



UNIVERSIDADE  
**CATÓLICA**  
PORTUGUESA

UNLOCKING THE HYPE: AN ANALYSIS ON HOW BLOCKCHAIN  
TECHNOLOGY COULD AFFECT HOSPITALITY CULTURE

Dissertation submitted to Universidade Católica Portuguesa

to obtain a Master's Degree in

Culture Studies – Management of the Arts and Culture

By

Elia Tonello

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September 2019



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Under the supervision of Prof. Paulo Campos Pinto

And co-supervision of Prof. Álvaro Barbosa

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## **Abstract**

*The aim of my thesis is to find the right “key” to unlock the hype surrounding blockchain technology and to find effective applications in the hospitality industry that could change its cultural framework. To do so, hospitality culture and how technology shapes it will be discussed. Blockchain technology is just one of the various innovations that is determining the “liquid” society we live in. For this reason, a general panoramic of the technological and managerial framework will be further discussed. Furthermore, the specificities of the blockchain will be described, considering both its positive and negative aspects. Through the analysis of qualitative and quantitative secondary source data and a comparison with interviews of experts of these sectors, evidence and opinions will be presented in order to discuss this innovative technology from a culture studies perspective.*

**Keywords:** *Liquid Modernity; Management; Organizational Culture; Hospitality Industry; Hospitality Culture; Emerging Technologies; Technology and Culture; Hacker Culture; Blockchain Technology; Gartner Hype Cycle for Emerging Technologies; Blockchain Applications; “Dynamic” and “Static” Definitions of Culture.*

## **Dedication**

I would like to dedicate this dissertation to a very special friend of mine from my childhood: Naty.

## **Acknowledgments**

First of all, I would like to thank my family - my mother Nori, my father Claudio and my sister Giorgia, who supported me during my upbringing and my academic development. They have always believed in my choices and they allowed me to have the most incredible experiences. Another huge thank goes to my wonderful grandmother Cecilia who took care of me during my childhood and to the other grandparents who are no longer with us. My aunts and uncles, my fantastic cousins - a fundamental part of my life. I would really like to thank Giorgio, Lillis, Renata, Miro, Laura and Sergio and all of their children who I grew up with and have been very kind to me.

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## **List of Abbreviations**

AI – Artificial Intelligence

B2B – Business to Business

DAO – Decentralized Autonomous Organization

HR – Human Resources

ICO – Initial Coin Offering

ICT/IT - Information and Communication Technology / Information Technology

IoT - Internet of Things

MaaS – Mobility as a Service

OC – Organisational Culture

OTA – Online Travel Agency

P2P - Peer to Peer

PoS - Proof of Stake

PoW - Proof of Work

*'Blockchain technology is a new tool in our toolbox. We need to use it when it is the right tool for the job at hand'* (McLean and Deane-Johns, 2016: 5)

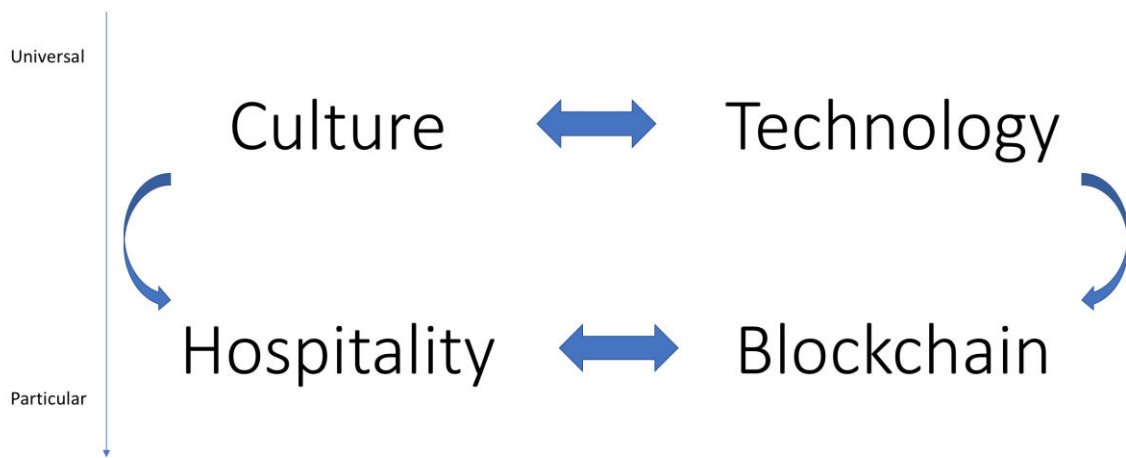
## **Introduction**

### **I. Background**

In 2008 a mysterious unknown character called Satoshi Nakamoto (probably just a nickname for a group of hackers) published a paper which outlined a new 'peer-to-peer electronic cash system' (Nakamoto, 2008: 1) named Bitcoin. This digital asset was the first example of what has since been labelled a "cryptocurrency" which allows anyone to carry out encrypted transactions without the need of a third party, such as banks, intermediaries or governments (cf. Nakamoto, 2008). This new technology quickly gained attention, by 2017, due to its financial hyper-evaluation, (from 1 BTC corresponding to US\$ 1 in 2008, it reached the value of more than US\$ 19.000,00 in December 2017). Something that captured the interest of relevant stakeholders was its apparent versatility across multiple sectors: the distributed ledger technology, *alias* the public transaction database, which permits this currency to work (cf. Underwood, 2016) (cf. Dogru, Mody and Leonardi, 2018). This is better known as 'Blockchain technology', a term that has gained lots of popularity in the last few years (cf. Huckle and White, 2016) (cf. Iansiti and Lakhani, 2017) (cf. McLean and Deane-Johns, 2016) (cf. Michelman, 2017). Various articles have described this technology as 'disruptive' and able to revolutionize different sectors of our society (cf. Dogru, Mody and Leonardi, 2018) (cf. McLean and Deane-Johns, 2016) (cf. Michelman, 2017) (cf. Perlman, 2017). It is not surprising to discover that some people in the world of academia argue that this technology reached the "peak of inflated expectation" in 2017 regarding the 'Gartner Hype Cycle for Emerging Technologies' (Notheisen and Hawlitschek and Weinhardt, 2017: 1063). However, the "plateau of productivity" could be around the corner. For this reason, a careful, unbiased and cross-subject analysis of this topic is needed with the purpose of finding the right 'key' to 'unlock' the blockchain hype. This thesis will focus on the analysis of how this technology

could affect the hospitality culture, going on to explore different applications of the blockchain technology in the hospitality industry.

This dissertation is aiming to open a new academic field of research about the biunivocal relationship between the universal concept of “culture” and “technology”, using the particular cases of “hospitality” (in the case of “culture”) and “blockchain” (in the case of “technology”), as shown in *Figure 1*.



*Figure 1 - Culture, Technology / Hospitality, Blockchain*

Through the development and the analysis that concern the relationship between hospitality and blockchain, a new “way of seeing” the relationship between culture and technology will be given. For this reason, it is expected that this dissertation will have a real impact on the world of academia, creating a fertile soil for further developments and discussions.

## II. Research Questions and Objectives

This thesis will follow a line of argumentation that touches on different topics and can open different debates. Two principle research questions will be raised and discussed in the analysis of this thesis:

1. To analyse the hospitality industry through a culture studies perspective (chapter one and five). To do so, it will be necessary:
  - to understand how the hospitality industry is represented from a theoretical point of view;
  - to understand in which context hospitality and culture are captured;
  - to find the right match between the existing definitions of “culture” and “hospitality”;
  - given the previous elements, to understand which different definitions of “hospitality culture” can be given.
  
2. To analyse the repercussions that blockchain technology might have on hospitality culture (chapter three, four and five). To do so, it will be necessary:
  - to understand the current technological framework of the hospitality sector;
  - to explore the advantageous and disadvantageous aspects of blockchain technology related to the hospitality industry;
  - to show the relationship between technology and culture;
  - to define which cultural repercussions this technology might have on the hospitality industry, based on the various definitions of “hospitality culture” previously given.

Therefore, the objectives of this dissertation are to find adequate answers to these two research questions through the quantitative and qualitative data collected during the research process.

### III. Methodology

As regarding the research framework, four open interviews to experts related to hospitality industry and/or blockchain technology have been carried out. “Open” rather than “closed” interviews have been opted for due to the new nature of this technology. In this way it has been possible to gain more knowledge about this recent topic and to better address the research questions. These interviews have been then compared to the data collected through the literature review process: both qualitative and quantitative data has been used for this dissertation. For this reason, even though the research is using a cultural studies perspective, sociological, anthropological, philosophical and economic aspects have been essential for the outcome of this dissertation, which is divided into five chapters.

In the first chapter the current relationship between technology and management in “liquid modernity” will be described (cf. Bauman, 2000) (cf. Klenk, 2015). Bauman’s definition of modernity has been chosen because it allows the reader to picture through a powerful metaphor the relationship between individuals and the society (s)he lives in. Also, the author used this concept to describe different aspects of everyday life, characterizing its versatility, thus allowing the definition to be applied to various contexts. Furthermore, Klenk’s analysis sets “liquid modernity” in the technological framework (cf. Klenk, 2015), which is one of the central topics of this dissertation. In the second paragraph of the first chapter, hospitality industry and hospitality culture(s) will be explained (cf. Kunwar, 2017) (cf. Dawson, Abbott and Shoemaker) (cf. Dawson and Abbott, 2011) (cf. Canavan, 2015) as well as the relationship with emerging technologies (cf. Zsarnoczky, 2018). In this way, after having set the dissertation in the cultural studies’ framework, the main concept of “hospitality”, “culture” and “technology” are presented here. The third paragraph of this first chapter presents the repercussions that a technological change in a company can have on its organisational culture (cf. Gallivan and Srite, 2005). This is an essential step that leads to the heart of the topic: the cultural repercussions of technology. A few examples of this phenomenon in relationship to the hospitality sector have been given, in order to show what the specific case analysis is.

The second chapter will discuss some current weaknesses regarding the inefficient use of technology within the hospitality sector - such as: data privacy and social security, double payments and the presence of intermediaries, food waste and lack of traceability. The reason why this chapter is important is because the technological problems presented in this chapter could be solved through the technology described in the following chapter. For this reason, it will be shown how the technology in question (blockchain) might propose a solution to improve these weaknesses.

In order to do that, the third chapter will explain more in depth how blockchain works, discussing some key topics related to it, such as degrees of decentralisation, the Internet of Things (IoT) and smart contracts. In this way, the reader will have the tools to understand

the following analysis, which will explain how this technology could be applied to the hospitality industry and the benefits and problems it could bring.

The fourth chapter will focus on the potential disadvantages and advantages that the adoption of this technology might bring to the hospitality industry. The disadvantages will be firstly presented, with a particular focus on the inflated expectations surrounding the blockchain “boom” that happened at the end of 2017 as well as the economic and environmental challenges that this technology is causing (cf. Coleman, 2016) (cf. Huckle and White, 2016) (cf. Huckle, Bhattacharya, White and Beloff, 2016) (cf. Kshetri, 2017) (cf. Vranken, 2017). This chapter will be followed by the advantages this innovation might have in hospitality, supported by both of qualitative and quantitative data collected through secondary sources (cf. Dogru and Mody and Leonardi, 2018) (cf. Ahmed and ten Broek, 2017) (cf. Kwok and Koh, 2018) (cf. Miraz and Donald, 2018) (cf. Önder and Treiblmaier, 2018) (cf. Tian, 2016). It is extremely important to underline that in this chapter interviews has been used, made during the making of this dissertation, to argue both the disadvantages and the advantages of this technology for the hospitality sector.

In the fifth (and the final) chapter the repercussions that this technology might have on the two definitions of hospitality culture – dynamic and static, given in chapter one - will be described and compared to the interviewees’ opinions. In order to do so, firstly an analysis regarding the relationship between technology and human capital and secondly, between technology and hospitality culture, will be given. In this way, there will be the right tools to show the dual cultural repercussions that this technology might have on the hospitality industry.

#### IV. Why it is set in the Cultural Studies Framework

From a Cultural Studies point of view, different milestones of this academic field have been taken into account for this research. Bauman’s idea of “*Liquid Modernity*” (2001) has been utilised to set the current condition of individuals in the today’s fluid world, where the boundaries of human relations are blurred due to the technological framework that surround the post-modern society. Furthermore, the repercussions of “*Liquid Modernity*”

in managerial practices (*Management in a Liquid Modern World* [cf. Bauman, 2015]) have been stipulated in order to describe the new technological concepts of “open source” and “crowd funding”, essential to introduce the Blockchain topic.

The second theoretical point of reference to cultural studies in this dissertation is Himanen’s *The Hacker Culture and the Spirit of the Information Age* (2001). The book itself aims to be a socio-philosophical description of the disrupting nature of the *hacker* (not to be confused with *cracker* – its negative connotation) in the era of the Information Society. On the other hand, the epilogue of the book - written by Manuel Castells – has very interesting insights for the cultural studies field. Through his analysis of the cultural and historical roots of the “Network Society” and the “Information Age” he presents an unavoidable link between technology and culture that might be synthesized in this phrase: ‘there are no technological revolutions without cultural transformation’ (Castells, 2001: 177).

Another fundamental book for the cultural conceptualisation of this book is Capeloa Gil *The Cultural Life of Money*. In the first pages of her book, Capeloa Gil underlines the relationship between culture and money, focusing specifically on the capitalistic society. In fact, Gil’s analysis targets money as a material iconic representation of the cultural and economic structure of capitalism (cf. Gil, 2015). Moreover, she mentions the problem of trust that arose with the introduction of paper money – a topic that will be debated several times in this research. She compares this economic development to the introduction of new currencies like Bitcoin – which is the electronic currency that gave birth to Blockchain. Capeloa Gil defines this economic innovation as “virtualisation of value” (Gil, 2017: 7), a terminology that will be used several times in chapter three.

In the last chapter, Grossberg’s *Cultural Studies in the Future Tense* will help to explain how this research, which aims to find the repercussions of Blockchain technology in the hospitality culture, is set in the cultural studies perspective. In fact, as the author argues, cultural studies aim to describe how people’s everyday lives are related to culture - which is a complex term composed by economic, social and political structures. More specifically, Grossberg argues that the object of culture studies is ‘an effort to find an intellectual practice that is responsible to the changing context in which it works’ (Grossberg, 2010: 9), which Castells would argue is technological, thus cultural in this case.

## V. State of the Art

This thesis is composed of interdisciplinary and multi-faceted subjects. The definition of hospitality and hospitality culture has been taken from the tourist and hospitality management studies (cf. Kunwar, 2017) (cf. Meyer, 2017) (cf. Dawson and Abbott, 2011). The definition of culture and the current repercussions of technology in the modern world belongs to cultural studies and economic fields (cf. Bauman, 2000) (cf. Castells, 2001) (cf. Bernasconi, Harris and Moensted, 2006) (cf. Lewin, 1947), whereas the description of what blockchain technology is and how it works has been collected from Information Technologies studies (cf. Nakamoto, 2008) (cf. Huckle and White, 2016). On the other hand, the two main research questions of this dissertation are set in what academics identify as a “gap in literature”: thus far, nobody has ever studied these specific themes. In fact, firstly, there none or few articles about hospitality industry analysed from a cultural studies perspective (based on the reachable sources available by this research). Secondly, although the cultural repercussions of a new technology on society is not a new topic in the academic debate (cf. Gallivan and Srite, 2005) (cf. Bauman, 2015) (cf. Himanen, 2001), it is the first time that the cultural repercussions of the specific blockchain technology in the restricted hospitality industry case-study has been investigated. For this reason, even though the research inherent to this dissertation’s topics has been very challenging (in terms of available material) and technical (to understand the mechanism of how blockchain works the study of IT related terminology has been required), it can be argued that this is a very innovative topic that can give a strong contribution to the scientific community.

Going into more details, the first fundamental definition that will be presented is the one of hospitality culture. As regarding this concept, two main articles have been written by Mary Dawson and Jeanna Abbott. One is called “Hospitality culture and climate: A proposed model for retaining employees and creating competitive advantage” (2011) and published by the *International Journal of Hospitality and Tourism Administration*. The other one, written by the previous two authors plus Stowe Shoemaker, is called “The hospitality culture scale: a measure organisational culture and personal attributes” (2011), published by the *International Journal of Hospitality Management*. From these definitions, it



emerges that the description of hospitality culture sounds very similar to the “static” definition of “culture”: (cf. Tylor, 1871) ‘norms, rites, rituals, strategic beliefs and values that the workers of that sector share’ (Dawaon, Abbott and Shoemaker, 2011: 292).

Following to chapter two, where different technological weaknesses of the hospitality industry has been presented, various articles related to public news and online newspapers related to innovation in business have been taken into account (cf. Perlroth and Tsang and Satariano, 2018) (cf. Colendi, 2018). The former speaks about a cracking episode that has been launched to Marriott International (biggest hotel chain in the world), while the latter about how blockchain technology might have prevent it.

In the second paragraph of this chapter, institutional, academic and mass mediatic sources have been collected (cf. Competition and Markets Authority, 2019) (cf. Nakamoto, 2008) (cf. Triptease, 2016) (cf. King, 2017). The topic is the problematic intermediation in hospitality, where the first article shows that the British Government recognises that Online Travel Agencies (OTA) are used to have an un-ethical behaviour in the market. The second academic source shows how blockchain technology might offer a solution for this problem. The third and the fourth ones show that big hospitality firms (Hilton and Marriott) launched campaigns to encourage people to book directly and not through OTA. In the last paragraph of this chapter, just one single article has been used related to the tourism and hospitality management field (cf. Pirani and Arafat, 2014). This article speaks about the problem of waste and lack of traceability in the hospitality industry.

As regarding the topic of blockchain linked to the hospitality sector, given that the majority of academic articles linked to this technology are really recent (from 2014 to today), and the topic very specific, the amount of literature available is quite limited. On the other hand, due to the international and cross-boundaries essence of this technology, the sources and the institutions that published the articles found are extremely varied in terms of geographical presence. Blockchain technology is a type of data structure that enables the identification and tracking of transactions in a distributed network of computers. The most important articles that have been used for this research will be now presented.

The first is the article that propagated to blockchain technology, thus Bitcoin: “A peer-to-peer electronic cash system” by Satoshi Nakamoto (2008) published on *bitcoin.org*, which

gave an insight about what blockchain technology is from a technical point of view. It describes the mechanism of Bitcoin, the first cryptocurrency as well as the first real application of blockchain technology.

The second and the third are Martin Zsarnoczky's "The Digital Future of the Tourism & Hospitality Industry" (2018) and Tarik Dogru, Makarand Mody and Christie Leonardi's "Blockchain Technology & its Implications for the Hospitality Industry" (2018) both published on *Boston Hospitality Review*. The authors in both articles give a detailed description of different technological applications, with a specific focus on blockchain, in the tourism and hospitality industry.

The fourth fundamental article related to this chapter is Feng Tian's "An agri-food supply chain traceability system for China based on RFID & blockchain technology" (2016), published by *13th International Conference on Service Systems and Service Management (ICSSSM)*. Tian shows how blockchain technology might be applied in the Food and Drinks sector of the hospitality industry, increasing product traceability on the supply chain.

Following in the list, Irem Önder and Horst Treiblmaier's "Blockchain and tourism: Three research propositions" (2018), published on *Annals of Tourism Research*, and Andrei O.J. Kwok and Sharon G. M. Koh's "Is Blockchain Technology a Watershed for Tourism Development?" (2018), published by *Current Issues in Tourism*, delineate different aspects in which blockchain technology might disrupt the tourism and hospitality industries.

In the fourth chapter, the disadvantages and advantages of the application of blockchain technology in the hospitality industry are presented.

As regarding the disadvantages, the different articles that relate to the current moment of "hype" that blockchain technology is facing has been a central topic of debate for this dissertation. Jackie Fenn and Hung LeHong, "Hype Cycle for Emerging Technologies" (2011), published by *Gartner*, Sue McLean and Simon Deane-Johns's "Demystifying Blockchain and Distributed Ledger Technology–Hype or Hero?" (2016), published by *Computer Law Review International*, Benedikt Notheisen, Florian Hawlitschek and Christof Weinhardt "Breaking down the blockchain hype–towards a blockchain market engineering approach" (2017), published by *ECIS 2017 Proceedings*, and Radia Perlman's "Blockchain: hype or hope" (2017), published by *Security*, all point out this issue. The

first, simply identifies that emerging technologies go through different stages during their life: during the development of this dissertation, blockchain is facing a moment of “hypesness”. Articles two, three and four analyse the positive and negative aspects regarding the application of this technology in business. Other articles have been used to point out other disadvantages that this technology possesses: potential data privacy thefts (cf. McLean and Deane-Johns, 2016), hacking of the code linked to blockchain (not to the blockchain itself) (cf. Underwood, 2016), environmental costs (cf. Vraken, 2017).

