conditioned. In the case of Niky's, that offers also vegetarian and vegan cuisine types, suppliers excersice a moderate bargaining power, since, apart from traditional products, the merchant relies on suppliers providing special packaged and fresh ingredients specific for particular cuisines.

[92] Source https://www.forst-trento.it/.
[93] Source https://www.nikys.it/.

Bargaining Power of Buyers

Buyers have a weak bargaining power when these two restaurants are considered, because, even if buyers have the possibility to choose from a wide range of substitute product options, they will not likely find the atmosphere and attention to detail combined with a high product quality the businesses run by Nicola Malossini offer them.

Threat of New Entrants

New entrants represent a moderate threat for Forsterbräu Trento and Niky's, since they are not subject to heavy costs as far as the land, construction, building and equipment costs are concerned. Their only obstacle is the company's brand development, constituting the only reason that may weaken their strength when compared to the already well-known brands of Forsterbräu Trento and Niky's.

Threat of Substitutes

In the catering world substitute products are many, but what influences their threat strength is the customer decision and the switching costs he/she is subject to when switching from an initial product to a substitute one. In the case of Forsterbräu Trento and Niky's, the well-finished locations, cuisine and service are not the only factors distinguishing the two restaurants from other ones operating in the same industry. In addition to them, the customer gives a high importance to the atmosphere created in those restaurants, that makes it difficult for other substitute products to compete and weakens their strength, making it moderate, in the business environment of the companies considered.

Competitive Rivalry

There are obviously other alternative restaurants, pubs or fast foods that can offer the customers various food typologies, but Forsterbräu Trento and Niky's count on a loyal customer base and a strong brand image due mainly to the high quality products and excellent service they manage to offer to their clients, thus competitive rivalry represents a weak force in this case, since tourists choose restaurants through online catering review applications like Tripadvisor.com, where the two restaurants taken into

consideration boast many and excellent reviews and are placed in the top positions of search results, while locals, apart from using these review applications, make their choices based on word of mouth reviews, that are almost always favourable to the two merchants.

Both the restaurants face weak forces from the point of view of buyers and competitors and moderate forces from the point of view of new entrants and substitutes, while as far as suppliers are concerned, Forsterbräu Trento is subject to a weak supplier bargaining force, while Niky's is subject to a moderate supplier bargaining force. This ecosystem, that lacks of strong bargaining forces from any of the key players, permits the companies to use their resources for implementing their business missions, rather than focusing them in dealing with significant market threats.

4.12.3 "Forsterbräu Trento & Niky's" Bitcoin Introduction Pros & Cons

Both the restaurants started accepting Bitcoin payments in 2016. In the case of Forsterbräu Trento, in particular, the decision to introduce Bitcoin as a form of payment was an idea of the director, making Forsterbräu Trento the only Forst restaurant that participates in the Bitcoin network. Nicola Malossini became acquainted with the Bitcoin technology after a meeting with an Inbitcoin representative that presented him the Bitcoin innovative technology and the way the businesses Nicola Malossini managed could have used it. Inbitcoin initially proposed the Inbitcoin Business software to the Forsterbräu Trento, so that the software could have increased its visibility by appearing as a payment method in the most famous restaurant of the city, but the technology was then introduced also at Niky's, in order to be experimented. Although transactions have been sporadic in the two merchants, more or less 15 and 10 overall transactions respectively at Forsterbräu Trento and Niky's, both the merchants are willing to continue their Bitcoin experience with greater hopes for the future. Identifying in Bitcoin the advantage of a new form of payment that can attract a new customer segment and enrich the payment alternatives of customers, apart from leading to a new factor incentivising companies' promotion, the director views as a disadvantage the one week deposit timing for bank transfers relative to the Bitcoin payments received by the merchants that go through the Inbitcoin bank account before being credited to the merchants' bank accounts. Disillusioned on the Bitcoin technology, Nicola Malossini

confirms he does not personally believe in the establishment of Bitcoin as the monetary system of the future, but it recognises its adoption in the restaurants he manages is an added value for the final customers.

