Universidad Popular Autónoma del Estado de Puebla

Interdisciplinary Centre, Graduate Programs and Research

Department of Economic and Administrative Sciences

Master on Management and Marketing

Title

A digital marketing strategy on acceptance and use of Bitcoin as a payment method

Submitted in fulfillment of the requirement for the degree of Master of Science in Managment and Marketing

By

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Puebla, México. July, 2019

Universidad Popular Autónoma del Estado de Puebla

Centro Interdisciplinario de Posgrados

Investigación y consultoría

Maestría en Dirección y Mercadotecnia

Estrategia de mercadotecnia digital para la aceptación y uso de Bitcoin como método de pago

Tesis para obtener el grado de Maestro en Dirección y Mercadotecnia, presenta:

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Puebla, México. Julio, 2019

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Centro Interdisciplinario de Posgrados, Investigación y Consultoría.

Departamento de Ciencias Económico Administrativas

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SE APRUEBA EL PROYECTO:

"A digital marketing strategy on the acceptance and use of Bitcoin as a payment method".

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Junio 2019

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Abstract

Bitcoin surged as a response to the 2008 crisis on which governments showed their incapability of counteract it. A digital, decentralized and transparent cash system based on cryptography is what Satoshi Nakamoto proposed when he first released the first version of bitcoin. The 2016 boom of the price of the cryptocurrency made it jump to the public eye and started to be considered a solid payment method. For this, a descriptive, non – experimental and transversal research was made in order to know the status of the use and acceptance of bitcoin as a payment method, and its perceived risk, as well as what products have been bought using bitcoin and a demographic profile of owners. The results showed that although owners find bitcoin useful and risk – free for shopping, shops do not accept it for payments. Also, most of the owners have high technical knowledge about the functioning of the enviroment. With this information, a digital marketing strategy was developed in order to make, first, managers know the potential of bitcoin and, in second instance, increase the value of their businesses through the implementation of bitcoin as a payment method covering five domains: customers, competition, data, innovation and value.

Introduction

For several years the banking system has had no rival in the economy of any country. Money has been part of the social contract since it replaced the gold as the main exchange medium. The Bretton Woods System was implemented in 1944 and established the US Dollar as a reserve currency which based its value on gold. This way, other currencies had a fixed exchange rate that could easily convert from one to other (Dooley, Folkerts-Landau, & Garber, 2003).

The convertibility of the US Dollar to gold stated by this system was removed in 1971 which led to the creation of *fiat* money: currency without a value. A value that is maintained by the fact that people think it does have one. The 2008 economic crisis exposed the fragility of this system and the incapability of governments to stop the initial and future effects of this situation, creating a sense of distrust on the banking system.

This sense of distrust on central entities about the management of the monetary system is not something new. In the decade of 1990 a group of programming and cryptography hackers known as Cypherpunks, devised a cryptographic – based monetary system which did not had to be controlled by a bank or any other central authority but the development was not possible at that moment because of the technological barriers they had.

Many attempts of creating a functional monetary system based on cryptography were developed in the following years but none of them succeeded at their implementation until on 2008 Satoshi Nakamoto, an unknown figure in the ambit of cryptography, issued on Metzdowd, a cryptography mail list, the white paper of what he (or maybe they) called bitcoin.

Bitcoin: A Peer – to – Peer Electronic Cash System is the name of the text, in which the author proposes a decentralized, auto – regulated and cryptographic – based cash system that could be massively implemented to replace fiat money and the influence of external entities on its regulation.

This started as an experiment and slowly it started to attract enthusiast from the crypto

and programming environment, as it solved problems as double – spending and the classic Byzantine generals problem. At first, it had no monetary value but as their potential was seen by specialists, it started to be changed for fiat money. The first time it was made, Gavin Andresen changed 10,000 bitcoins for $50 and the first time a transaction was made using bitcoin, Laszlo Hanyecz bought two pizzas for the amount of 10,000 bitcoin, making the first valuation of the cryptocurrency at $0.0025 USD per bitcoin.

Azam and Qiang (2014) state that some of the most electrifying advances in economy have come from e – commerce. This is because systems that in first instance were made to work on the Internet, now work outside it and are being used for conventional commerce, such as PayPal or Bitcoin.

The use of bitcoin as a payment method is something that is still in development as it is still not widely accepted by the society and thus, for shops. There is still a limited amount of people who do know what is this new economy about and how it works. This is a challenge for marketing, as one of its main drives is the customer and, if the customer is starting to adopt a new payment method (as once happened with credit cards), marketing should respond to this force by creating solutions and implementing this innovation into the mainstream little by little in order to adapt the commerce stakeholders to the clients' needs.

The adaptation to a new economic paradigm concerns to marketing as economy is the base of commerce, a socio – economic activity in which customers and enterprises create exchange (and sometimes affective) relationships and on which marketing has based its definition: "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" (p. 1) as American Marketing Association (2013) states.

Chapter 1. Research protocol

1.1 Purpose of the study

Until year 2009 commerce have had as the only mediator to financial institutions, which work as trusted third parties for every banking transaction. The weakness of this system, according to Nakamoto (2009), is just the trust on these institutions, mainly because of the possibility of making reversible transactions and a loss of trust derived from the 2008 economic crisis, when the fragility of the banking system was exposed (Fillieule, 2016).

An option for not depending on the banking system is using cash for payments, but when this possibility is not available, there were no solution for making payments without an entity in which to trust for making the transactions. In order to solve this problem, Nakamoto (2009) proposed an "electronic payment system based on cryptographic proof instead of trust, allowing any two willing parties to transact directly with each other without the need for a trusted third party" (p.1). Starting from this, a system known as blockchain was created and with the use of other technologies, Nakamoto implements the first cryptocurrency called Bitcoin in 2009.

The adoption of Bitcoin as a payment system has had problems due to its volatility. People started using this cryptocurrency as a speculation instrument in order to get revenues in the short place but this has diminished its focus as a way to pay in daily life. Governments have tried to make regulations about this new payment method as suddenly became a boom and Mexico has not left this topic aside by creating a Fintech law which is unique in Latin-America.

All this happens although Bitcoin has been known from year 2013 because of the close of a Dark Web site called The Silk Road, defined by Bearman (2015) as an eBay made for drug illicit trading, in which the payment method was Bitcoin. News like this could influence in the adoption by the user at the time of electing Bitcoin as a payment method.

The rise of the use of the Internet, the development of e-commerse and the emergence of a new type of consumer, the e-consumer, that has characteristics as a high knowledge of

products and the openess to use non-traditional channels and new technologies, makes bitcoin an option for paying goods and services that these consumers want, but it also offers a new payment option to consider for business.

For this reason a non-experimental, transversal, descriptive research will be developed. Through the use of questionnaires it will be possible to determine what are the factors that affect the use and acceptance of Bitcoin as a payment method within people who already own them and to use this information to propose a marketing strategy for business to adopt bitcoin as a new way of payment.

1.2 Significance of the study

Bitcoin is a relatively new payment method that could be considered both a technology artifact and an economic instrument of value transaction (Li & Wang, 2017). This takes importance because traditionally, the payment methods are controlled by a central authority like a bank, but in this case, there is no third-trusted-party on which this technology relies; replacing fiat money for daily transactions. In addition, on mid 2017 the prices started to rise, an event that pushed people buying bitcoin, making them potential good-traders in the physical and electronic market, but also cryptocurrency traders using it as a speculative instrument because of its volatility.

Recently, the mexican government developed a law that aims to regulate the way fintech companies offer their services to people. This development that is unique in Latin - America and that is considered very advanced in the world, opens the possibility to offer financial services based on technology backed up by the governemnt regulatory system and considers cryptocurrencies (including bitcoin) as virtual actives that can be used legally by these institutions.

Abreast of this regulation, fintech companies have being funded and some people are using bitcoin as a financial instrument or as currency. If the consumer wants to use it to buy goods, marketing must be aware of what is bitcoin and how and where it can be better

used at this adoption stage. E-marketing should also be present as this new payment method has an electronic nature and could be used to improve the way e-consumers are related with businesses through a digital marketing strategy.

1.3 Objetives

1.3.1 General objective

To determine what are the factors that influence bitcoin owners to use it as a payment method in order to make a digital marketing strategy.

1.3.2 Specific objectives

- To identify what is important for people who own bitcoin in order to use it as a payment method.
- To describe the risk perception of bitcoin owners.
- To know in which type of products or services it is more frequent the use of bitcoin as a payment method.
- To make a description of people who own bitcoin.
- To propose a digital marketing strategy to include bitcoin as a payment method for businesses.
- To give a suggestion on what kind of goods and what segment of people to focus on a digital marketing strategy of adoption of bitcoin as a payment method.

1.4 Research questions

- What is important for people who own bitcoin in order to use it as a payment method?
- What is bitcoin owners' risk perception?
- In which type of products or services is it more frequent the use of bitcoin as a payment method?
- What are the characteristics of bitcoin owners?
- How can be bitcoin included as a payment method for businesses through a digital marketing strategy?

- What kind of goods and segment to focus on creating a digital strategy of adoption of bitcoin as a payment method?

1.5 Project scope and restrictions

1.5.1 Scope

A non-experimental, at not manipulating variables; transversal, because it will only cover a single point in time and does not comprise the evolution of the environment; descriptive research, since what is wanted is to detail the present situation of Bitcoin as a payment method in Mexico; will be performed.

1.5.2 Restrictions

The research will take place from May 1st to November 1st vía online. Because of the nature of bitcoin, it is not possible to have a whole list of people who own this cryptocurrency. For that reason, the sample is going to be calculated with infinite population formula with non-probabilistic sampling methods.

The questionnaire will be spread vía Facebook through groups focused on the use and trade of bitcoin and other cryptocurrencies and that cover the mexican public. This due to the ease of reaching people without the need of knowing and contacting them personally.

Chapter 2. Literature Review & Background

2.1 Digital marketing

The use of Internet, social media, mobile apps, and other technologies that people had no access in the last years, is now part of billions of persons worldwide. As this happens, their role as consumers have changed including digital channels in which they can purchase, consume or even being sellers Stephen (2016). Example of this is the emergence of business models as C2B and C2C, redefining the way a company relates with its customers (Wind & Mahajan, 2002).

Marketing has responded to this changes by increasing the use of these channels in the process of purchasing (Stephen, 2016). For Zikiene and Kalmakhelidze (2016), the spread of this tool has changed the path humanity has followed and it is affecting everything, including marketing.

Business activities have emigrated to the Internet in order to have more coverage and take advantage of new technology, but it has put theory in difficulties as some approaches are not valid anymore. Advertising campaigns, promotional techniques, and some payment methods have had to adapt to this new digital stage to keep helping business and consumers in a world in which social networks have an impact of millions of people at the same time, in different physical locations and at a really fast speed (Zikiene & Kalmakhelidze, 2016), and to adapt to a recently created borderless economy, as (Wind & Mahajan, 2002) state.

The Internet revolution made possible that business could communicate with potential customers in different countries and leaving behind physical barriers that, before this happening, could not be removed in an efficient way, leading a paradigm shift in marketing (Kiani, 1998). This new environment enables marketers to use a many – to many communication model, to individualize and customize the market, create dialogue instead of monologues, to create a decentralized market in which customers can choose from many options, to consider the customer as a partner, and to create communities in which ideas

can be developed with the very point of view of the actual users (Kiani, 1998).

This idea complements what (Keith, 1960) states: the consumer should be the center of the marketing activity and that companies must adjust to the changes that the consumer dictates. With digital marketing, this became a full reality as it is easier to get information directly from the consumers, in no time, and to create products and services as personalized as wanted. As (Oklander, Oklander, Yashkina, Pedko, & Chaikovska, 2018) state, a maketing strategy should be created in order to make the interaction between the seller and the consumer stronger.

(Smith, 2012) defines digital marketing as "the practice of promoting products and services using digital distribution channels *vía* computers, mobile phones, smart phones, or other digital devices" (p. 86). (Oklander et al., 2018) establish that the principal direction of digital marketing is to create a personalized attitude to the users despite of offering a product or a service. Technological innovations permit the development of marketing strategies that allow marketers to create a personalized environment in which the different customers can feel identified with.

2.2 Digital consumers

As a consequence of the rise of the Internet as a medium of exchange, a new form of user is identified: the digital consumer or e-consumer. A consumer that targets shopping through electronic media.

The study of these consumers has gained importance due to the proliferation of online shopping, according to Dennis, Merrilees, Jayawardhena, and Wright (2009). The e-consumers show a openess to change, which make them more likely to try new possibilities. Duralia (2016) states that digital consumers have different characteristics than traditional consumers: preoccupation for functional characteristics of the products and innovation; as well as giving importance to price, time, and the diversity of the offer. For Cetină, Munthiu, and Rădulescu (2012), marketers have to include the new clients in

the process of creation of new products or services.

Internet gives e-consumers the opportunity to have access to a great variety of information from which they learn and take decisions at the shopping time trying to make the best choices, which is the biggest challenge (Duralia, 2016). For that reason, there are factors that influence the decision making of online purchasing behavior which, at the end, is the usage of certain platform or technology to make transactions.

Smith (2012) defines market mavens as consumers that have product knowledge and that act as disseminators of this knowledge with other people. This corresponds to the characteristics that Duralia (2016) has stated before for e-consumers but Smith (2012) links them to the Millennial generation (Table 1 shows the generation classification according to Williams and Page (2011)).

Table 1

Generations classification by born year

Generation name	Born between
Pre – Depresion Generation	Before 1930
Baby boomer Generation	1946 – 1964
Generation X	1965 – 1977
Generation Y	1977 – 1994
Generation Z	1994 – 2010

Adapted from Williams and Page (2011).

The Millennial generation (generation Y) is, according to Williams and Page (2011), those people born between 1977 and 1994, into a technological, electronic, and wireless society; being open minded and pursuing choice, customization, speed, and innovation as values. Being able to learn new concepts very fast is another characteristic of this generation as they grown up with technology (and the Internet) that allows them to have a better understanding of everything.

According to Smith (2012), Millennial generation use of e-commerce and new technologies will grow as they have been identified as an important force behind online shopping. Also, they tend to prefer to buy from companies that help people, communities and the environment.

Along with the development of the Internet, technology and devices have been designed to make a better integration between the network of networks and its users. This is how mobile devices such as smartphones and tablets have became important in how marketing reaches consumers. As a reaction, e – commerce evolved into m – commerce or mobile commerce.

M – commerce is defined as a direct evolution of e – commerce in which marketing uses mobile and wireless technologies to make possible a personalized and interactive communication between organizations and targets (de Souza & Baldanza, 2018).

de Souza and Baldanza (2018) state that the use of mobile devices has make Millennials to be more active in promotion and use of m – commerce, and marketers are increasing the use of this media to meet the demands of m – consumers. This allows a diversity of mobile services as SMS, MMS, GPS, mobile payment and mobile banking; permitting two features that e – commerce does not have: ubiquity and location; making possible the commerce practically anytime and anywhere.

2.2.1 The payment method

Constantinides (2004) identifies as factors that enhance the online experience for e-consumers the usability and the interactivity, which are called functional factors. Within the usability factor there is one category called payment process. Cumbersome, lenghty processes, and interupted online transactions are part of the most important sources of customer irritability when the payment moment has come.

Centering in the payment process, alternative payment methods are considered important for customers when talking about fulfillment, according to Constantinides (2004). These alternative payment methods leave aside cash, banking transferences, credit

card and even third-parties like PayPal. This becomes relevant because the payment method should adequate to the customer. Azam and Qiang (2014) state that some of the most electrifying advances in economy have come, in recent years, from e-commerce and the reason is because now payment methods have evolved into systems that are widely used not only for e-commerce but also for conventional commerce, such as credit and debit card systems and online payment platforms as PayPal.

2.2.2 E-consumer behavior

(Dennis et al., 2009) states that the study of e-consumer behavior is gaining importance due to the grow of e-commerce. Also, e-consumers tend to be more educated, younger than average and tend to be male; differing from the conventional consumer. A characteristic that the authors emphasize is that e-consumers are considered innovators. This adjective comes from the classification made by (E. Rogers, 1983) that states that the consumer can be into five categories (innovator, early adopter, early majority, late majority or laggard) depending by the time a consumer adopts an innovation, as seen in Table 2.

Table 2

Adopter categorization on the basis of innovativeness

Category	Percentage of adoption (%)
Innovators	[0 - 2.5]
Early adopters	(2.5 - 16]
Early majority	(16 - 50]
Late majority	(50 - 84]
Laggards	(84 - 100]

Adapted from E. Rogers (1983).

Azam and Qiang (2014) state that in order to explain online consumer's behavior, researchers have used theories from the theory of reasoned action (TRA) like the technology acceptance model (TAM), the theory of planned behavior (TPB), and the

unified theory of acceptance and use of technology (UTAUT), which is the union of the next theories: TRA, TAM, MM (motivational model), TPB, C-TAM-TPB (Combined TAM and TPB), MPCU (Model of PC utilization), IDT (innovation difussion theory), and SCT (social cognitive theory) to the better understanding of what are the factors which motivate consumers the use of certain technology.

2.2.2.1 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology, developed in 2003 by Venkatesh, Morris, Davis, and Davis (2003), was developed as technology information has had an impact on how every people behave in the present. The authors concern about the development of various theories that try to explain user acceptance and use of new technology that are based on different areas of knowledge, such as: information systems, psychology, and sociology. This could lead to a "pick and choose" decision-type or to choose a model in a biased way.

UTAUT takes the major eight models that explain this behaviour and fusion them into a single one that better explains the view of user acceptance towards new technology, using four constructs that have a significant importance on this conduct, as shown in Table 3.

When making this theory, Venkatesh et al. (2003) noticed and demonstrated that although other models have other three constructs (anxiety, self-efficacy, and attitude toward using technology), they have no impact on the intention of use, so they removed them from the model.

As current payment methods are a mix of new technology and traditional payment methods, UTAUT has been used to explain the acceptance and use of them, such as online banking and Bitcoin. Examples of this application are the work titled Analysis of technology acceptance and customer trust in Bitcoin in Indonesia using UTAUT framework by Novendra and Gunawan (2017), and a master's degree thesis titled Understanding Bitcoin adoption: unified theory of acceptance and use of technology (UTAUT) application from University Leiden in the Netherlands by Jurate (2014).

Table 3

UTAUT constructs

Construct	Definition
Performance expectancy	Defined as how much does an individual believe the use of a system will help to perform a task. It is considered to be the most important predictor of intention.
Effort expectancy	From the perspective of the user, it is how easy the system is for its use. It has been researched that this construct is more salient for women than in men. For that, this is more determinant for female.
Social influence	Defined as how much a person thinks that important others believe that he or she should use the new system. This construct tend to be more important when the use is mandatory and no voluntary and only happens in early stages of the adoption.
Facilitating conditions	It is how much an individual thinks that an organizational or technical infrastructure exists to make the system work. It is related with age as older people give more importance to having someone to help them in the use of the technology.

Adapted from Venkatesh et al. (2003).

2.2.3 Perceived risk

Marafon, Basso, Espartel, de Barcellos, and Rech (2018) explain that news and stories about robbing, hacking, money laundering and experiences from other people can affect the use of electronic payment methods. This is considered an important factor to study as it is another dimension to consider in order to know if a new payment method is perceived as risky for its potential users.