In relation to the advantages, different core articles could be identified. The first shows the possible repercussions of blockchain in nine different aspects of the hospitality industry (Kwoh and Koh, 2016). The second creates a real application of blockchain on the transportation side of the hospitality industry, displaying how this technology might increase social security (cf. Huckle, Bhattacharya, White, Beloff, 2016). The third and the fourth exhibit the benefits that this technology might have in terms of increased traceability in the supply chain (cf. Ahmed and ten Boek, 2017) (cf. Abeyratne and Monfared, 2016). Lastly, the first article ever written regarding blockchain will be used another time to show that, through the help of this technology, the problem of double payments can be solved (cf. Nakamoto, 2008). The previous article mentioned, as well as Önder and Treiblmaier’s ‘Blockchain and tourism: Three research propositions’ (2018) published on *Annals of Tourism Research* show how blockchain might lead to a process of disintermediation within the hospitality industry.

Lastly, in the fifth chapter, Grossberg’s ‘Cultural Studies in the Future Tense’ (2010) (a milestone of the Cultural Studies field), has been used to define what cultural studies is: ‘an effort to find an intellectual practice that is responsible to the changing context in which it works’ (Grossberg, 2010: 9), specifying that the changing context in this case is the technological one. The following article used regards the definition of human capital as: ‘the stock of skills that the labour force possesses and is regarded as a resource or asset’ (Goldin, 2014: 1). Furthermore, this topic has been related to the that of technology, explaining that the level of productivity increases when human capital absorbs the notions related to the new technological adoption by the company (cf. Mincer, 1989). To conclude, two articles address the potential changes that the adoption of a technology might have on firm’s culture (cf. LockTrip Manifest, 2018) (cf. Gallivan and Srite, 2005).

In addition, most of the articles considered for this research are recent (from 2014 to today, 2019) and extremely varied in terms of geographical presence (U.S.A., China, U.K., Germany, Netherlands, Hong Kong, Singapore, Bulgaria, Italy, Macau, Portugal, Finland). No field studies have been accomplished due to the restricted time available.

## **1. Technology, Hospitality and their links to Culture**

Keywords: *Technology / Digitalisation / Liquefaction / Uncertainty / Management / Industry 4.0 / Smart Cities / ICT / IoT / Hospitality / Hospitality Culture*

### **1.1. Technology, Management and Hackers in the Liquid Modernity**

Technology and innovation are key factors for the efficiency and progress of our society. Since the dawn of man, these two concepts have demarcated different historical eras and have shaped people's mentality. Technology can be defined as any kind of amalgamation of scientific and technical knowledge under the control of a firm (or firms), with characteristics of uniqueness and protection (cf. Bernasconi, Harris and Moensted, 2006). This knowledge is then installed into an object, a service, an information system or a management model, with an economic aim. Technological change can take place for various reasons, such as: availability of an updated version, which brings obsolescence of the previous version; an increase in the dimension and complexity of a company; internationalisation of the market; a change in the system of laws in which the organisation operates or a change in the economic context (cf. Dawson, 1994). Nowadays, one of the main technological processes that is characterising different aspects of our everyday lives is that of digitalisation. Digitalisation is defined as "the process of converting material or information into a digital form" (Hall, 2018: A1). This is due to the high dependence that our society has on computers and other informatic tools. From a conceptual point of view, this is the consequence of a condition that the world we live in has been experiencing for the last fifty years. In fact, the "solidity" of objects, ideas and social relationships has been replaced by "liquidated" forms of them (Bauman, 2000: 8). They are not structured, secured and consolidated anymore, instead they are becoming more flexible, subject to change and uncertainty.

It is specifically this last concept that characterises the relationship between technology and management. When starting the process of innovating their companies, entrepreneurs face risks and much uncertainty and so close evaluation of the various possible outcomes is necessary (cf. Bernasconi, Harris and Moensted, 2006). This gets even more complex in a situation where 'individuals cannot any longer hold on to organisations or established societal structures for guidance and perspective' (Klenk, 2015: 1). People, companies and

organisations are difficult to manage due to the lack of structure that characterise their thoughts, feelings and relationships. For this reason, one can argue that the processes of digitalisation and liquefaction have completely shaped the culture of the twenty-first century. Within the world of work, it has become apparent in the necessity for change in managerial practices (cf. Klenk, 2015). Lewin proposed a ‘three-phase model of change for organisational development’ (Lewin, 1947: 5) which aims to improve managerial practice by ‘unfreezing, changing and refreezing’ organisational culture. Even if this has been regarded as successful in the past, it might not be valid anymore in the context of ‘Liquid Modernity’ (cf. Bauman, 2000) due to the lack of solidity and stability in today’s society. Therefore, contingency theorists argue that to allow the development of organisational culture, that is in line with technological innovation, a contextual analysis of the relationship between an organisation and its environment is needed (cf. Dawson, 1994). The challenge of our time is to earn consciousness of this phenomenon so that we can use it in the most profitable way. For example, the advent and spread of the internet might represent a new understanding of management, creating a shift from competition to mutual benefit and from individualism to interdependence (cf. Klenk, 2015). In practical terms, if nowadays a traditional company with a well-structured hierarchical management is facing a moment of crisis due to the lack of consciousness about the external changes that our society is living, it might consider overturning the managerial structure of the company through the application of new innovative tools. Companies nowadays are moving towards a more horizontal and open structure of leadership and management (cf. Frankfort, 2016) mainly due to technological development. These managerial shifts can be described by the idea of collaborative economy (cf. Klenk, 2015). Successful collaborative economic examples are represented by open source software and kernels (examples like Linux, Java, Mozilla Firefox or Google Chrome) and the crowdsourcing model such as that of Wikipedia (cf. Klenk, 2015). All of the aforementioned provide examples of companies that have successfully adapted managerial practice to be more inclusive, in parallel with an increasingly technological society.

At this point, it is important to introduce those who are allowing innovation to happen in the era of “Liquid Modernity” (which corresponds to the “Information Age” described by Castells in the epilogue of Pekka Himanen’s *The Hacker Ethic and the Spirit of Information Age*). “Hackers” are enthusiastic computer programmers who share their

works with others. They believe that individuals can create great things by joining forces in imaginative ways, maintaining their existing ethical ideals, thus data privacy and freedom of information (cf. Himanen, 2001). The aforementioned is the definition of “Hacker Culture” which is considered the cultural source of technological innovation (cf. Castells, 2001).

In the next chapters, the focus will move towards a specific technology called blockchain, which is characterised by both a horizontalization of management through the use of an open source system and a specific crowd funding (a form of crowd sourcing) system called Initial Coin Offering (ICO). For this reason, one can argue that blockchain represents what Bauman was identifying as a solution to face the crisis that liquid modernity presents to the world of management. Furthermore, as this technology is encrypted and open source, it can be seen as an empiric continuation of the presence of the hacker’s values – as described by Himanen’s work - in our society.

Potential applications of this specific technology in the hospitality industry will be discussed further. To do so, the hospitality industry will be described along with the main characteristics that shape its culture and its current relationship with technology.

## 1.2. Hospitality Industry, Hospitality Culture(s) and Hospitality Technologies

### 1.2.1. *Hospitality Industry*

The hospitality industry is one of the most important protagonists of the service and experience economies, and it is the second largest employer in the world (cf. Kunwar, 2017). It could be also described as ‘the commercial project of the tourist industry’ (Kunwar, 2017, pp. 56). The most ancient hypothetical Proto-Indo-European root of the different vocabularies connected with the concept of hospitality is *\*ghos-ti* which could be translated as “stranger” or “guest” (Kunwar, 2017: 59). From the mix of the suffix of this word with the Proto-Indo-European root *\*poti* (meaning ‘powerful’) the compound *\*gos-pot* is created. This evolved to the Latin *hospes* (‘guests’, ‘visitor’, or ‘friend’, as well as origin of the word “hosts”) and *hospitalitas* which means ‘friendliness to guests’ (Etymoline, 2018), “entertainment of guests” or “hospitableness” (Kunwar, 2017: 60). It is

from this expression that the etymology of “hospitality” is intended today (cf. Etymoline, 2018). A welcoming behaviour by hosts (locals, owners) towards guests (strangers, tourists) is what characterises this sector. The hospitality industry can be divided into four categories: lodging (hotels, hostels, or shared economy applications like Airbnb), food and beverages (restaurants, bars), travel and tourism (booking flights, trains, buses and other ways of travelling) and recreation (cinema, museums, attractions and spectator sports) (cf. Novak, 2017). Hospitality can be tangible (represented for example by the purchasing of food, cocktails or a night in a room) or intangible (composed by attitudes, skills and knowledge) (cf. Hanim, 2015). It is this second facet that yields the uniqueness of this industry. In fact, the value of service in hospitality represents a big part of overall customer satisfaction. For this reason, the employee plays a fundamental role in the outcome of the industry. Studies confirm that the characteristics of people working in hospitality can be divided as follows: 49% sector-specific skills (cooking, knowledge about wine, IT skills, etc.) and 51% emotional skills (such as kindness, optimism, work ethic, curious intelligence, empathy, self-awareness and integrity) (cf. Rooz, 2017). Emotional skills are those that create the foundation of the hospitality culture. (cf. Rooz, 2017)

### 1.2.2. *Hospitality Culture(s)*

The word “culture” can be interpreted by a number of different definitions with different connotations. The first is more in line with its original etymology: from the Latin *colere* which means ‘to tend, to guard, to cultivate’ (cf. Barnhart, 1988). At that time, the word *cultura* was used exclusively with regard to agriculture until when the Roman philosopher and lawyer Cicero formulated the sentence *cultura animi philosophia* where for the first time “culture” obtained its current connotation (cf. Schoenmakers, 2012 9).

On the one hand, considering its origin, it is possible to give this first definition of culture: ‘that complex whole which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of society’ (Tylor, 1871: 1). This definition of culture is related to the history and the development of a specific group of people. It is a static definition, defined by what already happened in the past, even though could be subjected to changes in the future. For this reason, it will be referred to



this as the “static” definition of culture. This is the most traditional one and it will be useful to analyse some specific aspects of what hospitality culture is.

On the other hand, another possible meaning of culture, taken from the natural science world, is: ‘to grow (microorganisms) in a specially prepared medium’ (cf. Collins, 2010). Paraphrasing this definition in social sciences’ terms, a new interpretation of “culture” might be seen as a: ‘fabrication of expressive-symbol elements of culture, such as art works, scientific research reports, popular culture, religious practices, legal judgments, journalism’ (Peterson and Anad, 2004: 311). In this definition, the “new-expressive elements” are an allegory of the biological “microorganism” of the previous one. From this parallelism, it emerges a connotation of action and dynamism of the word “culture”, a verb instead of a noun. For this reason, it will be referred to this definition as the “dynamic” definition of culture. Once this definition would be applied into the society, the process of making culture, produced by individuals, would then lead to a change in the society in which they belong (cf. Bennett, 2007). This second definition will be more useful for the last part of this dissertation, where the relationship between hospitality culture and technology will be analysed.

The third definition of culture originated by an expression, coined by Raymond Williams, which states that culture is a ‘structure of feelings’ (1958). Despite the brevity of this definition, it is the most difficult one to analyse. This is due to the double presence of a static essence (represented by the word “structure”) and a more dynamic one (“feelings”). Moreover, this definition could be seen as the synthesis between the two previous ones. Nevertheless, this third interpretation of what the word “culture” represents will not be used for this research.

It is important to notice that the purpose of cultural studies - thus of this dissertation - could be described as ‘an effort to find an intellectual practice that is responsible to the changing context in which it works’ (Grossberg, 2010: 9). In the specific case of this research, the changing context in question is that of “hospitality culture” and the tool that might be responsible for this change is Blockchain technology, which will be further discussed.

Hospitality culture can be described as the ‘norms, rites, rituals, strategic beliefs and values that the workers of that sector share’ (Dawaon, Abbott and Shoemaker, 2011: 292). There are some strong similarities with the first definition previously presented. Hospitality culture is linked to the broader field of organisational culture and it is often used by human resources departments in order to evaluate the right employees to hire. In fact, it has been shown that finding the right people who fit the hospitality culture and climate of the firm create the right environment to increase the level of commitment to the company (cf. Dawson and Abbott, 2011). This is expected to cause an initial decrease if the staff turnover rate of the company followed by a growth in customer satisfaction and loyalty (cf. Dawson and Abbott, 2011).

Each firm in this sector exhibits a different hospitality culture, thus a different structure of core beliefs and values shared between employees. In fact, as a study shows, Marriott, Brinker, Disney, ClubCorp, and Chinck-fil-A described their cultural traits using different core ideas (cf. Dawson and Abbott, 2011). For some of them the most important values are the pride of belonging to that specific firm or the importance of hiring the best people, while others focus more on honesty or having very ethical behaviour. For this reason, it should be more appropriate to use the plural form ‘hospitality cultures’ (Dawson, Abbott and Shoemaker, 2011: 292).

Chick-fil-A	ClubCorp	Marriott	Brinker	Disney
Cathy (2002)	Dedman (1999)	Mariott and Brown (1997)	Brinker and Phillips (1996)	Capodagli and Jackson (2007)
“We are happy to be here.”	Pride in belonging	People are number one	Hire the best people	Willing to go the extra mile
Spirit of a servant	Hiring for attitude over aptitude	Commitment to continuous improvement	“Can do” enthusiasm	Honesty
	Treat our members like kings and queens	Dedication to hard work	High ethical behavior	Integrity
	Members are always right	Having fun	People who are:	Insistence on superior quality
	To succeed you must give value	Managers who:	-bright	
	Treat mistakes as opportunities to learn	-are hands on	-energetic	
	We’re in the repeat business	-take care of the smallest details	-honest	
	Business as a family affair	-are good for a multicultural environment	-persistent	
		-radiate energy and enthusiasm	-flexible	

Figure 2 - Hospitality Cultures of Different Firms (Dawson and Abbott, 2011. Pp. 294)

The second definition of hospitality culture could be described as the interaction and exchange of creativity between host and guest, from which a change in values may be generated (cf. Canavan, 2016). There are several ways in which two people might

exchange their creativity: talking about different cultural perceptions as regarding food and customs, joking or sharing knowledge, etc. This is more related to the second definition of culture mentioned before due to its dynamic nature. In this definition different factors have to be considered. The relationship between guest and host and their exchange of creativity is highly influenced by the environment they stay in. The production and reproduction of meaning that can be transmitted by a local, traditional restaurant or hotel will be very different related to a modern and technologically advanced one. For this reason, it could be argued that the technological framework of a specific hospitality firm influences its culture. Therefore, the application of a new innovation in the hospitality sector will affect the cultural framework of the industry.

### *1.2.3. Emerging Technologies and their Applications in the Hospitality Industry*

The world we live in today is shaped by what we do with our technological devices, creating an environment structured into online and offline systems (cf. Zsarnoczky, 2018). This is causing a ‘smartification’ of the ecosystems that surround us, allowing technological objects to enter in contact with humans. This is represented partly by the achievement of the Industry 4.0, which can be seen as the fourth step of the industrial revolution where ‘the combination of Internet technologies and future-oriented technologies in the field of “smart” objects’ gives birth to a new shift in industrial production (cf. Lasi, Fettke, Kemper, Feld and Hoffman, 2014).

A fundamental aspect of Industry 4.0 is the interaction between individuals and machines by means of the Internet of Things where the exchanged information is collected through the usage of sensors and decision making is done through computer systems (cf. Belusova, 2018).

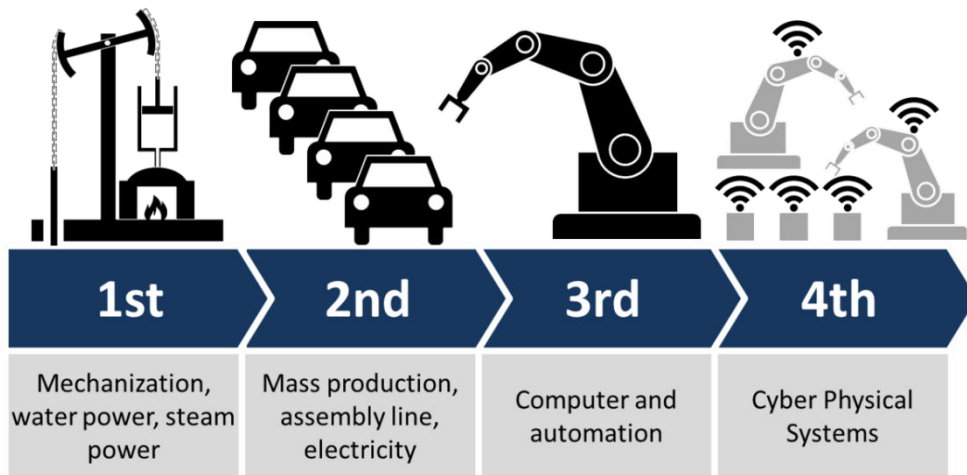


Figure 3 - Industry 4.0 (Retrieved from Wikipedia 'Industry 4.0')

Another global phenomenon that is benefitting from the Internet of Things is that of Smart cities. Smart cities interconnect people with different technologies – such as Information and Communication Technologies, data synchronisation and the aforementioned IoT – with physical infrastructures in the urban context (cf. Gretzel, Sigala, Xiang and Koo, 2015). These forms of technology would provide an important development in service provision which could represent a shift in the way cities are managed. In fact, the term “smart city” is used ‘to describe efforts aimed at using technologies innovatively to achieve resource optimisation, effective and fair governance, sustainability and quality of life’ (Gretzel, Sigala, Xiang and Koo, 2015: 179). A principle group of users of smart cities are tourists, who are also fundamental stakeholders in the hospitality industry. Tourists can be highly attracted by smart destinations due to the higher service quality they can enjoy from the innovative applications involved. To make just a few examples, buses in Barcelona offer USB ports for charging smartphones, Brisbane placed beacons (small tools that transmits radio signal to Bluetooth-equipped devices) to indicate point of interests of the city, and Amsterdam is testing sensors for better crowd management (cf. Gretzel, Sigala, Xiang and Koo, 2015). There are many aspects that distinguish the previous pattern of tourism (also called “e-tourism”) with the new smart version. One key differentiating factor is that while e-tourism is just presented in the digital form, Smart Tourism is represented by a coexistence between both digital and physical forms. Consequently, gadgets like sensors and smartphones play a central role, while previously just websites were involved. In Smart Tourism the visitor can enjoy the technology during the

experience; while earlier it was just possible to do it either before or after it. In e-Tourism the essential aspect was sharing information, nowadays the focus on big data collection. The paradigm shifted from interactivity to technology-mediated co-creation, allowing the tourist to be a central actor in shaping the sector. The tourism sector has seen a shift from a value chain-based structure with the presence of different intermediaries, to an industry that integrates smart objects so that the whole ecosystem is included, and each traveller is at the centre. Lastly, the typology of goods and service exchange has been turned upside down between the parties, passing from a more direct and traditional kind of exchange (B2B, B2C and C2C) to a collaboration between the parties (public-private-consumer). Thus, in the smart tourism paradigm, a reorganisation of stakeholders has been affecting it.

	e-Tourism	Smart Tourism
<i>Sphere</i>	digital	bridging digital & physical
<i>Core technology</i>	websites	sensors & smartphones
<i>Travel phase</i>	pre- & post-travel	during trip
<i>Lifeblood</i>	information	big data
<i>Paradigm</i>	interactivity	technology-mediated co-creation
<i>Structure</i>	value chain/intermediaries	ecosystem
<i>Exchange</i>	B2B, B2C, C2C	public-private-consumer collaboration

Figure 4 – Comparison between e-Tourism and Smart Tourism, (Gretzel, Sigala, Xiang and Koo, 2015)

A disadvantage that has developed with the transformation of the tourism industry from “E” to Smart is the issue of security and privacy. In fact, the constant data-on capture through the usage of public Wi-Fi or some applications offered by Smart Cities, make tourists’ personal information vulnerable to be stolen by crackers. The problem is that in most of the cases the information provided by the open applications or services is greatly needed and the travellers may be easily persuaded to forego privacy management (cf. Gretzel, Sigala, Xiang and Koo, 2015). Blockchain – which will be presented and developed in the following chapters - could offer a helpful solution to these problems. Another link between the process of smartification and blockchain regards smart contracts

which, as the name deduces, are a computerised and automated kind of agreements between the different parties involved in the application that blockchain support.

The smartification process of both industries and cities is instigating to an obligation for companies to keep up with emerging technologies in order to be competitive. Most of the radical innovations in the hospitality sector come from outside the industry group. Therefore, it is essential for hospitality managers to identify which emerging technologies are appropriate. For instance, due to the fact that nowadays most people have access to a smartphone, to put a highly technological phone in a hotel room may not be profitable (cf. Harrison and Enz, 2005). In addition, it is extremely important to make investments in cost-saving technology (as it could be the case of blockchain) because even though there would be an increase in the fixed cost, a consequential reduction of the variable costs would likely follow. In this way, the firm could achieve a cost advantage for their investment on the new technological tool applied (cf. Harrison and Enz, 2005). Therefore, there are many innovations that have to be carefully monitored for the future development of the industry. For instance, the usage of P2P communication – which is a network created by two or more computers that researchers without passing through a different server (cf. Cope, 2002) - boosted the improvement of scheduling and gave rise to new strategies of marketing and sales (cf. Zsarnoczky, 2018). Another important disruptive innovation for the hospitality industry is the cloud-based Client Relationship Management database system. This technology allows hospitality market stakeholders to get information about their clients through data collection. The gathered material is useful to address personalised advertisements based on their tastes and individual preferences (cf. Zsarnoczky, 2018). All of these technological innovations that are moving towards the hospitality industry may be very beneficial for different firms. It is important to note that an analysis by the companies of both the innovative and contextual framework in which it would be applied are fundamental.

