



T.C.

ANKARA YILDIRIM BEYAZIT UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES

BLOCKCHAIN APPLICATIONS IN TOURISM SECTOR

MASTER'S THESIS

BURAK KÖKSAL NAİR

DEPARTMENT OF MANAGEMENT

ANKARA, 2021

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ANKARA, 2021

APPROVAL PAGE

The thesis entitled “Blockchain Applications in Tourism Sector” prepared by Burak Köksal NAİR has been accepted in fulfillment of the requirements for the degree of Master of Management at Ankara Yildirim Beyazit University by unanimous vote.

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Management.

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PLAGIARISM PAGE

I hereby declare that all information in this thesis has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work; otherwise I accept all legal responsibility. 28/12/2021.

Burak Köksal NAİR

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ABSTRACT

Blockchain Applications in Tourism Sector

Blockchain is a recently featured cryptography-based technology. This technology, which has many applications, especially in the finance sector, has been used in the tourism and accommodation industry recently. However, few studies have been conducted on the uses of this new technology in the tourism and hospitality industry. Having a great potential, blockchain applications can provide benefits in many areas from payment security to employee satisfaction and customer satisfaction in the tourism sector. Therefore, it is of great importance to investigate the current blockchain applications in the tourism sector and to determine their opinions about this application. This thesis study is designed as a literature review and evaluation of employee views. Block chain applications in tourism will be examined and presented with descriptive research method, which is among the quantitative research methods. This thesis of both on a global scale and is thought to shed light on the tourism industry in the context of Turkey to the accommodation block chain applications.

Keywords: Blockchain technology, Dapps, Tourism, Tourism staff .

ÖZET

Turizm Sektöründe Blok Zinciri Uygulamaları

Blok zincir, son zamanlarda öne çıkan kriptografi tabanlı bir teknolojidir. Finans sektörü başta olmak üzere birçok uygulama alanına sahip olan bu teknoloji, son zamanlarda turizm ve konaklama endüstrisinde kullanılmaktadır. Ancak turizm ve konaklama endüstrisinde bu yeni teknolojinin kullanım alanlarına dair çok az çalışma yapılmıştır. Büyük bir potansiyele sahip olan blok zincir uygulamaları, turizm sektöründe ödeme güvenliğinden çalışan memnuniyeti ve müşteri memnuniyetine kadar birçok alanda fayda sağlayabilir. Bu nedenle turizm sektöründeki mevcut blok zincir uygulamalarının araştırılması ve çalışan bu uygulama hakkında görüşlerinin belirlenmesi büyük önem taşımaktadır. Bu tez çalışması literatür taraması ve çalışan görüşlerini değerlendirme çalışması olarak tasarlanmıştır. Turizmde blok zincir uygulamaları nicel araştırma yöntemleri arasında yer alan betimleyici araştırma yöntemiyle incelenip sunulacaktır. Bu tez çalışmasının hem küresel ölçekte hem de Türkiye bağlamında turizm ve konaklama endüstrisinde blok zincir uygulamalarına ışık tutacağı düşünülmektedir.

Anahtar Kelimeler: Blok zincir teknolojisi, Dapp, Turizm, Turizm çalışanları.

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LIST OF ABBREVIATIONS

BCT	Blockchain Technology
CBT-	Cryptography-Based Technology
CS	Customer Satisfaction
ES	Employee Satisfaction
THI	Tourism and Hospitality Industry



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1. GENERAL OVERVIEW OF BLOCKCHAIN TECHNOLOGY

Blockchain technology has been one of the most attractive topics of the 21st century. Merriam Webster online dictionary defined blockchain as “*a digital database containing information (such as records of financial transactions) that can be simultaneously used and shared within a large decentralized, publicly accessible network*”. According to this definition, it can be clearly seen that this technology is in fact a way to store certain information. In this section, this thesis provides a general overview on the blockchain technology. First, this section will analyse how blockchain technology have emerged in the current space. Then, the underlying reasons for this technology to be developed will be discussed.

It is important to understand the reasons to need such technology. In the next step, a more detailed definition of the blockchain will be provided. The purpose for a more detailed definition of this concept is to better reflect the deeper meaning. After that, the usage areas of the blockchain technology will be presented. The usages cases will be briefly mentioned for different sectors such as banking and finance, government, insurance, healthcare and tourism sectors. Some of the prominent applications and case studies in these fields will be explained. Within the scope of this thesis study, blockchain applications in the tourism industry will be evaluated in more detail. Next, the technology of the blockchain will be explained.

This section will shortly introduce the technology and peer-to-peer payment concept without going deep down to the more technical aspects. The technical aspects of blockchain technology and its applications are beyond the scope of this study. After explaining the details of peer-to-peer payments, its advantages, immutability of the records and the trust established between participants parties, the first section will be completed.

In line with the purpose of this study which aims to analyse the blockchain application in tourism sector and implications of these applications on the consumer side, it is important to take a deeper look into the concept of blockchain. By understanding the environment that led to such a great shift, it is possible to uncover the possible applications

and possible benefits offered by this technology. 21st century has been an important era for the technological developments. With the invention of internet, everything in different sectors have changed significant. Such technology has disrupted almost all of the traditional sectors including the tourism sector. Therefore, it is necessary to understand these disruptions and these changes to better position the tourism sector in the future.