Risk is a situation in which the decision maker has knowledge that may influence his or her decision on using certain tool and the probability that something may happen (Marafon et al., 2018). Measuring perceived risk is the way to know if this is important to people at the time they take the decision of using or not bitcoin as a payment method. As bitcoin is based on the Internet, there is certain similitude between Internet banking and the cryptocurrency. Perceived risk is known for having a negative influence in the adoption of online payment methods. In addition, bitcoin has been related to money laundering and fraud since the down of a dark web site called Silk Road on 2013.

When the customer perceives that conditions are not very uncertain, they can perceive more control over the online payment method, increasing the probability of using it. It has to do with acceptance of risk: the interpretation of what the customer thinks about the payment method. Together, they both can influence the decision taking about using or not Bitcoin as a payment method (Marafon et al., 2018).

2.2.4 Product classification

There are people who already use bitcoin as a payment method through payment platforms as BitPay, Coinbase, CoinGate and several others; so it is important to know what are the products they are buying. For this, the product classification by Holbrook and Howard (1977) is taken from Winzar (1992). It classifies products in four categories, as shown in Table 4

2.2.5 Segment profile

According to Karjaluoto, Mattila, and Pento (2002), it has been recognized that

Table 4

Products classification by Winzar

Category	Description
Convenience goods	Those goods that their comparison with their alternatives are little enough to be despiced (Holton, 1958). Those goods that consumers purchase frequently, immediately, and without effort (American Marketing Association, 1948).
Shopping goods	Those goods that are worth of comparison as there are significative differences for purchasers in terms of time, money, and effort (Holton, 1958).
Specialty goods	Those goods that are only for certain group of consumers and implicate special purchasing effort (American Marketing Association, 1948). Brands are part of specialty goods and they can overlap the first two categories. It all depends on the consumer's perspective about the comparison (Holton, 1958).
Preference goods	Similar to specialty goods but elected just by brand or other relevant characteristic (Winzar, 1992).

Adapted from Winzar (1992).

demographic characteristics have impact on consumer attitudes and behaviour. Also, the author recognizes that literature about technology acceptance reveals that there is a link between the acceptance of new technology and age, as older users will show more resistance to the adoption of new systems, as Trocchia and Janda (2000) also state.

Karjaluoto et al. (2002) propose the measure of demographic characteristics in order to have a better understanding of what are the particular characteristics of the segment of study: gender, age, income per family, educational level, and occupation are going to be used to describe the segment of bitcoin owners.

2.3 Digital strategy

2.3.1 Definition

Bones (2019) describes a strategy as the art of making choices. These choices must come from analysis from information taken, in this case, directly from the customer in the market. Choices taken should create distinction between the competitors of a company: value.

A digital strategy can be defined, according to Rum (2018) as the application of new technologies to an existing business activity in order to focus on creating new digital capabilities that serve to support the business. The key word is *digital*, as this new strategy should be part or a larger marketing or business strategy, being always specific for each organization.

Bharadwaj, Sawy, Pavlou, and Venkatraman (2013) emphazise on using a digital strategy as a way to go beyond the traditional way and use digital technologies to create a clear different value to the customers, but also using them in the operations, purchasing, supply chain and marketing areas

It is important to remark that for Rum (2018), a digital strategy is not critical for every company as it is an investment of resources (such as time and money) that not every company has (v.g. small companies), but they can still perform digital activity such as buying ads or tweeting, keeping digital presence without the need of having a whole digital strategy.

The use of marketing through digital channels is considered by Smith (2011) as one of the most promising fields of development for the area in the decade. As well, Smith (2012) states that digital marketing is the most promising venue for reaching generation Y (millennials) because, as seen before, this segment is linked to technology and the use of the Internet and mobile devices in their daily life.

This kind of strategy should be focused on going digital, rather than on using IT tools to make the existing strategy work. This is a difference that Aron (2013) establishes and that

is important to consider. The author considers that an IT strategy is a technical answer to something that is already done, while a digital strategy is the way a business should evolve to survive in a pretty changing environment like the present digital world.

2.3.2 Characteristics

A digital strategy must be unique for every organization, and according to Kane, Palmer, Nguyen Phillips, Kiron, and Bucklye (2015), a good one will have three characteristics to be successful:

1. Think long(er) term: it is important for companies, no matter the size, to think on a longer time horizon at the time of develop a digital strategy. This is because of the rise of new digital disruptive technologies that should be considered to take part of the original strategy. This strategy must evolve as technology does and sometimes a five-year horizon is not long enough, evocating to use a 10 – to 20 – year time frame Kane et al. (2015).

2. Effectively communicate digital strategy to employees: an effective strategy should permeate the whole organization. That is the reason of make every single employee part of the strategy and be sure that it is well understood at every level of the organigram. This is a way to ensure that fast response to any problem can be found inside the organization and that these problems will be communicated to modify and strengthen the strategy (Kane et al., 2015).

3. Make digital strategy core to the business: the research made by MIT and Deloitte found that most advanced companies put the digital strategy in the core of the business, rethinking the way of making business taking as a base the digital trends that happen inside and outside the organization (Kane et al., 2015).

In addition, Shaw (2016) propose 10 characteristics that most high performing digital organizations have in common:

1. Fast – moving, agile and flexible: a characteristic of the digital environment is its fast growth and development. This is why it is important for companies to make fast adaptations of what they are doing and how they are doing it in order to have solutions for these changes, that sometimes are not predictable.

2. Customer – focused: Shaw (2016) states this point as an obsession for the customer and their experience. A multi – channel experience is something that present customers want from a brand and is something that must be included in a digital strategy, always considering the specific characteristics of the customer.

3. Innovative and experimental: looking for new opportunities and making experiments is a key that is mostly seen in young companies. Shaw (2016) says that without innovation, a company could not survive in the long term.

4. Data – driven: there could be large amounts of data that could be gathered from customers, but without the correct tools, this data will not be useful for companies. Analytics of data from a CRM system or a simple database are crucial to have a better understanding of what does the client is doing and what they want, deriving on a more powerful strategy.

5. Unafraid: closely linked to being innovative, being unafraid is important to take risks but also to accept that something is not working the way it should and start from zero. Challenging the *status quo* is crucial in a digital environment in which a large amount of competitors try to increase their marketshare.

6. Collaborative: collaboration between different departments of a company is important, so the strategy can permeate the whole company and take it all and everyone to the same direction. Also, there are times in which collaboration should be made between different companies in order to defy bigger challenges and to get bigger benefits.

7. Empowered staff: as said before, in the digital environment changes are very quick and the staff should be prepared to take action in the moment these changes surge. Speed, agility and flexibility are things that an empowered staff could achieve when having the power to take decisions that benefit the company in the right moment, without the need of asking for permission. Of course, it should be considered what are the actions every person on the staff can make and what are the actions that could need the approval of someone else.

8. Digital by default: Shaw (2016) consider that the success come from focusing on digital from start. In contrast with traditional companies, a digital focused company do not see digital as an add – on but almost as a philosophy. It is clear that not every service or product can be offered, delivered or used in a digital way and this is why it is important to make research of what is the best way to make what the company is doing, always remembering not to forget the customer characteristics.

9. Clear, evangelical leadership: leaders play an important role when applying a strategy, being it digital or not. If leaders of the organization can apply the strategy in almost an evangelical way, it means that they must fully understand the strategy and can make the whole organization believe it can work in the benefit of the company.

10. Willing to invest: it is just a minor percentage of digital organizations that spend little on staff and tech, but must organizations must be willing to make an investment to develop or acquire the best skilling staff in the market and the best technology that adapts to what the strategy needs. Sometimes investment can be very big or not, it all depends on what the strategy is.

Shaw (2016) says that long – term success of a company using a digital strategy is based on a mix of talents, borrowing strategies, try new things and adapt to the environment as fast as possible. Also, it is important to consider that at the time of working in digital, no

team or area of the business will work without the others. Seeing everything in an holistic way is the best way to manage a digital strategy.

2.3.3 Customer engagement model

In a digital environment that has rapid changes, customer engagement should be a priority. van Doorn et al. (2010) establish that customer engagement behaviors are not only transactions. Instead, they are behavioral manifestations by the consumers that maintain a firm or a brand focus, beyond purchasing. A result from motivational drivers.

For Bowden (2009), engagement is a set of task behaviors that promote connections with others. The author also considers that the process of customer engagement is a sequential psychological process to become loyal to a service or brand. Verhoef et al. (2010) complements this idea focusing on digital environments in which customer engagement consists on multiple behaviors like Word Of Mouth (WOM), blogging or providing customer ratings to a brand.

In order to explain the customer engagement model, Bowden (2009) and Verhoef et al. (2010) propose different frameworks that directly resemble to the customer journey mapping and are shown in Figures 1 and 2 respectively.

The framework proposed by Bowden (2009) shows the customer engagement process in a general way and developed using data from the hospitality industry, although it shows a generalized process of engagement. In the upper side it shows the process through which new customers start the process, with an undeveloped knowledge of the process. Satisfaction is the first goal of the process, then an evaluation is made by the customer, influencing the calculative commitment of each of them and evaluating the service. This produces a feedback that is used at the time of deciding or not to use the service or product again.

The lower side of the process shows the path used by customers that repeat. The knowledge structure is developed and satisfaction is assumed. This develops trust and involvement to the brand, that can derive into an affective commitment. Loyalty is then

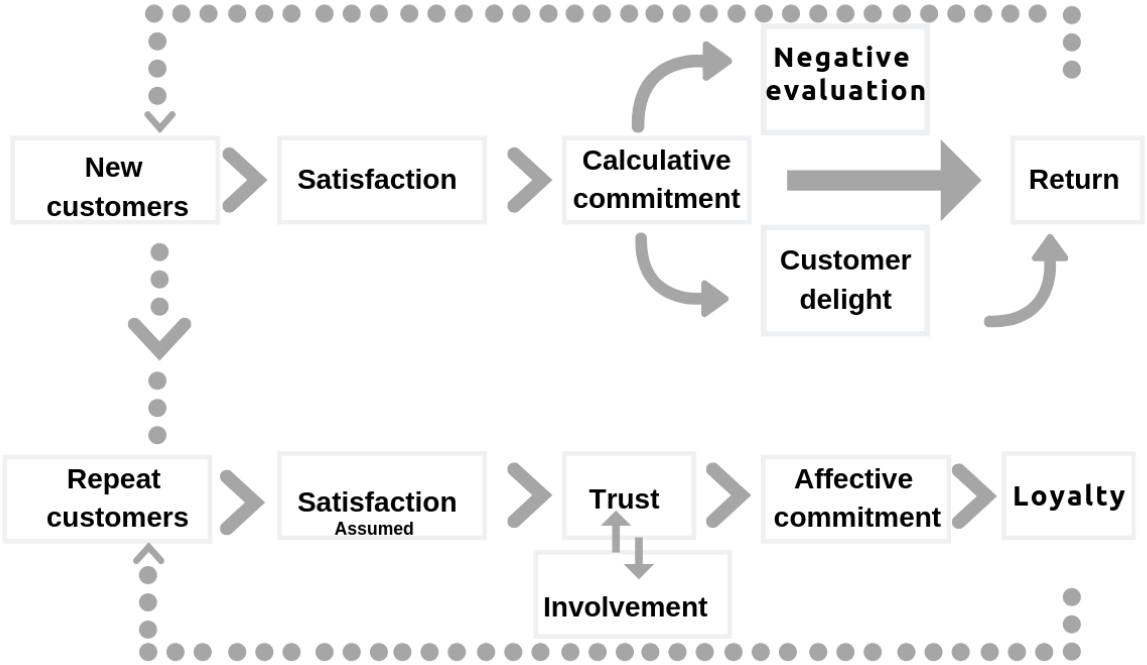

Figure 1. Customer Engagement Framework. Adapted from Bowden (2009).

created, being it a link between the customer and the brand, going beyond a simple transaction and creating a relationship.

In the case of the framework proposed by Verhoef et al. (2010), it is designed specifically to a digital environment, in which the customer engagement behaviors will be affected directly by the customer characteristics, the firm initiatives, and the environment. As a consequence, marketing metrics will be measured and affected too, having a direct incidence on the firm's value. In addition, the firm strategies will have influence on the customer engagement and at the time of establishing the metrics, the reason why a good strategy is needed.

The customer engagement model can be used as a starting point to develop a strategy. In this case, a digital strategy. As stated before, these models have similarities to the Customer journey tool, which can be developed for each firm's specific situation and that will be explained later as an initial point for the creation of a digital strategy.

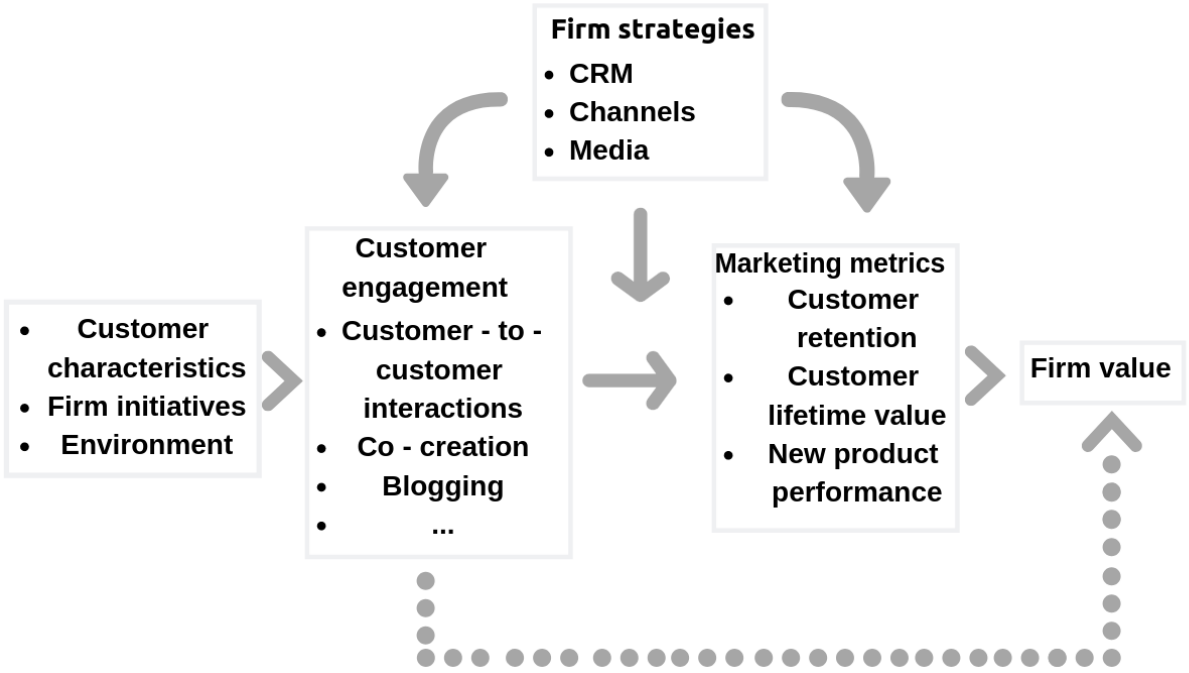

Figure 2. Customer Engagement Framework. Adapted from Verhoef et al. (2010).

2.3.4 Strategy for e-commerce for the 21st century business

Hamilton (1997) had a vision about what e-commerce would evolve through years more than two decades ago. His vision could be summarized into three words: content, convenience, and confidence.

There should be incentives to use the Internet as a medium of exchange, such as a better service, price, or service. As well, it must be convenient for the users, the same way they used ATMs in 1997; and finally, the user should be confident about the way the transactions are done, leaving trust in the hands of other people. This three characteristics should create a marketplace, an infrastructure, and a legal and regulatory market (Hamilton, 1997).

These chellenges were considered by some institutions, including governments. For example, Office of the Privacy Commissioner of Canada (2004) was worried about the misuse of digital channels by Canadians and it was pointed that in order to citizens to trust on this new technology, they had to be sure that their personal data online was secure.

This pushed them to create documents like the Personal Information Protection and Electronic Documents Act, which promotes trust in the private sector of Canada about fair information management. As well, in the public sector the creation of the Privacy Impact Assessment (PIA) helped different departments to handle personal information. Even with the creation of these two acts, Jennifer Stoddart, Privacy Commissioner of Canada, aimed for a general overhaul of the Privacy Act to have a better reflection of the electronic reality of Canada at that time (Office of the Privacy Commissioner of Canada, 2004).

Strategy& (2018) states that by 2020 Generation C (for "connected") will be totally immersed into a digital world in which computers, the Internet, mobile services, and social networking are a second nature to them, transforming the way we work and consume, being leaded by three forces:

- Consumer pull: generation C is fully adapted to a digital environment, expecting to be connected at every time.
- Technology push: low – cost devices and a great infrastructure are creating an environment that eases the influence of technology on everyone's daily life. Also, the technology is being developed and replaced at a fast rate.
- Economic benefits: markets reward early technology movers as there is a wave of capital that leads innovation and digitalization.

Also, Constantinides (2006) states that if marketing is going to be a value – adding activity, it should be focused "on the factors underlining customer value as well as building market – oriented, flexible and inventive organizations, able to constantly innovate and adapt to fast – changing market conditions" (Constantinides, 2006, p.26).

There are some firms that underestimate the power of "digital" in a strategy, as Catlin, LaBerge, and Varney (2018) state. These firms do not consider digital media to create strategies and, of course, they do not pay attention to the changing environment that the development of technology has made. In order to avoid this behavior, the authors consider that there are four barriers to fight in order to make leaders understand and consider

digital strategies into their business, as seen in Table 5

Table 5

Points to fight for including digital strategies into a business

Fight	How to win
Ignorance	Catlin et al. (2018) say that it is important to make leaders learn about what digital is and how it can change the way a business works and earns money. If they do not fully understand what it is, they will not fully understand how it will help them.
Fear	By giving managers the necessary tools and giving them training about their correct use is one step to fight fear. Also, the creation of support networks to share experiences, best practices and to motivate the workteams are great ways to defy the fear of change.
Guesswork	A way to fight against guesswork is to make fix objectives that the strategy could accomplish joined to research about the digital environment and how it can help to reach what is proposed.
Difussion	To focus on one thing is the best solution for diffussion. A first thing to do is to view the business as a portfolio of initiatives. What are you offering that can be improved with digital technology? The second thing is to be conscious that big moves should be required. A big reallocation of resources, a great investment or even a fusion with another company are things that should be considered to focus on a single thing at a time.

Adapted from Catlin et al. (2018).

D. Rogers (2016) states that digital transformation is not about technology but about strategy and implementing new ways to think. Once the benefits from using a digital strategy and digital tools is known by leaders, the author proposes five domains of strategy to create value by creating a digital strategy: customers, competition, data, innovation,

and value, described in Table 6.

Table 6

Five domains of digital strategy

Domain	Description
Customers	They are dynamically connected and interacting in ways that change their relationships with businesses. They influence each other and have access to digital tools to make decisions.
Competition	Competition goes beyond offering similar products or services and is described as offering similar value, despite of their nature and making them asymmetrical competitors.
Data	Traditionally, data was generated through inner processes in business that obeyed to specific goals. Now, data is generated outside the business vía social media, conversations and interactions. This data is now considered the lifeblood of businesses and allows them to generate new value propositions.
Innovation	It is a process to generate, develop, test, and brought new ideas to the market. Traditionally it was focused on a finished product and market testing was difficult and costly with a high cost of failure. Now digital technologies ease idea testing, gaining market feedback at a faster rate than before.
Value	This domain tended to be constant and defined by the specific industry in which the business developed. Now, constant evolution of the markets, industry and technology drive value propositions to be dynamic.

Adapted from D. Rogers (2016).