CHAPTER 5

General Discussion on Case Studies Findings and Conclusions

5.1 Outline of Merchants' Business Model

Each case study present in Chapter 4 is structured in three main parts: the first one is a general introduction to the merchant's business history and its current state of business, the second part is an analysis of the merchant's business model and the third part is an overview on the impact of Bitcoin adoption in the business. Leaving aside the first and the third part of each case study, that will be analysed later in the chapter, the second part will be taken into consideration in this section, in order to outline the main attributes common to the business model of merchants joining the Bitcoin network.

Table 9 summarises the identification of the external threats faced by merchants in their everyday business activities with respect to suppliers, buyers, possible new entrants, substitute services and products and competitors operating in the market. At first glance it is possible to notice that the overall forces exerted on merchants by the other market key players are mostly moderate ones, followed by weak forces in the second place and by strong forces in the third place. This indicates that the markets where the merchants studied in Chapter 4 belong to, are moderately subject to suppliers', buyers', new entrants', substitutes' and competitors' power and permit market participants to operate in a business environment where strong forces are minor protagonists, while moderate and weak ones contribute in shaping the business model of the merchants. Analysing one by one the five forces of the Porter's model, it can be seen that the bargaining power of suppliers is considered as a weak force by 7 merchants, meaning that the majority of the interviewed merchants runs a business that depends on common and easily available goods, that lower the merchants' switching costs with respect to providers and weaken the suppliers' bargaining power in the business relationship. The second force listed, namely the bargaining power of buyers, is positioned between a weak and a moderate estimation, proving that the merchants manage to offer buyers a high quality service and product proposal, factor helping them in building brand

awareness, customer loyalty and creating an own business identity. The threat of new entrants is generally perceived as a moderate force, since all merchants interviewed are classified as micro and small enterprises and for this reason the costs of doing business for new entrants are low-end positioned and the only difficulty they face is the brand and identity development process along with the customer base creation. As far as the threat of substitutes is concerned, it is evaluated mostly as a moderate threat by merchants, since the interviewees are businesses that rely mainly on common product offerings, as confirmed by the weak bargaining power of suppliers considered previously, and, even though they succeed in differentiating themselves from competitors, substitute products still represent a moderate threat to address in their business strategy. This consideration is verified also with the competitive rivalry force evaluation, between weak and moderate, proving that the markets these merchants operate in are not yet saturated, and the buyers' demand leads merchants to improve their offerings in order to enlarge their share of customer base, in a reality where competition is not running the game, but it is sufficiently present to encourage merchants dealing with a healthy competition.

Table 9: Merchants Analysis with the Porter's Five Forces Model

	Weak Force	Moderate Force	Strong Force
Bargaining Power of Suppliers[94]	7	2	2
Bargaining Power of Buyers	4	5	1
Threat of New Entrants	2	8	0
Threat of Substitutes[95]	3	6	2
Competitive Rivalry	4	4	2
	20	**25**	**7**

[94] The total sum of merchants evaluating the bargaining power of suppliers is 11, because the tenth case study involves two different merchants managed by the same direction team and each of them perceives differently the intensity of the bargaining power of suppliers: Forsterbräu Trento considers it weak, while Niky's considers it moderate.

[95] The total sum of merchants evaluating the threat of substitutes is 11, because in the fifth case study Golf & Country Südtirol distinguishes the threat of substitutes when considering the single services it offers on their own, that face a moderate threat, and then considering them as a bundle, facing a weak threat.

Going ahead with the analysis of the business model of merchants presented in the case studies chapter, another observation defining their business model is the number of employees each merchant relies upon qualified with respect to the official European guidelines on the classification of small and medium enterprises. Applying the staff headcount parameter to the companies considered in the research, it is noticeable that none of the companies can be classified as a large or medium sized enterprise, but all of them are classifiable as micro and small sized enterprises, with the majority of them running micro sized businesses.