1.1. What is Blockchain?

In less than the last decade, blockchain has been the major hype across different sectors. Investopia (2020) defined blockchain as “*blocks made up of digital pieces of information*”. Based on this definition, it can be seen that each block in the blockchain contains some type of information. Later, when a new piece of information is stored in a block, this block is added to the previous block thus creating a chain.

Yli-Huumo et al. (2016) expressed that blockchain has eliminating the trust problem across the parties when a transaction took place. Furthermore, with this technology, the central authority required for the validations of the transactions were eliminated as well. Dogru, Mody & Leonardi (2018) expressed that the lack of central validation authority has led to a decentralised structure across the chain. Thus, the only authorised party for the validation and transaction process was the participants themselves (p.2). With this decentralised structure, mediators such as payment mediators and transactions handlers could be eliminated.

As expressed by Ozdemir et al. (2020), there are Proof of Work (PoW), Proof of Stake (PoS); Delegated Proof of Stake (DPoS), Proof of Born (PoB), Proof of Authority (PoA) consensus systems on the blockchain. In the Proof-of-Stock protocol, users who want to be able to verify transactions and get a share of the revenue must lock their cryptocurrency assets to be used for verification. In this locking process, which is called "staking" (getting a share from the income), the amount to be used for this transaction in the wallet cannot be withdrawn from the wallet until the lock is removed and marked as the user's share on the network. Proof of Work (PoW) is a protocol that was created to prevent attacks that basically disrupt the functioning of a system and unsolicited messages sent by e-mail called Spam. The Proof-of-Work protocol emerged in 1993 in an article by computer scientists Cynthia Dwork and Moni Naor. In 1999, it was included in the

literature with the efforts of researchers named Markus Jakobsson and Ari Juel. Bitcoin and many other cryptocurrencies are blockchain systems protected by networks formed by the combination of decentralized nodes (nodes). The main task of these systems is to ensure the sustainability and continuity of the network. The network has operators called miners who are tasked with adding new blocks to the blockchain. The addition of these blocks is possible by solving some complex mathematical problems. Since it is very difficult to solve these problems, powerful processors are needed. In DPoS systems, users choose the person to verify the blocks by voting. These people are also entitled to verify transactions. Users can even transfer their voting rights to others and let someone else choose the verifier. The voting mechanism is similar to the proof of stake, the more staking the more voting rights. Thus, a person who is voted by a user with a higher stake gains the right to rank higher.

The first miner who solves the problem and verifies the transactions in the block is entitled to receive the cryptocurrency reward determined in the network and the transaction fees paid for the transactions in the block by publishing the transaction to the network. Transactions published on the network that are verified by the miners are recorded in a distributed ledger system called blockchain. All users connected to the network can download a copy of the blockchain and also verify all approved blocks.

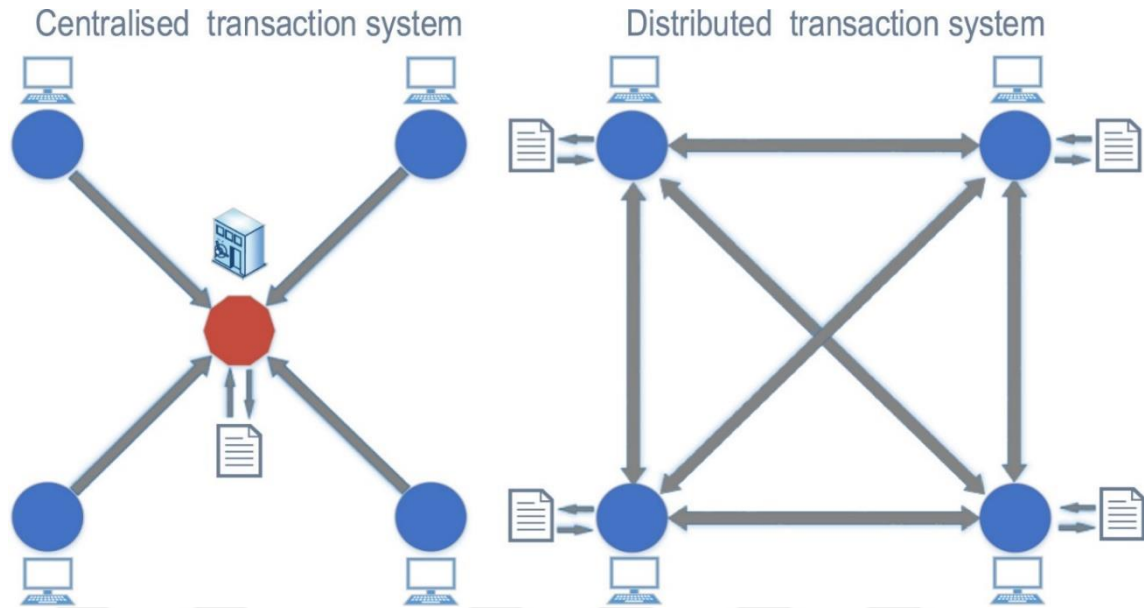


Figure 1. Decentralised and distributed structure of the blockchain. Adapted from Troy, S. 2020. Distributed ledger technology.