The development of sharing economy applications like Airbnb, Uber, Booking.com, Agoda (to mention just few) are revolutionising the hospitality sector. These particular platforms offer users the chance to share digital and physical space of their properties in order to ‘maximise the use of resources capacities for the purpose of social well-being’ (Zsarnoczky, 2018: 2). The main idea of sharing economy is that the seller is giving the

buyer what (s)he has in excess and the buyer in need responds through payment. The “sharing” of economy is leading to a new pattern of business model which could be described as “postmodern” (cf. Zsarnoczky, 2018). In fact, as with the smartification of cities, we are witnessing a process in which different hospitality stakeholders are involved. Therefore, business owners and consumers are considered partners in the sharing economy business model (cf. Zsarnoczky, 2018). Given sharing economy’s potential to easily unite business owners and consumers in a mutually beneficial way, such technology could be seen as a useful way to face the challenges brought by increasing individualism in today’s society (cf. Klenk, 2015).

As regarding the near future, the emerging technology that may have more impact in the tourism and hospitality industries is Artificial Intelligence. Examples of Artificial Intelligence already used in the industry are facial recognitions and other digital services for user’s identification in order to optimise travellers’ personalised experiences. Virtual Reality and Augmented Reality will create a new imaginary touristic space where digital elements are integrated into authentic life locations. 3D printing is already able to reproduce edible artificial food, through the employment of powders and oils in the printing process. In China and in Japan the presence of unmanned work force is already in the market, both in hotels and restaurants (cf. Zsarnoczky, 2018). Lastly, blockchain technology, in its all forms – from cryptocurrencies to booking platforms – is starting to spread like wildfire in the hospitality market, a development which will be further analysed.

### 1.3 Relationship between Technology and Culture in the Hospitality Industry

It is likely that most of the innovations mentioned above are going to change the way hospitality has been managed so far, causing an important shift in the cultural foundation of the industry. In fact, ‘IT exerts specific “impacts” on organisations, thus “causing” changes in Organisational Culture’ (Gallivan and Srite, 2005: 320). Others stated that some values embedded in an IT application may collide with the given firm’s culture (cf. Gallivan and Srite, 2005). For this reason, one can argue that it is important to consider an IT-OC-fit analysis before applying a new technology into a company’s ecosystem. Those

who support this point of view are identified as “interactionist” and generally they consider culture as a fixed object. On the other hand, part of the academia states that OC is constantly subjected to change - which is also the *Management in a Liquid Modern World* (cf. Baumann, 2015)’s prospective -, as well as divided into subcultures and subcategories within it (cf. Gallivan and Srite, 2005). Culture could then be seen as dynamic inside companies, due to the different workers, managers, departments and infrastructures that compose it. The perception of the adoption of new technology might be regarded in various ways by the different parties related to Organisational Culture. However, the fact that a significant technological shift will have a certain degree of influence on Organisational Culture is unquestionable. For instance, some think that the introduction of cryptocurrencies as a recognised form of economic exchange by tourism institutions and other applications of its specific distributed ledger (blockchain) may cause a certain modification of the cultural background of the industry (cf. Kwok and Koh, 2018). These aspects will be further examined in chapter three. In order to get there, a panoramic of the current technological weaknesses within the hospitality sector follows in the next chapter.

## **2. Current Technological Weaknesses of the Hospitality Sector**

Keywords: *Security; Data Privacy; Intermediaries; Double Payment; Solid Waste Management; Traceability;*

There are various weaknesses regarding the use of technology in the hospitality sector which are going to be underlined in this chapter. The aim of this dissertation is to examine which of them could be remedied by the usage of blockchain technology.

### **2.1. Data Privacy and Information Security**

As previously mentioned, the process of smartification has raised problems with data privacy and information security due to the constant data-on capture that smartphone applications, social media and free-Wi-Fi apply. Furthermore, the recent hacking of the



Starwood reservation system of Marriott International showed the negative repercussions that the digitalisation process could bring to the hospitality industry. Five hundred million names, email and street addresses as well as a large number of credit card details and passport numbers were stolen on the 30<sup>th</sup> November 2018 (cf. Perlroth and Tsang and Satariano, 2018). This episode, the second biggest data breach after that of Yahoo in 2013, underlines an important problem with the technological framework of the hospitality industry that needs to be solved. On the one hand, one can argue that companies should be more careful about their cybersecurity measures in order to protect customers' information. On the other hand, personal users should be more careful in the choice of their passwords for the login process or should be careful not to open spam they receive in their mailbox. However, it is a matter of fact that the more technology develops, the more attackers are adapting themselves to the challenges that the informatics world faces. It has been argued that one of the potential systematic solutions to this specific trouble could be the application of blockchain technology (cf. Colendi, 2018). It is not by chance that nowadays this application has been embraced by major players of the stock market, such as NASDAQ, in order to solve digital security concerns (cf. Miraz and Donald, 2018). The next chapter will further discuss how this innovative tool might increase online security and place hackers in a state of powerlessness (cf. Tackmann, 2017).

## 2.2. Intermediaries and Double Payments

In February 2016 the famous hotel chain Hilton Worldwide launched its largest campaign in 97 years of its history called "Stop Clicking Around" (cf. Triptease, 2016). The aim of this operation was to 're-educate consumers to book direct' (Hospitality Awards, 2016). Furthermore, Marriott International, already mentioned in the previous paragraph, sharpen its attack on Online Travel Agencies (OTA) (cf. King, 2017). The reason why hospitality firms are moving in this direction is because the commission that booking platforms charge nowadays is between fifteen and twenty-five per cent of the whole price of the booking (LockTrip Whitepaper: 20). Moreover, the Competition and Markets Authority (a British independent and non-ministerial department) has recently taken action against the most important OTAs (Expedia, Booking.com, Agoda, Hotels.com, Ebookers and Trivago) due

to ‘pressure selling, misleading discount claims, the effect that commission has on how hotels are ordered on sites and hidden charges’ (cf. Competition and Markets Authority, 2019). For this reason, it is evident that OTAs problems do not concern just the commission itself but also their marketing and selling techniques.

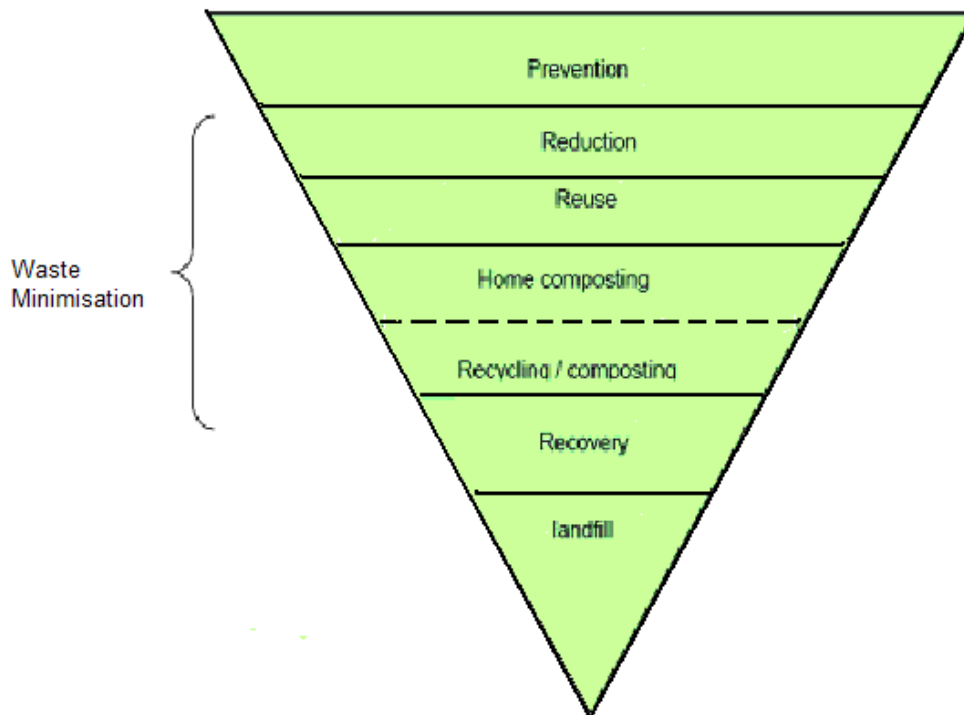
The problem of intermediation is obviously one that goes far beyond the hospitality industry, considering that our economic system is based on banks and financial institutions. These intermediaries ensure that ‘payments over communications channel’ (Nakamoto, 2008: 1) to not be double spent. Indeed, it is the banks that operate as guarantor of the right outcomes of the transactions. For this reason, it is really difficult in our capitalist society to imagine a world where economic transactions were not managed by a trusted third party. As the next chapter will argue, cryptocurrencies, through the use of blockchain technology might represent a way to do so (cf. Nakamoto, 2008). Due to the detachment from the current economic pattern, some analogies between blockchain and the socialism ideology have been identified and analysed (cf. Huckle and White, 2016). More specifically, blockchain’s characteristics of not having to rely on a central authority and the idea of public and cooperative ownership match with the core characteristics of the socialism paradigm.

From the development of cryptocurrencies, LockTrip (one of the companies interviewed for this thesis) developed one of the first booking platforms for hotels and short-term rental with zero per cent commission fee (cf. LockTrip Whitepaper), a topic that will be developed in the final chapter.

### 2.3. Solid Waste Management and Lack of Traceability

In the hospitality industry, especially on the “HoReCa” (denomination for “Hotel, Restaurant, Cafés”) side, solid waste management can have a very strong influence on the economic revenue and environmental impact of a firm. Through proper strategies, hotels can reduce up to 25% the amount of waste produced compared to those that are not adopting any plan (cf. Pirani and Arafat, 2014). Around 50% of the total waste produced by the hospitality industry comprises that of food products, which is also up to one third of

the whole food served in this sector (cf. Pirani and Arafat, 2014). There are different strategies that can be applied in order to reduce this issue.



*Figure 5 - Solid Waste Management (SWM): From Least to Most Favored Option, (Pirani and Arafat, 2014)*

First of all, it is fundamental to establish a “waste hierarchy”, to understand which behaviours and actions can be considered more or less favourable in relation to this topic. As shown in *Figure 4*, the most favourable opinion for solid waste management is that of “prevention”: education and creating awareness amongst customers and employees about the impact of food waste. For instance, notes could be added on food menus or staff could be trained in order to explain which products or dishes should be consumed as early as possible to avoid waste. The second option is to apply reductive techniques, which will be further explained. Reutilisation of products which would expire shortly thereafter is a relatively good option. Recycling, probably the aspect believed to be most effective, is placed exactly in the middle of this scale. The three least favoured options are composting, energy recovery and landfill.

As regarding the “reduce option” mentioned above, it is necessary to identify the different stages where waste might take place. From decreasing the quantity of food served to

clients to prudent managerial strategies related to the supply chain. In relation to this last point, checking of hypothetical product contaminations or damages to the packing at the moment of delivery is the first starting point (cf. Pirani and Arafat, 2014). However, the aim of this dissertation is to analyse a solution from a broader perspective that would involve a managerial optimisation of the whole supply chain process. As mentioned previously, the solution consists in the application of the blockchain technology as a tool for tracking the itinerary of the products during the various steps of the supply chain.



Figure 6 - Supply Chain Management (SCM), (Rouse, 2010)

The next chapter will present how this technology can be applied to solve the lack of traceability of foodstuffs as well as how the specific application of this technological tool could bring about an important boost in food waste managerial optimisation. One start-up operating in this field will be presented and analysed through secondary analysis method and interviews.

### 3. Blockchain Technology

**Keywords:** *Blockchain Technology; Bitcoin; Peer-to-peer; Smart contract; Transactions Degrees of Centralisation; Internet of Things; Smart Contracts; Positive and Negative Aspects*

Since humankind established a communitarian way of living, it had to find a way to give value to goods and services in order to be exchanged. From the primitive system of bartering, to the more developed creation of the coin, the concept of “currency” has developed at the same pace as technology. One of the most relevant economic disruption that took place in the twentieth century - together with the introduction of the credit and debit card’s system - was the introduction of paper money, which represented the first ‘virtualisation of value’ (Capeloa Gil, 2014: 7).

Due to the “technologic boom” the modern society is experiencing today and the digitalisation process expanding like wildfire, the largest amounts of money that are being transferred - in the first economy in the world (U.S.A.) – exchanged through transactions is happening online, as can be seen in *Figure 6*. (cf. Smith, 2018) (cf. Federal Reserve, 2016). Following Capeloa Gil *The Cultural Life of Money*’s terminology, this could be seen as the second phase of economic “virtualisation of value”.

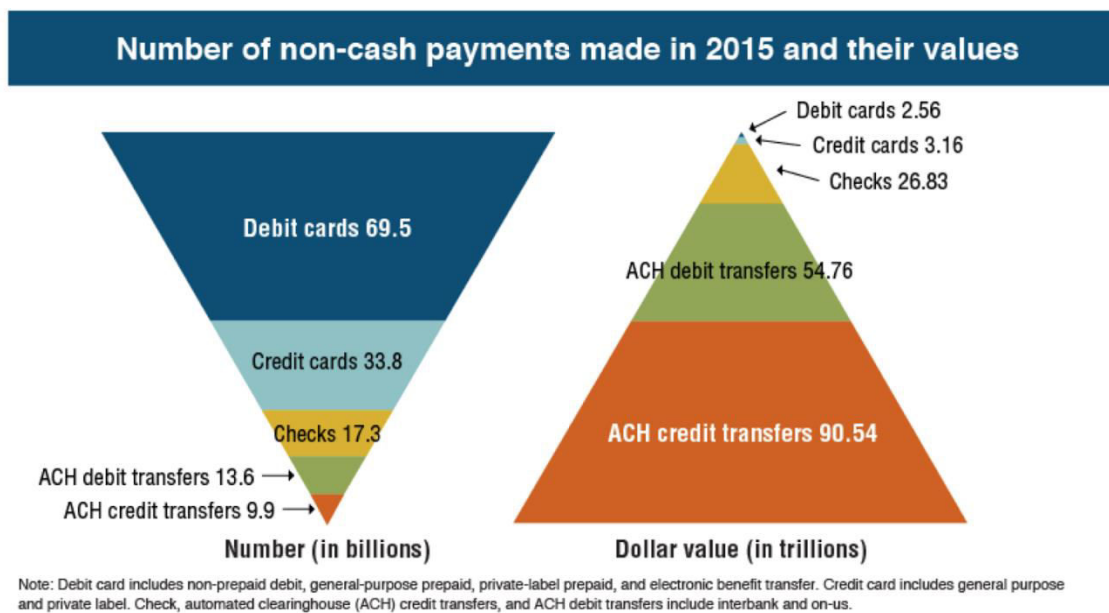


Figure 7 - Number of Transactions and Their Value in U.S.A., (Federal Reserve, 2016)

It is becoming evident that the place where most of the economic interactions will take place in the near future is that on the internet. In this framework, a new innovative currency that exists just on the web (thus it does not have a physical form), and whose supply is not determined by a central bank, has arisen: the cryptocurrency. As it will be shown, is a decentralized encrypted tool that it is working on a distributed network of computers through a specific kind of data structure called Blockchain. Cryptocurrencies are also mentioned in Capeloa Gil's book. In fact, the author says that Bitcoin (the first cryptocurrency ever created) could be perceived by people in the same way as paper money was one century ago. Following this line of thoughts, cryptocurrencies might be considered the third economic step of "virtualization of value".

At first glance (Figure 7), it could be considered just as a new financial bubble due to the high value that Bitcoin quickly reached related to the financial system. In fact, even though this phenomenon is recent – Bitcoin was born in 2009 – it is earning attention due to how quickly it is increasing in value (from the end of 2016 to the one of 2017, 1 Bitcoin passed from around € 730,00 to more than € 16.500,00) (cf. XE Currency, 2018).



Figure 8 - Bitcoin / Euro Currency Chart Exchange: 2 Years

However, having looked into it in more depth, it is clear that the repercussions that it may have from a cultural perspective are consistent. In fact, due to the fact that there is no need for a third party to certify the transactions, no banks are needed for this system to work. Banking and financial institutions would be replaced with an innovative, transnational and digitally reliable economic system, where the problem of trust would not subsist as a consequence of its distributed (thus not centralized) network, as explained by *Figure 8*.



Figure 9 - How Cryptocurrencies Works

The next paragraphs will be described more in details how of the aforementioned can be through the mechanism of blockchain technology.

### 3.1. What is Blockchain Technology?

Digital economy is a worldwide network of economic interactions based on digital computing technologies. Its medium of exchange is the “digital currency”. This can be centralized, when there is a central point of control over the money supply, or decentralized, when the money supply comes from different sources. The most famous example of a decentralized economic system is that of cryptocurrencies, which uses cryptography to secure its transactions.

The decentralized control of each cryptocurrency works through a blockchain, which is a type of data structure that enables the identification and tracking of transactions in a distributed network of computers. As it could be identified in *Figure 9*, when each “block” (the most recent transaction) is completed, it is recorded and added to a “public ledger” in chronological order, creating a “chain” of “blocks”.



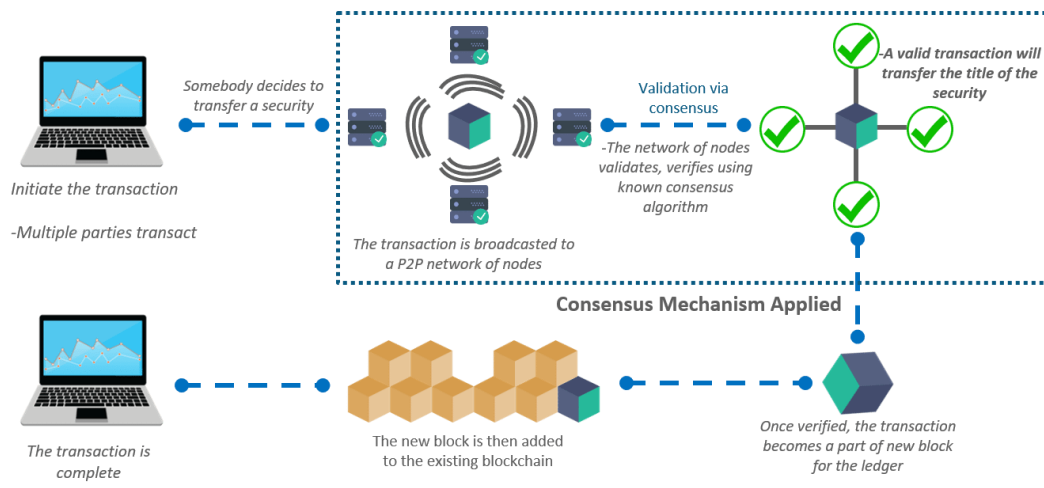


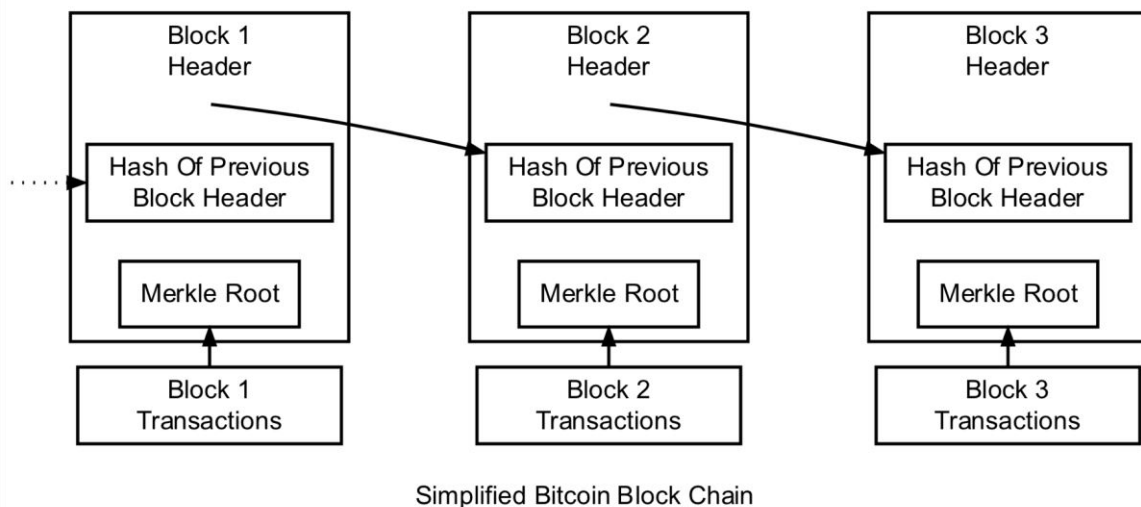
Figure 10 – How Blockchain Works, (Miraz and Donald, 2018)

This technology was developed through a paper by a still unidentified author (or group of authors) named him/her/them self/selves “Satoshi Nakamoto” (cf. Nakamoto, 2008). It is important to underline that in this paper – that achieved resounding success both in the world of academia and in the entrepreneurial environment –the word “blockchain” was never mentioned (cf. Nakamoto, 2008). It appeared for the first time in an e-mail exchange between Satoshi and Hal Finney (the individual who received the first-ever Bitcoin transaction from Nakamoto) (cf. Satoshi Nakamoto Institute, 2008).