Table 10: Merchants Company Category by Staff Headcount

Merchant Name	Staff Headcount	Company Category
Batzen Bräu	50	Small Sized
Mani al Cielo 2.0	6	Micro Sized
Impact Hub Trentino	10	Micro Sized
Fabbrica di Pedavena Levico	37	Small Sized
Golf & Country Südtirol	50	Small Sized
Ristorante Il Doge	5	Micro Sized
L'Orto di Pitagora	3	Micro Sized
Macelleria Equina Zenatti	3	Micro Sized
100-ONE	8	Micro Sized
Forsterbräu Trento & Niky's	40[96]	Small Sized

An additional aspect that helps drawing the picture of the business model matching to the analysed merchants is the business category they place themselves in. Differently from the business category classification of Trentino Alto Adige Bitcoin payments accepting merchants listed by ranking in Chapter 3 and positioning in the podium respectively as Shops, Services and Catering belonging merchants, the mini-sample of the merchants interviewed for this thesis is mostly part of the catering ecosystem in 7

[96] The staff headcount in the tenth case is the sum of employees working both at Forsterbräu Trento and at Niky's, but, when taken into consideration singularly, Forsterbräu Trento classifies as a small sized enterprise, while Niky's as a micro sized one.

cases[97] and includes franchising pubs, restaurants, wine bars and even more structured businesses, as in the case of Golf & Country Südtirol, whose business does not belong exclusively to the catering category, but also to the tourism and sports one, because of the hotel and golf structures co-existence in the same business activity.

Table 11: Classification of Merchants by Business Category

Rank	Business Category	Merchants
1	Catering	7
2	Services	1
3	Shops	2
4	Tourism	1
5	Sports	1

The categorisation of the merchants on the basis of the Porter's Five Forces Model, the overall staff headcount and the business category classification contributes in defining a general business model attributable to the companies that adopt Bitcoin as a method of payment: generally in the region of Trentino Alto Adige, but also at a national and international level with few exceptions as proved by online literature, merchants including Bitcoin as a payment instrument are micro to small sized physical enterprises operating in the services, retailers, catering and tourism markets, whose main purpose in introducing Bitcoin payments is offering buyers an additional service in a business ecosystem where competition and response to competition are not the leading forces of the ecosystem, but they are the drivers to the merchants' offering improvement and diversification process.

5.2 Merchants' Process of Bitcoin Adoption

After having identified the typical business model of the merchants recognising Bitcoin payments, this section is going to examine the process of Bitcoin adoption undertaken by these merchants, trying to understand the current adoption state of this innovative

[97] The counting of the businesses with respect to their business category takes into account ideally 12 merchants, since in the Golf & Country Südtirol case study the merchant can be qualified in three categories: sport, tourism and catering. Even though this "double" information belongs to the same case study it is taken into account separately in the chart.

technology and the future scenarios that can be verified with respect to the Bitcoin adoption path.

When considering an innovative technology as in the case of cryptocurrencies and in particular Bitcoin, the life cycle of the technology is characterised by different life cycle stages depending on the time and visibility variables. In the figure below is taken into consideration the hype cycle visual graph created by the American research and advisory company Gartner Inc., that provides information technology insights for global businesses and makes it possible, through the hype cycle graph, to depict the present state of the life cycle of an emerging technology.