Source: <https://searchcio.techtarget.com/definition/distributed-ledger>

As the name suggests, the structures where data is stored in the blockchain approach are called blocks and these block structures are organized as a chain, in a linear sequence structure in terms of time. This structure allows all information to be kept identical to all participants. Since the most up-to-date information is kept on all users on the network, there is no need for a reliable central agent for recording and verifying transactions.

IBM (2020) defined three key properties for the blockchain technology which were distributed ledger technology, immutability of the records and smart contracts. Each one of these properties play a key role in realising the transactions across the chain. While these properties provide a high-level safety across the change, there are also some concerns regarding the blockchain technology. The following section will provide a broad look to some of the major concerns in the blockchain field. Moreover, tourism-specific concerns for blockchain applications shall be provided within the scope of this thesis study.

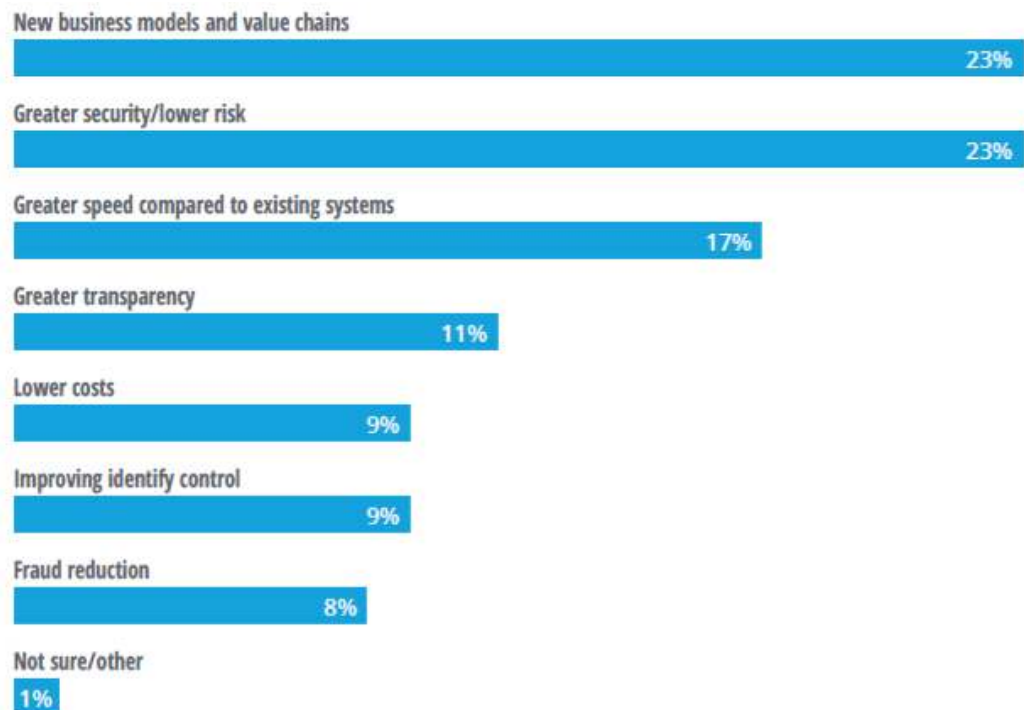


Figure 2. Perceived benefits of blockchain over traditional business method. Adapted from Deloitte 2019, Blockchain Survey

Source: <https://www2.deloitte.com/content/dam/Deloitte/se/Documents/risk/DI_2019-global-blockchain-survey.pdf>.

As it can be seen from Figure 2, C-level manager participants of Deloitte 2019 Blockchain Survey have explained the perceived benefits of blockchain over traditional business models. According to the information provided in the figure, the main benefit perceived by the C-level managers is new business model and value chains. This is followed by greater security and lower risks presented by this technology. Greater speed compared to existing systems and greater transparency are other perceived key benefits. Lower costs can provide important advantages on the financial side while improving identify control and fraud reduction can decrease the risks associated with security.

As expressed by Ozdemir et al. (2020), ledger logs entire transaction happening on the blockchain [1]. The ledger is stored on a disturbed system which forms the basis of the blockchain technology. Furthermore, each participant of the blockchain can store the copy of the ledger. This adds further security to the blockchain system. As each player has their own copy, it is impossible to change the ledger. However, there are still concerns regarding the blockchain technology.

1.2. Concerns About Blockchain Technology

As in many new technologies, blockchain comes with some major concerns. While these major concerns are not industry-specific, there might be issues lying deep underneath different industries as well. Since this thesis study is investigating the blockchain applications in tourism sector and how these technologies are perceived by the tourism sector stakeholders, it is important to look at some of the general concerns as well as some of the concerns specific to the tourism industry. The lack of related literature on blockchain applications in tourism sector limits the scope of this sector. Therefore, this section focuses on explaining the general concerns regarding blockchain technology. Some of the potential problems related to these general concerns shall be highlighted in the respective sections.

Walport (2016: 6) argues that current data management methods, especially where personal data are kept, usually include legacy information technology systems deployed in a single organization, a number of network and messaging systems have been added to communicate with the outside world, and these additions increase the cost and complexity. According to Walport, single point failure costs of highly centralized systems are very high. These systems are vulnerable to cyberattacks and are often out of sync and up to date. In contrast to this situation, distributed ledgers are structurally stronger against attacks because they contain multiple shared copies of the same database rather than a single database. For a cyberattack to be successful, it is necessary to attack all copies of the database. This technology is also resistant to unauthorized data alteration or destruction. Participants in the network are immediately aware of any changes in the logbook. All copies of the registry at any given time are identical to each other.