For this five domains to be correctly studied, changed and implemented, D. Rogers (2016) propose that it is needed new frameworks in order to formulate strategies that best adequate to every company and their particular situation to adapt and grow in the digital

age.

Next, some tools are exposed in order to have a departure point to develop strategies for each of the dimensions stated before. These tools are only intended to be a general framework from which to start developing every company's own strategy and it must be comprehended that there are much more tools from where to choose for specific situations.

2.3.3.1 Customer journey

D. Rogers (2016) explains that in order to have a better connection with the client in a digital era, it is important to re – examine customer's path to purchase. This is because of the characteristics of e – consumers that purchase in a different way from traditional consumers. The purchasing path can be examined and better understood based on a customer journey mapping.

As Lemon and Verhoef (2016) proposes, customers now interact with companies in diverse touch points in different channels, complexing the customer journey. This customer journey changes with time, so it is important to remark that when mapping one, it is valid for time t as seen in Figure 3. This mapping is made in three stages: prepurchase, purchase and postpurchase as seen in Table 7.

The behaviors contained in each stage should be studied in some other dimensions: brand – owned, partner – owned, customer – owned and social/external/independent. This is because customers should deal with different stakeholders in this process. Depending on the different business, one could have more importance than others in each stage but all of them must be considered. These dimensions are explained in Table 8.

Once the customer journey is mapped, it could be easier to make changes and implementations on it, using it as a reference of a current status on the process and being the firm capable of comparing it with future mappings to measure if changes were satisfactory. This leads a continuous improvement cycle to have a better adaptation to what the customer needs and asks for. This tool can be complemented with a dedicated market research to make improvements to the path.

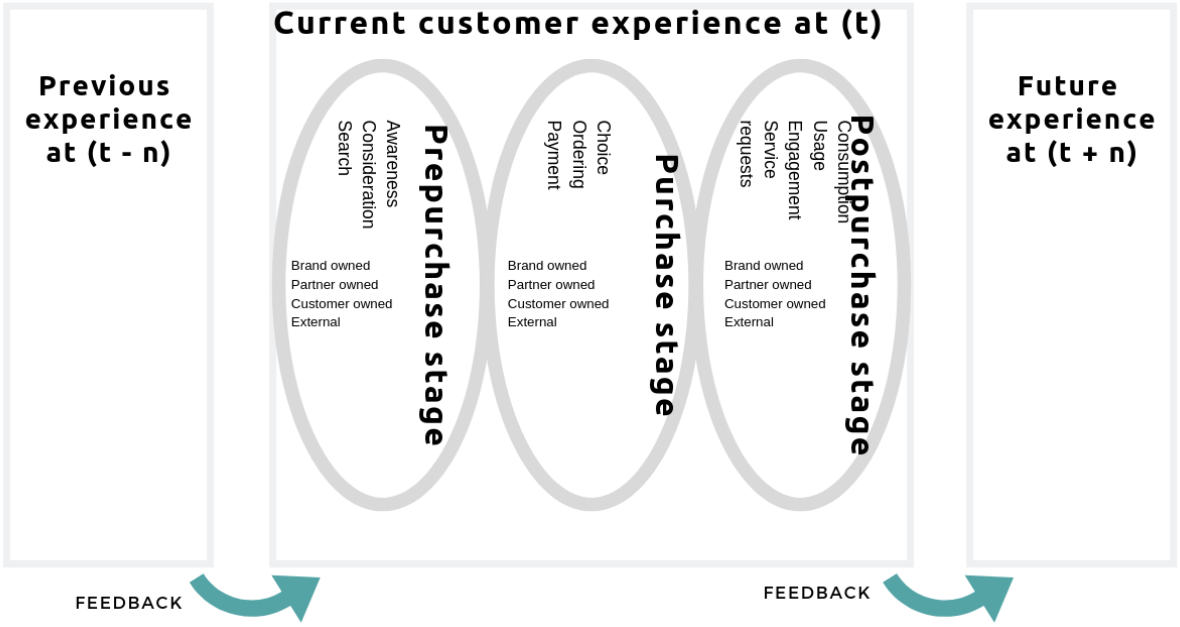

Figure 3. Customer Journey diagram. Adapted from Lemon and Verhoef (2016).

Table 7

Customer Journey Stages

Stage	Description
Prepurchase	Comprises aspects that the customer faces before a purchase transaction and traditionally, it is divided into awareness, search and consideration behaviors.
Purchase	All the interactions between the customer and the brand are studied under the purchase event itself and choice, ordering and payment are the behaviors to consider.
Postpurchase	Includes behaviors such as usage, consumption, postpurchase engagement and service requests or postpurchase services. This last stage could extend temporally from the purchase stage to the end of the customer's life.

Adapted from Lemon and Verhoef (2016).

Table 8

Customer Journey Touchpoints

Touchpoint	Description
Brand – owned	Customer interactions that are controlled by the firm, such as advertising, websites, loyalty programs, attributes of the product, marketing campaings, packaging, service, pricing and many others.
Partner - owned	Customer interactions that are designed, managed or controlled by the firm and partners. Examples of partners are marketing agencies, multichannel distribution partners, multivendor loyalty program partners and communication channel partners.
Customer - owned	Actions taken without the influence of the firm or partners, only by the customer. To think about desires, needs and preferred payment method (partners could play a role) are examples of these actions. Although traditionally this touchpoint is considered as external, now it is important to consider it in the value creation strategy of a firm.
Social/External/Independent	External touchpoints like other customers, peer influence, information sources or the environment can influence in the customer journey. This should be also considered for the digital strategy as e -customers are considered to be highly influenciable by peers.

Adapted from Lemon and Verhoef (2016).

2.3.3.3 Collaboration between companies

Parting from the fact that competition in a digital stage can come from companies that do not sell the same, the added value that a firm offers to their customers should be important enough for them to keep a customer – business relationship. Asymmetrical competition has become a problem to traditional business in which the paradigm of compete with your similar is still valid.

Porter and Kramer (2011) state that these companies view value creation narrowly, optimizing short – term financial performance. For this to be solved, the authors lie the solution on the principle of shared value, which apart from creating value for the customer, it creates value for the society and economic value.

Shared value is defined by Porter and Kramer (2011) as: "Policies and operating practices that enhance competitiveness of a company while simultaneously advancing in economic and social conditions in the communities in which it operates. Shared value creation focuses on identifying and expanding the connections between societal and economic progress" (p. 2). The authors also define value as benefits relative to costs, not just benefits alone.

As can be seen, the concept of shared value is extensive and goes beyond marketing and the value creation process through competitors. For the purpose of this research, shared value is exposed as a way to create links between competitors and support industries in order to create value to the customers and have a common benefit from the actions taken by all of the stakeholders, without the need of concentrating all actions and knowledge in just one firm.

For Porter and Kramer (2011) in order to create value under the shared value concept, there are three ways: reconceiving products and markets, redefining productivity in the value chain and building supportive industry clusters at the company's locations. These three ways are all connected and are influenced by each other, thus, creating value in one of them, will improve the other two.

By creating industry clusters, each company has an expertise area that will be complemented by other's in the cluster to integrate all that expertise into a product or service that best matches the customer needs or desires.

Another way to collaborate in an asymmetrical competition environment is the creation of platforms. A platform is a set of layers of infrastructure that have certain standards on which many individual entities can operate for their own gains (Hagel, 2015). One clear example of platform is the Internet: a platform over which services like the World Wide Web (www), videoconferencing or communication services, like electronic mail, are offered and used.

Creating a platform is a way to create value without the need of having an important amount of resources or knowledge. There are three types of platforms, as Hagel (2015) state and can be seen in Table 9

Table 9

Platform Types

Platform	Description
Aggregation platforms	They facilitate transactions, connect users to resources and tend to operate on a hub-and-spoke model.
Social platforms	They facilitate social interactions, connect individuals with communities and tend to foster mesh relationship networks.
Mobilization platforms	They facilitate mobilization, move people to act together and tend to foster long – term relationships to achieve shared goals.

Adapted from Hagel (2015).

D. Rogers (2016) consider that platforms can provide great benefits to companies that can effectively create one. Most of the times, platforms do not create content directly or do not own the product or service that they offer. Instead, it is created or offered by users, as in the case of Facebook or Aribnb. As a result of this, platforms could have a high

operating operating margin.

Other benefit from a platform is that they can grow very fast, depending on the business. Internet tends to be a platform for platforms and because of that, using Internet services can make a platform highly scalable. In addition, once a platform is well established, users tend to use them as similar platforms will only try to copy the value that a highly accepted platform is offering.

In perspective, value creation through collaboration is highly effective as there is no centralization in this process. Every stakeholder will complete a full service or product in which more than just one firm will be benefited from the process.

2.3.3.3 Data is also an asset

D. Rogers (2016) consider that data gathered by companies is a key asset and a source of innovation and value creation. This data was traditionally generated by surveys and it could be costly to get and store it in dedicated servers inside the company was even more coslty. Now, with the develop of technology, this is not the same panorama as before.

Now data can be gathered easier and provided by users without even notice it. Interactions on social media is a way to receive feedback and gather raw data for a later analysis. The way of gathering data depends on the business. For example, a factory can get data from installing sensors all over the value chain, a gym can implement a wearable device for their members in order to get health data about their customers, CRM software can help to collect data about purchases of clients based on an NFC – based app or a RFID card that identifies every user, or even using a face – recognizer software based on CCTV installed on a shop to know the path a client follows when purchasing.

An interesting case in which people are generating large amounts of data is the Quantified Self movement in which people monitor themselves 24/7. Podometers in their shoes, wearable devices that monitor vital signs and sleep, phones saving locations vía GPS and apps that control their finances is what is normal for followers of the movement. The objective is to track their lives to improve them, to have a self – knowledge through

numbers (Wired, 2009). This can be translated to the value creation process of a company.

It all depends on what kind of data the company is trying to gather and for what purposes. Data gathering can be as simple as asking customers to check – in on a social media app in your shop. Once data is gathered on a database, then interesting things could happen.

D. Rogers (2016) propose four templates to create value from customers data: insights, targeting, personalization and context. They are all explained in Table 10

Tools used to analyze large amounts of data are Big Data and Data mining. According to Oracle (2019b), Big Data is varied data that is created in large amounts and at a fast rate. These three characteristics are fundamental to choose when to use or not to use Big Data providers to store information. Oracle (2019a) consider that fields where to use the tool are: manufacturing, retail, healthcare, oil and gas, telecommunications and financial services. Specifically in the retail sector, it can be used on product development, improving customer experience, knowing customer lifetime value, the in – store shopping experience and pricing analytics and optimization.

In contrast, data mining is the process by which all data stored (in Big Data or not) is analyzed. Techniques used are exposed in Table 11.

These techniques can be used without the need of having a Big Data service, analyzing a short amount of data, for example. Also, they can be used by every company no matter their size, putting the power of data analysis at reach of everyone would like to benefit from it in a digital era.

Table 10

Templates to create value based on data

Template	Description
Insights	Data can be used to unveil patterns or behaviors that are not seen at first sight. They can reveal how clients would reaction to certain changes or even how engaged they are with the brand. This can be later used to make modifications to the present paradigm and to adapt it to what the client wants.
Targeting	Data analysis can reveal characteristics of an audience that is most attracted to a product or a service, deriving into micro – categories of customers to which target certain product, service, a group of them or even the whole brand.
Personalization	If targeting divided clients into micro – categories, it is important to treat them differently as they have different characteristics. Data can provide defined characteristics of each micro – segment, leaving managers the task to adapt the business to them.
Context	Giving customers a context also adds value. Is the core business of the company technology? Give them a technological context in which you are applying the other three insights.

Adapted from D. Rogers (2016).

Table 11

Data Mining techniques

Technique	Description
Association	Simple correlations are made between items. It is used to identify patterns of behavior, for example.
Classification	It describes multiple attributes of a set of data. It can be also be used as entry data for other techniques.
Clustering	By using one or more attributes, data can be linked to group them into clusters. Useful when targeting products or services.
Prediction	It analyzes trends, classification, pattern matching and relation to make a prediction.
Sequential patterns	Frequently used over long – term data, it can identify trends or regular occurrences of events.
Decision trees	Can be used as part of a selection criteria, starting generally with a concept with two possible outputs, this technique can make decision paths.

Adapted from Brown (2012).

2.3.3.4 Innovation

D. Rogers (2016) define innovation as any kind of change in a product, service or process that adds value. This can go from an incremental improvement to the design and implementation of something completely new.

In a digital era, innovation should come at every stage of a process, leaving aside the idea that innovation is only for finished products and improving them by looking at their failures. Now, minimum viable prototypes are factible due to the develop of technologies that save money and time, at the same time they provide the mediums to test products and services at every stage of their development, making easier to find failures or

improvement areas to attack in order to have a much better final product or service to offer and that has much more added value to customers than if done with the old paradigm.

For Saarelainen (2017), there is no innovation without experimentation, as it is fundamental to have insights and new knowledge. Seen in another way, experimentation is a search of value, a journey for innovation.

Every experiment environment is different, that is why there is no a generic way to do it. There are tools, techniques and protocols that can be found and used by everyone but they must be a reference and must be always adapted to the specific environment in which it will take place. Saarelainen (2017) has identified steps that could help at the moment of planning an experiment, as seen in Table 12

Once the experimentation guide is set, it is important to know why the experimentation process is made this way. D. Rogers (2016) establishes that experimentation has seven principles or benefits that are exposed in Table 13

Experimentation can be made through different frameworks but all they have the same basic steps. Defining which framework use or to use a mix of them, is delegated to those in charge of the innovation process at every single firm, always adapting them to their own environment and particular situation.

Table 12

Experimentation steps guide

Step	Description
Define a purpose	Why are you running this experiment? This is the basic question to do when defining purpose. Any response is valid, although it is a negative one. It lets you know if it is needed to experiment or if the outcome is already known.
List of assumptions	It is important to differ from what is already known to what is being assumed. To make a list of both of them will make it easier to experiment.
Identify the most critical assumptions	Focus on the most important assumptions. To put a weight to each one can help to identify which are the critical ones and, thus, to those that should be a priority.
Design and run your experiment	Collect as many information as possible in a short time and using little effort. Keep it simple. Surveys and market research is not a good idea at experimenting because they take too much time. The best idea is to run the experiment in real conditions.
Collect data	Record everything. Data will be useful.
Review results and decide on next steps	Compare results with the goals. By comparing, knowledge is created, changes arise and the need of repeating can surge. This step is connected to the first one in an iteration until being comfortable with the results, that will lead to go to a solution for a problem.

Adapted from Saarelainen (2017).

Table 13

Experimentation principles

Principle	Description
Learn early	It is important to start experimenting at the very beginning of the innovation process. Knowledge can surge at any step, leading to an early add of value.
Be fast and iterate	Speed is important as seen in the previous principle. In addition, iteration is crucial as processes can always be improved.
Fall in love with the problem, not the solution	This way of thinking keeps you focused on what the customer needs and to provide more than one possible solution.
Get credible feedback	Once a set of solutions is thought, they must be tested with real people to get real feedback. Going with customers with just and idea, will just lead to speculation
Measure what matters now	Setting metrics is important so the experiment and the results can be controlled and improved.
Test your assumptions	If assumptions are tested, confirmed or contradicted, it can help to have a clearer view of the situation and to avoid risk.
Fail smart	Failure is inevitable in the experimentation process, but this failure comes with new knowledge that will help to produce more value and to improve the process.

Adapted from D. Rogers (2016).

2.3.3.5 Adapting the value propostion

In a digital era, a fixed value proposition do not work. Now, it is dynamic and is defined by the changing customer needs, making it relevant to uncover next opportunities and evolving before it is needed to be always vigent (D. Rogers, 2016). For this to take place, all previous domains of the digital strategy contribute.

This value creation way is known as adaptation. de Kluyver (2012) explains Ghemawat adaptation approach to value creation, and taken from Ghemawat's AAA framework, as changing one or more elements of a company to meet local requirements or preferences. Although Ghemawat's framework is intended to be used by global firms, it can be easily used by any kind of firms in a digital era as it is already globalized.

A tool used for the creation of a new value proposition is the Value proposition roadmap. It consists on six steps divided into two stages: overall activities and activities for the consumer. Overall activities are explained in Table 14 and those for the consumer are explained in Table 15.

By applying the Value proposition roadmap, new elements of value will surge based on the analysis done. It is important to remark that, the same way as experimentation, this step can be looped as many times as needed in order to improve the new value offer, always expecting it to be focused on what the customer needs or desires.

Also, the framework itself can be looped to master the process and to add new elements at each iteration. The main objective of the framework is to have a reference guide on how to adapt to a digital era and it must be complemented with other tools and to the specific environment of each firm.

Table 14

Overall activities

Activity	Description
Identify key customer types by value received	Every firm has different kinds of customers, so it is important to identify them by what kind of value they receive. It can be easily done by data mining strategies.
Define current value for each customer	Each customer has different benefits that get from you. To list them is helpful at the time of describing each segment.
Identify emerging threats	Threats can come from other firms that offer similar value, substitute products or services or by minimizing your value offer. New technologies, a change on customer's needs or desires or new competitors are threats to be aware of.

Adapted from D. Rogers (2016).

Table 15

Activities for the consumer

Activity	Description
Assess the strenght of current value elements	Using the list of value elements for each kind of customer, assess each item asking if it decreases or increments the value to the customer.
Generate new potential value elements	This step is an opportunity to get elements that are decreasing value to the customer and use them as a source of opportunity to create new value. New technologies, trends that involve current customers and unmet customer needs must be considered.
Sinthesize a new value proposition	Knowledge from previous steps must be used to make a new value proposition. Elements to create value can be classified into: • Core elements: These are the base and strength of the proposition. • Weakened elements: Elements that are losing value to customers and could be reinforced. • Disrupted elements: They should be discarded as they have lost their value. • New elements: New value elements that come from identified opportunities and are a priority to invest on.

Adapted from D. Rogers (2016).

2.4 Bitcoin

2.4.1 Bitcoin background

Modern cryptography has been used since the decade of 1960 when Bailey Whitfield Diffie started to develop a concept called public-key cryptography along with Martin Hellman, which led to the develop of multiple tools such as PGP (Pretty Good Privacy), which is considered the first encryption shareware (Levy, 2001). Since then, cryptosystem software have been used mostly by the government to protect their communications but had not been used in a wide way by civilians, except for researches and developers.

The interest of using cryptography as a way to secure information across Internet surges with a movement called cypherpunks. This movement, surged in the early 1990s, according to Epstein (2015), had the idea that cryptography could preserve the freedom of online communications by shielding them against the influence of the government, extending its opportunities to the exchange of goods and services; changing the existing paradigm. As Buckminster Fuller said: "you never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete." (Epstein, 2015).

This movement made possible the development of Wikileaks, an online website in which there is leaked information mostly about governments; TOR, an anonymous proxy which makes connections untraceable and let users visit hidden services just as Wikileaks; Cryptophone, a mobile phone which ciphered all communications; as well as La Quadrature du Net, a group that promotes the rights of citizens on Internet, mainly about free circulation of knowledge (Tangen-Mills, 2013).

In 1985, David Chaum, who is considered the founder of the cypherpunk movement, published the paper titled "Security without identification: transaction systems to make big brother obsolete", which stated the bases of anonymus digital cash and pseudo-reputation protocols (Falkon, 2017). Also, in 1993, Eric Hughes writes the Cypherpunk's Manifesto in which he states that it is important to create systems that

allow people to make anonymus transactions. He also says that now it is possible to do this through software (electronic technologies) and he makes reference to the creation of electronic money. As well, he declares that for privacy to take place, it must be part of the social contract, so it is important that most people agree with the fact that this is important and useful for them (Hughes, 1993).