Figure 17: The Life Cycle Stage of Bitcoin in Gartner's Hype Cycle Graph

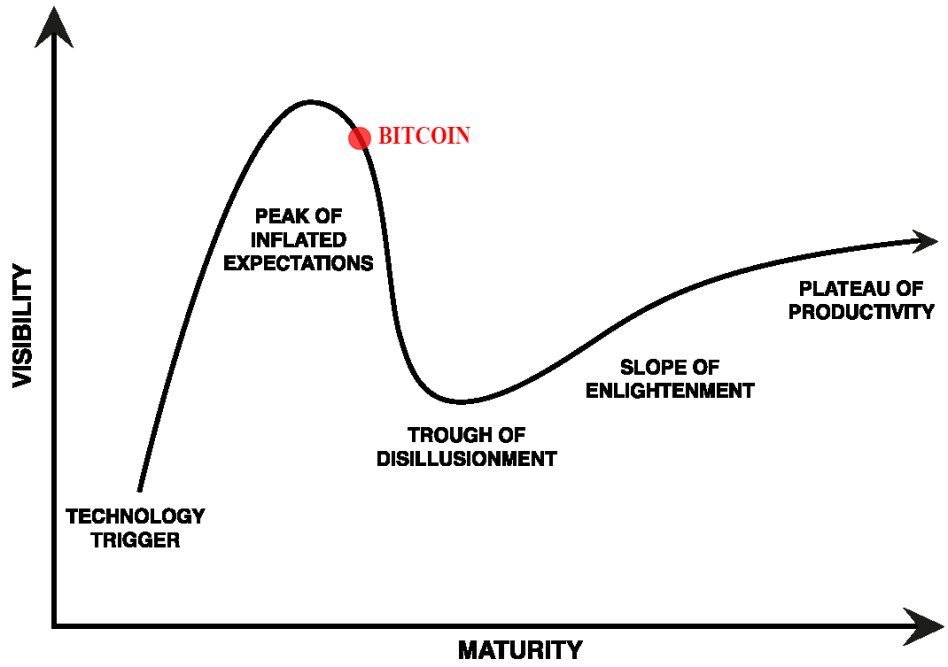


Figure 17 illustrates the current state of the Bitcoin technology[98] as analysed by the Gartner incorporation in its 2017 report on the life cycle of emerging technologies. As represented in the figure above, an emerging technology undergoes different stages during its life cycle. The first one is the "technology trigger" phase taking place at the first years after the introduction of the innovative technology when its maturity is low

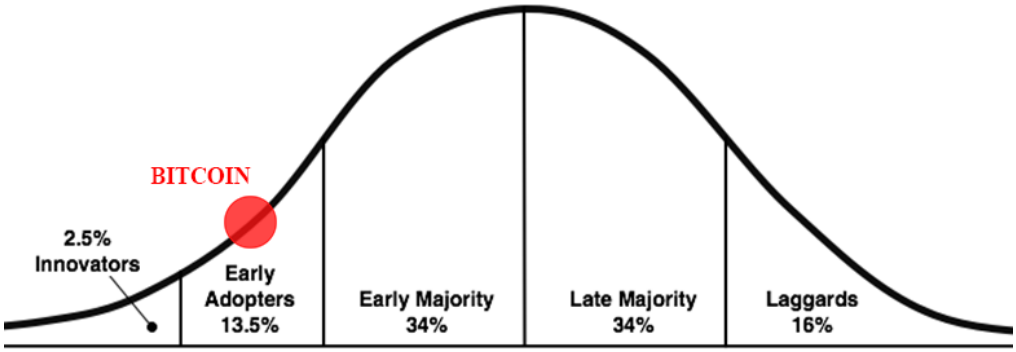
[98] Gartner Inc., *Hype Cycle Report for Emerging Technologies*, 2017.