1.2.1. Blockchain Speed Concerns

To better understand the blockchain technology in all aspects, it is important to consider both advantages and disadvantages of the technology. One of the main issues associated with blockchain is the speed. According to World Economic Forum (2018), in general technology and especially the new technology accelerates the business operations (p.4). This acceleration can decrease the overall time required to complete any steps and procedures in a given task. In today's fast world, the business that can become faster has

the competitive advantage over the other business. This is also valid for the tourism industry. As the World Economic Forum (2018) further discussed, the blockchain acts as a mere exchange of value. This technology focuses on eliminating the mediator parties while trying to accelerate the transactions between the parties (p.4). However, when it comes to acceleration and faster transactions, blockchain might not be the answer.

Schatsky, Arora and Dongre (2018) expressed that slow transactions on the blockchain is one of the main issues that prevent industry wide adaptation (p.2) However, there is one option to solve this problem. Blockchain offers other benefits such as security and decreased costs. Compared with each other, business might be willing to compromise one of the core business areas. When the weights of all factors are considered, it is clear that speed might be less important than security and lower prices for the service.

Satoshi Nakamoto's Bitcoin, known as the greatest post-internet invention, is based on blockchain. Blockchain technology has a functioning that can be confusing for those who are not experts in the business. To understand blockchain, first of all it is necessary to mention the P2P, that is, the "Peer to Peer" protocol.

Daily Hodl (2018) provided a comprehensive review for the transaction speed of the blockchain. When the top coins like Bitcoin, Ethereum and Ripple are considered, even there is a huge gap between these three major coins. Daily Hold (2018) stated that while Bitcoin can handle 3 transactions per second, Ethereum can go up to 15 or 20 transactions per second. On the other than, Ripple can handle up to 1,500 transactions per second. The difference between Ripple and Bitcoin are huge and significant. When different businesses adopt different blockchains, the speed of transaction can greatly vary.

For the tourism and hospitality industry, there is no study on how blockchain speed affects the applications in the tourism industry. However, it is clear that like in many other sectors, speed is the indispensable elements of the tourism sector as well. In a highly consumer-oriented industry, guests and consumers want higher speed to book their flights, book their hotels and access to information regarding tourism destination. In this case, if blockchain is implemented in the tourism industry, consumers would naturally expect faster booking without any mediators. When the current transaction speed per second ratios are considered, it is clear that there is room for improvement.

Cointelegraph (2019) has compared the transactions speeds between a bank transaction – SWIFT – and the fastest cryptocurrency of the current time which is Ripple as expressed above. Accordingly, Visa can achieve 1,000 to 2,000 transaction per second. When Visa and Ripple are compared, it can be clearly seen that traditional bank transactions can reach up to the speed of cryptocurrencies. Furthermore, SWIFT transactions seem significantly advantageous compared to some prominent cryptocurrencies like Bitcoin and Ethereum. However, this advantage is only on the speed side. When the overall costs and security aspects are concerned, traditional bank transactions have significant deficiencies.

1.2.2. Blockchain Integration Issues

Other issues related to blockchain is the integration across sectors. This issue is often defined as interoperability issue. Schatsky, Arora and Dongre (2018) stated that since there are no set standards for blockchain, integration and interoperability poses significant challenges at the business level (p.4). If the system in a business does not work in harmony, there surely will be problems. Furthermore, in some extreme cases, the entire business might be compromised due to lack of integration between the systems in a business.

Additionally, Bitdegree (2019) reported that the number of blockchains have reached up to 861 in May 2019. This significant increase in the number of blockchains have happened in less than a decade. When the high number of blockchains are considered, it is clear that the integration is a problem. For example, in case of tourism businesses, if two different service providers such as the hotel and hotel booking service uses different blockchain structures and cryptocurrencies, it might be impossible to handle the transactions without integrating these two chains. Although integration remains to be a challenge, there are certain attempts to overcome this problem.

As Deloitte (2019) and Schatsky, Arora and Dongre (2018) reported, there is an attempt to create a consortium across the participants and stakeholders. Such consortium can be beneficial in different terms. For example, the Global Legal Blockchain Consortium (2020) focused on security and privacy aspects as well as interoperability issues of blockchain to align the global stakeholders of this industry. While this consortium focused

on the legal aspects, there are various other consortiums such as Hyperledger, Enterprise Ethereum Alliance, China Ledger, R3 and IBM Food Trust.

1.3. Sectors That Use Blockchain Technology

Blockchain technology first emerged as a means of payment in the form of Bitcoin. Bitcoin (2009) is defined as “*an innovative payment method and a new kind of money*”. Investopia (2019) reported that Bitcoin was first created in 2009. In fact, this date is recorded as the first blockchain date as well. Since Bitcoin works on a blockchain, the date of birth for these two can be accepted as 2009.

Investopia (2019) explained that the first transaction with Bitcoin was completed on January 2009 to buy pizza from Papa John's. The price for the pizza was 10,000 Bitcoins where one Bitcoin was worth \$0.0008. From 2009 to 2020, there has been significant changes in the market. The price has fluctuated over time, new blockchains have emerged over time and new cryptocurrencies were introduced over time. As this technology has become wide spread, the number of industries that adopted blockchain has increased as well. Figure 3 illustrates the sectors using blockchain according to 2019 Deloitte Blockchain Survey.