Following this clarification, it is now time to pass the discussion to the content of the paper that initiated this innovation. The aim of this work was to describe the functioning of a ‘peer-to-peer electronic cash system [that] would allow online payments to be sent directly from one party to another without going through a financial institution’ (Nakamoto, 2008: 1). In order to have a better understanding, it will now be discussed what a peer-to-peer (P2P) network is. To grasp the concept, it might be useful to start with those functions that made it more commonly known. Probably, its most famous applications – especially for younger generations - are those that have been used for piracy and music downloads such as µTorrent or eMule. In fact, a P2P network it is nothing more than a way to connect different computers to each other through the web. In this way, each single computer linked to this network becomes both a file server and a client (cf. TechTerms, 2018). In this way it is possible to search and download files on other people’s computers. It is argued that, through the reliance on a distributed network of computers, it is possible to create a system where electronic transactions using cryptographic proof take place. This

would solve the problem of the necessity of a third trusted party, which would establish a centralised model.

In order for encrypted transactions to take place on a distributed network of computers, there is the need for a timestamp server which has the function of producing a ‘computational proof of the chronological order of transactions’ (Nakamoto, 2008: 1). For this reason, the timestamp server has the purpose of verifying that a specific ‘block’, which is composed by the ongoing transaction, plus the ‘hash’ of the ‘block’ that came chronologically before, existed at that specific time (cf. Nakamoto, 2008). In computer science vocabulary, to ‘hash’ is a way of encrypting original data with another compressed value (cf. TechTerms, 2018). Thus, in this specific case, ‘the hash of the block that came chronologically before’, signifies the encrypted and compressed version of the previous transaction plus the hash of the transaction that came before, and so on. It is precisely here that the idea of a ‘chain’ of ‘blocks’ arises, due to the fact that each new block created contained in turn the ‘hashed’ information of the block before (*Figure 10*).



*Figure 11 – Simplified Blockchain Transaction, (Miraz and Donald, 2018)*

Due to this encrypted system that is keeping each transaction tracked as well as privacy-secured, it is necessary that each interaction is publicly announced (cf. Blockchain, 2017). In relation to this point, it is fundamental to underline one important aspect: even though the transactions are publicly announced, the public keys are kept anonymous. This means

that even though everyone can see that someone is sending a certain amount to someone else, it is not possible to identify any other information about the parties involved.

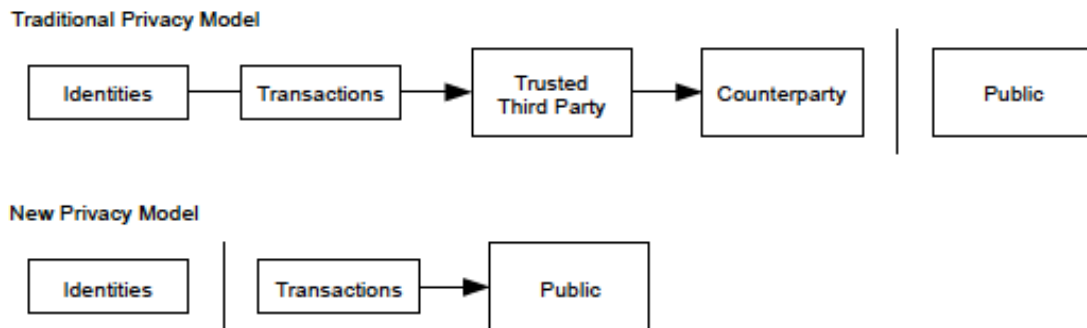


Figure 12 - Comparison between "Traditional Privacy Model" and "New privacy Model", (Nakamoto, 2008)

This automatically led towards a new model of privacy, where trusted third party and counterparty are not part of the system – as it could be observed in *Figure 11*.

It is interesting to notice that cryptocurrencies have been developed during a very disruptive year, macroeconomically speaking: 2008. Some argued that this year represented ‘a systemic crisis of neoliberal capitalism’ (Kotz, 2009: 305) which may have led to a rebirth of the socialist movement. On the other hand, other academics put in evidence the capacity of the blockchain mechanisms to support some socialist theories through its decentralized transparency and auditability (cf. Huckle and White, 2016).

For this reason, one may argue that blockchain and cryptocurrencies might have revolutionary repercussions on our society from a cultural point of view: the redundancy of trusted – or institutional – third party which are usually needed to carry out the transactions; their transnationally – i.e. the ability to go beyond national borders; and, last but not least, the transactions being encrypted. For these reasons, it could be argued that if a hospitality firm would adopt this technology, either through allowing cryptocurrency payment or installing other blockchain applications, its organizational culture would change, alighting the possibility to go towards a way to re-think the cultural roots of the hospitality sector.

### 3.2. Public, Consortium, Private: Different Degrees of Centralisation

What has been said so far may sound utopic, and from a closer analysis of the topic it is clear that there are some aspects that need to be underlined. In fact, the kind of blockchain structure that has been referred so far, it is the public one. However, other two typologies of structure exist: private and consortium (*Figure 12*). These differences are based on the degrees of centralisation of the ledger.



*Figure 13 - Public, Consortium, Private Ledgers and Today's System, (Huckle and White, 2016)*

If compared to today's typical system which relies on a centralised ledger, public blockchain is the opposite given the fact that the access is "permissionless" (Huckle and White, 2016: 9). To explain what "permissionless" means, it is necessary to explain what the mining process is. As previously explained, the word "hash" means, thus finding a way to compress and encrypt the previous transaction in order to create a new "block". To "mine" means the work that is required by the different computers of the network, to find the right algorithm in order to finalise the 'hashing' process, thus the block. (cf. Jimi, 2018) In the case of Bitcoin the mining works through Proof-of-Work (PoW), where every time a computer manages to find a solution to carry out the hashing function of the block, it broadcasts the result to the distributed network of computer in order to get confirmation about the outcome of the mining. If the network of computers gives a "proof" of its "work", then the block would be completed and added to the chain. This is also called 'consensus' model, being the decision based on a confirmation among the stakeholders (cf. Nakamoto, 2008). "Permissionless" means nothing more than a system where the mining process is open to everyone without restrictions (cf. Huckle and White, 2016). A

completely decentralised blockchain is also “public”, which means that anyone can carry out transactions.

Consortium blockchain is less decentralised because, even though it is public from a transaction point of view, the mining access is restricted, also defined as ‘permissioned’ (Huckle and White, 2016: 9).

Finally, private blockchain model is composed by the same characteristics of the consortium one, with the only difference that just the subjects who own private keys are the ones that are able to carry out transactions in the system. (cf. Huckle and White, 2016).

### 3.3 The Bond between Blockchain and Internet of Things: Smart Contracts

One of the most disruptive repercussions that blockchain can have, concerns the development and improvement of the Internet of Things (IoT). IoT regards the idea that devices - in the future - will be interconnected and will communicate between each other in a bidirectional way, exchanging users’ data that will be collected in a centralised system (Zsarnoczky, 2018). After having explained that one of the core components of blockchain is the fact of being decentralised, it is already possible to see in which way blockchain can innovate IoT.

Challenge	Explanation	Potential blockchain solution
Costs and capacity constraints	It is a challenge to handle exponential growth in IoT devices: by 2020, a network capacity at least 1,000 times the level of 2016 will be needed.	No need for a centralized entity: devices can communicate securely, exchange value with each other, and execute actions automatically through smart contracts.
Deficient architecture	Each block of IoT architecture acts as a bottleneck or point of failure and disrupts the entire network; vulnerability to distributed denial-of-service attacks, hacking, data theft, and remote hijacking also exists.	Secure messaging between devices: the validity of a device's identity is verified, and transactions are signed and verified cryptographically to ensure that only a message's originator could have sent it.
Cloud server downtime and unavailability of services	Cloud servers are sometimes down due to cyberattacks, software bugs, power, cooling, or other problems.	No single point of failure: records are on many computers and devices that hold identical information.
Susceptibility to manipulation	Information is likely to be manipulated and put to inappropriate uses.	Decentralized access and immutability: malicious actions can be detected and prevented. Devices are interlocked: if one device's blockchain updates are breached, the system rejects it.

Figure 14 - Blockchain of Things, (Kshetri, 2017)

Taking into account the network capacity that IoT will need to handle in the near future (as shown by Kshetri in *Figure 13*), the necessity to find a way to communicate smoothly and securely is fundamental. Blockchain, though its distributed architecture which uses encryption to exchange data, can be a solution to this issue. With the fact that records would be kept by all the users and those records would be immutable, hackers would not have any possibility to strike. Thus, as *Figure 13* explains, there are four main issues related to IoT that Blockchain might be able to solve.

Firstly, due to the exponential growth that IoT devices might face, constraints of costs and capacity will be a central issue. The decentralised structure that compose this technology may allow devices to communicate securely and in an automated way – through the use of *smart contracts*, which will be further discussed.

Secondly, each block that composes the IoT architecture might represent a point of failure for all devices related to that system. Blockchain would be able to secure each IoT's transaction in an encrypted way, avoiding its architecture's deficiencies.

Thirdly, there are different sources of problems for an IoT system that relies on a central cloud server, such as: cyberattacks, power off or bugs. The distributed network of computers on which blockchain relies would allow information to be stored in every different device linked to it.

Fourthly, in a traditional IoT system, information is subjected to manipulation. Blockchain would lead to an immediate detection of the suspicious action allowing the information to be stored in an immutable way.

The very specific tool that would allow IoT to cooperate in a harmonious way with blockchain - as mentioned in point two of the previous list – is a *smart contract*. Even though it was firstly conceptualised more than 20 years ago by Nick Szabo (cf. O'Dair and Beaven, 2017), it got popular with the emergence of the Ethereum blockchain (cf. Savjee, 2017). These innovative contracts allow transaction protocols to take place, following the terms of the agreement that comply with that established by the different parties involved in usage of the blockchain (cf. Underwood, 2016). In order to reach optimal usage of this tool, it would be necessary to combine it with artificial intelligence (AI) and big data solutions (cf. Kshetri, 2017). In fact, if IoT devices will be interconnected through the application of smart contracts, AI and big data solutions will represent the “engines” that

allow this system to operate. In fact, AI – through constant big data collection - would allow smart contracts to work in an automatized way. This would facilitate the life of humans, in a future where computers will ‘observe, identify and understand the world without the limitations of human-entered data’ (Huckle and Bhattacharya and White and Beloff, 2016: 462).

The interaction between humans, different emerging technologies and the physical world they live in, is leading to a historical era of cultural disruption. The smartification of the society is probably representing a New Age in the evolution of humankind, which would follow the preceding industrial and information’s ones described by Weber and Castells (cf. Himanen, 2001). The cultural repercussions that the adoption of a specific technology - blockchain – might have on a restricted business aspect of the society – hospitality – will be presented in the last chapter. Before getting to that point, an analysis of the disadvantages and advantages that this technology might bring within this industry will now follow.

#### **4. How Blockchain Technology Could (or Could not) Strengthen Weaknesses and Bring Innovation within the Hospitality Industry**

##### **4.1 Disadvantages and Advantages of Blockchain Application in the Hospitality Sector**

The Heisenberg Uncertainty Principle for sub-atomic particles in Quantum Mechanics enunciated in 1927 states: “the more precisely the position (of a particle) is determined, the less precisely the momentum (of that particle) is known in this instant, and vice versa” (Kashyap, 2014: 1). This fundamental scientific theory can be adopted in our daily life in the following way: when we consider a phenomenon, we should be aware that the more we may increase the focus on one variable, the more other variable’s accuracy will decrease (cf. Kashyap, 2014). In the case of emerging technologies, due to their disrupting nature, one can be obfuscated by the innovation that this new tool might bring into the society and in hand can become blinkered to its drawbacks. For this reason, in this framework of uncertainty, both the disadvantages and the advantages that this technology might bring to

the hospitality industry will be presented, in order to produce an as-unbiased-as-possible analysis.

There are already a few firms in the hospitality sector that decided to break the ice and apply the distributed ledger technology to their business plan who have kindly accepted to take part in this dissertation through interviews. In the following paragraphs, three different current projects related to the hospitality sector, plus one by a PhD student – sceptical about the real potential of this technology - will be presented. In this way, the repercussions that their business ideas might have in the hospitality industry (in the first three cases) and a new proposed solution to strengthen IT security by the PhD student, will be further discussed. With the data gained through the interviews carried out, the aim is to have a better understanding about which hospitality weaknesses could actually be strengthened through the application of this technology by a firm.

The following paragraphs will be divided into two parts. Firstly, the negative aspects found during the secondary data analysis will be presented. The priority will be given to those that match with the arguments used by the most sceptical of the interviewees: a PhD researcher from the University of Saint Joseph (Macau). Secondly, the other three interviews will be linked to the potentially useful aspects of this technology for the hospitality sector. This data will be analysed and compared to secondary data analysis in order to give a broad panoramic of this theme.

While the first approach wants to underline, criticise and improve the current inefficiencies of this innovation, the other three interviewees – each supported by respective blockchain-based projects - are strongly pro-blockchain and believe in the potential that this technology can have.

#### 4.1.1. Disadvantages

One of the four experts contacted for this dissertation was a PhD student of the University of Saint Joseph in Macau. His academic background is in IT and his areas of expertise are Artificial Intelligence, IoT and data privacy. He is currently working on a doctoral project that is strengthening internet security as well as optimising data privacy. From the various



interviews, his was the most technical (and sceptical) one, which helped this research to be better addressed and focused. For this reason, I will use the data collected by his interview in order to criticise some relevant aspects of blockchain technology.

#### 4.1.1.1. *The Hyper-Hype*

It is almost unavoidable for a breakthrough technology to experience - during the first period of existence – a moment of hype. At the beginning, people are tempted to overstate its positive aspects, while neglecting the fact that it needs time for a technological ecosystem to develop (cf. Michelman, 2017). In the current case of the blockchain technology, the level of “hype” has – depending in which part of the world - already reached its peak. In fact, a relevant part of the academia is not convinced by the actual effectiveness of this technology (cf. Michelman, 2017) (cf. Perlman, 2017) (cf. Notheisen and Hawlitschek and Weinhardt, 2017) (cf. Morini, 2016). For example, one indicator that confirms this point can be seen by the combined crypto market capitalisation: while at the very beginning of 2018 it reached \$ 800 Billion (cf. Marshall, 2018), exactly one year later it dropped to \$ 100 Billion (cf. Young, 2019). On reading the main newspapers, blogs or social media posts it seemed that ‘distributed ledger technology is a universal panacea for business challenges (and world peace!)’ (McLean and Deane-Johns, 2016: 5). The PhD student previously mentioned interviewed for this research agrees on this point. Speaking about the excessive level of “hype” surrounding this technology, he argued: ‘[...] An issue blockchain is facing right now is the real over hype about this topic. Nowadays it has almost become a way for companies to look cooler, as it would be just a matter of marketing. I heard about a company that from the moment it mentioned that it would have started to use the blockchain, its value in the stock market increased of something 20-30%. For this reason, I decided to take a step back, even though I see that there are some good potential applications.’

For this reason, a proper analysis of the current effective situation is needed. To do so, it will be considered the ‘Gartner Hype Cycle for Emerging Technologies’ graph (*Figure 14*) will be considered to see where this technological tool is placed, as regarding the year 2018.

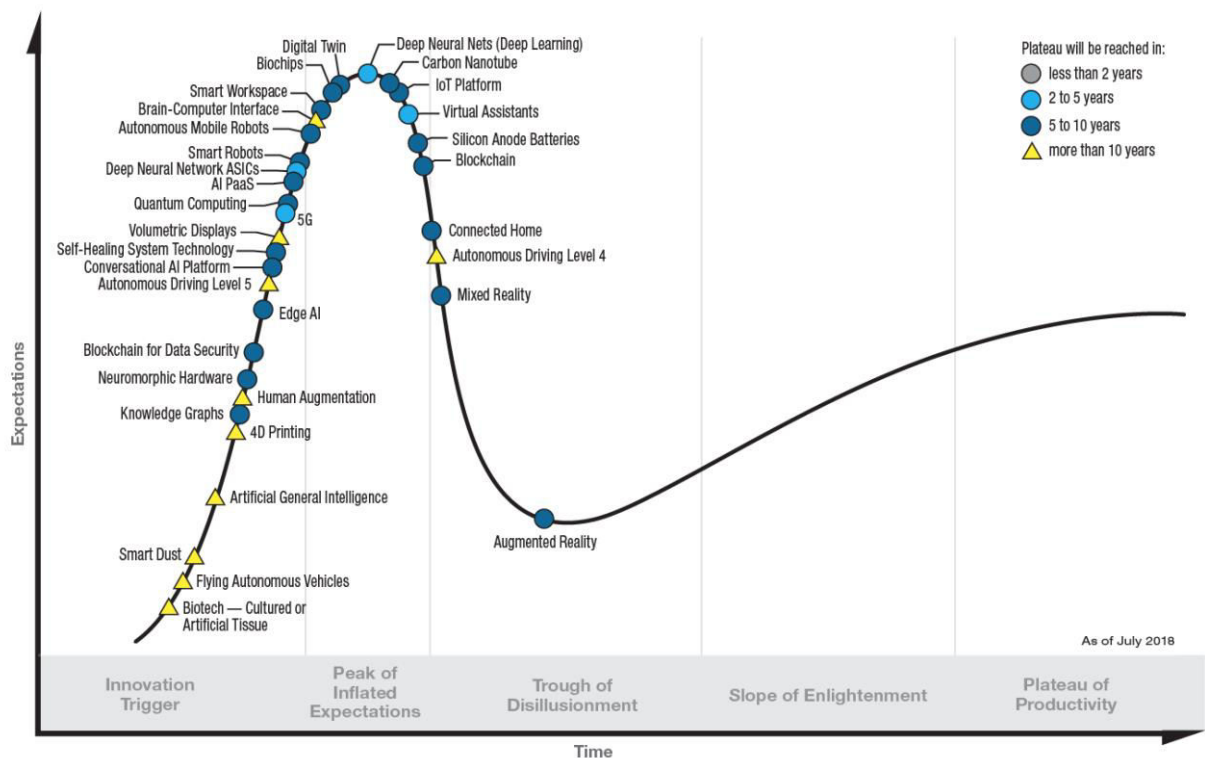
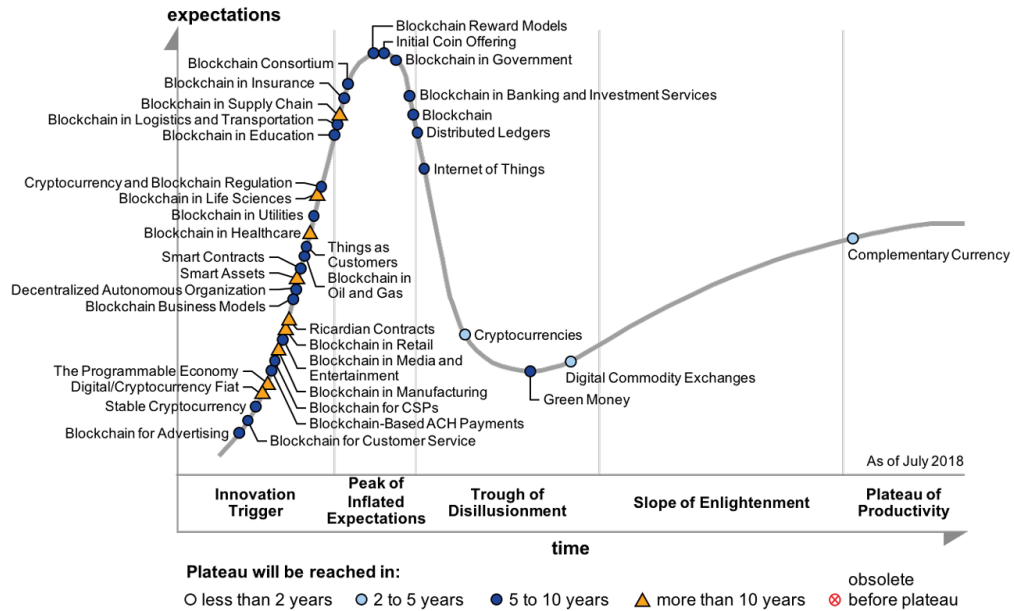


Figure 15 - Gartner Hype Cycle for Emerging Technologies, (cf. Panetta, 2018)

On the line of x-axis there is the time variable whereas the ordinate represents the expectations. Furthermore, each emerging technology is associated to a dot with a specific colour which indicates when the “Plateau of Productivity” will be reached. This is the last step that a technology may reach, and it serves to represent the moment when the innovation will be mature enough for people’s everyday life. Before that, it is argued that innovations have to face a phase of “hype”, followed by a fleeting moment of disillusionment. A new rise of expectations would then proceed, creating a “slope of Enlightenment”. Just beyond that, it starts the effective social utility of the tool begins, the moment when the innovation is surrounded by an ecosystem that is able to support it. It is important to notice that, following the trend of this graph, one year might cause a relevant difference in the positioning of a specific technology. In the case of blockchain, it is not easy to meticulously define its current position. However, the following graph could help to show what the current situation of Blockchain technology application in business is (Figure 16).