and visibility on the rise. Following, there is the "peak of inflated expectations" stage that corresponds to an economic bubble, with a higher maturity time and visibility reaching its peak. The third stage is called "trough of disillusionment" and coincides with the technology losing visibility with the passing of time and the replacement of the initial enthusiastic spirit with a more disillusioned and skeptical one realising that the new technology presents technological issues like any other form of technology with the issues towering over the advantages the technology has led to. The two final stages are an optimistic conclusion to the life cycle of a technology, since they confirm that after a period of disillusionment, the technology manages to reach a "slope of enlightenment" stage first and later a "plateau of productivity" state that overcome the short term skeptical phases for the long term success state. Clearly not all technologies go through all of these stages, in fact some of them fail and disappear with the "trough of disillusionment" critical phase, while others, after this phase, succeed in establishing their leadership in the market. Bitcoin has passed the "technology trigger" initial stage and is on the way of exiting also the "peak of inflated expectations" stage, heading towards the "trough of disillusionment" stage that may end its innovation path or proclaim it as a universally recognised technology destined to revolutionise the future of the monetary system. At the present it is not possible to predict one of this outcomes, but considering the innovation strength behind the concept of cryptocurrencies and their potential for transforming the economic ecosystem currently adopted worldwide, cryptocurrencies are definitely going to reach the two final stages of their life cycle.

The cryptocurrency, and in particular Bitcoin, present life cycle state positioned in the relatively late "peak of expectations" stage is confirmed by the case studies analysed in Chapter 4, since most of them recognised that the maturity phase of Bitcoin has moved forward, although its visibility has remained high. Although some of the interviewed merchants do not believe that the Bitcoin monetary system will replace the current monetary system, the other merchants definitely trust the Bitcoin power and their main hope is to testify the Bitcoin future recognition by society and global legislative, governmental and economic authorities.

Depending on the life cycle stage of the emergent technology identified with the Gartner's hype cycle graph, the diffusion of innovation graph[99] pictured below, shows the current adoption rate of Bitcoin by the population.

Figure 18: The Bitcoin Innovation Adoption Diffusion



Based on the Gartner study and results on the life cycle of cryptocurrencies and on the examination of the case studies with reference to the Trentino Alto Adige merchants aspects of year of Bitcoin adoption, percentage of Bitcoin transactions and Bitcoin customer base, the cryptocurrency, and in particular the Bitcoin, technology is confirmed to have been adopted at first by the group of innovators and at the present by the group of early adopters.

The first aspect takes into consideration the year in which the merchants analysed in the case studies started accepting Bitcoin payments. The ten merchants are divided among four years: one of them started the Bitcoin adoption process in 2014, three of them in 2015, only one in 2016 and the majority of the merchants inaugurated Bitcoin e-payments in 2017. Considering that Bitcoin was launched in 2009 and the first merchant adopter in Trentino Alto Adige, being more precise the vegetarian and vegan restaurant L'Orto di Pitagora, joined the Bitcoin network five years later in 2014, may seem to be a long period of time, but, when thinking of the role Bitcoin aims to, since it strives for being recognised in the future as the official monetary system, it is a short period of time, because it is not such an easy process the fact of co-existing with traditional currencies and working on overcoming their confirmed power and influence on society

[99] Rogers E., *Diffusion of Innovations*, 1962.

to be established as the new mean of monetary exchange. For this reason the ten case studies reported in this dissertation take into consideration early adopters of the Bitcoin technology, but when these merchants are considered in a more restrained comparison in space and time, clearly the ones recognising Bitcoin as a form of payment between 2014 and 2015 enter the innovators adopters definition more easily than the other ones. Noticeable the fact that the majority of the merchants are positioned in the early adopters Bitcoin user population share.