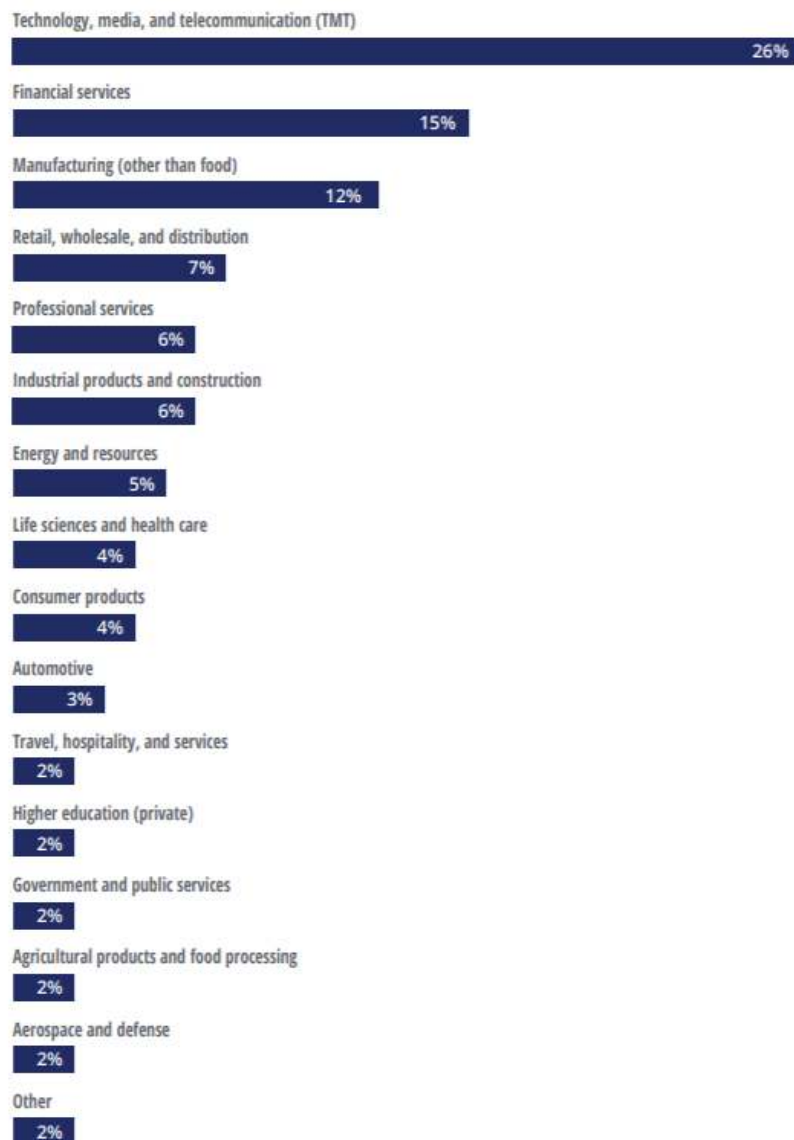


Figure 3. Deloitte 2019 survey report for sectors using blockchain. Adapted from Deloitte 2019, Blockchain Survey

Source: https://www2.deloitte.com/content/dam/Deloitte/se/Documents/risk/DI_2019-global-blockchain-survey.pdf

When Figure 3 is analysed, it can be seen that technology, media and telecommunication sector has the highest blockchain usage compared to other sectors. This sector is followed by finance services. Manufacturing services excluding food manufacturing ranks the third in terms of blockchain adaptation. Retail, wholesale and distribution sector as well as professional services, industrial products and constructions sector, energy and resources sector have relatively high adaptation rates. However, consumer products, automotive, travel, hospitality and services, private higher education,

government and public services, agricultural products and food processing and aerospace and defence industries have relatively low ratio in terms of blockchain adaptation.

Technology, media and telecommunication sector has widely adopted the blockchain technology. In fact, this wide adaptation in the sector is due to the intrinsic properties in this field. Since blockchain is a technology itself, it is only natural to see such high adaptation rates across this sector.