2.4.2 Development of the first electronic payment systems

Following this reasoning, in the 1990s decade there were some developments that tried to implement these ideas in a vary of ways. For this, electronic payment systems are not something that is new for the industry. Chaum and Brands (1997) explains that by 1999 electronic equivalents of traditional cash were being developed and launched worldwide. While some of these developments were made by banks in order to improve traditional credit and debit cards systems, others were taken ahead of this idea thinking about to replace the traditional system.

McAndrews (1999) says that stored-value systems, credit-based, and deposit-based systems that make possible to transfer value over computer networks were new technology in 1999, almost 20 years ago. He also states that these techniques are a great promise that offer added convenience to the consumer, although they add a risk layer to the transactions like: fraud, legal and operational risks. One example of offering added convenience to the customer is that, according to Due.com (2016), the first remarkable digital wallet, PayPal, was created in order to complement eBay with a way for customers to store their credit cards for continuing purchasing in the platform.

In this context, McAndrews (1999) observes the difference between a closed network, like those used in ATMs, or credit card point-of-sales; and an open network, in which all transactions can be seen or intercepted directly without the permission of any banking institution or any other third party; describing problems in open networks like: it is possible for everyone to know who is making certain transactions and the amount, how to verify that the message has not been altered in the process, and how to safeguard the

message from being altered or redirected to another receiver. At that time, it was known that cryptography was the solution for the last two problems, involving a system that makes a virtually closed newtork inside the open network.

2.4.3 Popular e-money approaches

There were many attempts to solution the problems that were identified for open networks. In 1996, Jakobsson and Yung (1996) presented an offline e-money system which anonymity could be revoked by the banking institution owning it. They enabled this characteristic in their system because e-money can be used for illegal transactions, robberies, black-mailing, and money-laundering.

By revoking anonimity, the system provides traceability, always pursuing the law accomplishment. Their objectives by doing this system are: unforgeability of funds, anonymity for the honest users, blindfolded-freeness, and a legal traceability of every single transaction made. Also, it provides the possibility of giving back funds in case of an incorrect transaction, framing-freeness and solves the problem of overspending a single coin (double-spending). The problem with this system is exactly its added value: anonymity revocation. If this happens, in fact, the system has never been anonymous as there is a third-party controlling this characteristic, as (Jakobsson & Yung, 1996) propose.

One of the most popular and first approaches to electronic money is E-gold. Launched in 1996 by Dr. Douglas Jackson, offered gold, silver, platinum, and palladium accounts in which people could exchange fiat money for grams of these metals. One of the objectives of E-gold was to be immune to inflation, as its value was based on valuable metals. Several direct competitors started to launch their own e-coins: e-Dinar (2000), e-bullion (2001), GoldMoney.com (2001), 3P Pay (2001), Pecunix (2002), and I-golder (2005). E-gold story ended in December, 2005 when FBI and Secret service discovered that it was being used for illicit transactions. By 2009, all accounts were suspended (White, 2014).

Another of the most popular e-money instances is Liberty Reserve. With little requirements for buying, selling, and trading, it became very popular. It maintained a

price parity between Liberty Reserve Dollar and US dollar, as well as Liberty Reserve Euro to Euro. This parity and the freedom the company gave to users, made it very attractive for criminal money transfer (McCombie, 2016). According to The United States Department of Justice (2016), it was an underworld cyber-banking system used for money laundering of illicit proceedings. All this conducted Arthur Budovsky, its creator, to a 20-years sentence for money laundering and other charges.

About 1998, Nick Szabo, a computer scientist thought about a new electronic coin called Bitgold. The innovation of it was the effort to make it valuable without basing the price on any other asset. If something is difficult to get, it has value like gold. The problem with metals and fiat money is that they are controlled by a centralized third party (in which people have to trust). Also, it is not practical to carry gold bars to make purchases. The solution for giving value is something called proof-of-work. This works by giving computers a cryptographic equation to solve, this way, everytime an equation is solved, the transaction is validated by the network (Peck, 2012).

But this was not the first time a proof-of-work method was implemented. In 1997 Adam Back, in order to solve the spam problem, designed and publicated a system (called hashcash) with the follow ideology: if something is expected to be received and it is important, it worths to be authenticated. As well as in most proof of work scenarios, a cryptographic equation has to be solved in order to validate the e-mail as legit (Back, 1997).

2.4.4 Double-spending and decentralization

There exists one problem known as double-spending in which, as e-money is just a series of zeros and ones (software or an archive), there exists the possibility of copying and pasting money the times needed to become rich. According to Asokan, A. Janson, Steiner, and Waidner (1997), in an e-cash system, every coin should have a serial number so, when a payment is done, the bank can register this serial number, link it to a transaction and be sure that it cannot be used twice once it is spent. But this solution is only effective when there is a central institution which manages the transactions.

There is a characteristic that E-gold and Liberty Reserve had in common: centralization. If the main node of the network fails, the entire network fails. As well, all information is controlled by a central party which has the power to manage information the way they think is pertinent (the same way as banks and institutions like PayPal, Visa or Mastercard). For this, when FBI noticed there was illicit movements in these systems, it was pretty easy to get information and to stop the operations of them. A trustworthy e-money system should keep working although there are problems like this, the same way the financial system used everyday have worked for several years.

A classical computer sciences problem called The byzantine generals problem is important to understand the importance of mitigating this trust problem in decentralized e-money systems. Lamport, Shostak, and Pease (1982) define it as a way to make two byzantine generals to come to an agree of attacking a city when they are in opposite sides of the site and there is just one way to communicate: through a third-trusted party. When this third-trusted party is not as trustworthy (maybe a traitor), there is a trust problem. There should be an algorithm that enables these two generals come to an agree being sure that the information has not been altered by this third party.

This can be translated as a money transaction in which two people want to make an exchange but they have to trust on the bank, PayPal, Visa, or Mastercard. As stated by Fillieule (2016), trust on the banking system decreased because of the 2008 crisis and the disability of government's policies to counteract it. This represented an opportunity for e-money but there had not been a solution to make it trustable until Bitcoin was developed.

2.4.5 Bitcoin development

Bitcoin is the first cryptocurrency. Developed in 2008 when its author, best known under the pseudonym of Satoshi Nakamoto, sended its white paper titled: "Bitcoin: A Peer-to-Peer Electronic Cash System" to the cryptography mailing list of Metzdowd. According to Wallace (2011), none of the users of the mailing list have ever heard of him, the mail came from a free German service, and Google searches gave no results making

reference to Nakamoto. Anyway, he (or maybe they) created a system which solved problems (on the e-money context) prior cryptographers and computer scientists have not. Bitcoin has fiat money characteristics: durability, portability, fungibility, scarcibility, divisibility, and recognizability, according to Bitcoin.org (2018).

The first Bitcoins surge in 2009 when Nakamoto mines the first block (known as Genesis block), initiating the Bitcoin network and generating the first 50 Bitcoins on January 3, 2009 at 12:15:05 PM, according to Block Explorer (2018), which at that moment had no monetary value because there were no people who made monetary transactions for them. Little by little the word Bitcoin became popular in the cryptography world and more people were interested on it, downloading the code and implementing nodes for the network, at the very style of open source projects.

Not long after the creation of the network, the first transaction between wallets was effectuated to Hal Finney, as Peterson (2014) describes. Finney had a long reputation in the cryptographic media, as he ran the first cryptologically-based anonymus remailer and was involved in the cypherpunks mailing list. Maybe for that reason Nakamoto sent 10 bitcoins as a test and Finney had an e-mail conversation with him reporting bugs and fixing them.

As the Bitcoin network became stronger and better for transactions because of the aportations of coders, the first time bitcoin was changed for fiat money was when an England coder called Gavin Andresen bought 10,000 Bitcoins for $50 and created a site called the Bitcoin Faucet in order to promote the use of Bitcoin, as describes Wallace (2011). Also, Andresen stated that Bitcoin was designed to bring people back a decentralized currency, as said by Greenberg (2011).

To the first bitcoiners group it was joined David Forstrer, a farmer who accepted them as payment method for his alpaca socks, but the most famous bitcoiner must be Laszlo Hanyecz because of buying two pizzas for 10,000 bitcoins from Papa John's using bitcoin as an indirect payment method.

2.4.6 The Bitcoin infrastructure

In order to make everything work, there is a infrastructure under Bitcoin runs. Yahanpath and Wilton (2014) says that this network is made of thousands of people and organizations which run software to make it work.

It is possible that the most important part of the Bitcoin infrastructure is the blockchain. It is a critical piece that makes possible decentralization in the transactions and can be considered the network itself. Wandhöfer (2017) states that decentralization is a complete computing revolution that makes a seamless payment system that can work all across the World. All the transactions in the blockchain are public and can be examined with tools like blockchain.info. It means that although Bitcoin is known for its anomymity, it is possible to know from where and to where a transaction goes every time, but it is not always possible to know who are the parts of the process (privacy).

This technology implemented by Nakamoto solves the problems of double-spending and centralization (The byzantine generals problem) in a very elegant way. With this, the Bitcoin network provides anonymity, decentralization, and a public ledger which can be seen by everybody at anytime but cannot be modified (unless there is 51% of control over the network).

Neyer and Geva (2017) describe the blockchain as a database that puts sequential records in a block, making a chain with the next block vía cryptography. It can be (and must be) shared and confirmed by any member in the network (as it is a decentralized P2P network). It gives value to Bitcoin by a proof-of-work equation that must be solved, giving the "miners" (a way to call people who lend their computer power to solve these cryptographic equations and as a comparison with gold miners) a portion of Bitcoin as payment. The same way hashcash works but in a different context.

For Underwood (2016), this technology has a potential beyond Bitcoin, as it can be used for financial sector, commercial applications, and developing countries where people have no confidence in institutions. Also, Hansen and Kokal (2018) say that the potential of

blockchain is to give people trust and transparency back, because now transactions are mediated by third parties whose interests may not be congruent with our own.

For the process of making transactions to take place, everything starts with the Bitcoin client, which is software, properly called Bitcoin Core Client, that makes the computer of a person a node of the network. This node can act as wallet, mining node and/or full blockchain database (described in Table 16). A characteristic that every node performs is newtork discovery, enabling the discovery of new nodes in the peer-to-peer network. The propose of the Bitcoin client is perform, verify, propagate, and incorporate transactions into the network, as Turner and Irwin (2018) say.

These actors in the Bitcoin network cannot work without certain processes, the most important is network discovery. In order for a node to work, it is necessary for it to find another node in the network (otherwise, it would not be a network). The node sends a message to know if there is another node with which connect and, of course, to make them know it is now a player in the newtork. When it happens, they start to exchange addresses and broadcast the new node information to other peers. By doing this, it is possible to trace a node and to link it to an IP address, making it vulnerable when anonymity is needed (Turner & Irwin, 2018), but protecting the node through a proxy like TOR makes traceability really hard.

A mechanism that helps the network discovery process is address propagation. Once the node has contact with one or more nodes, it is important to start sharing other information aside of the existence of the new node. The node sends a message asking for directions of their direct neighbors (those which now have their IP address) so they can propagate their address and return other peer's. This process is important to have communication with the whole network and, of course, to make transactions with every node (Turner & Irwin, 2018).

With this processes, a Bitcoin transaction through the blockchain can be performed in this (simplified) way: a node initiates a transaction and broadcast the information about the amount and the wallet identifier to their neighbor nodes and these nodes to their

Table 16

Bitcoin network types of client

Wallet	Miner	Full blockchain node
A wallet consists of a file which has the client information: private and public keys used for the cryptography system to make the transactions possible, as well as the incoming and outcoming addresses, funds, transactions made with the wallet, user settings, and technical information. For anonymity purposes, it is not recommended to use the same address for different transactions. This must lead to traceability (Turner & Irwin, 2018).	Turner and Irwin (2018) describe the mining process as adding validated transactions to the blockchain through the proof-of-work. Once other nodes receive a new block, they check the cryptographic equation to ensure it is valid. By doing this process, the system secures itself from fraudulent transactions and solves the double-spending problem. Also, miners have a reward for the work as Bitcoin portions. When miners join the network, more blocks can be added and at the same time, the proof-of-work increases its difficulty.	It contains, as a database, the whole and fully synchronized version of the public ledger (blockchain). The advantage of this kind of node is that it can perform verification of any transaction independent of any other entity on the network. For the node to have an updated version of the public ledger, there is a synchronization protocol used for communicating with the other nodes in the network (Turner & Irwin, 2018). It is like asking your neighbor what's new in the neighborhood.

Adapted from Turner and Irwin (2018).

neighbor nodes until covering the whole network. The transaction is included in a block (with other transactions) but is not yet confirmed. That is the miners work.

When the block arrives to the miner nodes, they compete to solve the proof-of-work with two objectives: the most important is to validate the transactions and the secondary objective is to get paid by doing it with satoshis (portions of Bitcoin). These satoshis can be later sold by the miners to get a payment in fiat money. One satoshi is one hundred-millionth of Bitcoin, but payments for mining are right not in the scale of Bitcoins (Kelly, 2017).

When a miner finds the proof-of-work solution, it broadcasts it to the whole network so the block is validated, but it only happens if nodes accept all the transactions as valid; avoiding double-spending. If it happens, the next block can be tied with this using its cryptographic hash (identifier) as the previous network hash (Nakamoto, 2009).

As specified in Bitcoin's white paper written by Nakamoto (2009), if two versions of the validated block are broadcasted, the nodes save the two versions until one of the branches of the network grows. This is because the network gets to a consensus when most of the nodes have the same information (which is considered valid for most of the nodes in the network). This prevents the blockchain from being hacked and having blocks modified in order for false enrichment.

Bitcoin cannot be mined forever. The Bitcoin network is programmed to produce 21 million Bitcoins (Bitcoin.org, 2018) but as the proof-of-work difficulty gets harder, it will take years to get to that point. According to Kelly (2017), the limit will be reached around year 2040 and a block is confirmed every 10 minutes in the blockchain.

As proof-of-work gets more difficult, the concept of mining pools take place: they are groups of mining nodes which share the difficulty of the proof-of-work by sharing resources and also, sharing the generated Bitcoin rewards. The only problem with this way to work of miners is that they go back to centralize the network (Turner & Irwin, 2018). According to Blockchain.info (2018), there are 16 identified mining pools.

2.4.7 Value acquisition and rise

Once the network was working and being tested by professionals like Hal Finney, the first service to sell and buy bitcoin was New Liberty Standard vía PayPal. The cost was based on the average amount of electricity required for mining bitcoins at that date. It gives a selling price of 1,578.76 bitcoins for $1 USD (plus PayPal transaction fee) and a buying price of 1,578.78 for $1 USD (minus Paypal transaction fee). These prices are those announced for december 28, 2009 but the first time prices were released was on october 5, 2009 (New Liberty Standard, 2009).

The procedure to buy bitcoins was to send an email specifying the amount desired (a total of 15,100 bitcoins available) and, as the rates could change because of electricity price or the amount of Bitcoins mined by the owner, the prices would depend on the time of the day the email was sent (New Liberty Standard, 2009).

The first known transaction for fiat money was on october 12, 2009 (5,050 BTC for $5.02 USD). Also, the first time bitcoin was used as a payment method (in an indirect way) was on may 22, 2010 when Laszlo Hanyecz bought two pizzas for the amount of 10,000 BTC, making the first valuation of bitcoin at $0.0025 USD per bitcoin. Another important step for bitcoin to grow was the opening of Mt. Gox: a bitcoin exchange that was announced by the user mtgox at the forum of bitcointalk.org (99bitcoins.com, 2018).

This site became very popular for bitcoin traders as it let them trade bitcoin like fiat money like they would do in a traditional exchange. Two years later, bitcoin's price reached the dollar parity on this exchange, leading to the opening of new exchanges trading other fiat currencies apart from american dollars. Britcoin (GBP), Bitcoin Brazil (BRL), and BitMarket.eu (EUR) simplified the process of owning Bitcoin as people could buy and sell Bitcoin at their local currency price without making the transition to dollars, increasing the accessibility of bitcoin around the world (99bitcoins.com, 2018).

2.4.8 Negative aspects linked to Bitcoin

Until this point, Bitcoin seemed only to work as an economic experiment but on June

1st, 2011, an article titled "The underground site where you can buy any drug imaginable" was published in *Gawker* in which Chen (2011) starts by detailing a "normal" buying process through a website called Silk Road in which a subject known as Mark decided to pay 50 bitcoins (around $150 USD at that time) for buying 100 micrograms of LSD (Chen, 2011); uncovering the use that some people were giving to bitcoin in the dark web and also revealing that, in fact, the cryptocurrency could be used as a real payment method.

It was not common to find stores accepting bitcoin instead of fiat currencies until Silk Road was uncovered. The author describes the site as Amazon, if Amazon sold mind-altering chemicals; because of the facility of use and the way transactions were secured. It was like being in the future (Chen, 2011).

It had a set of rules that included a ban of anything which purpose was to harm or defraud. Any kind of arms, assassination services, or other kind of things were sold in Silk road; only drugs. The administrator expressed in an email to the author that the community members were honest and fair people, always willing to cooperate with others to make the site grow. It seemed to be a very trusty environment because of anonymity (Chen, 2011).

Talking about payment methods, Silk Road didn't accept credit or debit cards, PayPal, or any other kind of payment that could be traced. Bitcoin was the payment method by excellence (Chen, 2011). For Chen, since Silk Road started operations in February, 2011, it represented the most complete implementation of the bitcoin vision, although not all bitcoin enthusiasts support the idea of Silk Road, given that the link between drugs and bitcoin could criminalize the cryptocurrency.

On April, FBI (2012) publishes in an internal way a paper that analyzes bitcoin from its perspective: a way for people to generate, transfer, launder, and steal illicit funds with some anonymity. The agency also states that in the near future, bitcoin will be treated as another payment option, attracting cyber-criminals that, in the case the price stabilizes and is mass-adopted, will go beyond the cyber world. It also makes a linkage between

groups like the hacktivists Lulzsec to purchase a botnet and that the cryptocurrency was supporting this kind of “criminal” associations.

Silk road worked until Ross Ulbricht, the author and owner of the site, was charged with narcotics trafficking conspiracy, computer hacking conspiracy, and money laundering conspiracy. Also, Silk Road was taken by the FBI and suspected to have made over $1.2 billion USD of which Ulbricht earned $79.8 million USD from comissions. Ulbricht was a 29-year-old physics and research scientist who wanted to use economic theory as a way to abolish the use or coercion and agression amongst makind, in his own words. (Jeffries, 2013).

On June 20, Chapman (2011) reported that hacker activity on Mt. Gox exchange’s database leaded the drop of bitcoin price to a penny to later recover the price to about $13 USD. All this because a failure in security of a computer of one of their auditors. This affected the reputation of bitcoin as the author states, although it can be also seen as positive for the cryptocurrency as it demonstrates that it has value at the time someone is trying to steal it. At the end, this situation leaded the down of Mt. Gox some years later for a similar reason.

This was not the only time an exchange was hacked to steal bitcoins: on March 1st, Goodin (2012) reported the steal of Bitcoins worth $228,000 USD from popular Webhost Linode. 46,703 BTC were confirmed to be stolen from wallets stored on the servers. Eight customers were affected included Gavin Andresen, who said he was working on updating the bitcoin network to prevent thefts like the one happened to him.