Table 12: Merchants by Year of Bitcoin Adoption

Year	Merchants
2014	1
2015	3
2016	1
2017	5

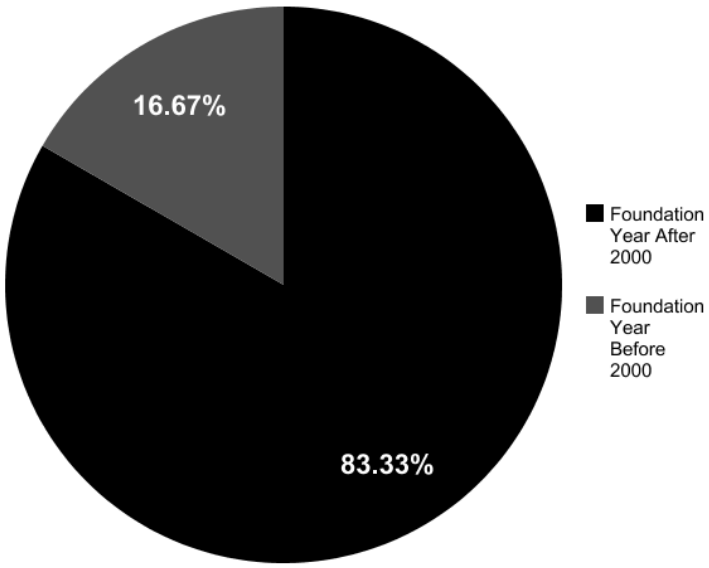
Considering the second aspect, the year of Bitcoin adoption by merchants does not appear to have a strict relationship with the transactions amount each of these merchants has counted since the introduction of the Bitcoin payment method in the company. The number and amount of Bitcoin transactions is quite low for every merchant, depending mostly on the initial skepticism and retain of BTCs by an already scarce customer base, apart from the Mani al Cielo 2.0 bar that is the company relying on the higher number of Bitcoin transactions.

As for the third aspect, dealing with the Bitcoin customer base Trentino Alto Adige case study merchants have dealt with in the last years, it is a still very limited population share, as confirmed by the scarce percentage of Bitcoin transaction weighting in the overall company income reported by interviewed merchants, that even though consists in a quite variegated population sample, as confirmed in the majority of the case studies, it still presents some common attributes. Customers paying in Bitcoin are positioned mainly in the 25- 40 age range, having a medium to high education level, a disposable income to invest in, lots of curiosity for emerging technologies and a great willpower to dedicate to Bitcoin speculative operations. Moreover, these customers support the Bitcoin philosophy with regard to the anonimity and decentralisation concepts and are ready and impatient to test how Bitcoin payments work. Both locals and tourists, they

are reported to spend Bitcoins when the price is affected by an increasing trend, leveraging on the fact that what they had invested previously has a higher value, and tend to hold or sell Bitcoins when price volatility is directed towards a price decreasing trend.

Relative to the merchants' adoption of the Bitcoin technology, an interesting aspect that can be seen in each of the case studies, is the foundation year of the companies participating in the research. When having a look at the year in which each company was established, the year belongs ten times out of twelve to the third millennium[100], with businesses starting their activities not more than 20 years ago, excluding the Zenatti Equine Butcher Shop, whose year of foundation dates back to 1958, and Niky's Vintage Food & Champagnerie, that was opened in 1992. Businesses that have been founded recently act on the basis of a philosophy endorsing open-mindedness, curiosity for innovation, embracement of new technologies and an always young spirit that helps them keeping up-to-date and innovating theirselves in order to be able to compete and be distinguished and preferred by buyers with respect to the other businesses identified with the industry rivalry.

Figure 19: Merchants' Foundation Year



[100] The counting of the businesses with respect to their foundation year takes into account ideally 12 merchants, since in the Golf & Country Südtirol case study the golf field was inaugurated in 2015 and the hotel and restaurant in 2017, and in the Forsterbräu Trento and Niky's case study the second one was launched in 1992, while the first one in 2012 with the new management. Even though this "double" information belong to the same case study they are taken into account separately in the chart.

Taking into account the diffusion of innovation graph, the merchants' foundation year, their Bitcoin adoption year along with the percentage of registered Bitcoin transactions and the size of the BTC customer base, the Bitcoin is to be considered an emerging technology that is still riding the wave of its visibility and has not yet reached that stability stage that can identify it as a reliable technology for replacing the official monetary system, phase that is going to be reached in a period of 5 to 10 years as predicted by the Gartner team, which is a plausible scenario given that the number of international merchants accepting Bitcoin continues to grow day by day, registering only from December 2017 to May 2018 a 12% increase rate[101].