## Hype Cycle for Blockchain Business, 2018



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Figure 16 - Gartner's Hype Cycle for Blockchain in Business (Pemberton-Levy, 2018)

What it is certain is that expectations about the impact this technology will have on business reached its peak in conjunction with the cryptocurrencies' evaluation (cf. XE Currency, 2018). On the other hand, as Figure 16 shows, blockchain application as a "complementary currency" (differing from "cryptocurrencies") is the only one that is going to reach the "Plateau of Productivity".



Figure 17 - Bitcoin Trend: June 2017 - June 2019

It is interesting to notice the similarity in the shape of the graph between *Figure 16 (Hype Cycle for Blockchain in Business 2018)* and *Figure 17 (Bitcoin Trend: June 2017 – June 2019)*. It does not necessarily mean that there has been causation between the Bitcoin trend and the usage of Blockchain in business. On the other hand, it does possibly mean that there is correlation between the two. This might consolidate the idea that blockchain as a “complementary currency” is actually reaching the “Plateau of Productivity” and that the ‘Gartner Hype Cycle for Emerging Technologies’ is a useful tool supported by empiric evidence.

Various recent articles in the world of academia show that the majority of blockchain applications remain at the “Peak of Inflated Expectation” (cf. Michelman, 2017) (cf. Perlman, 2017) (cf. Notheisen and Hawlitschek and Weinhardt, 2017) (cf. Morini, 2016). However, most of these authors recognise the disruptive potential of this innovation for different sectors: from the C2C transactions to asset management, from sharing economy to manufacturing (cf. Notheisen and Hawlitschek and Weinhardt, 2017).

A very useful way to prove the efficiency of the blockchain, in a specific real-case scenario, is through a comparison with traditional solutions. Regarding this, one can argue that exist much cheaper and effective options to solve business problems that do not require the usage of blockchain (cf. Perlman, 2017).

#### 4.1.1.2. *Misused*

Following the previous quote from the PhD student's interview, a new critical aspect of today's situation of blockchain technology might be identified. In fact, the expert argues that nowadays some companies are announcing to apply blockchain technology to their company just for 'marketing purposes'. Later on, he argues: 'My point is the following: if in your business different parties trust each other, then why use it [the blockchain technology]?!'. From this statement it is clear that a problem of "misuse" of the application of the technology by companies is currently taking place in the market.

Furthermore, the researcher maintains that cryptocurrencies – and more specifically Bitcoin – are and will be, the most long-lasting application of the blockchain system. However, this is not the only long-term application of this technology. Other possible useful usages can be identified but they have to own the following characteristics: a problem of trust related to the ownership of a specific asset (for instance: real estate, insurance profiles, medical reports) for a big group of people (i.e. worldwide) may subsist. For this reason, in addition to the financial sector, he sees potential effective usage in public notaries, accreditation of titles and medical reports.

#### 4.1.1.3. *Data Privacy and Security*

As already mentioned, after Edward Snowden's disclosures (cf. Walker, 2015), privacy in relationship to big data collection became a central topic of debate. Firstly, in the case of Bitcoin, it has been argued that its security depends on the fact that no other group can collect the same amount of compute power as Bitcoin. One can argue that a nation-state could concentrate more compute power than Bitcoin without problems (cf. Perlman, 2017). Furthermore, it is important to underline that it could be possible to deduce part of the

identity of the person that made the transaction either accessing to a party that has access to the private key or through the transaction itself (cf. McLean and Deane-Johns, 2016). Moreover, a new emerging technology might make it possible to decrypt the content of the records: quantum computing (cf. McLean and Deane-Johns, 2016). For this reason, one may argue that, although at a first glance blockchain technology has the potential to solve data privacy and security issues, on closer inspection this innovative tool might be subjected to decryption. The PhD researcher interviewed argues that, due to the fact that every stakeholder would have a full copy of the data in his/her own computer, a hacker could attack the encrypted data whilst “offline”, so that none could notice it. This would be more difficult to take place if the combined development effort of every stakeholder worked on a single code-base, due to the fact that this system is more secure. Nonetheless, this benefit could be achieved without the necessity of relying on a shared, public ledger (blockchain). For this reason, the interviewed PhD researcher is now working on the development of a new system that he considers being a purer form of decentralisation to that achieved by the blockchain architecture. In fact, he maintains that if personal data would remain under the exclusive control of users, the risk of attack to individual user-controlled systems would be lowered. On the other hand, this would imply that user-owned infrastructures might hold and process the data, whereas a blockchain does not have such a requirement.

#### 4.1.1.4. *Initial Investment Costs*

This is a really common issue that regards companies that want to apply an emerging technology to their business model. It is not easy to calculate the cost of setting up a blockchain for a company business. This is due to the fact that if the entrepreneur were a software developer specialised in this topic, the investment could be free (cf. Hyperledger, 2018). If this is not be the case, the cost of hiring a blockchain developer can be really high, mainly due to the lack of supply of specialised professionals. Referring to the average hourly payments, a blockchain software developer could range from around US\$40,00 for those located in India until US\$150,00 to US\$200,00 for North American experts (Suprunov, 2018). Furthermore, the expert interviewed for this dissertation’s

opinion is that a “permissioned”, private blockchain could be easily replaced by a less expensive system (and more efficient) created with “traditional technologies”.

#### 4.1.1.5. *Hackings, Thefts and Breaches*

There have been a few important cases of hackings related to - but not directly to - the distributed ledger technology. The first and most relevant - in terms of millions of dollars involved - was that endured by the Distributed Autonomous Organisation (DAO) based on the Ethereum technology in 2016, where more than US\$53 million was stolen (Underwood, 2016: 3). As regarding this episode, the interviewee explains: ‘I got really worried [about DAO], I was definitely against it because you can’t decide to centralize something that was born with the purpose of being decentralized. So, I lost trust in the project.’

It is extremely important to understand that the hacking did not happen to the Ethereum itself but to the application that was built around it (cf. Falkon, 2017). Therefore, blockchain-related companies should make sure to have access to highly specialised supervisors that could check the trustworthiness of the structure of the code (cf. Underwood, 2016). However, the worst year for cryptocurrencies hacking attacks was 2018. In fact, during that year, a cumulative amount of US\$ 882 million were stolen (cf. Mohan, 2018). Even in this case, the points of failure were not related to the blockchain technology itself, but to the online storage wallets exchange and the ICO spaces (cf. Mohan, 2018). For this reason, even though the blockchain technology is ‘the most unhackable data storage present on the market today’ (as claimed by the PhD researcher), professionals should focus on the surrounding tools related to its usage.

#### 4.1.1.6. *Environmental, Storage and Economic Costs (?)*

The blockchain application that is consuming the most electricity power is by far Bitcoin. It has been calculated that the amount of electricity generated to allow this cryptocurrency to work is 500 MW, equal to what a nuclear plant consume per day (Perlman, 2017: 70). Moreover, in order to allow each stakeholder of the network to have a copy of the transaction, public blockchain can be – depending on different factors, as for instance if

using Proof-of-Work as a kind of consensus mechanism - extremely expensive in terms of data storage (cf. Perlman, 2017). On the other hand, one can argue that due to technological development of the different kind of hardware used to mine, the mining energy cost has dramatically dropped from 2011 (cf. Vracken, 2017).

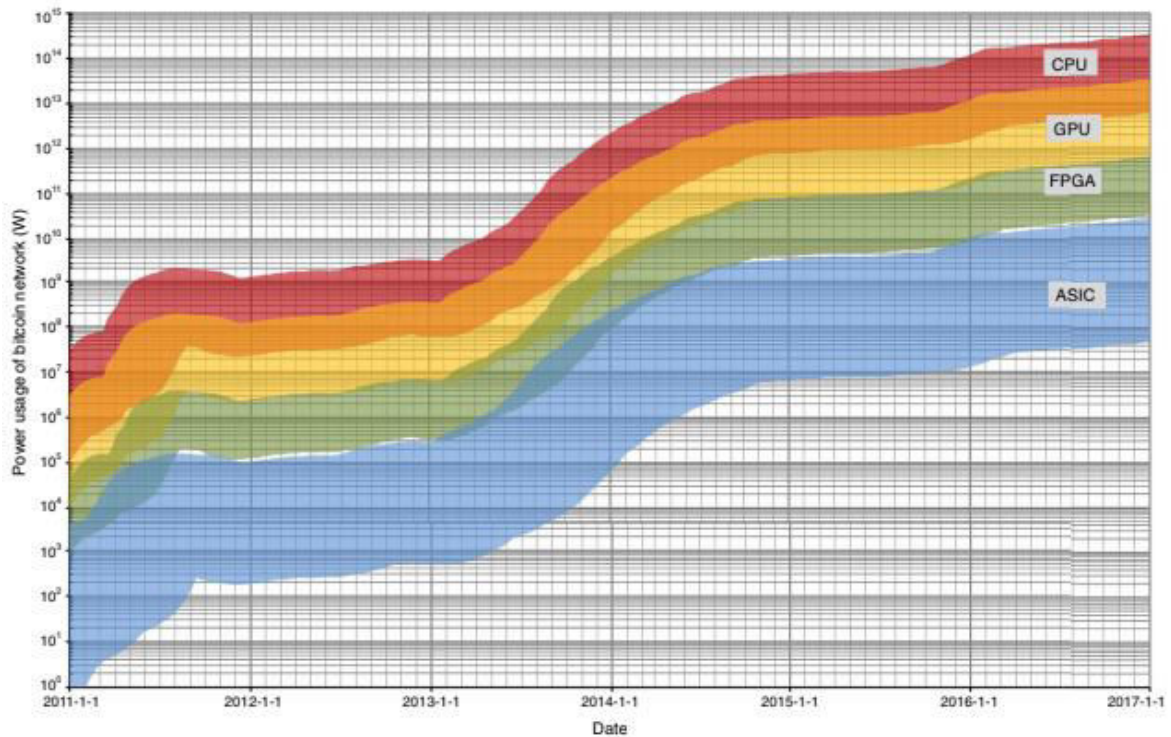


Figure 18 – Bitcoin Mining Hardware Development: Estimated Power Usage, (Vracken, 2017, pp. 6)

As Figure 18 shows, from the first generation of computer used for Bitcoin mining (CPU) to the fourth one (ASIC) the amount of power used for the mining process has been subjected to an exponential growth in efficiency. The University of Saint Joseph’s researcher argues: ‘As regarding the environmental topic, I think that the amount of energy used nowadays for Bitcoin mining is huge. But thanks to the technological development of the computer we are working with, a highly efficient / performative computer’s chips allows us to expend much less energy.’

Having said that, one can also compare the sustainability of Bitcoin mining to the one of gold mining and to the energy needed to support the banking system. As the data shows,



around 500 PJ per year are necessary for gold mining, 2340 PJ to make work the banking system, whereas “just” between 3 to 16 PJ are required to support the Bitcoin mining process.

#### 4.1.1.7. *Scalability and Latency*

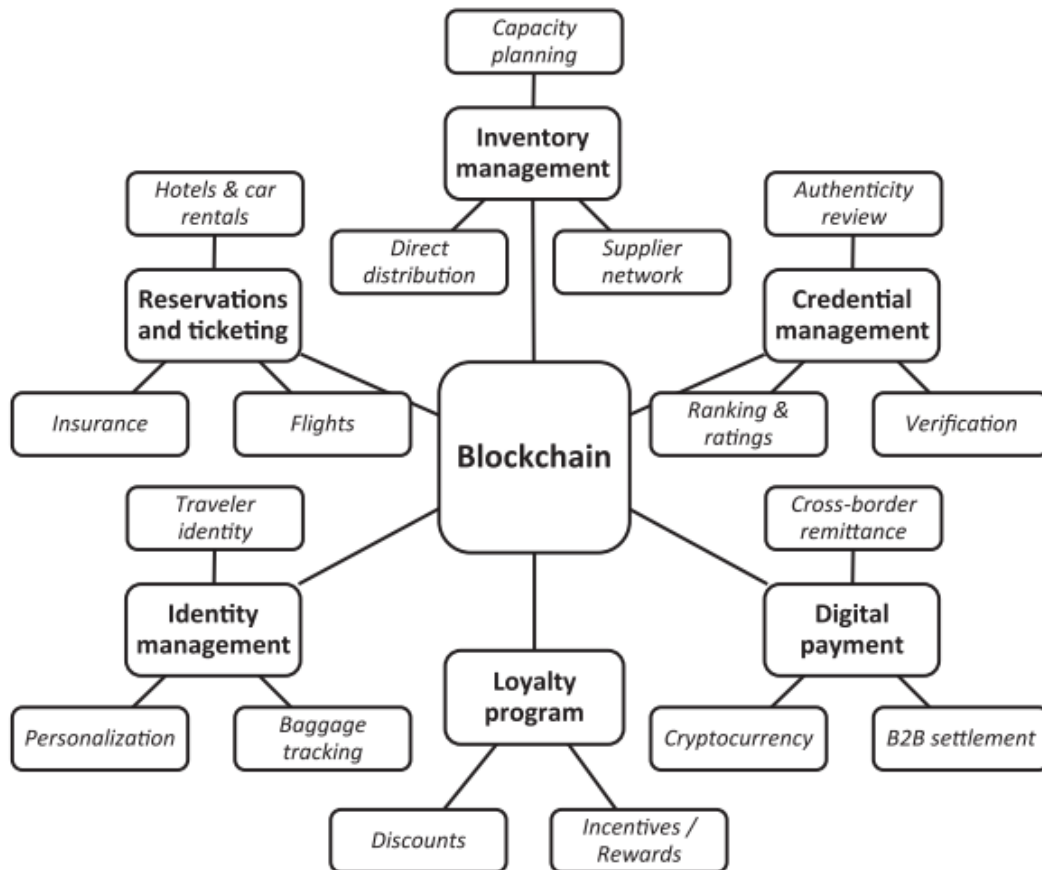
Even though their open infrastructure architecture can allow blockchains to be more easily scalable, it has been noticed that some of them suffered from transaction processing latency (cf. McLean and Deane-Johns, 2016). For this reason, an expanding organisation that wants to apply a distributed ledger application should test in advance which is the right one to adopt for its business model in order to not have to face a scalability issue. For example – the researcher argues – Bitcoin is facing a problem of scalability nowadays. In fact, people cannot use Bitcoin for micropayment anymore. However, software developers are developing a program called “Lightning Network” that is trying to solve this issue and allowing small Bitcoin transactions to take place.

#### 4.1.1.8. *Early Stage for Prime Use*

Even though different governments – with a specific focus on small island economies (SIEs) (cf. Kwok and Koh, 2018) – are focusing on the adoption of blockchain for boosting countries’ economies, blockchain applications are still in the early stage (cf. Notheisen and Hawlitschek and Weinhardt, 2017). Moreover, many organisations nowadays are still relying on out-dated legacy systems and/or paper-based documents. For this reason, in order to successfully apply this innovation, the company’s technological framework should be upgraded in order to support it (cf. McLean and Deane-Johns, 2016). Therefore, the potential to have a technological breakthrough is there, but on a large scale the technology is not ready yet for commercial use (cf. Underwood, 2016)

#### 4.1.2. Advantages

The potential disruptive applications of the distributed ledger technology in the hospitality industry are countless, as demonstrated by Kwoh and Koh in *Figure 19*.



*Figure 19 - Key Applications of Blockchain Technology in the Hospitality Industry, (Kwoh and Koh, 2018)*

Blockchain can be used to manage the storage of goods: in this way the capacity of a warehouse can be planned as well as the quantity of products supplied and sold. Another field of the hospitality industry that can benefit from the usage of this technology regards credential management. Reviews, rankings and ratings can be easily authenticated and verified. It has been already mentioned several times that blockchain was created to support a new idea of digital payments, i.e. cryptocurrencies. Considering that the hospitality industry highly relies greatly on international parties entering in contact with each other – also from an economical point of view – the idea of a cross-border currency which does not imply any fee in international transactions can be very beneficial for this

industry. Blockchain can be utilised for boosting loyalty programs, where discounts and incentives can be given to customers, employees and other stakeholders. The topic of identity management can be deeply developed through this technology, which could help the tracking of baggage as well as digitalising - thus dematerialising - the identity of the traveller. Finally, it will be possible to book, reserve and buy tickets on a platform which relies on the distributed ledger application. The different stages of the trip, from the flight tickets to the travel insurance, can be purchased in this way. Moreover, hotels and car rentals will be available assets to be listed on a distributed ledger.

One may argue that technological innovation represents the engine that allows enterprises to achieve a higher rate of economic growth. This phenomenon would be caused by mainly the optimisation of two variables: costs reduction and increase in productivity (cf. Çalışkan, 2015). The next paragraphs will discuss which potential beneficial applications Blockchain technology may bring to the hospitality industry.

The other three people that have been interviewed are two entrepreneurs and one business development manager from three different start-ups. The first is a young entrepreneur of a start-up called “*WeGo*”, that is using blockchain technology for the MaaS (Mobility as a Service) industry. This sector could be perfectly included in the last section of *Figure 18*, thus blockchain used for car rentals reservations. The entrepreneur’s idea could be seen as a fusion of Airbnb and Uber supported and managed by the underlying blockchain technology. Indeed, while users can rent out their own vehicles to others (tourists or locals) in exchange for payments, the technology is used both to track the movement of the car and to put the driver in contact with the user, the mechanic and the insurance company through smart contracts. This new application is part of the sharing economy model where, as described previously, those people who have an excess of a specific good (house, room, car) are renting it and making it available for others who need it (cf. Zsarnoczky, 2018). The second interview was about an entrepreneur involved in the roastery process of the coffee industry, who owns a group of companies in the UK, Italy and Malta called “*Caffè Latino*”, and which is now going to open a new roastery in the centre of London. The usage of the blockchain in this case will optimise the management in the supply chain, from the family that grows the bean to the final consumer. This case study can be circumscribed to the first and the second branches of *Figure 19*, i.e. as a tool to improve both inventory management - which regards supplier network and direct distribution – a

well as credential management, having the possibility to verify the right provenience and authenticity of the product in the supply chain.

The third expert that has been interviewed is the business development manager of *LockTrip*, a Bulgarian start-up that is using blockchain technology on an online booking platform (the marketplace) for hotels and renting properties. Their aim is to offer the first zero per cent commission platform where hotels' and rental houses' owners can list their properties. In this way they can maximise their profits and customers would be able to find cheaper solutions, creating a win-win situation on both sides of the industry.

#### 4.1.2.1. *New Innovative Form of Payment*

It has been officially declared that payment in Bitcoin is now accepted by the European Court of Justice as a new form of payment which is not subject to taxation (cf. Önder and Treiblmaier, 2018). Indeed, different hospitality firms such as CheapAir, Expedia, One Shot Hotels and Webjet have already decided to offer to their customers this alternative currency as a new way of payment. *WeGo*'s entrepreneur, argues: 'Another important aspect that links this project to blockchain regards forms of payment. In fact, even though Fiat currencies will be accepted in a first moment, the aim is to move all the transactions to cryptocurrencies.'

#### 4.1.2.2. *Social Security through Automatization*

A concrete example of how this technology could boost security could be seen in *WeGo*'s business model. In fact, the founder explains: 'Another relevant aspect of this app regards the security. For instance, through a sensor placed in the "add2 portal" (a small door under the dashboard of the car), data is collected during the vehicle itinerary which is used to evaluate whether the driver is respecting the traffic rules or not. This is very important because it gives a social purpose to the project: good drivers can in fact gain digital tokens (cryptocurrencies issued to fund the start-up, which can be used by users as discounts), created to stimulate good driving behaviour. It is important to notice the important link between IoT and blockchain technology related to this project. In fact, in addition to the evaluation of driving behaviour, the pairing of these two innovative tools put together

allow mechanics, insurance companies and – if necessary - ambulances to be informed in case of car accidents. In this case the users, if not badly injured, can take pictures of the event, uploading them on the app in order to document it.’

Another example collected by secondary data which shows the potential benefits of embedding blockchain in the IoT mechanism is an application called AutoPay. This app allows car drivers to settle automatized routes – for example tracking cars to petrol stations or to free parking spaces, based on the drivers’ needs - through the employment of blockchain’s smart contracts (cf. Huckle, Bhattacharya, White, Beloff, 2016). This example shows how blockchain technology can be combined with sharing economy applications and the IoT, with the purpose of strengthening the security of this specific side of the hospitality sector through a process of automatization.

#### 4.1.2.4. *Time and Cost Saving*

The previous topic is strongly related to this one: automatization leads to an optimisation of time and costs. In fact, it is not by chance that various start-ups in the Fintech industry are developing blockchain architectures for private ledgers in order to cut costs and reduce transaction time (cf. Underwood, 2016). Without the need of an institutionalised third party that supervises each transaction, both costs and time would then be decreased through the adoption of this technology. In the example of *WeGo*, for instance, blockchain allows vehicles to be easy traceable. In this way, both drivers, insurance agents, mechanics and ambulances can track the route and the condition of the car. Therefore, people - through the usage of an algorithm - can see the fastest route, thus reducing costs and time.