The same way it happens with fiat money, bitcoin has been used to defraud people who want to obtain fast revenues. One of the first cases it happened was when on the forum known as BitcoinTalk the user Pirateat40 (Trendon T. Shavers) promised people 7% of return weekly if they made large transactions of Bitcoin (more than 50 BTC) to later abscond with about 500,000 BTC and being charged for defrauding people in a Ponzi scheme 99bitcoins.com (2018).

2.4.9 Acceptance of Bitcoin

But not everything in the bitcoin environment is fraud and thefts. On november 15, 2012 on the Wordpress blog, Wordpress.com declares that in order to meet their objectives and make the site's upgrades more accessible to people wherever they are, they started to accept bitcoin as a payment method. PayPal blocks access from over 60 countries and some credit card suppiers have the same restrictions. Restrictions should not exist for anybody and this is the main reason they started accepting this cryptocurrency to buy upgrades to their free service. The goal is to enable people, not to block them (Skelton, 2012).

Also, great investors turned into bitcoin as on 2013 the bailout of Cyprus leaded to the lose of faith in the safety of the banking system, as some of them faced losses in their deposits in local banks. Given the news about investors going into bitcoin for this situation, the price of the cryptocurrency popped 87% going from $47 USD on march 16, 2013 to $88 USD on march 28, 2013 (Farrell, 2013). It was so hard the effect of the news that Mt. Gox, at this time the main bitcoin exchange in the World, went into a lag period in which some people made panic sales because of the hacking precedent the exchange had. In order to repair the lag, the site went down for about two hours to add more servers in order to accept all the new traffic the situation was generating (Mt.Gox, 2013).

Cryptocurrencies were now in the spotlight not only for people who were willing to use them but also for governments. For this reason, on November 30, 2013, a hearing called "Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies" was held by the U.S. Senate Comitee on Homeland Security and Governmental Affairs in order to discuss the current situation of cryptocurrencies and what could be the changes that the law had to have (OnBitcoin, 2013).

On this hearing, bitcoin was compared with the Internet some years ago, when it was difficult to know if it was going to be used for crimes. Other comments about the status of the cryptocurrency environment was that it was important to operate in a way so innovation could not be truncated. Aside from criminal uses of these new form of currency

(making reference to Silk Road), it was remarkable that serving the unbanked was one of the situations where there was an identified opportunity area of where cryptocurrencies could help the society. Finally, the comitee agreed that Bitcoin holds a great promise (U.S Senate Comitee On Homeland Security and Governmental Affairs, 2013). This hearing made that the price of bitcoin rised from $641.23 USD to $1,075 USD just 10 days after (99bitcoins.com, 2018).

Darlington III (2014), supports the idea of the opportunity area identified in the hearing and identifies others: a solution for hyperinflation, fluctuating exchange rates, and fraud prevention. In the case of hyperinflation, H. Hanke and K. F. Kwok (2009) say that in the cases when a commodity (as bitcoin is considered by some governments) has served as money, hyperinflation do not ocurr. For the volatility of exchange rates, Darlington III (2014) explains that if the bitcoin price stabilizes, it could be an option to invest for people living in countries which fiat currency is highly volatile, such as in Brazil, Argentina, Nicaragua, or Venezuela. Fraud prevention is one of the most easy-to-see advantages bitcoin provides as it relies on a public ledger that everybody can see, analyze but not modify. Finally, bitcoin can be used to make unbanked people have access to the system as a payment made with bitcoin can be performed through a SMS message or using the Internet service; this is important as, according to the World-Bank (2018), 1.7 billion adults have no access to a bank account.

2.4.10 Regulations, payment method and price speculation

Governments started to put special attention to bitcoin in what refers to legislation due to its decentralization and the use over territories in which it was not regulated. The first problem identified is the economic and financial definition of bitcoin, which is still unclear as there is no consensus on what bitcoin is exactly and thus, how to treat it in the financial system makes unclear the establishment of a regulatory framework.

Now bitcoin is banned in China but before this situation, the country accounted for the most exchanges of bitcoin and other cryptocurrencies (Ponsford, 2015). In an economic

forum, Yi Gang, the deputy governor of the People's Bank of China declared that bitcoin could not be considered as a legitimate financial instrument but people were free to participate in the market (Century, 2013). But just days after this event, the government established that all banks in China should be restricted to use the cryptocurrency as a currency, allegating money laundering and a threat to financial stability.

The measure was taken because users who are also bloggers, activists, or 'revolutionaries' could use this cryptocurrency for funding their actions, a behaviour the government would not allow (Ponsford, 2015). The government also classified bitcoin as a virtual commodity and that should not be circulated or used in the marketplace (Mullany, 2013). After this news, the price of bitcoin decreased by 20%, as China was one of the main markets for bitcoin yet (Riley & Dayu, 2013).

At this point, it was clear that the price of bitcoin, although it was not controlled by a central authority, it was for sure controlled by the macroeconomics situation, specifically by regulations made by countries and acceptation from people in the market. Bartos (2015) states through an analysis made from March, 2013 to August, 2014, that supply and (specially) demand factors in the economy have an important influence on bitcoin prices and that this cryptocurrency follows a standard economic model of currency price formation.

Companies as Dell started to accept bitcoin as a payment method on its online store, becoming the largest company to accept it at this time (Pevehouse, 2014). As well, Braintree, a subsidiary of PayPal started to accept bitcoin on september 8, 2014. This action made the community to speculate that in the near future, PayPal would integrate bitcoin on its main payment system (The Guardian, 2014). Also, by the end of 2014, Microsoft announced that the company would accept bitcoin from US customers for digital content on the Windows and Xbox online stores through BitPay service (Chansanchai, 2014). This would not stop here as more and more companies started to do the same like the online gaming platform Steam in 2016.

As bitcoin started to take off as a payment method amongst technology companies, on september 18th, 2015, the cryptocurrency was declared as a commodity by the Commodity Futures Trading Comission (CFTC), the same way oil and gold are classed. With this situation, bitcoin had a regulatory framework within exchanges can work through in the US and people would pay taxes for trading (Clinch, 2015a). Unlike cash, people trading cryptocurrencies now should be aware of the procedence of them in order to avoid acquiring bitcoins involved in stealing and money laundering.

In contrast, in september of the same year, the European Court of Justice determined that bitcoin and other cryptocurrencies will be treated the same way as fiat money. It means that these virtual currencies could be exchanged without paying taxes (VAT exemption) (Clinch, 2015b). This happens although the European Central Bank in its paper European Central Bank (2015) explicitly specifies that cryptocurrencies do not fully meet three functions of money stated in the literature: medium of exchange, store of value and unit of account. This situation, added to the fact that in the US bitcoin could be considered as currency, commodity, money and property (depending on the government agency) (Gautham, 2015), shows the unclear status of bitcoin and boosts the importance of a clear and widely-accepted definition that could be used to make a regulatory framework.

While all these news went to the public eye, the price of bitcoin kept arising until breaking the $1,000 USD limit on January 3, 2017, making the massive media to cover the event and making speculations about a price rising over the year which ended up in an influx of new users. As the price kept on the rise, Japan declared bitcoin as a legal currency on April, 2017; while Russia, one of the major opponents of bitcoin was trying to regulate the currency in order to accept it as a legal financial instrument in 2018 (Kharpal, 2017a).

Not everything was good for the price of the cryptocurrency this year as Jamie Dimon, JP Morgan & Co. CEO, declared that it was a fraud and that he would fire any employee trading with the cryptocurrency. He also compared the rise of price with the 17th-century tulip bulb mania, just when the cryptocurrency got to a value of $19,000 USD in december.

Investor Deniss Gartman said that in the long term, the addition of future contracts should help the market to moderate (Fox, 2017).

Also, chinese authorities ordered all exchanges based on Beijing to stop trading and inform all of their users about a closure. Also, exchanges were asked to tell the government how they will allow users withdraw their funds in a secure way. This happens as a way to prevent risks in a highly speculative market. As a result, the bitcoin price decreased by 5%, added to the decrease made by the declarations of Jamie Dimon which resulted in a felt of about 10% in the price of the cryptocurrency (Reuters, 2017).

Future contracts came to push bitcoin's price when CME announced plans for launching bitcoin futures. Terry Duffy, CME Group chairman and CEO, told that the introduction of futures of bitcoin could bring more institutional investors to the environment (Kharpal, 2017b). The same way, Cboe Global Markets made public the launching of their own futures on bitcoin (december 11, 2017) starting at $15,000 USD and scaling to $17,540 USD. Experts assured that contracts would increase market transparency and the price of the cryptocurrency; although the Futures Industry Association said that these contracts were very precipitated at no considering the risks (Bloomberg, 2017).

Just some days after, bitcoin reached its highest price peak of almost $20,000 USD, a rise of 1,824% since January 1, 2017. 96% of economists surveyed by the Wall Street Journal believed, at that point, that the priced was just driven by speculation (Morris, 2017). This growth was clearly an invitation for some people to invest money on bitcoin as revenues should be easy to get as the price keep rising but then, regulations started to stop this growth and they hit more than some experts would predict.

On december 28, South Korea's government announced that it was planning to cease operations of exchanges if regulators felt there was a need to do so. It was also a security measure in order to stop the opening of anonymous accounts to trade cryptocurrencies and prevent money laundering. With this news, the price of bitcoin dropped about $1,000 USD, showing the high volatility the market faces and how it was linked to what

governments and other institutions were doing in the environment (Partington, 2017). After that, the price started to decrease dramatically.

Other news that hit the price of bitcoin was the ban of all ads promoting any kind of cryptocurrency on Facebook. This was done assuming that all of the ads were related with deceptive practices. The ban applied for binary options, initial coin offerings (ICO), and cryptocurrencies. Directors of the social media said this policy was made intentionally broad in order to protect users to be scammed as the price of bitcoin was escalating and people with malicious objectives were trying to get money from non-expert users (Griffin, 2018). In addition, Google and Twitter did the same just some weeks after on March, 2018; this made the price to fell below $8,000 USD (Rooney, 2018).

While these tech companies and most banks were staying away from bitcoin and all kind of cryptocurrencies, one of the most renamed banks in the world opened a bitcoin trading operation. Goldman Sachs is the first bank to offer (if approved) a variety of contracts linked to the price of bitcoin. A study made by the bank concluded that it is not a fraud and that some clients wanted to hold it as a commodity, the same way they do with gold (Popper, 2018).

For Moreno (2016), leaving aside contracts linked with cryptocurrencies as bitcoin, banks could be benefited from the blockchain technology because most of the transactions made nowadays are digital. Cost reduction, simplification of processes, traceability and control over transactions are advantages that banks could take benefit of. On the other hand, banks are also worried of some advantages such as transparency and decentralization, that could lead competitors to know exactly what happens in every bank at every moment.

Commercial banks using, developing or adapting this technology are: BBVA, BNP Paribas Group, Goldman Sachs, J.P. Morgan, Bank of America, Santander, Royal Bank of Canada, UBS, BNY Mellon, Deutsche Bank, Barclays, Commonwealth Bank of Australia, TD Bank, Wells Fargo and many more (Moreno, 2016).

While these banks are focusing on improving their services, there are projects coming

from central banks in order to create their own cryptocurrencies that better adapt to the current money paradigm, at the time they enjoy from the benefits the blockchain and other technologies could bring them. Fedcoin is a project proposed in the US in which the central bank could issue its own cryptocurrency; accepting people to open accounts directly on the central bank without using the services of a commercial bank. This could facilitate control over transactions in the country but leaves commercial banks out of the game.

It can be seen that the influence of bitcoin and other cryptocurrencies in the macroeconomic environment is taking importance as governments and other private institutions are trying to adapt and create systems based on them. This could be an indicator of adoption within the banking system.

2.4.11 The lightning network

As shown before, there have been attempts to include bitcoin and other cryptocurrencies into the current economical system as banks and governments are developing legal frameworks to trade with it, but there is one technical problem: the velocity of the transactions.

The capacity of the blockchain itself and the fact that for one operation to be considered legit, it must be broadcasted to all the nodes in the network decreases its capacity as a payment network as one block is verified by miners every 10 minutes, supporting seven transactions per second (Thaddeus Dryja, 2016).

While Visa payment network can afford up to 24,000 transactions per second (Visa, 2018), it is not possible for the bitcoin network at this moment to reach that peak and this makes people to trust more on centralized solutions rather than on bitcoin to make payments. In order to achieve so many transactions per second, it is needed to perform these transactions off the blockchain. A near-unlimited number of transactions and a very little fee cost per transaction lead to the develop of a micropayments system.

The base of this micropayments system called Ligthning network is the payment channels. They create a relationship between two parties in which at least one of them are

sending funds. The transaction only happens if both of the parties agree and each channel remains opened for about 10 minutes (the time needed for a block to be mined) and in this time both parties can make as many transactions as they want until the channel is closed (by both of the parties). The final amount of the payment is set and send to a block to be mined and verified (Thaddeus Dryja, 2016).

This helps the bitcoin blockchain (and any other blockchain) to process more payments than before with minimum fees per operation. According to 1ML (2018), the number of nodes connected to the lightning network (until december, 2018) in the bitcoin network is 4640 with 14833 payment channels and with a total capacity of making transactions for about $2,014,133.68 USD.

An example in which the lightning network has been implemented in order to make micropayments is a candy machine. Presented in the Ligthning hack day, it was designed to work through an app and using the lightning network to make the payment and, as the author declared, he is interested on combining this technology with the real world. The price of the candies are between five and 30 dollar cents, demonstrating that micropayments are factible through the bitcoin blockchain happening in an almost immediate way and no matter the amount (Salgado, 2018).

Recently, PayPal made a modification on its commissions policy increasing them to a range between $2.99 USD to $4.99 USD, depending on the country. Although, if the transaction is made using a credit card, debit card, or PayPal credit, the amount increases by 2.9% plus a fixed fee based on the currency (PayPal, 2018). This new fee policy makes cryptocurrencies a better option to transfer money as Bitcoin fees are about $0.03 USD if using the normal newtork or about $0.02 USD if using the lightning network for making the transactions (Buy Bitcoin Worldwide, 2018).

Also, Mastercard reported that for the first quarter of 2018 registered an increase in their cross-border payments but comparing the results with the last semester of 2017, there was a decrease of 2%. This is alleged to be because of the recent drop-off in crypto wallet

funding using their services (Mastercard, 2018). This was due to the decision taken by JP Morgan, Bank of America and Citigroup to ban the purchases of cryptocurrencies (including bitcoin) with their credit cards. Citigroup declared that they will review their policies as the market evolves, bringing the possibility of buying cryptocurrencies in the future again with their cards (Jennifer Surane, 2018).

Mastercard have not left the blockchain technology aside and has obtained a patent for new technology that may increase the speed of transactions made with cryptocurrencies. This new technology is based on crypocurrency-based transactions with a link to fiat money. This is willing to take the best of the blockchain and the best of traditional transactions for maintaining security and speed (Vaškevičius, 2018).

2.4.12 Studies made in other countries

A recent study made by Ipsos for ING bank in 15 countries like the US and some European countries such as: Spain, Luxembourg, France, Germany, and the UK; revealed the following information (Ipsos, 2018):

- 66% of the European citizens have heard about the technology.
- Only 9% of them own cryptocurrencies.
- 25% of the European participants are willing to possess some kind of virtual currency in the near future.
- 35% of Europeans agree bitcoin is the future of spending online.
- A minority in Europe consider cryptocurrencies as a payment method for items like: coffee (23%), international online purchases (30%) or children's university fees (20%).
- Awareness is highest in Austria (79%) and Poland (77%), while in Belgium (38%) and France (50%) are the less.

The same way, Bank of Canada have made a research in Canada with the following results (Currency Department, 2018):

- 85% of the population are aware of the existence of bitcoin.
- Ownership is of 5%.

- Only 3% of transactors used bitcoin as a payment method in physical stores.
- 12% of transactors used bitcoin as a payment method on the Internet.

As this technology is intended to be more used by population, some institutions have taken this fact into account. On July, 2018, NASDAQ maintained a closed door event in order to improve the image of cryptocurrencies and validate their potential in global markets. Implications, future regulations, and how they will be surveilled were main topics that are known to be discussed in the event with about half a dozen of companies, including traditional and crypto exchanges. This will not be the last event of this kind as it is a market opportunity for them (Verhage, 2018).

2.5 Fintech sector

As Sanicola (2017) states, fintech is a sector in which companies use new technology to create financial services and to improve the existing financial sector for both consumers and businesses. Financial management, insurance, payments, asset management, and other kind of financial services are included. They compete directly with traditional banking and financial institutions where they cannot compete or where there is a business opportunity that traditional services providers are not attacking.

Easy access, convenience, efficiency, and speed are characteristics of people who use these services (Sanicola, 2017); reaffirming the characteristics of e-consumers that Duralia (2016) stated before and that fintech companies are tackling through the use of disruptive methods.

In the last years, Latin-America has joined the global fintech revolution. Ruvolo (2017) states that in 2016, 25% of the venture capital investment in Latin-America made in IT was for fintech; growing from 182 investments in 2015 to 197 in 2016, a record cipher was stated.

2.5.1 Fintech in Latin-America

The biggest market in the region is Brazil with 56% of the whole venture capital

destined for fintech, seconded by Mexico with 26% of the total (about $130M USD); 33% more than in 2015. But, in general, Mexico has more investment of venture capital in all stages (Ruvolo, 2017)

Finnovista (2017a) states that Brazil had 230 firms working for this sector while Mexico standed in second place with 180 to year 2016. From these firms, 43% says that their mission is focused in debancarized people, as fintech tries to solve problems derived of financial exclusion. Also, states that the dialogue between entrepreneurs and who design politics is a topic of importance to make this sector reach a good development and create a major impact on society.

2.5.2 Fintech in Mexico

At the time Fintech Radar Mexico 2018 was last updated (August 8th, 2018), 125 new fintech startups surged in Mexico. On year 2017, Mexico was positioned with 238 startups that have been identified in 11 different segments, while in 2018 the country counts with 334 (as seen in Figure 4) positioning the country as the biggest fintech environment in Latin America, leaving Brazil in second place. Compared with Colombia, the mexican environment is 2.5 times bigger, more than three times bigger than Argentina and more than four times the chilean environment (Finnovista, 2018).

Characteristics of the mexican market are: high Internet and mobile penetration, great entrepreneur and e-commerce environment, low penetration of traditional banking services, and low sophistication in the credit offer; making fintech environment propitious for development in Mexico (Finnovista, 2017b).

The leading segments in the country are:

- Payments & remmitances – 23%
- Lending – 22%
- Enterprise financial management – 13%
- Personal financial management – 11%
- Crowdfunding – 9%

Figure 4. Fintech sector by segments in Mexico by 2018. Adapted from Finnovista (2018).

- Business technologies for financial institutions – 7%

Within the five remaining segments there is one called Payments: Crypto. In this segment only 5 startups are competing in mexican territory: Bitso (the leading exchange), ISBIT, mexbt, VIVA, and AirTM. They all work with cryptocurrencies as exchanges or traders. This segment grew 2% from 2017 to 2018 as seen in Figure 5.

Until 2018 there were no laws that protected users against any fraudulent or non-desired action by fintech service providers. On march 3rd, 2018, the called "Fintech law" was approved by the mexican senate and, although it does not make any regulation on cryptocurrencies about paying taxes, as they are considered not currencies (just actives), it regulates other aspects of the fintech sector.