5.3 Bitcoin Payments Pros and Cons perceived by Merchants

Finally, as far as advantages and disadvantages perceived by merchants with the introduction of Bitcoin payments in their activities are concerned, the most mentioned advantage is the Bitcoin electronic payment as an extra service offered to the customer and the most mentioned disadvantage is the Bitcoin price volatility. Not all of the merchants have joined the Bitcoin network because of their passion and trust in the concept of cryptocurrency, some of them have adopted Bitcoin as a form of payment because they just wanted to offer their clients an additional service, because it would not make any sense for them not to offer a service that was available and working optimally. Although they are not the majority, this aspect underlines the fact that a monetary system is not chosen by the population because of the philosophical principles it claims to respect, but mostly because it is an efficient and easy to use system that simplifies the user's everyday operations making him/her prefer it with respect to other systems. This is the purpose Bitcoin is trying to reach in the future, since at the beginnings of the establishment path of a new technology it is useful to have a niche category of enthusiasts that believe in the ideology of the technology and promote it to change current schemes, but in the long run this niche has to be joined by another part of the user base, that has to be enough large to permit the technology to lead the market and join the network only if it will suit users' needs better than the other payment instruments. Other advantages mentioned by merchants as for the Bitcoin payments are

[101] Source https://coinmap.org/.

the acquisition of a new customer base, that despite being small, causes the enlargement of the overall customer base of the merchant, the low transaction fees merchants are subject to with Bitcoin transactions, the greater visibility and press recognition for companies in which the Bitcoin adoption has become a marketing pillar, and lastly the Bitcoin price revaluation, that is important to merchants not converting Bitcoin payments received in euros, that see their income increase as the Bitcoin price increases. Related to this aspect is the most cited disadvantage, being the high Bitcoin price volatility, that on the one hand may increase the merchants' turnover, but on the other hand may also decrease it drastically in case the Bitcoin price decreases.

5.4 Final Observations

After presenting the cryptocurrency world and international business ecosystem to the reader, this thesis directs the research on a national and regional specific level, restricting the study to the Trentino Alto Adige population of merchants accepting Bitcoin payments, by conducting ten case studies on ten different merchants, analysing for the first time the business model, state of adoption rate and advantages and disadvantages aspects related to the introduction of the Bitcoin payment instrument in these businesses. The research elaborates the main characteristics of the business model corresponding to Bitcoin accepting merchants, confirms the Gartner's Bitcoin technology life cycle stage positioning by empirical evidence and outlines the major pros and cons reported by merchants with regard to the adoption of Bitcoin payments, in a thesis where Italian regional findings can easily be conformed also on a national and international level as far as Bitcoin accepting worldwide merchants are concerned. The final impression on Bitcoin payments is that it is still too soon to confirm that Bitcoin will be universally considered as a method of payment in the future and not just as an investment asset, but it is not too soon to add that this technology will continue promoting its efficacy and usefulness, by increasing day by day its customer base, both from the merchants and from the buyers point of view, unless retroactive regulations are approved and come into force to obstruct a technology that ironically presented itself as free from regulations and interventions by third parties.

APPENDIX A

Interview Outline of the Case Studies

Section 1 – Company Overview

Foundation Year

Location

Number of Employees

Company Vision

Product/Service Description

Core Competences

Porter's Five Forces Analysis

Section 2 – Focus on Bitcoin Payments

Year of Bitcoin Introduction in Payment Systems

Reasons of Bitcoin Introduction in Payment Systems

Bitcoin Payment Service Provider the Company relies upon

Customer Characteristics

Frequency of Bitcoin Payments

Advantages of Bitcoin Payments

Disadvantages of Bitcoin Payments

Significant Effects at Company Level after the Introduction of Bitcoin Payments

Interest in introducing other Cryptocurrency Payments

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