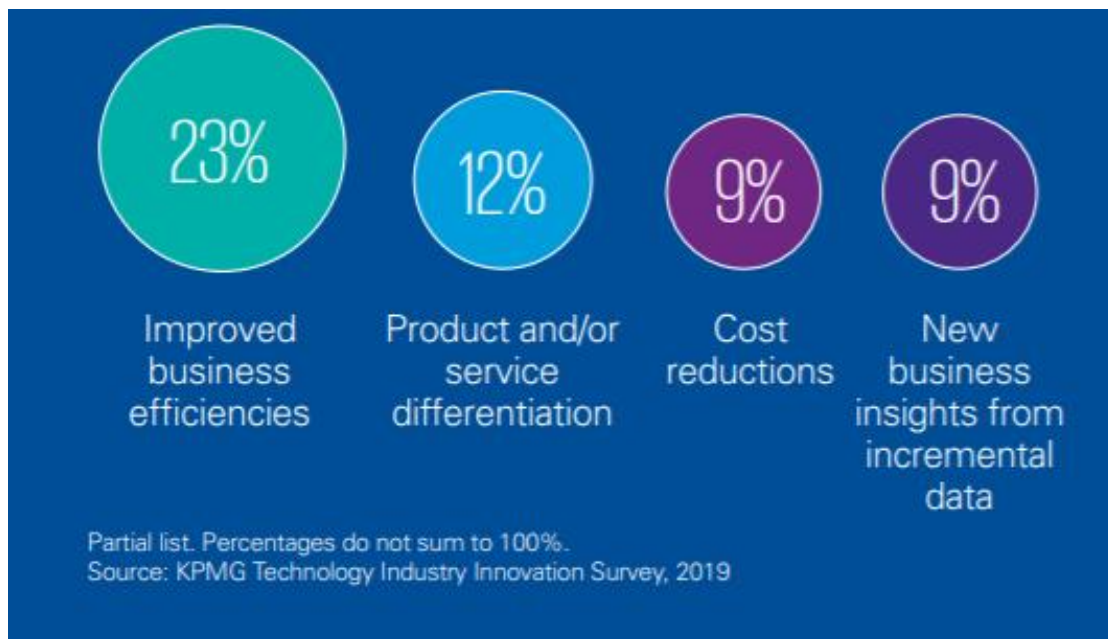


Figure 4. Benefits offered by blockchain technology. Adapted from KPMG Technology Industry Innovation Survey. 2019.

Source: <https://assets.kpmg/content/dam/kpmg/us/pdf/2019/02/blockchain-tech-survey-2019-infographic.pdf>

KPMG (2019) conducted a survey of C-level managers in technology, media and telecommunication sectors to provide insights about how these managers consider blockchain applications in their own sectors. As it can be seen from Figure 4, majority of the C-level managers perceived improves business efficiency as the major benefit of the blockchain. By using technology, it is possible to increase the overall efficiency of a business which naturally translates into decreased costs and increased revenue. Supporting this view, 9% of the survey participants expressed that decreased costs is another benefit offered by the blockchain technology. While 12% believed that this technology can help

differentiating their products or services in the sector, 9% believed that this technology can provide business data to obtain better insights about the sector.

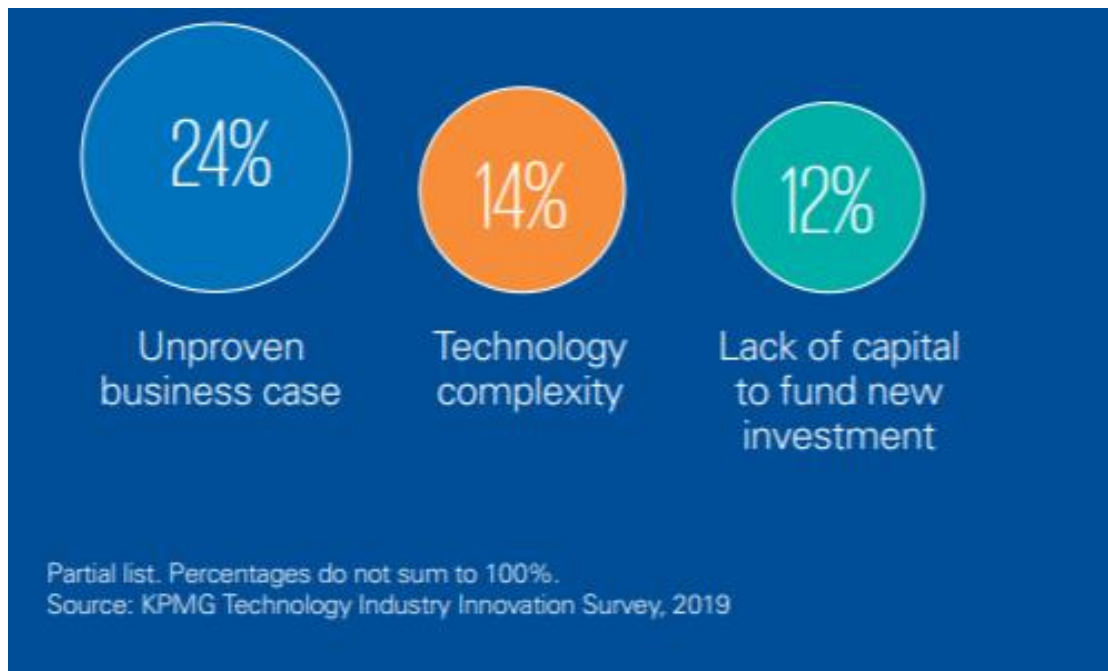


Figure 5. Perceived challenges of blockchain technology. Adapted from KPMG Technology Industry Innovation Survey. 2019.

Source: <https://assets.kpmg/content/dam/kpmg/us/pdf/2019/02/blockchain-tech-survey-2019-infographic.pdf>

On the other hand, the same survey by KPMG (2019) showed that there are certain perceived challenges of the blockchain in technology, media and telecommunication sector. One of the major challenges is unproved business cases. Accordingly, C-level managers want to see more business cases with tangible results. Additionally, technological complexity and lack of capital to fund new investment are the other major challenges perceived in this industry. Based on these data, it can be deduced that the knowledge regarding the blockchain technology is still limited. Since technology, media and telecommunication sector is the sector with highest blockchain adaptation rate, it is only natural to experience challenges and issues in other sectors.