A regulatory framework is what this law is made for, giving fintech sector more legality by protecting clients and their patrimony. Hard punishment are going to be applied to startups that do not obbey the lineaments of the law (CNN, 2018). Also, this framework is the only one applied to fintech sector in Latin America, which makes Mexico a potential

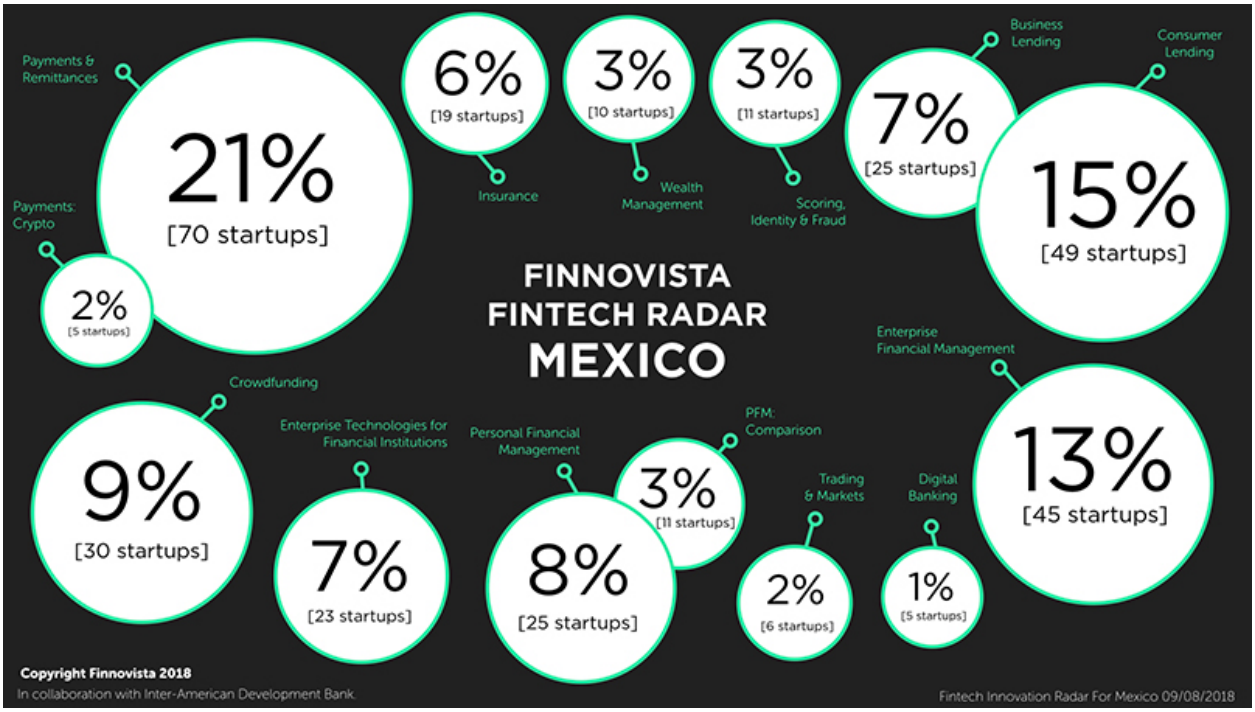

Figure 5. Fintech sector growth by segments in Mexico by 2018. Adapted from Finnovista (2018).

hub for financial services as it is built in order to not dis-incentivise new ideas and new services (Crabb, 2017).

According to Notimex (2018), the fintech law makes Mexico attractive for fintech companies from around the world. This is because rules are now clearer than in most of the countries in the globe, facilitating companies to offer financial services to people. Secretaría de Hacienda y Crédito Público (2018) states that Mexico is number seven worldwide to regulate this sector, regulating two figures: Instituciones de Fondos de Pago Electrónico (IFPE) and Institituciones de Financiamiento Colectivo (IFC); as well as vitual actives (cryptocurrencies) that could be used by IFPEs and IFCs, being the central bank the institution that authorizes which virtual actives are legal.

This law puts Mexico in a situation in which cryptocurrencies like bitcoin can be freely used without the impediment of the law, considering them actives that do not pay taxes for owning and letting consumers use bitcoin as if they would use fiat money for common

transactions. According to Coinmap (2018), there are 193 establishments that officially accept bitcoin as a payment method within mexican territory, making the acceptance of bitcoin as a payment method a possibiliity.

Chapter 3. Methodology, results & proposal

3.1 Methodology

This research is intended to have the following characteristics:

- Descriptive research: it will be limited to only outline the current situation of use and acceptance of bitcoin as a payment method.
- Non-experimental: as no variables are going to be manipulated, just described.
- Transversal: it will just cover a single moment in time and there will not be a tracing of the characteristics of the environment in the future (for this work).

The information is going to be recollected through questionnaires applied vía Google forms, which, by its nature, can cover a wider zone than traditional paper questionnaires. This is important because this research's subjects of study are people who live in Mexico and own bitcoin. Age is not a factor to be a delimiter in the characteristics of subjects of study because everyone can buy bitcoin despite of their age, although most exchanges ask users to be 18+.

The questionnaire is formed of four sections:

- Use and acceptance of bitcoin as a payment method: in this section UTAUT questionnaire is adapted to this research. A scale from one to five is used for every item.
- Perceived risk: taken from the paper by Marafon et al. (2018), this instrument is adapted from four constructs (perception of risk, [future] intention of use, acceptance of risk, and self-confidence) to two of them: perception of risk and acceptance of risk. This is because the other two constructs are not being measured for this research. Items are measured in a scale from one to five for every item, indicating if the scale is different from other questions.
- Products bought with bitcoin: for this section, a filter question is needed as people not always have used bitcoin for paying. If so, a classification taken from Winzar (1992) and proposed by Holbrook and Howard (1977) is presented to know the buying frequency with bitcoin for every category. A scale from one to five is used for every category.

- Demographics: this section is based on the instrument used by Karjaluoto et al. (2002) and only the demographic items are used and adapted for this research. Scales in this section are different because of the nature of the section.

The whole questionnaire can be consulted in appendix A.

As the sample is located in Mexico, a Spanish-speaking country, the instrument is going to be applied in Spanish for a better understanding of it. The sampling, at its first stage (pilot test) is going to be by convenience and applied to only 10 people to test if every item presented has coherency and can be truly understood for participants. Modifications about writing and meaning are the objective of this first stage comprehended between march 29th to april 11th.

The second stage of sampling, is the whole sampling itself (applied from May 1st to November 30th, 2018). Convenience sampling method is going to be applied at first to reach people who own Bitcoin. It is going to be asked these people to reference the instrument to people they know who also own bitcoin (snowball sampling). This is because it is hard to know exactly who owns it at first glance and it is more probable that those who already own bitcoin know who else owns it.

Population for this research is calculated with the following parameters:

- $Z = 1.65$
- $p = 50\%$
- $q = 50\%$
- $i = 10\%$

The calculation is made as follows:

$$n = \frac{Z^2 \cdot p \cdot q}{i^2} = \frac{1.65^2 \cdot 0.5 \cdot 0.5}{0.1^2} = 68.0625 \approx 68$$

3.2 Results

For this section, results will be shown and analyzed through the constructs measured:

- Use and acceptance of bitcoin as a payment method.

  - Performance expectancy.
  - Effort expectancy.
  - Social influence.
  - Facilitating conditions.
- Perceived risk.
  - Perception of risk.
  - Acceptance of risk.
- Product classification.
- Segment profile.

Each construct will be measured through a factor loading analysis in order to know the correlation questions have between them and which are more relevant to determine the importance of the construct in the analysis. Also, Cronbach alpha will be calculated to know the validity of each construct.

The first question in the instrument is: in a scale from 1 to 5, how well do you consider to know how bitcoin works? 72% of the sample consider that they do know how the cryptocurrency works, indicating that most of the sample have technical knowledge about bitcoin, as shown in Table 17

Table 17

How well do you consider to know how bitcoin works?

Score	Frequency	%
1	1	1.02
2	5	5.1
3	21	21.43
4	38	38.77
5	33	33.67
Totals (n=98)	98	

3.2.1 Use and acceptance of bitcoin as a payment method

Performance expectancy

The construct Performance expectancy is divided into the following items:

- PE1. I would find bitcoin useful at shopping.
- PE2. Using bitcoin enables me to do shopping more quickly.
- PE3. Using bitcoin increases my productivity when doing shopping.

Results for each question are shown in Tables B1, B2 and B3 respectively, contained in Appendix B. Research shows that 67% of the participants Agree and Strongly agree that bitcoin would be useful at shopping, being Agree the response that most repeated (41.1%). Also, in the case of considering bitcoin as a way to increase productivity and velocity of shopping, only 30.61% and 35.71% of the participants considered respectively that they Agree and Strongly agree with this situation.

For construct Performance expectancy, the factor weight analysis gives the results shown in table 18 and Cronbach alpha value is 0.91.

Table 18

Factor loadings for Performance expectancy construct

Item	Factor loading
PE1	0.88
PE2	0.95
PE3	0.93

Factor loadings for Performance expectancy construct indicate that there is a high correlation between items, being PE2 item the one which has most relevancy in the construct.

Effort expectancy

The Effort expectancy construct is divided into the following items:

- EE1. It would be easy for me to become skillful when paying with bitcoin.
- EE2. I would find bitcoin easy to use when paying.
- EE3. Learning to pay with bitcoin is easy to me.
- EE4. My interaction paying with bitcoin would be clear and understandable.

Tables C1, C2, C3 and C4 in Appendix C show the results for each item. Results show that 63.26% of the participants Agree and Strongly agree that it would be easy for them to become skillful when paying with bitcoin. As well, 37.24% of them think that they would find bitcoin easy to use when paying, while 73.47% think they would find easy to learn to pay with bitcoin. In the case of the interaction with bitcoin, 94.90% think that it should be clear and understandable.

For this construct, the factor weight analysis is shown in Table 19 and Cronbach Alpha value is 0.82.

Table 19

Factor loadings for Performance expectancy construct

Item	Factor loading
EE1	0.94
EE2	0.93
EE3	0.91
EE4	0.23

Factor loadings for Effort expectancy construct indicate that there is a high correlation between items except for item EE4. This can indicate that, although the value is acceptable for an exploratory research, it could be part of another construct being not measured for this instrument in this context.

Social influence

The Social influence construct is divided into the following items:

- SI1. People who influence my behavior think that I should pay with bitcoin.
- SI2. People who are important to me think that I should pay with bitcoin.
- SI3. In general, shops accept bitcoin as a payment method.

Tables D1, D2 and D3 in Appendix D show the results for each item. In this case, for all items, responses were mostly Strongly disagree and Disagree, showing that for participants social influence is not a factor that make them use bitcoin as a payment method. For item SI3, which asks if shops accept bitcoin as a payment method, 85.71% of the participants coincide that in Mexico, shops (in general) do not accept the cryptocurrency for payments.

Table 20 shows the factor weights analysis for the construct, with a Cronbach Alpha of 0.76.

Table 20

Factor loadings for Social influence construct

Item	Factor loading
SI1	0.91
SI2	0.90
SI3	0.63

Factor loadings for Social influence construct indicate that there is a high correlation between items SI1 and SI2 with the construct, while there is less correlation between SI3 and the construct but it is still relevant as the weight is acceptable for an exploratory research.

Facilitating conditions

The Facilitating conditions construct is divided into the following items:

- FC1. I have the resources necessary to pay with bitcoin (e.g. infrastructure).
- FC2. I have the knowledge necessary to pay with bitcoin.
- FC3. Bitcoin is not compatible with other payment methods I use.
- FC4. A specific person (or group) is available for assitance with difficulties I could have when paying with bitcoin.

Results for each item of the construct are contained in Tables E1, E2, E3 and E4 in Appendix E. For participants, 52% of them do have the resources to pay with bitcoin, 72.45% of them do have the knowledge to make payments with bitcoin, a number that confirms the first question of the instrument. Also, 45.92% of the participants consider that bitcoin is compatible with other payment methods they use, while 35.71% of them consider that there is no available assistance for solving problems when paying.

Table 21 shows the factor weight analysis for this construct that have a Cronbach Alpha of 0.63.

Table 21

Factor loadings for Facilitating Conditions construct

Item	Factor 1 loading	Factor 2 loading
FC1	0.82	0.35
FC2	0.89	0.10
FC3	0.37	-0.90
FC4	0.61	-0.06

Factor loadings for the Facilitating conditions construct show that there is a relationship between FC1, FC2 and the construct, while there is a relationship between FC3 and FC4 in a negative way with a factor that is not being measured by this construct, but still being the weights acceptable for this research.

3.1.2 Perceived risk

Perception of risk

The construct Perception of risk is divided into three items answering the question How would you characterize the decision to use bitcoin as a payment method? with the following scales:

- PR1. High potential for loss/High potential for gain.
- PR2. Very negative situation/Very positive situation.
- PR3. Significant risk/insignificant risk.

Results for each item are shown in Tables F1, F2 and F3 contained in Appendix F. Research shows that for PR1 scale only 15.3% of the participants consider the decision of using bitcoin as a payment method as a high potential for loss. For PR2 scale only 6.12% of them consider the decision as a negative situation, and for PR3 scale 17.35% of respondents consider using bitcoin for payments as risky. Means and modes for items PR1, PR2 and PR3 are shown in Table 22 and factor weight analysis for the construct is shown in Table 23. A Cronbach Alpha of 0.7 is obtained for the construct.

Table 22

Means and Modes for Perception of risk constuct

Item	Mean	Mode
PR1	3.87	5
PR2	4.12	5
PR3	3.59	5

Means above the mid of the scale indicate a low general perception of using bitcoin as a payment method as a risk. Also, modes for all items are five, which confirm the low perception of risk.

Table 23

Factor loadings for Perception of risk construct

Item	Factor loading
PR1	0.86
PR2	0.90
PR3	0.62

Factor loadings for Perception of risk construct indicate a high correlation between items and the construct, being PR2 the one which is the most determinant.

Acceptance of risk

Construct Acceptance of risk asks to agree or disagree with the following statements:

- AR1. Safety first.
- AR2. I do not take risks with my money.
- AR3. I prefer to avoid risks.
- AR4. I take risks regularly.
- AR5. I really dislike not knowing what is going to happen.
- AR6. I usually view risks as a challenge.

Results show that 86.73% of the participants Agree and Strongly Agree that for them,

safety is first. About taking risks with money, 56.12% do not take risks or are neutral with the fact. About avoiding risks, respondents showed neutrality as well as with the fact of taking risks regularly. 55.1% of the participants consider they dislike not knowing what is going to happen and 58.16% usually view risks as a challenge.

Results for each item are in Tables G1, G2, G3, G4. G5 and G6 in Appendix G. Factor weight analysis is shown in Table 24 with a Cronbach alpha of 0.73.

Table 24

Factor loadings for Acceptance of risk construct

Item	Factor loading
AR1	0.81
AR2	0.71
AR3	0.70
AR4	0.55
AR5	0.57
AR6	0.53

Factor loadings for construct Acceptance of risk show to be highly correlated with the construct, being AR1 the most determinant.

3.1.3 Products bought with bitcoin

A filter question was asked in the questionnaire to know what is the proportion of people owning bitcoin who have used bitcoin as a payment method. Results (Table 25) show that 58.16% of the participants have used bitcoin to buy something.

For this section, responses of only 57 participants were taken into account, resulting in the following: shopping goods are those that are the most bought with bitcoin by the respondants (45.61% of them answered that they Sometimes, Usually and Always buy this category with bitcoin). Convenience goods is the category less bought with bitcoin as 89.47% of the participants consider that they Never and Hardly every use bitcoin to buy

Table 25

Have you used bitcoin to do shopping?

Answer	Frequency	%
Yes	57	58.16
No	41	41.84

products from the category. For specialty goods, one third (31.58%) of the participants agree that they Sometimes, Usually and Always use bitcoin for buying the category, while preference goods are bought with bitcoin by 36.84% of people who have used bitcoin as a payment method.

Tables H1, H2, H3 and H4 contained in Appendix H show the results for each category in detail.

3.1.4 Demographics

Results from this section point to the following demographic profile of people who own bitcoin for the sample analyzed: mostly males (79.59%) and a minority of women (20.41%). Most of the sample has an age range from 24 - 41 years old (69.39%, corresponding to Generation Y, according to Williams and Page (2011)), living mostly in Ciudad de México (16.33%), Jalisco (13.26%) and Puebla (12.24%); with an average household income per month in the range of $11,600 MXN to $34,999 MXN, having college (79.59%) and graduate (18.37%) degrees and being students (17.35%), businessmen (16.33%) and engineers (12.24%).

Also, it can be known that 95.92% of people who have used bitcoin as a payment method are men. 75% of women consider that they consider knowing how bitcoin works while 98.71% of men consider the same.

Tables I1, I2, I3, I4, I5 and I6 contained in Appendix I have the results for each item of this section.

3.3 Proposal

Bitcoin can be studied and incorporated in a broad spectrum of disciplines, including marketing. Because of its characteristics, this cryptocurrency is considered a technological innovation that, in the marketing ambit, can lead to create a digital marketing strategy in order to create a more personalized environment for specific customers, as Oklander et al. (2018) state.

This digital strategy should be focused on the e – consumer, a type of consumer that is highly involved with technology and that targets shopping through electronic media, showing openness to change and trying new possibilities (Duralia, 2016). The research made shows that this e – consumer can be identified at this moment as the Millennial generation because this is the group of people that most will to use bitcoin as a payment method.

Bitcoin owners in Mexico are highly skilled people that do know how this innovation works from the core, being them mostly males with college and graduate degrees, working as businessmen, engineers or still being students. Also, data from the research reveals that most owners do not consider using bitcoin as a payment method as a risk, just the opposite that happened when credit and debit cards were introduced years ago. This can be explained because they know the base of how the bitcoin network works at a technical level and, because of the transparency offered by the network, they can trace every transaction at every time.

For the digital marketing strategy this means that the incorporation of bitcoin as a payment method would not be a risk for companies as there is acceptation by the community of bitcoiners. They also consider the cryptocurrency as useful at shopping, easy to use when paying (low effort for them when using and learning to use), not to be influenced by any other person to use it, and being the infrastructure needed available for its use. The only problem noticed in the acceptation process is that most shops do not have bitcoin available as a payment method, limiting its use in the market.

From respondents, 58.16% of bitcoin owners have used it for payments. This means that they will to use it for shopping and, the same way as fiat money, those who have not used it to pay, are potential clients to which offer a new payment method based on an innovation at which not only shops but also governments, banks and other entities are putting attention to incorporate to the main economy.

This all aims to adequate a digital marketing strategy to what bitcoin owners from generation Y need. This segment is considered, according to E. Rogers (1983), as Innovators. They are the first 2.5% of population to adopt an innovation as bitcoin and, although they are a little percentage of the population, should be considered as important because this can be hold as a new paradigm for economy that can affect the way it runs.

Hamilton (1997) proposed that e – commerce should have three characteristics: content, convenience, and confidence. Content and confidence are covered by the bitcoin network itself, as there are incentives to use bitcoin as a medium of exchange such as its fees and people trust on the transparency and integrity of the system thanks to the blockchain and cryptography. The only aspect that has been left aside is convenience (as seen from the results of the research), as it is still not widely accepted and used for payments. This is where marketing fits in order to make bitcoin, a system that was developed as a value transaction platform, accepted and used in the shopping process by those who own it.