#### 4.1.2.5. *Traceability*

As the word itself suggests, blockchain is a “chain” of “blocks” - chronologically recorded through a timestamp server on a public ledger. Therefore, given that each transaction is consequentially recorded, this technology represents a secure way to rely on the traceability of the information (cf. Tian, 2016). This is very important, especially in a period when food fraud has become a very relevant issue. Several examples of this phenomenon have been experienced in the last years, for example the “horsemeat scandal”

in Europe in 2013, the “Sanlu toxic milk powder”, “clenbuterol”, “Sudan red” and “trench oil” in China (Tian, 2016: 1). With “food fraud” it is intended ‘intentional substitution, addition, tampering, or misrepresentation of food products for economic gain’ (Sharma, 2018: A1) and its economic impact it is estimated to be around US\$ 40 billion. For this reason, most of the largest corporations in this sector are starting to find ways to fight this problem. For instance, Wal-Mart Stores Inc, Nestles SA and Dole Food Co. started a partnership with VeChain, a company that is using both blockchain and Radio-Frequency Identification (RFID) technologies, whose purpose is to improve the traceability of goods (cf. Sharma, 2018). Through the fusion of these two innovations, companies can follow every step of the supply chain. This can generate several positive consequences: better food safety conditions, reduction of food waste, increasing transparency of the agri-food supply chain management and a following long-term drop of costs. In this framework - the second object of analysis for this dissertation - a London-based coffee roastery start-up was established. *Caffè Latino*’s entrepreneur Francesco Buompane decided to introduce blockchain technology in the supply chain of the coffee industry.

This company works in the following way: the final customer, through the scan of a QR code placed on the coffee cup or can, could have access to the different steps that the specific coffee had to pass through in order to get to the customer’s table. There is a social component of the project as well, due to the fact that part of the B2B profits will be sent to the farmer’s family who picked up the beans in the developing country where the coffee was produced. The idea that, through this technology, businesses can empower the lowest part of the pyramidal structure, can be a very useful tool to fight economic inequality. This would be possible just through the application of a fair-trade, impeccably traceable, good. To track food can provide various benefits both to business owners and to customers. For example, entrepreneurs can reduce food waste and eventually distribute the surplus to financially insecure people; on the other hand, consumers might obtain the right technological tools to calculate their ecological food print as well as getting to know shared-on-farm data (cf. Ahmed and ten Boek, 2017).

Another good that has been experimented with to increase supply chain traceability through blockchain is wine (cf. Everledger, 2016). The main added value that blockchain technology might bring to the food and beverage sector regards the fact that people can ‘verify the integrity of the claims made by these certifications [Fairtrade or Organic]’

(Abeyratne and Monfared, 2016: 1). This would solve the problem of trust in the food and beverage supply chain, allowing the system to work without having to rely on the word of stakeholders.

#### 4.1.2.6. *Disintermediation and Profit Optimisation*

The lack of a middle man or other third parties is probably the aspect that gained more popularity for this innovative tool. The benefits that this phenomenon brings can be divided in two main categories: economic and social. From an economic point of view, the removal of the cost of mediation – thus the fee that should be paid to the middle man, bank or any other intermediary – reduces the whole transaction cost (as already mentioned in paragraph four). From a social perspective, the two parties that have decided to establish the economic interaction between themselves, would not have to rely on anyone else (cf. Nakamoto, 2008).

The application of cryptocurrencies as well as the spreading adoption of blockchains are perfectly in line with the request of disintermediation that hospitality firms are looking for (cf. Triptease, 2016) (cf. Hospitality Awards, 2016) (cf. Competition and Markets Authority, 2019). Therefore, one can argue that blockchain-based and open source online travel platforms may lead to increased disintermediation in the hospitality industry, reducing market power and presence of the OTAs (cf. Önder and Treiblmaier, 2018). LockTrip, a Bulgarian based company, is doing just this. Their core business values could be summarised by two points. First, to sell their product with a zero per cent commission fee. This would be very challenging for OTA's competitors, considering that nowadays they charge between fifteen and thirty per cent of the whole reservation price (cf. LockTrip Manifest, 2018). The second is that of transparency. As previously explained in chapter two, after a Competition and Markets Authority's investigation recently published (cf. Competition and Markets Authority, 2019), the biggest OTAs have been accused of being misleading discount claims as well as charging hidden fees and taxes not declared before the booking. Through the zero per cent commission fee, LockTrip aims to create a transparent ecosystem, where both guests and hosts know that no extra costs would be charged in the marketplace.

The most immediate question that would arise is the following: how could such a business make profit? The answer to this question relies on the nature of the digital currency that this company is developing through its own-built blockchain. In fact, at first, LOC token was created on the Ethereum blockchain but now a LockTrip-owned blockchain will be developed and LOC will become a digital currency, named “LOC coin”. The more the currency circulates, the more its intrinsic value increases. In this way, due to the fact that the company owns fifty per cent of the total available number of tokens (which is divided into twenty-five per cent to the team, advisors, community and supporters and the remaining twenty-five percent works as a reserve for future development), they could allow their business model to work through zero per cent commission on transactions (which, at the moment, are all carried out through this currency). The remaining fifty per cent of the available number of tokens are sold to the public. The total available number of tokens is 18.6 million and if they will not be completely sold, the remaining ones will be destroyed. The marketplace will accept LOC Tokens, Bitcoins, Ether, Litecoin and fiat currencies via conventional payment methods. Just when customers buy LOC, they unlock full-service abilities for the decentralised booking marketplace. Subsequently, landlords or hoteliers accept this form of cryptocurrency and can withdraw it from the LockTrip platform. It is important to note that, in case the customer wants to pay through Fiat currency a commission of two point five per cent will be applied to convert the fiat into LOC. Of which, one and a half per cent goes to the payment provider and the remaining one per cent goes to the company.

Another company source of profit regards the sales of extra paid services offered to hotel in order to give more visibility to the listed property. For this reason, the kind of service LockTrip is offering is called “freemium”, thus a free version with extra paid services.



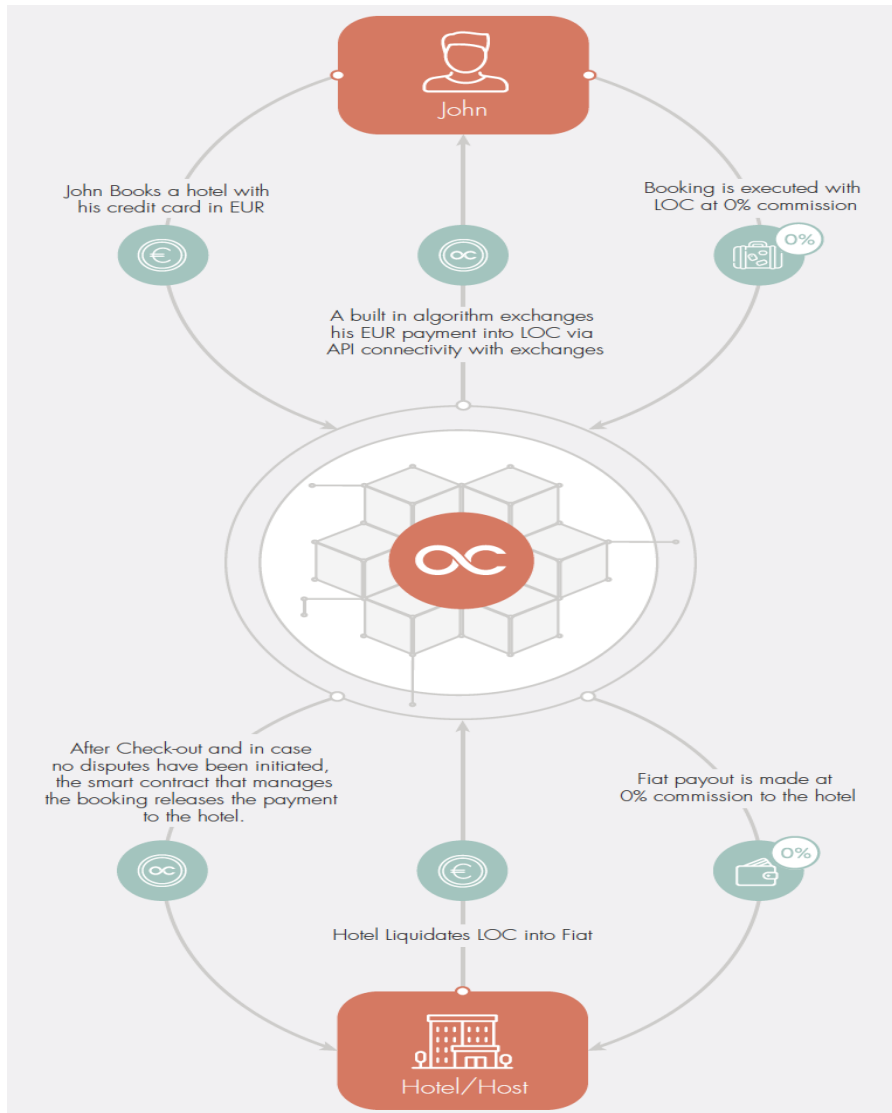


Figure 20 - How LockTrip Works (LockTrip Whitepaper, 2018)

In Figure 20 it is possible to see how this system works. John wants to book a night in a hotel / house. He can decide to book with a Fiat currency (Euro in this case). Through an algorithm, the amount of money his transaction requests, will exchange Fiat into LOC with a two and half percent as previously explained. In a second moment, just in case no disputes would be claimed, the smart contract created to manage the booking mechanism would allow the transaction to get into the hotel's account. Once the transaction is completed, the hotel liquidates LOC it received into Fiat to a zero percent commission fee. As it could be noticed, the problem of trust (cf. Nakamoto, 2008) would have been solved through this mechanism. In fact, the transaction would be completed just if no disputes

would arise between the parties involved. As regarding the topic of disintermediation (cf. Önder and Treiblmaier, 2018) (cf. Dogru, Mody and Leonardi, 2018), it is important to underline that no direct commissions would be charged during this mechanism. For this reason, even if in the case of Fiat payment banks would be involved in the transaction process, different layers of intermediaries are removed from this system. This would lead to an optimization of the profits (once LOC would start to catch on) as well as an economic convenience for the guest. Therefore, the customer might save around fifteen to twenty-five percent for the OTA commission fee, plus other three percent for the payment process with traditional currencies. Some academics argue that for this reason, the current largest OTA will lose some of their market portions (cf. Zsarnoczky, 2018). LockTrip has a network of more than one hundred thousand hotels already available and is planning to add other three hundred thousand during the first quarter of 2019 (cf. LockTrip.com, 2019). Furthermore, LockTrip planned to expand their business allowing flight tickets to be purchased on the same platform through blockchain technology mechanism. The name of this project is LockTrip Global Air Travel Service, with the purpose of charging zero percent commission. However, the aim of the company is to incorporate all travel-related services, in order to become a One-Stop-Shop blockchain based for all travel-related services. In fact, as the company argues, ‘Being a blockchain based company naturally means that the technology having the biggest impact on our business design is the underlying blockchain infrastructure’ (LockTrip Manifest, 2018: 1). There are different reasons why this technology is considered essential for the right completion of this business model. Firstly, the use of a peer-to-peer network allows information to be validated almost instantly. Secondly, it permits to exchange data in an extremely affordable way and at an unparalleled level of security. Lastly, the validity of the information is undoubted due to the fact that it is stored in millions of different computers (cf. LockTrip Whitepaper, 2018). Moreover, it is important to underline another repercussion that this innovative tool can have from the point of view of the person who wants to list his/her hotel or home. Indeed, the fact that the database of the marketplace is decentralised, autonomous and not subjected to any potential managerial risk or central censorship eliminates the issue of trust between him/her and the company.

#### *4.1.2.7. Solving the Double-Spending Problem*

This is probably one of the most important aspects because it has been targeted as early as in the 2008 Bitcoin paper. As described before, if using digital currency there is the risk that the holder might create a copy of the transaction, sending it back to the payee and asking him to double pay (cf. Nakamoto, 2008). It is argued that through the usage of a peer-to-peer timestamp server mentioned above the possibility of double-spending can be avoided (cf. Nakamoto, 2008). Therefore, instead of having to trust a central authority (also called mint) that decides itself which transaction arrived first, a whole network of distributed computers choose through a majoritarian system, which one was first received (cf. Nakamoto, 2008).

#### 4.1.2.8. *Decentralisation*

As already shown, the topic of decentralisation, which must to be managed cautiously due to the different potential blockchain structures, is one of the main disruptive characteristics of this technology. The reason why it is considered as revolutionary consists in the fact that it would challenge the current centralised system. It is important to notice that in the original Bitcoin paper, this characteristic has never been mentioned while referring to the ‘distributed network of computer’ (Nakamoto, 2008: 1).

#### 4.1.2.9. *Encryption and Data Privacy*

After the Edward Snowden’s disclosures in 2013 about the global surveillance program applied by the National Security Agency (NSA), the topic of information privacy and data security spread throughout the world (cf. Walker, 2014). Through the ‘hashing’ function presented before, blockchain can allow each content of the transaction to be encrypted as well as verified by the other parties of the network through the usage of cryptographic algorithms (cf. Underwood, 2016).

#### 4.1.2.10. *Profitability (In the Long-term)*

Due to the disintermediation and to the simplification that smart contracts would imply in the automated distribution of the assets, blockchain might be a source of profitability in the long term. It could also be considered that parts of the cryptocurrencies, especially at the beginning moments of their creations, have been – and some are still – very valuable. Thus, the adoption of cryptocurrency by a person or a firm may lead to almost immediate economic benefits.

#### 4.1.2.11. *Combatting Scams and Fraud*

Through the banking system, it is not possible nowadays to make a completely irreversible transaction due to the fact that banks have to offer the possibility to their customers to open a dispute and to arbitrate accordingly. What may happen is a reversal from one of the parties, which would increase the need for trust. For this reason, it is argued that a certain percentage of uncertainty, in the outcome of each transaction, is unavoidable.

Cryptocurrencies that rely on a completely decentralised blockchain would allow ‘transactions that are computationally impractical to reverse (to) protect sellers from fraud, and routine escrow mechanisms could easily be implemented to protect buyers’ (Nakamoto, 2008: 1).

#### 4.1.2.12. *Trust-Free*

Given that the trust is distributed in the whole infrastructure and not concentrated in a single point, the trust is spread in a system where no party needs to fully trust anyone else (cf. Tackmann, 2017). For this reason, it is argued that the concept of trust it is substituted by the one of cryptographic proof (cf. Nakamoto, 2008).

## 5. **Repercussions of Blockchain Technology on Hospitality Culture**

The potential implications that the application of blockchain technology might have on hospitality culture will be now presented, taking into account the different complex facets of the definitions of “culture” related to the hospitality sector. A “dynamic” definition of

culture – in its connotation of a verb rather than a noun (cf. Collins, 2010), which could be seen as a transitional period that will lead to a new shift - will be considered first.

Following this, a “static” definition of culture – thus a consolidated complexity of facts that create a specific and recognisable identity (cf. Tylor, 1871) – will be presented. The potential modifications that this technology might lead to for these two definitions of culture related to the hospitality sector will be subject to the four previously presented interviewees’ opinions.

To do so, first the main “terminological protagonists” of this analysis have to be presented: *firm culture*, *technology* and *human capital*. More specifically, the focus will be on the *cultural* consequences that may connect the interaction between the adoption of a new *technology* adoption (blockchain, in the case of this dissertation) by relevant *firms* of a specific sector (hospitality has been chosen for this research) with their *human capital* (the knowledge possessed by its employees). As regarding this last concept, which has not been previously discussed, “human capital” is ‘the stock of skills that the labour force possesses and is regarded as a resource or asset’ (Goldin, 2014: 1).

In order to set this analysis in the Cultural Studies field, Grossberg’s ‘Cultural Studies in the Future Tense’ (2010) will create the academic framework for the last chapter of this dissertation. In fact, the author argues that cultural studies aim to describe how people’s everyday lives are related to culture - which is a complex term composed by economic, social and political structures. More specifically, the project of culture studies – he maintains - is ‘an effort to find an intellectual practice that is responsible to the changing context in which it works’ (Grossberg, 2010: 9), which in this case is technological, thus cultural - as Castells (2001) would argue.

### 5.1. Technology and Human Capital

Technology and human capital are among the most important variables of a firm’s economic trend. From a micro-economic point of view, they are part of two different entrepreneur’s “cost categories”. Technology - being part of the “physical machine” that allows the system to work - is a “fixed cost”, thus a cost which ‘does not change with the amount of goods or services a company produces’ (Nickolas, 2018: A1). On the other

hand, human capital is a “variable cost”, thus a cost that ‘increases and decreases with the production volume’ (Nickolas, 2018: A2). Nevertheless, their relationship is closely connected. In fact, the quicker technological progress is, the higher the inputs in human capital should be due to a more profitable acquisition of innovative job-related skills (cf. Mincer, 1989). On the other hand, from a macro-economic point of view, “technological shocks” – thus, ‘technological changes that affect production outcomes through [...] the invention of new production processes or the improvement of existing ones’ (Schilling, 2015: 4) - will have a strong repercussion on human capital and manufacturing productivity.

## 5.2. Human Capital and Hospitality Culture(s)

As presented in chapter one, human capital has a strong impact on hospitality culture. Employees’ skills, knowledge, attitudes, behaviours and beliefs represent an important side of a hospitality firm’s culture (Dawson and Abbott, 2011: 294). On the other hand, it is true that employees are strongly influenced by the environment they work in. One of the most important elements that affects a company’s environment is the technology they utilize. Due to the reciprocal relationship between a hospitality firm’s technological framework, its human capital and its culture, the purpose of this chapter is to analyse the repercussions that the application of blockchain technology might have on hospitality culture. With “hospitality cultural framework” it is intended the composition of ideas, beliefs and values shared throughout the hospitality sector. In order to develop this analysis, the first two definitions of “culture” presented in chapter one will be taken into account. Therefore, the repercussions this technology might have on “dynamic” and “static” definitions of hospitality culture will be further discussed.

## 5.3. Changes in the “Dynamic” Hospitality Culture

The first repercussion that the adoption of blockchain technology may have on hospitality culture is linked to the second definition of “culture” presented in chapter one, composed

by two meanings. It is drawn from an amalgamation of the biological definition which sees culture as a growth of microorganism in a controlled context (cf. Collins, 2010) and that of social science which takes scientific research, reports, journalism, etc. that result in the symbolical elements that make up a culture (cf. Peterson and Annan, 2004).

In fact, the most immediate impact of the introduction of this technology in the business model of a hospitality firm is to create a new way of acting, based on decentralisation and cooperation between parties. These two processes correspond with the positive repercussions of management in “liquid modernity” (cf. Bauman Z., Bauman I., Kociatkiewicz and Kostera, 2015) - as described in chapter one of this dissertation. In fact, he identified the open source model (which is a decentralised system (cf. Wikipedia “Open-source model”, 2019) (cf. Levine and Prietula (2014)) and crowd funding (whose broader precursor was the cooperative movement (cf. Wikipedia “Crowdfunding”, 2019)) as solutions to fight the process of individualism and alienation (cf. Klenk, 2015). In fact, both open source software and crowd funding are present in the blockchain mechanism. For instance, in the cases of the three start-ups interviewed, this technology may produce a new way of storing data, allowing transactions to take place and involving employees in company decisions. In the case of WeGo, smart contracts, cryptocurrencies and blockchain applied to IoT will be the engine of cultural disruption. Information will be communicated much faster, more efficiently and with the highest level of security through encryption. As regarding Caffè Latino, blockchain will boost food traceability, giving the business model a social impact, which does not have to rely on “trust”: technology will prove it. Through the application of blockchain in LockTrip, the hospitality supply chain can experience a shift in paradigm for inventory distribution. Another source of disruption that LockTrip might lead to is represented by the decentralised booking engine – LOC Ledger – which is ‘open source and free to use by anyone in the world’ (LockTrip, 2018: A1). This would lead to a change in the economics of the retail travel industry which, without changing the habits of travellers, proposes a truly shared economy model that uses smart contracts for bookings, in order to allow a zero per cent commission to be charged (cf. LockTrip Manifest, 2018).

All of these different factors related to the companies’ projects, once combined with the companies’ human capital, might lead to a disruptive shift in hospitality culture. This shift

represents what this paragraph refers to with a change in the “dynamic” definition of hospitality culture.

#### 5.4. Changes in the “Static” Hospitality Culture

Once the technology – through the interaction with human capital - has been implemented and developed into these different projects, its “static” organisational culture would be able to take shape. Following the ‘Gartner Hype Cycle for Emerging Technologies’, a shift in the “static” definition of hospitality culture might be seen as the consolidation of the “Plateau of Productivity” by blockchain for this industry. As already described in chapter one, the “static” definition of culture is ‘that complex whole which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of society’ (Tylor, 1871: 1). In this case, the repercussions on the firm’s organisational culture are more related to a moment when the technology would be more consolidated in the companies’ business model. It is supposed that, once an emerging innovative tool becomes integrated as a part of employees’ daily tasks, it would lead to a modification of the firm’s culture (cf. Gallivan and Srite, 2005). Once these modifications become a normal technological pattern for the industry, they will become part of its culture.