In the last decade, there has been significant changes in the banking and finance sector. Higginson, Hilal and Yugac (2019) reported that different stakeholders of the banking and finance sector including governments, investment banks and other private

participants have been experimenting with the new technologies. Authors further express that blockchain has various opportunities for \$600 billion per year worth cross-border payment sector. Cross-border payment is different from domestic payment in many aspects. But the most important difference is the cost associated with cross-border payment. In this payment, different banks in different countries must interaction and complete the transaction together. Having multiple banks and players in the transaction naturally increases the overall costs of each transaction. The estimations of McKinsey (2019) show that blockchain has the potential to save \$4 billion per year in cross-border payment. Additionally, know-your-customer scheme implemented with blockchain can provide advantages to eliminate the risks of fraud and identity theft in the banking sector.

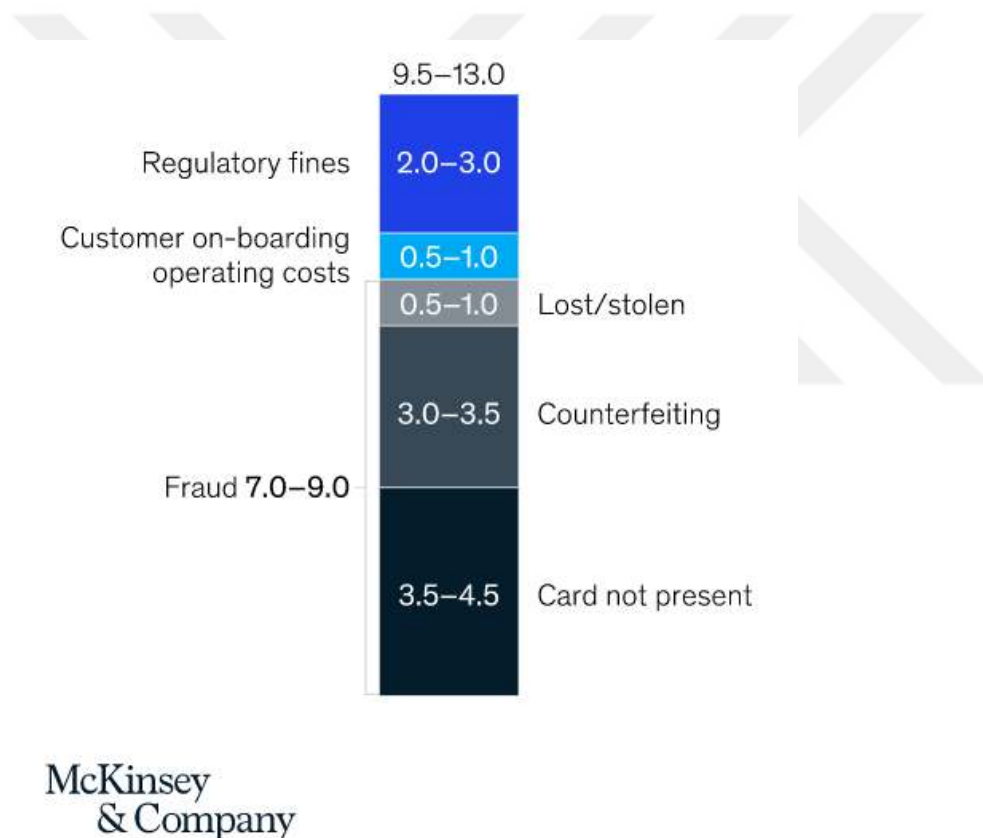


Figure 6. Potential savings with blockchain technology in finance sector (\$US billion).
Adapted from McKinsey & Company. 2018

Source: <https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/blockchain-beyond-the-hype-what-is-the-strategic-business-value>

As seen from Figure 6, blockchain technology implementation in banking and financing sector can provide significant financial savings in different fields. Among these fields, fraud and counterfeiting are the two important areas as these are the main reasons for the banks and the financial sector to experience risks. Furthermore, when the immutable nature of the blockchain records are considered, this technology can help analysing the customer data against any potential risks. Thus, credits can be allocated to customers with low financial risk and with high payment rates.

Blockchain can be a main driver in the manufacturing industry excluding the food manufacturing. Since the manufacturing of products and food are two separate processes, it is important evaluate them in two different categories. In terms of blockchain and other technologies, manufacturing of goods other than food can greatly benefit from this innovation.



Source: Capgemini Research Institute.

Figure 7. Possible benefits of blockchain in manufacturing sector. Adapted from Capgemini Research Institute. 2018.

Source: <https://www.capgemini.com/wp-content/uploads/2018/10/Digital-Blockchain-in-Supply-Chain-Report.pdf>

According to Columbus (2019) blockchain can provide up to 89% cost savings in the manufacturing industry. The main application in this field is related to internet of things (IoT). Furthermore, it is possible increase the revenues while decreasing the risks in the manufacturing sector.

Energy and energy distribution sector is one of the other popular applications field for blockchain technology. Andoni et al. (2019) conducted a comprehensive literature review on the use cases of the blockchain technology in the energy sector. One of the uses cases of this technology was expressed as power generation and power consumption of the local grids. Local grids often have high power generation costs.