This obeys to what Strategy& (2018) states for year 2020 and Generation C (for "connected"). A transformation of the way we work and consume leaded by three forces:

- Consumer pull: consumers are willing to use bitcoin as a payment method.
- Technology push: low – cost devices, infrastructure and a community (not an entity) that helps to support them, make possible the use of bitcoin for payments.
- Economic benefits: early technology movers have an important push in the adoption innovations. As bitcoin is both an innovation and an economic value transaction system, economic benefits could be higher than if it was only an innovation.

Bitcoin (as a payment method) can be used in order to add value to the shopping

process at its owners are shown to have intention to use it. The research revealed that most of the owners who have used the cryptocurrency for payments (58.16%), payed for shopping goods (45.61%) (v.g. apparel, furniture, jewelry, automobiles, dishwashers, computers, etc.). This gives a starting point from which to focus the digital marketing strategy, that added to the fact that owners have technical skills, can be focused on firms that sell electronics such as computers, SaaS, mobile phones, cloud – based services and other kind of stuff that have to do with technology; although it must not be limited to this area, this is a starting point to convert bitcoiners into customers.

The first step in order to create a marketing digital strategy is to make leaders not to underestimate how bitcoin as a whole can help to add value to their companies. Catlin et al. (2018) propose four steps in order to avoid fears about adopting new technology as bitcoin is. Table 26 shows these four fears and how to face them in order to make leaders understand the technology behind the innovation and how it can help not only their companies but the economy itself. Following the idea of Hughes (1993), for bitcoin to work, it is important to make it part of the social contract.

Making leaders to be aware of this new paradigm is important to make the digital marketing strategy work. This fits into the second characteristic that according to Kane et al. (2015) a good strategy should have: effectively communicate digital strategy to employees. If leaders do not fully understand how bitcoin as a payment method can help the company to create value to their clients, they will fail at the communication process and the strategy will not permeate the organization in a successful way.

The other two characteristics proposed by Kane et al. (2015) (Think longer term, and Make digital strategy core to the business) are covered with the fact that bitcoin represents a new economic paradigm that is yet changing the way governments and central banks see the future of the economic system, and that this trend is gaining force within specialized customers, making it important to consider the strategy in the core of the business.

Bitcoin fits at every of the five domains of a digital strategy that D. Rogers (2016)

Table 26

How to fight barriers to incorporate bitcoin in an organization

Fight	How to win
Ignorance	Education about how bitcoin works. It can start from reading about it on the Internet to assist to courses or workshops in order to have a better understanding about how this new economy works and how to get benefit from it. Also, as bitcoin is going to be used as a payment method, financial education courses are recommended as there is a difference between the "normal" economy and the crypto - economy.
Fear	To get involved into the bitcoin environment through workshops and to use bitcoin for small transactions just to fully understand how transactions are made. This transactions can be seen as an investment. Most bitcoin wallets are downloaded for free and have mobile and desktop versions that ease the adoption of them.
Guesswork	Objectives should focus, at this stage, on learning and describe how the implementation of bitcoin as a payment method could help the company to focus on creating a digital strategy.
Diffusion	This diffusion should focus on the inner client, making them know how this technology on payments can benefit the company and sharing information about the bitcoin environment.

propose. Table 27 shows how the use of bitcoin as a payment method adds value to a firm giving new digital capabilities to it, as Rum (2018) states a digital strategy should be foused on.

The clients stage is perhaps the most important one on which bitcoin can help adding value to. Bitcoin is stated in the purchase stage of the customer journey, on which all interactions between the customer and the brand directly happen, including the payment. But the influence of bitcoin do not only relies there, as offering a new payment method can influence the prepurchase and the postpurchase stages. At the first one it can make clients consider the brand to make a future purchase. At the postpurchase stage, engagement can be the result of using an innovative payment method. It opens the possibility for customers that do not considered certain brand before, converting them to actual customers and not only potential ones.

As Bowden (2009) states, engagement involves a set of behaviors that promote connection with others. Using bitcoin as a payment method could help to develop satisfaction to the new client, creating a positive evaluation of the service and making them to repeat the purchase process, deriving into loyalty and impacting into the firm's perceived value, specially for those willing to pay with bitcoin. This is specially important because generation Y are moved by what their peers have experienced, even if they do not know each other. In addition, as bitcoin is not regulated by a central authority, the community communicates in diverse blogs and forums, where they can recommend products or services where they can spend their bitcoins.

The use of bitcoin can be both brand – owned and partner – owned touchpoints. This is because the acceptance of the cryptocurrency for payments relies on the brand's decisions, including advertising, pricing and the payment methods themselves. On the other hand, it is partner – owned because payment platforms are provided by third parties most of the time.

In the case of competition, bitcoin can help by having information about transactions

Table 27

Bitcoin as a payment method in the five domains of strategy

Strategy	How bitcoin contributes
Clients	A digital strategy should focus on the client. Data from the research shows that bitcoiners want to use bitcoin for payments but it is still not widely accepted. Through the customer journey the payment methods are analyzed and bitcoin can be included as one of them to create value within the bitcoin community. Also, partners to use bitcoin for payments can be found through the use of wallet apps instead of developing its own app for the firm.
Competition	Bitcoin *per se* can be used as a platform to monitor inner processes: from a production line to payments but can be focused on the shopping process to gather data. Because of the nature of bitcoin, this registers can be seen by everybody, contributing to create information within a group of companies.
Data	Bitcoin transactions are all registered in the blockchain. This can be a source of data from which to create new information to consider to improve the bitcoin inclusion strategy. Also, patterns and predictions can be made from this data.
Innovation	Bitcoin surged as a new paradigm for the fiat – based economy. This new paradigm affects the payment process the same way credit and debit cards made years ago. This is considered an incremental improvement and experimentation and implementation of payment apps are low – cost, just as the experimentation principles ask.
Value	Value is created among the other dimensions but as D. Rogers (2016) states, adapting early to stay ahead the curve of change is something that, at this time, bitcoin as a payment method can contribute to create value in a digital strategy.

made by other companies because of the nature of the blockchain. It can help, in the case of firms that are associated, to track what is happening at each one of them in terms of transactions with bitcoin, leading to a further data analysis to update and create metrics that help the development of the firms. In the case of competitors that are not within a set of firms, transaction tracking is also possible in order to compare what they are doing in terms of bitcoin and to create or modify strategies that could help the company.

Data is probably the most important point that can be get from bitcoin transactions. As bitcoin is a big public decentralized database, data mining processes can be run over the network in order to try to find specific patterns and predictions that are important for companies. This needs specialists on databases, data mining and big data and a possible big investment on infrastructure to get information from the blockchain that could help to take decisions., but saving money as the network is not stored locally.

This is important for marketing as most of the times, it could be hard to make marketing research in terms of time and money. From analyzing a database that is generated at the time a purchase or a transaction is made and making the link between clients and wallets, the behavior of clients can be predicted in an easier and transparent way, just by paying. As all data and information get from any source, it must be treated in a confidential and secure way that ensures the client's privacy.

To be innovative is proposed by Shaw (2016) as one of the characteristics high performing digital organizations have in common. Bitcoin is itself a technological, economical, financial and information innovation, but it can also innovate in a marketing perspective in different areas such as studying the e – consumer behavior and e – marketing research, influencing on how decisions are made, saving time on how fast information is get from the market.

Also, as D. Rogers (2016) state, innovation should get market feedback at a faster rate than before, a thing that implementing bitcoin as a payment method can reach because it only needs a cellphone and a wallet app in order to start operating in the network and accepting payments. This is also a low – cost implementation that could make shops

introduce to the new economy with almost no cost in no time, offering a solution for generation Y bitcoiners willing to pay with it.

Once they accomplish these requirements, there are tools as Coin Map (www.coinmap.com) that work as worldwide potfolios of shops and service providers that accept bitcoin for payments, including location on an interactive map. In the specific case of Coin Map, a fee must be payed to be displayed and available for customers. A suggestion for this kind of portfolios is to develop a free platform on which shops could register with no limitations, supported by an open source community, the same way bitcoin and other projects such as GNU / Linux OS are supported, opening a window to shops that do not have the monetary resources to pay a monthly fee.

At the end of the strategy, value is created using the characteristics of the other four dimensions. This value must be dynamic as D. Rogers (2016) state because of the characteristics of the market and the asymmetrical competition. This value relies on what the firm is offering and how it adapts to what the specific market segment needs. In this case, data from the research shows that generation Y bitcoiners are willing to pay with bitcoin but shops do not accept it as a payment method.

This is an opportunity for firms in different areas to attract and retain clients by implementing payments with bitcoin and also be benefited by the information that could be extracted from the network, as it is public. Information about consumer habits can lead to a better decision making process at a faster rate, resulting on a better adaptation to a changing environment as e – commerce is, always focusing on what the client needs and wants.

Chapter 4. Conclusions & Reccomendations

4.1 Conclusions

Bitcoin surged as a response to the 2008 recession as people decreased their trust on banks and authorities, as they were uncapable of reversing the effect on the global economy through their policies. Based on the cypherpunks ideas, bitcoin technology has been developed since the decade of 1990, when the available technology did not permit the development of the system.

The cryptocurrency was developed in order to give people access to a medium of exchange without third-trusted parties, so people could make transactions in which governments and banks do not take part of. A replacement for fiat money which could be used by every person to make dairy transactions just as we do in our daily life.

The adoption of technology as a medium of exchange is a new paradigm that is currently trying to be implemented in the social contract, as bitcoin was first released 10 years ago; a short period compared with the one current money has been used for transactions. According to Hileman and Rauchs (2017), there are only 2.9 to 5.8 million active users of cryptocurrencies around the world (only about 0.07% of global population), indicating that people using bitcoin and other cryptocurrencies are considered Innovators, as E. Rogers (1983) considers to the first 2.5% of certain population in adopt an innovation.

For this research, 98 mexican bitcoin owners were questioned in order to have a better understanding of their acceptance and use of the cryptocurrency as a payment method, their perception of risk towards the use of bitcoin in payments, the articles they have bought with bitcoin (in case they have done so) and their sociodemographic characteristics.

The results of the research show that participants consider bitcoin useful for shopping but they do not consider it as very useful when talking about velocity and productivity at the shopping time. Also, they expect not to put much effort in the learning process for payment as it was shown that most of the respondents have knowledge about how the cryptocurrency works.

Social influence was demonstrated not to be an important factor in the acceptance and use of bitcoin as a payment method, remarking that there is low influence from shops as acceptance of bitcoin as a payment method is not a standard yet; but people have the resources and knowledge to operate bitcoin as a payment method. Also, bitcoin can coexist with cash and other digital payment methods as credit or debit cards as it is considered that it is compatible with them but assistance for problems is not something people consider available in the environment. This could be explanied because of decentralization, an inherent characteristic of bitcoin, being the assistance problem solved through the knowledge the community has.

Paying with bitcoin is not considered as risky at any stage for participants but they tend to be cautious about taking risks with their money, putting safety first. This could be reflected in the payment-use rate that was of 58.16%, being shopping goods the category most bought with bitcoin and convenience goods the less bought.

Finally, the demographics section resulted in a profile in which bitcoin owners are mostly males from generation Y (millennial generation) living in Ciudad de México, Jalisco or Puebla states and with a college degree or above, being students, businessmen and engineers their activities. This can confirm the fact that they do have technical knowledge about the functioning of bitcoin.

The payment-use rate can be a signal that people owning bitcoin wants to use it for payments but, as businesses do not accept it, it is difficult for users to make transactions for goods. This could be solved by fighting four fears that Catlin et al. (2018) consider companies have at the time of adopting a digital approach. These fears are normal as the bitcoin technology is still surging and will be active along with fiat money in the economic system until it is accepted by the society, the same way credit and debit cards had to face years ago.

Once these fears are out of the path, the creation of a digital strategy focused on generation Y is feasible, in which bitcoin as a payment method plays a role in the value

creation process as the inclusion of new technology to create new capabilities for the firm which implements it by adapting to what the market asks and early adopting new trends at a low cost.

In conclusion, acceptance and use of bitcoin as a payment method is still at an early stage, being people owning the cryptocurrency classified as Innovators that have technical knowledge and skills to use it (a factor for acceptance), although there is no official support by any institution and its use is not widespread. Also, bitcoiners consider the cryptocurrency useful for payments although not for increasing their performance at the time of doing shopping (this is being solved implementing the lightning network over the bitcoin blockchain).

Bitcoin do not represent any limitation at the time of being used along with fiat money in daily transactions in both users and government environment, a positive implication in its acceptance for exchanging. In addition, Mexico counts with the Fintech law which, at the moment, does not regulate taxations about the use of bitcoin in any scope giving the community the freedom of spread and use with no limit.

Knowledge is an important factor at this stage because as bitcoin could be considered technology and money, in order to be part of the social contract, people should know what bitcoin is and how it works. Participants of the research expressed that they do have this knowledge and, as they are Innovators, they do not depend on others to adopt bitcoin as a payment method; a situation that could change in the future as this cryptocurrency becomes more popular.

Also, prescence of knowledge can be explained as results show that owners of bitcoin are mostly highly-educated millennials, a generation known for having access to information through the use of Internet and taking decisions based on it which, added to the fact of having a degree, can understand the base of the bitcoin technical functioning.

Bitcoin use and acceptance goes beyond marketing as it is a multidisciplinary topic that has influence on diverse areas of study as IT, economy, finance, politics, public

management and social sciences. The spread, development, acceptance and use of bitcoin as a payment method (not only in Mexico but in the world) relies on people, more than on governments or other institutions for its decentralized nature. The environment will grow as more people get involved and contribute as programmers, miners, users or acceptants of bitcoin. Also, governments should put special emphasis on reaching consensus about the definition of bitcoin, as they are regulating its use within their territories and these regulations influence the way people interact and perceive bitcoin.

4.2 Reccomendations

As this research is transversal, it is recommended to make an analysis trough time to monitor how the acceptance and use of bitcoin as a payment method changes through time and also to know how the environment develops. This could be important as Mexico is considered, at this moment, as the most advanced economy in Latin-America for the cryptocurrencies environment and on investment on the Fintech sector.

In addition, and as the use of bitcoin is more spread through the years, a greater sample could be reached and it could reveal more accurate data about the situation of bitcoin as a payment method in Mexico, resulting in a better analysis that could serve the community to keep improving the technology.

With this information it could be possible to redesign and make better approaches to develop a full digital strategy of adoption and implementation of bitcoin as a payment method in this context, remembering that the environment is in constant change and marketing should respond to it to build a better relationship between customers and businesses.

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Appendix A

This appendix shows the whole instrument as applied and sent for sampling. The instrument is applied in Spanish due to the nature of the research and the characteristics of the subjects of study.

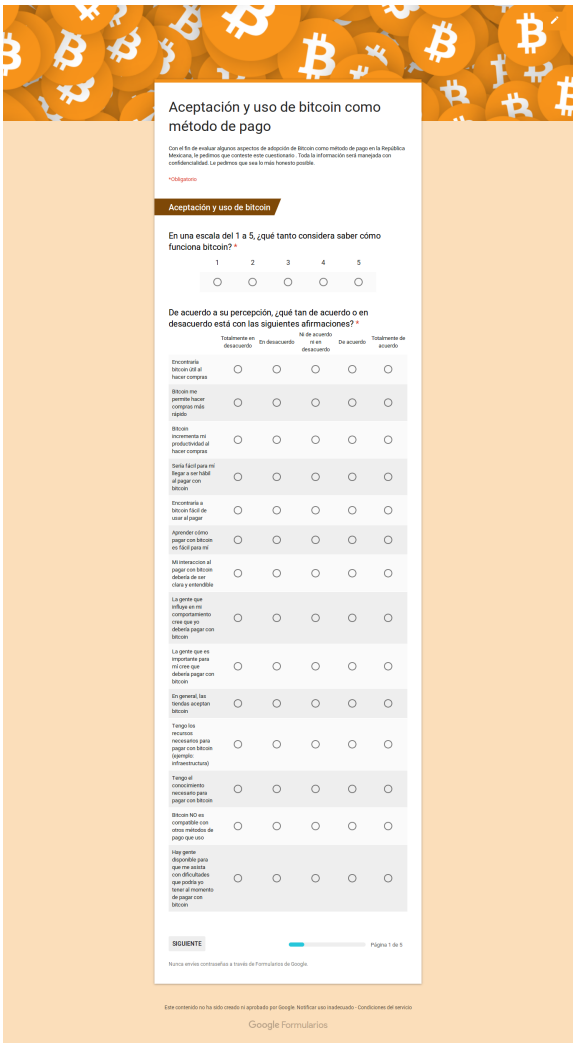
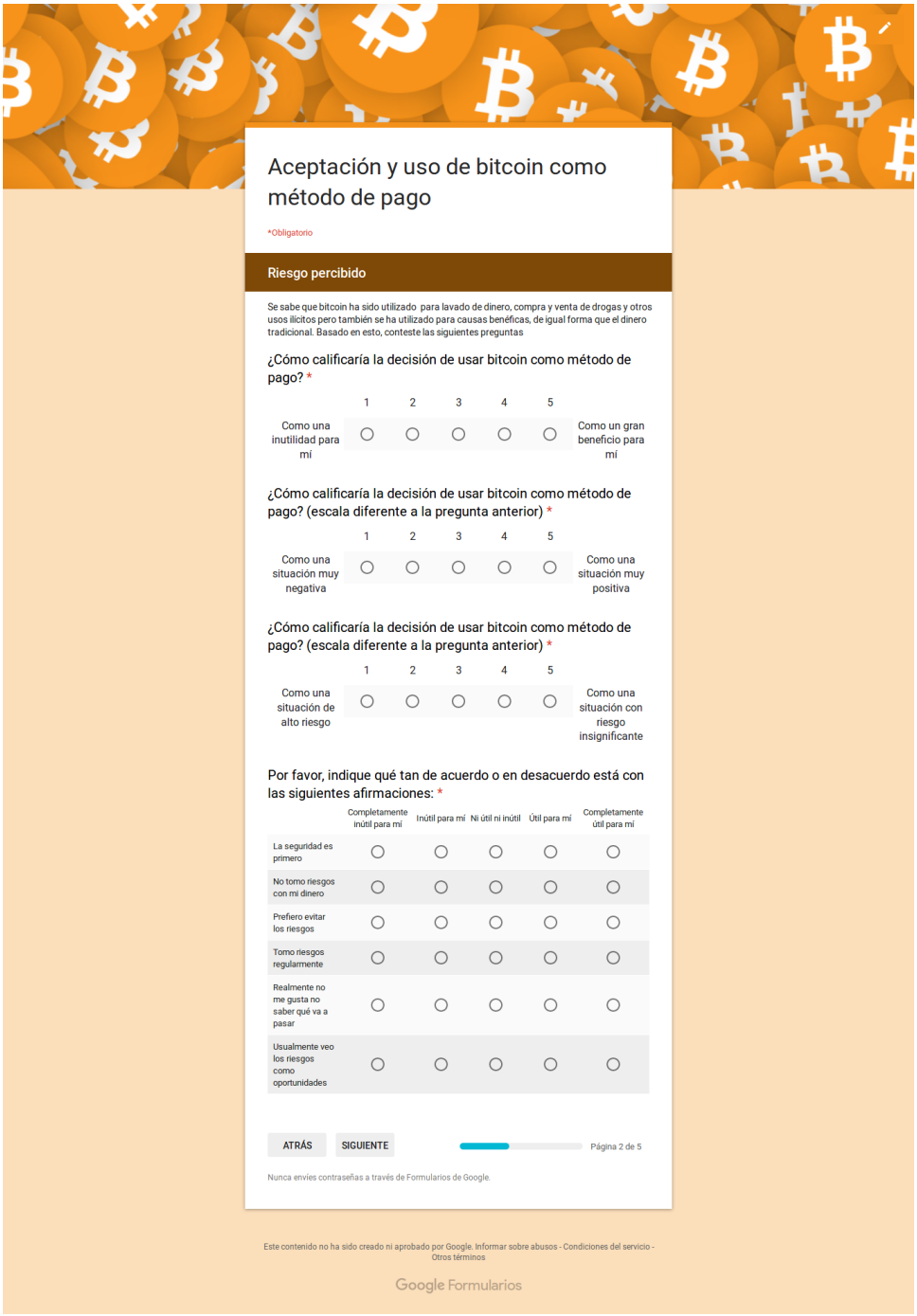


Figure A1. Acceptance and use of Bitcoin as a payment method section (UTAUT) section of the instrument.