For instance, car rentals “culture” (which is part of hospitality culture, as showed in *Figure 19* by Kwoh and Koh), before the arrival of the web, was very different. People had to organise car hire for themselves either through phone calls or face-to-face. With the introduction of the web, people could rent a car without having to interact verbally with each other. For this reason, it is argued that a technological shift will lead to a cultural shift (cf. Castells, 2001). The introduction of blockchain technology– taking into account the specific case of WeGo – might represent a new technological shift for car rental “culture”. In fact, the introduction of this technology might lead to a process of decentralisation and automatization. The different stakeholders (car owners, car drivers, mechanics, insurance agents, ambulance drivers), involved in the accomplishment of daily tasks, come from different institutions that will communicate between each other on a distributed network of computers. They will be joining the same P2P platform, exchanging information and



transactions in an encrypted way. According to WeGo's CEO opinion, blockchain will lead to a shift in the car rental side of hospitality culture. He also maintains that an important stakeholder that will boost the cultural (thus, technological) impact of blockchain for the car rental industry will be hotel owners. In fact, he maintains, 'hotel [owners] might decide to give customers cars to rent through WeGo as a service'. In this way, the investigated technology might become a consolidated innovation that will have reached the "Plateau of Productivity". In this way, blockchain will affect the "static" definition of culture of a specific aspect of hospitality industry.

A second side of the "static" definition of hospitality culture, that may be affected by the consolidated usage of blockchain technology, is that of food and beverages. Through the introduction of this innovation to the coffee supply chain, Caffè Latino aims to introduce cultural traits such as transparency in fair trade and sustainability through optimisation of waste. In fact, through the usage of smart contracts, both aspects would be achieved. According to Caffè Latino's business owner, this technology will be strongly disruptive for the cultural side of this industry. Once smart contracts will become a common technological tool to use for companies related in the food and beverage sector, it is likely that a "static" cultural modification of the industry will take place.

The third side of hospitality culture that might be affected by the introduction of blockchain technology is hotel bookings. Booking.com, Expedia and Trivago have been able to charge high commissions for each hotel booking, in return for high online visibility for accommodation providers. Blockchain might be able to disrupt this system, due to the aspect of disintermediation that characterises this technology. LockTrip, a Bulgarian start-up that applied this technology to its business model, allowing bookings with zero per cent commissions through its marketplace, might manifest a shift in paradigm for this topic. Furthermore, due to the fact that LockTrip is starting to apply blockchain to flight bookings as well, the cultural disruption caused by this innovation might regard different aspects of travel-related services. Once different companies - both start-ups and consolidated corporations - that require bookings in the hospitality sector will homogeneously apply blockchain to their business model causing disintermediation, a change in the "static" definition of a new field of hospitality culture will be reached. On

the other hand, LockTrip's business development manager does not believe so. She thinks that even though this is a revolutionary technology, it will not have an impact on hospitality culture. This is because, she maintains, cultural change should come from a change that arises from contact between different societies and LockTrip does not have this specific characteristic. To conclude, she argues that the interviewer and the interviewee might have a different terminological conceptualisation of what "cultural change" is.

In order to have a broader idea about the potential cultural long-term impact of blockchain, the opinion of the PhD expert interviewed for this dissertation will now be presented. When asked whether this technology will have a cultural repercussion on our society, he replied 'Yes and no'. In fact, he argues that blockchain at the moment is a hyped technology and it will not lead to a cultural shift. However, Bitcoin and other fully decentralised applications of blockchain will last long time and may be culturally disruptive. As regarding this last point, it is very interesting to specify what he means by "other fully decentralised applications of blockchain". As long as a technological application tries to solve a problem of "trust" and is public (thus, accessible by anyone), then the application of this technology might be useful. For this reason, it is arguable that hospitality – in all of its different facets – is a sector that generally possesses these specific characteristics. Hence, hospitality should be a good candidate for the "other fully decentralised applications of blockchain" previously discussed.

In conclusion, it is still too early to be able to say whether blockchain will have a "static" cultural impact on hospitality or not. This is due to the fact that it is difficult to describe all the different facets of this sector: some of them are suited to the usage of this technology, others are not. Furthermore, a terminological debate could persist – as shown by LockTrip's business developer – about how to define what "cultural change" really is. At the moment, blockchain is causing a "dynamic" cultural change in different hospitality-related sectors. If the technology will stand the test of time and spread to other branches of this sector, a "static" cultural change might be reached. Its implications could be comparable to those brought by the introduction of the internet in the nineties or that of social media in the first decade of the twenty-first century. The second decade has almost passed, where it appears that a main rule regarding technological development persists: if

an innovation exists on the market, then it is already too old. To interpret this in more technical terms: when an emerging technology reaches the “Plateau of Productivity”, the world of research and academia will focus on something new.

Here lies the beauty of what underpins technological innovation: a relentless desire to achieve what a twenty-first century person would define as “progress”.

## Conclusion

From the last quarter of the twentieth century, the globalised and “liquid” (cf. Bauman, 2000) society assisted in the shift in the technological paradigm, passing from the “industrial age” to the “information age” (Himanen, 2001). During this period, a constant introduction of new innovative tools has been shaping peoples’ life. This dissertation has focused on the *cultural* repercussions that a specific *technology* (*blockchain*) might have on a case study business sector (*hospitality*). Some people argue that the technology analysed in this research will have a similar cultural impact on modern society to that which Internet had in the nineties (Khurana, 2018) (Metry, 2017). More specifically, it would be able to disrupt different sectorial “cultures”, such as (to mention few of them): finance, transportation, academia and, as per this dissertation, hospitality.

A summary of the results of this dissertation are as follows:

- The hospitality industry has been analysed from a cultural studies point of view for one of the first times (based on the sources available during this research). This has been done by showing which definitions of “culture” are the right ones to define the more specific concept of “hospitality culture” (chapter one). From this analysis definition for “dynamic” and “static” hospitality culture has been given as well as how they differ (chapter five).
- The implications of what the introduction of blockchain technology might have on the two definitions of hospitality culture have been described (chapter five). In order to do so, the current technological weaknesses of hospitality industry have been shown (chapter two), as well as what blockchain technology is and how it works (chapter three). Furthermore, the disadvantages that currently characterise this technology, as well as the advantages it could bring to the hospitality industry have been presented in detail (chapter four).

As previously stated, hospitality has been analysed under a cultural studies perspective for one of the first times, opening a new field of research for cultural studies. Furthermore, this dissertation allowed the cultural perspective about a technological tool to expand: a topic

that nowadays is getting more and more important due to increasing human-machine interconnection. These two points have been unified by asking for the participation of four different interviewees about whether the introduction of blockchain will lead to cultural disruption in the hospitality industry. Their opinions have been essential to build an unbiased analysis from people who are working directly with this technology or researching it. In fact, differing points of views emerged from this dissertation as follows:

- On the one hand, blockchain technology is described as culturally revolutionary and disruptive (cf. Abeyratne and Monfared, 2016) (cf. Dogru, Mody and Leonardi, 2018) (cf. Huckle and White, 2016) (cf. Khurana, 2018) (cf. Metry, 2017). This seems to be the most shared feeling toward this technology. This can be identified by the hyper evaluation cryptocurrencies have had (cf. XE Currency, 2018) as well as by the current positioning of blockchain in the Gartner Hype Cycle (cf. Pemberton Levy, 2018). The first two founders and business owners interviewed for this dissertation agrees with this point of view, believing that their companies (*WeGo* and *Caffè Latino*) – through the use of blockchain - will help to lead to a cultural change within the hospitality industry. For this reason, one of the findings of this dissertation is that a relevant part of academia believes that the introduction of blockchain technology in the hospitality industry will lead to a modification of its culture.
- On the other hand, a large part of academia is much more sceptical. They see blockchain “beyond the hype” (Michelman, 2017: 1), believing that this technology has more disadvantages than advantages compared to traditional technologies. This view is shared by an increasingly consistent part of academia (cf. Perlman, 2017) (cf. McLean, and Deane-Johns, 2016) (cf. Notheisen, Hawlitschek and Weinhardt, 2017) and it is in line with what the Gartner Hype Cycle’s graph foresaw after the “peak of inflated expectations”: the “trough of disillusionment”. For this reason, the second finding of this dissertation consists in the fact that an increasing part of the academia considers blockchain as a hyped innovation that will not cause any kind of cultural disruption, thus no hospitality cultural change.

- Finally, two more moderate (but different) opinions by the third and the fourth experts interviewed for this dissertation will be given. Firstly, in *LockTrip*'s business development manager's opinion, blockchain will not lead to a cultural disruption of the hospitality industry. In fact, she maintains that cultural change has to be intended in a more social way rather than technological or economical. Nevertheless, the expert strongly believes in the innovative and useful nature of this technology with it being the most important part of *LockTrip*'s business model (cf. *LockTrip Whitepaper*, 2018). Secondly, the fourth expert interviewed for this dissertation – an IT PhD student of the University of Saint Joseph in Macau – argues that the only real cultural disruption blockchain could have within the hospitality industry would be through solving a problem of trust for a worldwide public within the industry. If this technology finds a solution with these kinds of characteristics, then hospitality cultural change would occur.

To conclude, two different definitions of culture identified in chapter one have been used to show that the process of cultural change is composed by two steps: “dynamic” (cf. Collins, 2010) and “static” (Tylor, 1871: 1). It has been argued that blockchain is now causing a “dynamic” cultural change within the hospitality industry and it is still too early to say if there will be a “static” one. Only time will prove whether blockchain will modify the “static” definition of hospitality culture or not. This would happen if the technology will gain the power to change ‘norms, rites, rituals, strategic beliefs and values that the workers of that sector share’ (Dawaon, Abbott and Shoemaker, 2011: 292).

The purpose of this dissertation has been to underline and analyse the link between two case-studies of two main academic topics: hospitality (*culture*) and blockchain (*technology*). In this way, new fields of studies have been “unlocked”, allowing future case-based and practical researches to take place.

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## **Annexes (I) – Questions to Interviewees and Ethical Approval Confirmations**

Interviewee A – Mr. Marco Filippi: Start-up Entrepreneur, “Wego”

*Q.1 How did you get to discover blockchain technology?*

I discovered this technology about one year and a half ago when I was working in the Financial Sector. We were analysing the development of Bitcoin as a financial asset. This analysis was regarding the trading related to this currency as well as its infrastructure, the Distributed Ledger technology (DLT), or blockchain. From that moment I started to think about how to develop this technology in real, everyday life and to how to transform it into an application. I then realise that blockchain could have been the fundamental added value for a project which I have been working on for long time.

*Q.2 In which sector of the blockchain are you specialized in / currently working on?*

I am currently working on a sector called MaaS (Mobility as a Service). More specifically on the applications that are linked to mobility and which look for new solutions to people's needs. It is linked to the concepts of smart cities, social inclusion and sustainable development. Everything was born from a personal need of finding a vehicle to rent, then I thought about developing it into an App which allows people to share their own vehicles with others, supported by insurance. Both the interface and the usage will be really easy. Therefore, we can say that this project progressed from a personal need to an investment that could be useful to everyone.

*Q.3 Is your application linked to the IoT (Internet of Things)? Do you think that blockchain has the potential to disrupt the IoT?*

Yes, it is. Through WeGo, people are connected to cars which will inform them about nodes of traffic detection. In this way, algorithms will calculate the fastest route in order to avoid them. The IoT has a fundamental role in this because there is a sensor in the “add2 portal” (a small door under the dashboard of the car) which collects data during the

vehicle's itinerary in order to check whether the driver is respecting traffic rules or not. In this way, we can award the good drivers, stimulating them to behave appropriately while using other peoples' car. Another important link that WeGo shares with IoT is related to car accidents. If an accident occurs, it is simultaneously communicated to the mechanic and to the insurance company. In the case of a large-scale crash, the ambulance would also be advised. When the car accident happens, the only thing the parties should do is to take pictures of the incident, downloading the app in order to document it. All of this would not be possible without the existence of IoT.

As regarding the second question, I think that everything (or almost everything) will be moved to blockchain (except data storage, because that would be too heavy). This could be very beneficial because it would allow people to avoid the problem of trusting central authorities. Moreover, the exchange of information may take place immediately.

*Q.4 Which kind of BOC structure is your company using? Public, private or consortium?*

The kind of blockchain WeGo will use is private, thus less decentralised. The supplier of Blockchain will probably be an external company, in the first place. The validation method is going to influence who is going to guarantee the consensus of each transaction. So far, we are thinking about giving a specific amount of assets to be mined, thus using a PoW method of consensus. We are still completing the details of this topic, so we could give updated information in a few months.

*Q.5 What kind of role do tourists have in your business model?*

Tourists represent a part of the demand of this service. Whenever a tourist needs a car in the place where s/he is for business or work, WeGo can satisfies its request. Actually, we are thinking about expanding to other transports as well after receiving a proposal in Malta to use the same business model in the sailing industry (boats and ships).

*Q.6 You mentioned Malta. From an article I've read, most of the Caribbean Islands, Malta and Mauritius are moving towards the usage of the Blockchain on a public and private*

*level. Do you think that this is due to the fact that being a closed piece of land, this technology would be easier to control?*

I don't think that the main reason is because they are islands, it's more the fact that are small countries. For example, I just came back from a business trip in Lithuania where they are starting to use the Blockchain both within the public sector and in the central bank. This is because the technology would allow bureaucratic tasks to process more smoothly. As regarding bigger and more structured countries this will be more challenging. More time will be required to apply this kind of technology in business and everyday life.

*Q.7 What do you think are the most negative aspects of the blockchain?*

The main problem nowadays, in my opinion, is that it is still unknown to the public, to the final user. The risk is creating a really powerful tool from a technological point of view that it is not understood by the end user. For this reason, WeGo will have to be able to communicate to the public effectively in order to make them understand the real benefits of using this application, and in hand to dissuade them from relying on traditional technologies. Another challenge that blockchain has to face is to find a way to create a dialogue with other important emerging technologies such as Artificial Intelligence (AI), data collection and IoT. Therefore, we have to gain appropriate knowledge about these topics in order to understand how to combine them together to make a more powerful tool.

*Q.8 Does your start-up rely on any intermediaries so far (i.e. banks)?*

Currently yes, fiat currencies are accepted a form of payment, thus banks are involved. The long-term target, which from our calculation should correspond to fifteen years, is to move all the transactions to cryptocurrencies in order to avoid any intermediaries to be part of the business model. It is important to note that in 2018 it would be almost impossible to offer such a service. That is why we allow people to pay both with fiat and cryptocurrencies. Moreover, we are developing tokens that will be given to all the "good drivers" (defined such by the IoT devices placed in the car as previously described) that will allow them to get discounts for the next rides. We believe that this aspect will boost the social impact that

our application can have. A “good driver” in fact can be considered as less harmful by the community s/he is living in.

*Q.9 Are you going to use a system of reviews as well?*

Yes sure, both from the driver and from the vehicle’s owner. In this way, the different parties may be aware - at the same time – about the reputation of the car and of the user. Therefore, the relationship between them may be under control.

*Q.10 Do you have any knowledge about applications of the blockchain for the hospitality sector? If yes, do you know any hospitality-related company or start-up that is using this technology nowadays?*

Yes, I know some companies that are currently working with blockchain in the hospitality sector, more specifically in the Eno-gastronomic sector. They are using blockchain in order to improve food traceability. In fact, their aim is to trace the product from the moment that the seed has been planted to the moment that you are drinking your product (bottle of wine, coffee, etc.). The consumer will just have to scan a QR code (on the bottle, can or product) to see the whole “story” of it. The different countries and movements involved may be traced in this innovative way. In this way, there will be a new kind of “blockchain certificate” (similar to the “biologic/organic” ones that some products have on their recipient) that will prove that the item is digitally stored on a blockchain.

I personally know two start-ups that are developing this application in their system. One is called Agri-ledger and was founded by a British entrepreneur that used the concept of traceability from the seed to the final fruits and vegetables. The second one is an Italian business owner who is opening a start-up in London called Impact Roastery. In this case, the disruptive innovation is applied to the coffee industry. He was buying coffee of really high quality and to prove this he decided to give to the consumer the possibility to track the product from its origin. Even in this case, there is a social impact involved because the farmer’s family - who harvested the coffee in the first phase of the supply chain - will receive a part of the income from sales. They are now starting with crowdfunding and the project will be launched in March.

*Q. 11 Do you think that WeGo (thus an application that relies on blockchain technology) might represent a company that is bringing a shift in paradigm for hospitality culture, in relation to car rentals for touristic purposes?*

I believe that services like WeGo will surely represent an innovation also for the hospitality sector because, not only will be much easier to find cheap cars to rent for tourists, but hotels might decide to give to customers cars to rent through WeGo as a service. For this reason, once WeGo will start to be applied to different aspects of the hospitality industry, I believe that it will represent a company that will bring a shift in paradigm for hospitality culture.

**INFORMATION SHEET FOR CONSENT  
TO PARTICIPATE IN A RESEARCH STUDY**

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**Confidentiality:** The records of this study will be kept private and your supervisor will not have access to your responses. In published reports, there will be no information included that will make it possible to identify you as a research participant. Research records will be stored securely. All data be kept on password protected computers in the researcher's laboratory. Written documents will be kept in the researcher's possession. Only approved researchers will have access to the records.

**Contacts and Questions:** If you have concerns or complaints about the research, the researcher(s) conducting this study can be contacted at Tel: +853 63058295 or Email: elia.tonello@gmail.com. In the event of a research-related injury, please contact the researcher(s). You are encouraged to contact the researcher(s) if you have any questions. If you have any questions, concerns, or complaints about the research or about your rights and wish to talk to someone other than the individuals in the research team, or if you cannot reach the research team, you may contact +39 3495699008.

*Please keep this information sheet for your records. By completing and submitting this questionnaire, I am agreeing to participate in this study.*



London, 29.09.2018

Interview B – Mr. Francesco Buompane: Business Owner, “Caffè Latino”

*Q.1 Can you explain your background as a student and/or as a worker?*

I graduated in business economy and then I started to work in sales with a multinational company of the coffee industry. Then in 2005 I opened in Italy - together with my brother - my own company called “Caffè Latino”. After a few years it started to expand firstly to London (2017) and then to Malta (2018). The company principles can be resumed in two points: to use our own in-house blend and to apply a fair-trade business ethical model.

*Q.2 How did you discover the Blockchain technology?*

I think that in order to run a business properly you have to be aware about all the innovations that society is offering you at that time. As soon as we heard, during an exhibition in Kensington (London) about this technology, we understood that it would have been a perfect tool for our business model.

*Q.3 How are you going to apply Blockchain to your business?*

Through a collaboration with Agri-ledger, a British start-up that applies the Blockchain technology to the agriculture supply chain, we want to give traceability to our coffee – from the seed to the final product – transparent and controllable by the customer, through the scan of a QR code.

*Q.4 How do you think that the Blockchain could influence the Eno-gastronomic and agri-food industries?*

As I said before, I think that this technology could boost the quality of the final product, giving the customer the possibility to check the trustworthiness of it through the traceable – blockchain based - certificate.

*Q.5 What kind of role tourists have in your business model?*



Given that “Caffé Latino” is a globalised company which operates in the hospitality industry, tourists are the central audience in the consumption of the product.

*Q.6 Are there any social implications within your project?*

Yes, through the sales of B2B (Business-to-Business) sales we are going to earmark a part of the income to the labourer’s family in the country where the coffee beans were originally picked (mainly Latin America and Africa). The family’s contribution will also appear in the moment of the scan of the QR code.

*Q.7 Do you know which kind of Blockchain structure you are going to use? Public, private or consortium?*

This is going to be established in the following meeting with Agri-ledger where we will set up the entire project.

*Q.8 Do you have any knowledge about other applications of the blockchain for the tourism sector? If yes, do you know any tourism-related companies / start-ups that are using this technology nowadays?*

In the last exhibition about innovations in the hospitality industry I’ve been to, I saw a company that was proposing to apply a QR code on the opening of beverage cans. This was allowing the customer, through blockchain technology, to see the proof of quality of the can as well as the itinerary that it took.

## Ethical Approval Confirmation – Francesco Buompane

☆ **Francesco Buompane**

7 ottobre 2018 18:35



Re: Progetto impact Roastery london

[Dettagli](#)

A: marco filippi, Cc: Elia Tonello, selena.pellegrini@gmail.com



Buongiorno a tutti,  
Grazie Marco per l'introduzione,  
Complimenti ad Elia per il tema scelto,  
Penso sia possibile parlare di turismo culturale, rimango a disposizione per una call settimana prossima, martedì 9,  
ore 17 o ore 11, in base al fuso d'ora .  
Buona domenica  
Francesco Buompane

[Mostra di più](#) da marco filippi

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Interview C – Mr. Felipe Farinha: IT PhD Student, University of Saint Joseph

*Q.1 What is your academic and work background?*

I obtained a bachelor's Degree in Computing Studies (London); Postgraduate's Degree in Artificial Intelligence (Edinburgh); Master's degree in Information Technology and right now I'm doing a PhD in Information Technology here in USJ. I also worked as a Software developer for many years (related to travel agency industry, medical industry, advertisements and telecommunications) while right now I am the IT networking manager of the University of Saint Joseph here in Macau.