Aceptación y uso de bitcoin como método de pago

*Obligatorio

Riesgo percibido

Se sabe que bitcoin ha sido utilizado para lavado de dinero, compra y venta de drogas y otros usos ilícitos pero también se ha utilizado para causas benéficas, de igual forma que el dinero tradicional. Basado en esto, conteste las siguientes preguntas

¿Cómo calificaría la decisión de usar bitcoin como método de pago? *

	1	2	3	4	5	
Como una inutilidad para mí	○	○	○	○	○	Como un gran beneficio para mí

¿Cómo calificaría la decisión de usar bitcoin como método de pago? (escala diferente a la pregunta anterior) *

	1	2	3	4	5	
Como una situación muy negativa	○	○	○	○	○	Como una situación muy positiva

¿Cómo calificaría la decisión de usar bitcoin como método de pago? (escala diferente a la pregunta anterior) *

	1	2	3	4	5	
Como una situación de alto riesgo	○	○	○	○	○	Como una situación con riesgo insignificante

Por favor, indique qué tan de acuerdo o en desacuerdo está con las siguientes afirmaciones: *

	Completamente inútil para mí	Inútil para mí	Ni útil ni inútil	Útil para mí	Completamente útil para mí
La seguridad es primero	○	○	○	○	○
No tomo riesgos con mi dinero	○	○	○	○	○
Prefiero evitar los riesgos	○	○	○	○	○
Tomo riesgos regularmente	○	○	○	○	○
Realmente no me gusta no saber qué va a pasar	○	○	○	○	○
Usualmente veo los riesgos como oportunidades	○	○	○	○	○

ATRÁS SIGUIENTE Página 2 de 5

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Figure A2. Perceived risk section of the instrument.

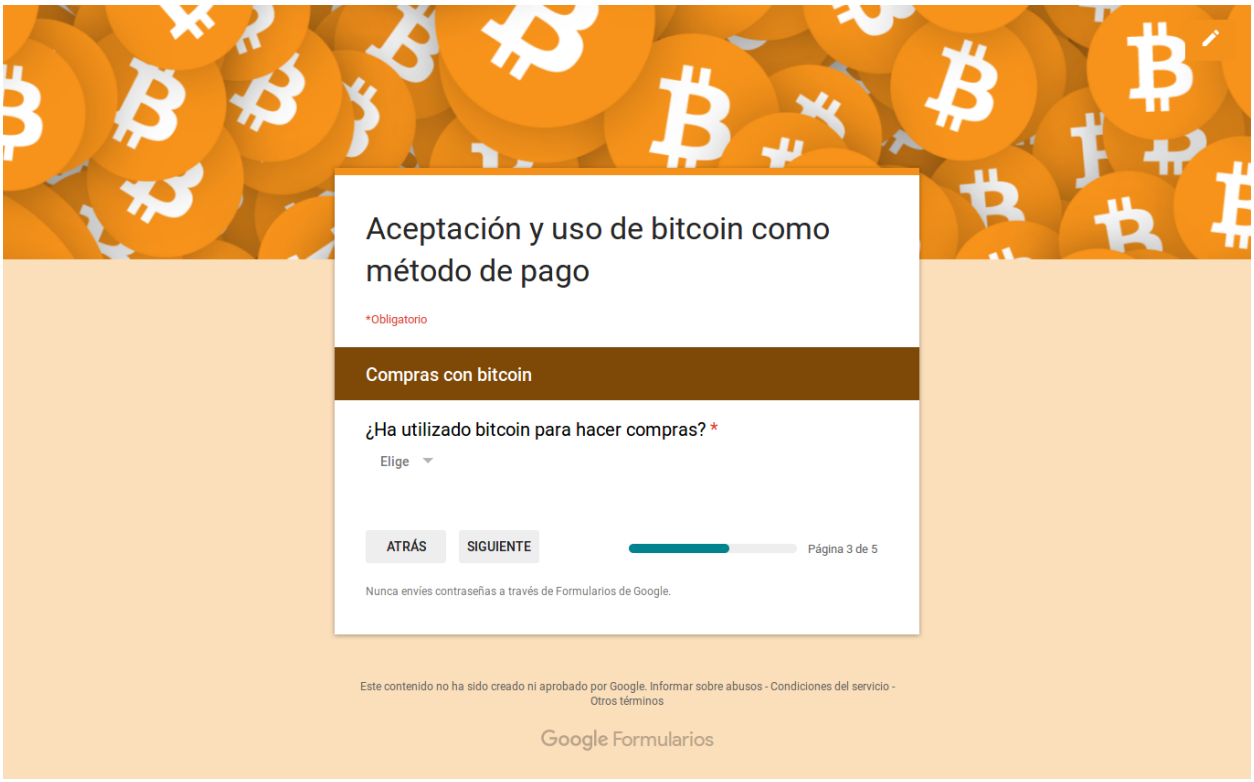

Figure A3. Filter question for products bought with Bitcoin section.

Figure A4. Products bought with Bitcoin section

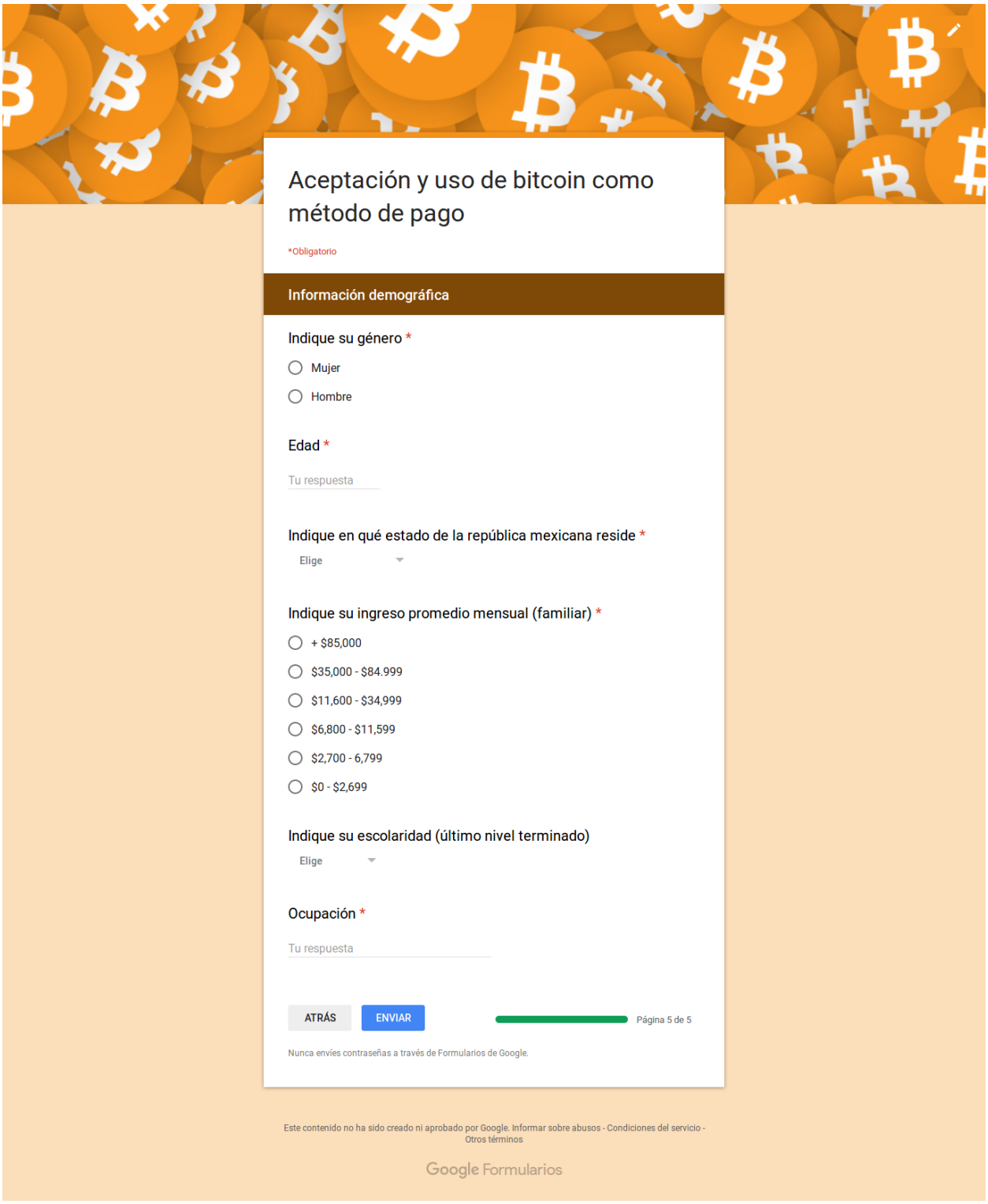

Figure A5. Demographics section

Appendix B

This appendix contains the tables corresponding to the construct Performance Expectancy, which is the first one of the section Acceptance and Use of bitcoin as a payment method.

Table B1

PE1. I would find bitcoin useful at shopping

Score	Frequency	%
Strongly disagree	11	11.22
Disagree	13	13.26
Neutral	8	8.16
Agree	41	41.84
Strongly agree	25	25.51
Totals (n = 98)	98	

Table B2

PE2. Using bitcoin enables me to do shopping more quickly

Score	Frequency	%
Strongly disagree	14	14.28
Disagree	21	21.42
Neutral	28	28.57
Agree	23	23.46
Strongly agree	12	12.24
Totals (n = 98)	98	

Table B3

PE3. Using bitcoin increases my productivity when doing shopping

Score	Frequency	%
Strongly disagree	13	13.26
Disagree	22	22.45
Neutral	33	33.67
Agree	16	16.32
Strongly agree	14	14.28
Totals (n = 98)	98	

Appendix C

This appendix contains the tables corresponding to Effort expectancy construct of the Acceptance and Use section of the instrument.

Table C1

EE1. It would be easy for me to become skillful when paying with bitcoin

Score	Frequency	%
Strongly disagree	9	9.18
Disagree	14	14.28
Neutral	13	13.26
Agree	24	24.49
Strongly agree	38	38.77
Totals (n = 98)	98	

Table C2

EE2. I would find bitcoin easy to use when paying

Score	Frequency	%
Strongly disagree	12	12.24
Disagree	13	13.26
Neutral	7	7.14
Agree	37	37.75
Strongly agree	29	29.59
Totals (n = 98)	98	

Table C3

EE3. Learning to pay with bitcoin is easy to me

Score	Frequency	%
Strongly disagree	11	11.22
Disagree	7	7.14
Neutral	8	8.16
Agree	29	20.41
Strongly agree	43	43.88
Totals (n = 98)	98	

Table C4

EE4. My interaction paying with bitcoin would be clear and understandable

Score	Frequency	%
Strongly disagree	0	0
Disagree	0	0
Neutral	5	5.10
Agree	8	8.16
Strongly agree	85	86.73
Totals (n = 98)	98	

Appendix D

This appendix contains the tables corresponding to items of the Social influence construct of the instrument.

Table D1

SI1. People who influence my behavior think that I should pay with bitcoin

Score	Frequency	%
Strongly disagree	29	29.59
Disagree	24	24.49
Neutral	26	26.53
Agree	13	13.26
Strongly agree	6	6.12
Totals (n = 98)	98	

Table D2

SI2. People who are important to me think that I should pay with bitcoin

Score	Frequency	%
Strongly disagree	32	32.65
Disagree	27	27.55
Neutral	24	24.49
Agree	10	10.20
Strongly agree	5	5.10
Totals (n = 98)	98	

Table D3

SI3. In general, shops accept bitcoin as a payment method

Score	Frequency	%
Strongly disagree	34	34.69
Disagree	50	51.02
Neutral	8	81.63
Agree	4	4.08
Strongly agree	2	2.04
Totals (n = 98)	98	

Appendix E

This appendix contains the results from construct Facilitating conditions of the instrument.

Table E1

FC1. I have the resources necessary to pay with bitcoin)

Score	Frequency	%
Strongly disagree	17	17.35
Disagree	14	14.28
Neutral	16	16.33
Agree	28	28.57
Strongly agree	23	23.47
Totals (n = 98)	98	

Table E2

FC2. I have the knowledge necessary to pay with bitcoin

Score	Frequency	%
Strongly disagree	11	11.22
Disagree	8	8.16
Neutral	8	8.16
Agree	36	36.73
Strongly agree	35	35.71
Totals (n = 98)	98	

Table E3

FC3. Bitcoin is not compatible with other payment methods I use

Score	Frequency	%
Strongly disagree	20	20.41
Disagree	25	25.51
Neutral	27	27.55
Agree	17	17.35
Strongly agree	9	9.18
Totals (n = 98)	98	

Table E4

FC4. A specific person (or group) is available for assistance with difficulties I could have when paying with bitcoin

Score	Frequency	%
Strongly disagree	19	19.39
Disagree	28	28.57
Neutral	16	16.33
Agree	19	19.39
Strongly agree	16	16.33
Totals (n = 98)	98	

Appendix F

This appendix contains the results for construct Perception of risk.

Table F1

PR1. How would you characterize the decision to use bitcoin as a payment method? (High potential for loss/High potential for gain)

Score	Frequency	%
1	7	7.14
2	8	8.16
3	17	17.35
4	25	25.51
5	41	41.83
Totals (n = 98)	98	

Table F2

PR2. How would you characterize the decision to use bitcoin as a payment method? (Very negative situation/Very positive situation)

Score	Frequency	%
1	4	4.08
2	2	2.04
3	19	19.39
4	26	26.53
5	47	47.96
Totals (n = 98)	98	

Table F3

PR3. How would you characterize the decision to use bitcoin as a payment method? (Significant risk/Insignificant risk)

Score	Frequency	%
1	8	8.16
2	9	9.18
3	27	27.55
4	25	25.51
5	29	29.59
Totals (n = 98)	98	

Appendix G

This appendix contains the results for construct Acceptance of risk.

Table G1

AR1. Safety first

Score	Frequency	%
Strongly disagree	9	9.18
Disagree	4	4.08
Neutral	0	0
Agree	32	32.65
Strongly agree	53	54.08
Totals (n = 98)	98	

Table G2

AR2. I do not take risks with my money

Score	Frequency	%
Strongly disagree	9	9.18
Disagree	22	22.45
Neutral	24	24.49
Agree	26	26.53
Strongly agree	17	17.35
Totals (n = 98)	98	

Table G3

AR3. I prefer to avoid risks

Score	Frequency	%
Strongly disagree	11	11.22
Disagree	24	24.49
Neutral	21	21.43
Agree	28	28.57
Strongly agree	14	24.49
Totals (n = 98)	98	

Table G4

AR4. I take risks regularly

Score	Frequency	%
Strongly disagree	9	9.18
Disagree	25	25.51
Neutral	18	18.37
Agree	38	38.77
Strongly agree	8	8.16
Totals (n = 98)	98	

Table G5

AR5. I really dislike not knowing what is going to happen

Score	Frequency	%
Strongly disagree	23	23.49
Disagree	31	31.63
Neutral	15	15.31
Agree	26	26.53
Strongly agree	3	3.06
Totals (n = 98)	98	

Table G6

AR6. I usually view risks as a challenge

Score	Frequency	%
Strongly disagree	6	6.12
Disagree	15	15.31
Neutral	20	21.43
Agree	35	35.71
Strongly agree	22	22.45
Totals (n = 98)	98	

Appendix H

This appendix contains tables for the Products bought with bitcoin section.

Table H1

PC1. Convenience goods

Score	Frequency	%
Never	48	84.21
Hardly ever	3	5.26
Sometimes	2	3.51
Usually	2	3.51
Always	2	3.51
Totals (n = 57)	57	

Table H2

PC2. Shopping goods

Score	Frequency	%
Never	25	43.86
Hardly ever	6	10.53
Sometimes	19	33.33
Usually	4	7.02
Always	3	5.26
Totals (n = 57)	57	

Table H3

PC3. Specialty goods

Score	Frequency	%
Never	34	59.65
Hardly ever	5	8.77
Sometimes	8	14.03
Usually	4	7.02
Always	6	10.53
Totals (n = 57)	57	

Table H4

PC4. Preference goods

Score	Frequency	%
Never	26	45.61
Hardly ever	10	17.54
Sometimes	9	15.79
Usually	5	8.77
Always	7	12.28
Totals (n = 57)	57	

Appendix I

This appendix contains the results for items from the demographics section of the questionnaire.

Table I1

SD1. Gender

Gender	Frequency	%
Male	78	79.59
Female	2 0	20.41
Totals (n = 98)	98	

Table I3

SD3. State of residency

State	Frequency	%
Aguascalientes	2	2.04
Baja california	5	5.10
Campeche	3	3.06
Coahuila	2	2.04
Chiapas	1	1.02
Chihuahua	5	5.10
Ciudad de México	16	16.33
Guanajuato	3	3.06
Guerrero	1	1.02
Hidalgo	2	2.04
Jalisco	13	13.26
Estado de México	6	6.12

Continued in next page

TableI3– *Continued from previous page*

State	Frequency	%
Michoacán	1	1.02
Morelos	1	1.02
Nayarit	1	1.02
Nuevo León	5	5.10
Oaxaca	2	2.04
Puebla	12	12.24
Querétaro	2	2.04
Quintana Roo	4	4.08
Sinaloa	1	1.02
Sonora	3	3.06
Tabasco	1	1.02
Tlaxcala	1	1.02
Veracruz	3	3.06
Yucatán	1	1.02
Zacatecas	1	1.02
Totals (n = 98)	98	

Table I2

SD2. Age

Age range	Frequency	%
Less than 23	21	21.43
24 - 41	68	69.39
42 - 53	9	9.18
Totals (n = 98)	98	

Table I4

SD4. Household income per month

Income range (MXN)	Frequency	%
I prefer not to tell	4	4.08
$0 - $2,699	3	3.06
$2,700 - $6,799	8	8.16
$6,800 - $11,599	18	18.37
$11,600 - $34,999	38	38.77
$35,000 - $84,999	19	19.39
+$85,000	8	8.16
Totals (n = 98)	98	

Table I5

SD5. Educational level

Level	Frequency	%
Elementary school	0	0
Junior high school	3	3.06
High school	15	15.31
College	60	61.22
Graduate school	18	18.37
Others	2	2.04
Totals (n = 98)	98	

Table I6

SD6. Occupation

Occupation	Frequency	%
Businessman	16	16.33
Developer	6	6.12
Student	17	17.35
Entrepreneur	6	6.12
Trader	8	8.16
Employee	7	7.14
Engineer	12	12.24
Salesman	4	4.08
Professor	4	4.08
Marketing	3	3.06
Others	15	15.30
Totals (n = 98)	98	