*Q.2 How did you get to know about blockchain technology?*

I discovered the technology thanks to the Bitcoin back in 2011. I downloaded the app and at the beginning I was quite sceptical about it. Nevertheless, I bought some Bitcoins for a really cheap price and then I abandoned it for a while. In 2013 it caught my attention again because it had growth to 90\$ (from 1\$ of 2011). I've got really excited about this topic and I started telling everyone that this would have been the new revolution.

*Q.3 Which sector of the blockchain are you specialized in / currently working on?*

I've never really worked in blockchain related field, but I would say I have a personal interest in cryptocurrencies and smart contracts. My areas of specialization are big data analysis and Internet of Things. As I said, I am a Bitcoin owner and user and from 2013 I have been involved in the organization of the Macau Bitcoin Meetup. I've managed to invite Adam Back here (the inventor of Hashcash, also mentioned by Nakamoto in his article (2008)) that was in Hong Kong and he decided to join us. It was a big honour for me to meet him. Also, in 2014 I bought – originally just to play with them – some Ethereum. It's funny though because I was an actual initial investor, which is what today people would call an ICO.

*Q.4 Can you tell me more about cryptocurrencies?*

As regarding the Ethereum topic, from the moment that it has been decided to create the DAO (Distributed Autonomous Organization) I got really worried, I was definitely against it because you can't decide to centralize something that was born with the purpose of being decentralized. So, I lost trust in the project. On the other hand, I think that now there is a new really interesting currency that I am following carefully, it is called Tezos. They are actually trying to replicate Ethereum but with a proper informatic structure and also with a PoS (Proof of Stake) timestamping scheme. This would make it more energy efficient and less expensive than the cryptocurrencies that are using PoW (Proof of Work).

*Q.5 You mention the DAO episode, so my question is the following: is blockchain technology really unhackable?*

In this case we are only speaking about the public ledger, thus the decentralized structure of the blockchain. I would not say that it is unhackable but, for example, Bitcoin is as unhackable as any other public system. It is important to notice one thing then: the amount of value stored on the blockchain is a good measure of how resilient the system is to the attacks. So, the bigger the value of content on the blockchain, the more difficult it will be to hack. Research shows that even if the top 100 supercomputers in the world were working together simultaneously, the probability that they would manage to hack Bitcoin is extremely low.

*Q.6 Which kind of ledger structure (public, private, consortium) will be more utilized by companies in the near future?*

I think the ones that will be mostly used by companies are private and consortium. However, I don't think it is the best option because you could create systems like that even without the blockchain. It would change its original meaning which is "decentralized data structure". I think that the most famous usage of public blockchain, Bitcoin and other cryptocurrencies, are the ones that will last longer.

*Q.7 Which are in your opinion the most negative aspects of the blockchain / which are the major challenges it is going to face?*

An issue blockchain is facing right now is the real over-hype. Nowadays it has almost become a way for companies to look cooler, as it would be just a matter of marketing. I heard about a company that from the moment it mentioned that it would have started to use the blockchain, its value in the stock market increased around 20-30%. In fact, for this reason, I decided to take a step back, even though I see that there some good potential applications. My point is the following: if in your business different parties trust each other, then why use it?

As regarding the environmental topic, I think that the amount of energy used nowadays for the Bitcoin mining is huge. But thanks to the technological development of the computers we are working with, a highly efficient / performative computer chip allows us to spend much less energy.

Another problem that Bitcoin is facing is that of scalability, in fact nowadays you can't use Bitcoin for micropayments anymore. However, they are developing a program called Lightning Network that is trying to solve this issue by allowing small transactions to take place.

*Q.8 Which sectors, in your opinion, will benefit the most from the blockchain?*

I think that in any sector that would require the concept of “trust” the usage of blockchain could be useful. For this reason, I think that the best usage you can have is in the financial sector. Another relevant use would be for notaries, thus putting ownership asset on a public ledger. This would involve real estate, insurance, accreditation of titles and medical reports for example. In these cases, the usage of private keys would be fundamental, which all the parties that would like to open the content of the asset should have access to. As regarding other fields that do not concern trust or ownership for a big group of people, I think that the blockchain would be unnecessary.

*Q.9 I recently read an article where an IBM team of IT experts (Tackman, 2017) develops a way to purchase tickets for concerts, events or festivals through the blockchain in order to avoid scams. Do you think that this could represent a useful usage of the technology?*

Yes, that could be a useful usage of this technology because in this case a problem of trust does exist related to ownership among a big group of people.

*Q.10 Can you do a smart contract without the blockchain?*

If it's a small group where all the stakeholders have access to the software and the parties trust each other, then yes.

*Q.11 Have you ever bought anything with cryptocurrencies?*

Yes, lots of times. I use Bitcoin every time I can. I bought computer RAM, games, music (through Bitunes, they also interviewed me about this topic once) and vouchers, which can have many different applications. For instance, through the voucher I can use it in different Starbucks around the world. It's a great deal.

*Q.12 Do you think that it has the potential to significantly change IoT (Internet of Things)? If so, in how many years?*

Actually in 2016 I was interviewed about this topic by a journal called "Chain of Things". As I said in that interview, I saw a case of blockchain being used to solve privacy concerns in IoT. You may refer to that interview: "IoT (...) intentional weaknesses can be avoided altogether if the manufacturers agree to make their IoT device stacks totally transparent (i.e. open source) and cooperate to ensure that any updates to existing IoT devices can only take place when there is consensus that the update will not violate user's privacy. This need for transparency and distributed consensus is where blockchain tech can really help." (Colwell, 2016)

*Q.13 Do you have any knowledge about applications of the blockchain technology in the tourism sector? If yes, do you know any tourism-related companies / start-ups that are using this technology nowadays?*

Yes, I have been contacted by two companies related to the tourism sector and the blockchain, one from Portugal and the other one from here (Macau). At the end I did not have the time to work for them therefore I cannot really go into detail about it.

*Q.14 Can you tell me anything about governments' intervention and regulations on Bitcoin / blockchain?*

I think that the influence of governmental regulations could significantly modify the shape of blockchain and cryptocurrencies in the near future. For instance, here in Macau Bitcoin has been banned, as well as Uber for example, probably because the government wanted to keep their interests safe. Also, the city used to have four Bitcoin ATM machines and for some unspecified reason the monetary authority decided to shut them down.

*Q.15 Do you think that this could have been happening due to the pressure of Mainland China (note: Bitcoin is banned in Mainland China)?*

I don't think so because if you look at Hong Kong for instance, there cryptocurrencies are completely allowed there. Actually, I go there sometimes for this reason. The last time I went there I went to ANX which could be considered a cryptocurrencies bank. This shows how big this topic has become.

*Q.16 Do you think that the application of blockchain as a way to store and secure customers' information could have avoided this from occurring?*

In short, my answer is no.

The potential for a personal data breach is a function of two main aspects:

1. The level of security of the information system. The less secure the system the higher the risk;

2. The amount and value of the data contained in the system. The more value the higher the risk.

These two aspects, when combined, result in an *effort/reward ratio* that criminals can estimate to help them prioritise the systems that they will focus their efforts on. High value systems will attract high-skilled attackers, which may or may not succeed in an attack depending on the security level of the system. It's for this reason that big companies with large amounts of personal data become obvious targets, and hence why they're often called "honey pots".

When it comes to storing data on a blockchain, we will see 2 opposing forces at play. On one hand, you will be putting a large amount of valuable data on a "public ledger". Even though it is decentralised, the concept of a blockchain is that everyone will have a copy of the data. Of course, this data can be encrypted, but since the attacker will have a full copy of the data on their own computer, they can attack the encrypted data whilst "offline", so no one else would even detect the attempted attack. So, it works against the #2 aspect above, increasing the risk of an attack. On the other hand, if the combined development effort of every stakeholder works on a single code-base, it is likely that the resulting software would be very strong security-wise. This would contribute to a lower risk of a successful attack on the platform. However, that benefit could still be achieved without requiring that personal data is shared on a public ledger. Different stakeholders could run their own small data silo using the ultra-secure software that everyone contributed to. So, there is no obvious benefit from placing the personal data on a blockchain.

My hypothesis, which I introduced in my Master thesis and which I'm now aiming to formalise and study in my PhD, is that personal data should remain as much as possible under the exclusive control of the users, with a set of APIs that enable enterprises to achieve their business goals without direct access to the data. This means there is no single system holding all the data, lowering the risk of attack to individual user-controlled systems. This is a considerable departure from traditional information system architectures, but I consider it to be a purer form of decentralisation than that achieved by blockchain architecture. The downside of this approach is that it requires user-owned infrastructure to hold and process the data, whereas a blockchain has no such requirement.



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*Please keep this information sheet for your records. By completing and submitting this questionnaire, I am agreeing to participate in this study.*

OCTOBER 10, 2018

FILIPPE FARINHA

Interview D – Ms. Nevena Petrova: Head of Business Development, LockTrip

*Q.1 Can you introduce who you are and what your company does? What are the aims of your company?*

I am Nevena Petrova, Head of Business Development for LockTrip. Our project is divided into three main elements. The first is a marketplace (LockTrip.com) which allows customers to book hotels and rental houses on an average of 20% cheaper than other OTAs. Flights are also available for up to a 5% lower average price than the competitors. The second element that we are developing is a distributed database as a marketplace-supporting infrastructure, which aims to disrupt the inventory distribution industry. In this way, hotels will regain control of prices improving transparency and efficiency. The distributed database will make it possible for all travel agencies to synchronize and source inventory without paying commissions. Both the marketplace and the distributed database operate at 0% commission fee. The third element is the LockTrip Blockchain, which enables the smooth operation between the first two elements. It's also optimised for other businesses that have identified a requirement for blockchain technology. It's our solution to a series of real-world issues that businesses currently face on the road to building a competitive and cost-efficient product.

*Q.2 I think that your project represents a very interesting way to use blockchain technology, contrasting the main issues that the world of academia raised (for references see: [Blockchain: Hype or Hope?](#); [From 'Blockchain Hype' to a Real Business Case for Financial Markets](#); [Seeing Beyond the Blockchain Hype](#); [Demystifying Blockchain and Distributed Ledger Technology – Hype or Hero?](#) ). Do you agree that this topic has reached the “peak of inflated expectations” of the ‘Gartner Hype Cycle for Emerging Technologies 2018’ ([5 Trends Emerge in the Gartner Hype Cycle for Emerging Technologies, 2018](#)) Do you think that your company might represent one example of those applications that will reach the “plateau of productivity”?*

While it is true that “more than nine out of ten ICO-based start-ups are likely to go to the wall [and] expectations of success from the experts are less optimistic than even for regular

start-ups (...) cryptocurrencies are still in the childhood phase, and blockchain technology provides a world of possibilities for practical applications that extend far beyond the financial sector” (LockTrip Whitepaper, pp. 6). I think that a great indicator of where the crypto market is currently placed in the hype cycle is represented by its valuation: from \$ 700 Billion at the end of 2017 to \$ 100 Billion now. The position of LockTrip in this context is best described by our ranking among 2,000+ projects. We started at ranked at 450 and are now are placed around 150. Thus, our token has significantly overperformed, proving that our business is valued in fiat values rather than in the context of hype and crypto markets and could suggest that we will play a role in this “plateau of productivity”.

*Q.3 Do you think that LockTrip (thus an application that relies on the blockchain technology) might represent a shift in paradigm for hospitality culture in relation to the hotel and rental homes booking process?*

There is one main difference between LockTrip and any other booking platform. In fact, ‘LockTrip will be the first ecosystem which allows end customers and property owners to deal with each other without any fee or commission’ (Whitepaper LockTrip, pp. 4). For this reason, one can argue that what LockTrip proposes is a disruptive technological tool within the OTA sector (LockTrip Whitepaper, pp. 23). The shift will likely not only be experienced by the hotel itself, but also by the supply chain they are feeding.

*Q.4 Can you please explain how the LockTrip structure of profit is composed?*

The profit LockTrip makes is based on two aspects. The first is the Freemium Model of monetisation. In fact, LOC ledger is an open source and free to use system, where users pay only for additional premium features for listed properties, which are being offered for small fees. Features include increased visibility on searches, volatility protection and special design perks. The second source of profit LockTrip gets is through the appreciation of the LOC token. This means that the profit the company makes is generated through the turnover rather than from commission-based profit margins. Every interaction with the distributed database, every booking placed on the marketplace and every transaction executed on our blockchain has a direct relationship to LOC. In fact, it plays such a central

role that its value is mathematically determined to rise with increasing booking volumes. Both company and team members are LOC holders, and both will only profit if LOC holders do so too. We hope it will give the basis to develop a new world standard of accommodation based on the LOC token: the more travel sites connected to the LOC engine, the higher the adoption of the LOC token and its value would be, thus allowing for exponential growth.

*Q.5 Some people argue that there are not so many possible applications of the public blockchain structure (thus completely decentralised, open source and free-to-use by anyone in the world). Your company seems that have found the right way to do that. Do you think that this is one of the aspects that makes your business potentially disruptive?*

Being on a public blockchain structure does not make our project unique by itself. The disruptive power only arises once coupled with our business model and once taken advantage of the following features that make us unique. For one, the distributed database means hotels only need to submit through one channel in order to distribute their inventory among all marketplaces. Plus, the fully decentralized environment, where the funds are stored in a smart contract until check-out allows customers to initiate a dispute in case the promised service was not provided. In such a case, the funds will be locked in a dispute smart contract and not paid out until the dispute is resolved. LockTrip has been facing four different stages as regarding the decentralisation strategy. It started decentralising the economy, then the booking mechanism, subsequently the inventory and finally the distribution.

*Q.6 Taking into account LockTrip's plans for the first quarter of 2019, flight tickets for 900 regular airlines and 350 low cost carriers will be available on the marketplace ([Announcing our Road-map for 2019](#)). Once initiated and consolidated, do you think that the LockTrip business model, through the help of blockchain technology, could represent an example of cultural change for all travel-related services within hospitality?*

I believe that cultural change is a modification of a society through contact with other societies, or some kind of discovery/invention. In our case this would mean through

innovation. I am not sure that the industry problems we aim to solve are related to the modification of any society. Neither do I consider that making the accommodation/air services cheaper by selling them at their real price will lead to modification in any society's culture. The question sounds like an attempt to fit a square in a circle for the purpose of accommodating a thesis' name that contains the word "blockchain" simply because it is popular now. Nowhere is this question asking about the problems we are solving, as means of an attempt to link somehow the effect from our disruption on the society and from there to its culture change. We provide freedom for the hotels from a monopolistic cartel called "rate parity agreement", which is already banned in several EU countries. For this reason, this question is for me totally irrelevant, unless you have a different understanding of "cultural change".

#### Ethical Approval – Mrs. Nevena Petrova

On Thu, Nov 15, 2018 at 10:37 AM Nevena Petrova <[team@locktrip.com](mailto:team@locktrip.com)> wrote:

Hello Elia,

Thanks a lot for the mail. You seem to have done a good job!

I'll be able to review the documents and information over the weekend. So, expect everything ready on Monday (hopefully).

Kindest regards,

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## Annexes (A) – List of Figures

Figure 3 - Wikipedia (2018), *Industry 4.0*. Retrieved from:

[https://en.wikipedia.org/wiki/Industry\\_4.0](https://en.wikipedia.org/wiki/Industry_4.0) (Accessed on: December 10, 2018)

Figure 4 - Rouse, Margaret (2010), “Supply Chain Management (SCM)”, *TechTarget*.

Retrieved from: <https://searcherp.techtarget.com/definition/supply-chain-management-SCM> (Accessed on: December 9, 2018)

Figure 9 - *How Cryptocurrencies Works*

Figure 10 – Miraz, Mahdi H. and Donald, David C. (2018), “Application of Blockchain in Booking and Registration Systems of Securities Exchanges”, *arXiv:1806.09687*, pp. 1.

Retrieved from: <https://arxiv.org/abs/1806.09687> (Accessed on: September 27, 2018)

Figure 52 - Nakamoto, Satoshi (2008), “Bitcoin: A peer-to-peer electronic cash system”, *bitcoin.org*, Retrieved from: <https://bitcoin.org/bitcoin.pdf> (Accessed on: September 27, 2018)

Figure 19 - LockTrip Whitepaper (2018), “Whitepaper: Ecosystem and marketplace for renting hotel rooms, properties, or accommodation”, *LockTrip*, pp. 20

## Annexes (B) – List of Tables

### *Figure 1 – Culture, Technology / Hospitality, Blockchain*

Figure 6 - Dawson, Mary and Abbott, Jeanna (2011), “Hospitality culture and climate: A proposed model for retaining employees and creating competitive advantage”, *International Journal of Hospitality & Tourism Administration*, 12(4), 289-304, Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/15256480.2011.614533> (Accessed on: September 27, 2018)

Figure 4 – Gretzel, Ulrike and Sigala, Marianna and Xiang, Zheng and Koo, Chulmo (2015), “Smart tourism: foundations and developments”, *Electronic Markets*, 25(3), 179-188, Retrieved from: <https://link.springer.com/article/10.1007/s12525-015-0196-8> (Accessed on: September 27, 2018)

Figure 5 - Pirani Sanaa I. and Arafat Hassan A. (2014), “Solid Waste Management in the Hospitality Industry: A Review”, *Journal of Environmental Management*, pp. 320-336. Retrieved from: [https://ac.els-cdn.com/S0301479714003879/1-s2.0-S0301479714003879-main.pdf?\\_tid=f2048c48-18d2-4a53-8a16-7581a4f816c5&acdnat=1544339587\\_de2e2f9e21baa2ece90e81df77ae283a](https://ac.els-cdn.com/S0301479714003879/1-s2.0-S0301479714003879-main.pdf?_tid=f2048c48-18d2-4a53-8a16-7581a4f816c5&acdnat=1544339587_de2e2f9e21baa2ece90e81df77ae283a) (Accessed on: December 9, 2018)

*Figure 7 - Federal Reserve (2016), “The Federal Reserve Payments Study 2016”, A Federal Reserve System Publication, pp. 3. Retrieved from: <https://www.federalreserve.gov/newsevents/press/other/2016-payments-study-20161222.pdf> (Accessed on: December 10, 2018)*

*Figure 8 - Bitcoin / Euro Currency Chart Exchange: 2 Years XE Currency (2018), XE Currency Charts: XBT to EUR 2Years. Retrieved from: <https://www.xe.com/currencycharts/?from=XBT&to=EUR&view=2Y> (Accessed on: December 10, 2018)*

*Figure 11* – Miraz, Mahdi H. and Donald, David C. (2018), “Application of Blockchain in Booking and Registration Systems of Securities Exchanges”, *arXiv:1806.09687*, pp. 2. Retrieved from: <https://arxiv.org/abs/1806.09687> (Accessed on: September 27, 2018)

*Figure 13* - Huckle, Steve and Bhattacharya, Rituparna and White, Martin and Beloff, Natalia (2016), “Internet of things, blockchain and shared economy applications”, *Procedia computer science*, 98, 461-466, Retrieved from: <https://www.sciencedirect.com/science/article/pii/S1877050916322190> (Accessed on: September 27, 2018)

*Figure 14* - Kshetri, Nir (2017), “Can blockchain strengthen the internet of things?”, *IT Professional*, 19(4), 68-72, Retrieved from: <https://ieeexplore.ieee.org/abstract/document/8012302> (Accessed on: September 27, 2018)

*Figure 15* - Panetta, Kasey (2018), “5 Trends Emerge in the Gartner Hype Cycle for Emerging Technologies, 2018”, *Gartner*. Retrieved from: <https://www.gartner.com/smarterwithgartner/5-trends-emerge-in-gartner-hype-cycle-for-emerging-technologies-2018/> (Accessed on: December 14, 2018)

*Figure 16* – Pemberton Levy, Heather (2018) “The Reality of Blockchain”, *Smarter with Gartner*. Retrieved from: <https://www.gartner.com/smarterwithgartner/the-reality-of-blockchain/> (Accessed on June 15, 2019)

*Figure 17* – Bitcoin.com (2019), “Bitcoin Core (BTC) Price June 2017 – June 2019”, *Charts Bitcoin*. Retrieved from: <https://charts.bitcoin.com/btc/chart/price#5ma4> (Accessed on: June 27, 2019)

*Figure 18* –Vranken, Harald (2017), “Sustainability of bitcoin and blockchains”, *Current opinion in environmental sustainability*, 28, pp. 4. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S1877343517300015> (Accessed on October 5, 2018)



*Figure 19* - Kwok, Andrei O. J. and Koh, Sharon G. M. (2018), “Is Blockchain Technology a Watershed for Tourism Development?”, *Current Issues in Tourism*, 1-6, Retrieved from: <https://www.tandfonline.com/doi/abs/10.1080/13683500.2018.1513460> (Accessed on: September 27, 2018)