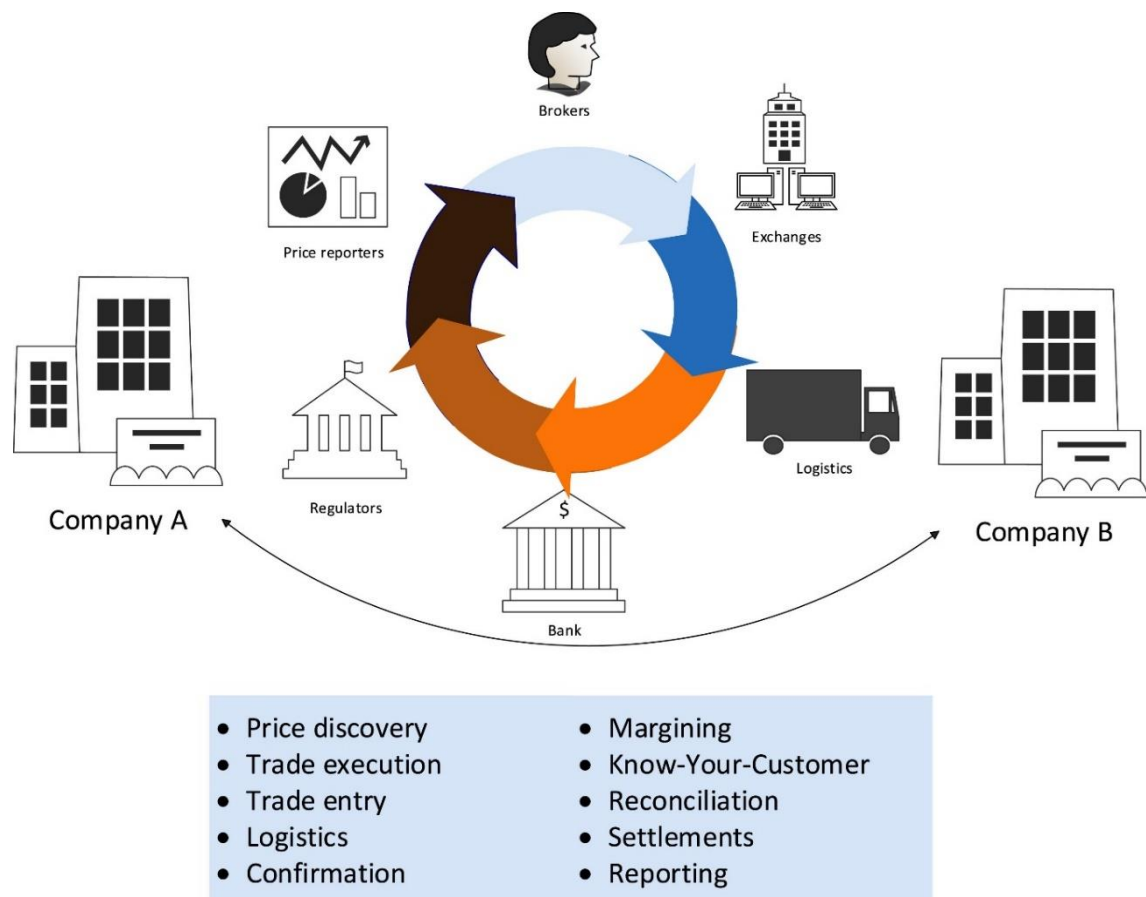


Figure 8. General scheme for possible blockchain application in energy sector. Adapted from Capgemini Research Institute. 2018.

Source: <https://www.capgemini.com/wp-content/uploads/2018/10/Digital-Blockchain-in-Supply-Chain-Report.pdf> >

As seen from Figure 8, there are high number of mediators in the energy sector. When blockchain technology is implemented to the energy sector, it is possible to decrease the number of mediators between the energy generator and the energy consumer. Andoni et al. (2019) further stated that smart grids and cybersecurity can be the other implementations areas in this field. Compared to technology and telecommunication sector,

this sector has relatively low adopting rates. However, as in other sectors, blockchain applications are promising in the energy sector as well.

Compared to other sectors such as banking, finance and manufacturing, blockchain applications in the tourism sector are rare. One of the main reasons for the lack of application is the intrinsic nature of the sector. Unlike technology or banking industries, tourism has limited areas of application in terms of technology. As noted, one of the most important innovations in the tourism and hospitality sector was the introduction of the internet. While internet was seen as revolutionary innovation in the sector, blockchain failed to be one of these innovative methods. However, there is an increasing demand in this area of research. While the number of related literatures is limited, this study and many novel studies try to investigate this subject in detail.

Pilkington (2017) proposed that blockchain might be means to promote the new destinations in the tourism sector. This study was limited to medical destinations in Moldova. Therefore, it is not possible to generalise the study. Also, the perceptions and views of the consumers and tourism sector stakeholders are not present. With the changing environment in the tourism and hospitality sector, there is an increasing need to analyse and understand the perceptions of tourism and hospitality stakeholders towards the innovations in the sector.

1.4. Blockchain Use Cases

In addition to sectoral adaptation cases, it is important to analyse which areas is blockchain used in different sectors. Usage areas can give a general view about the possible implementation areas especially in the sectors such as tourism.

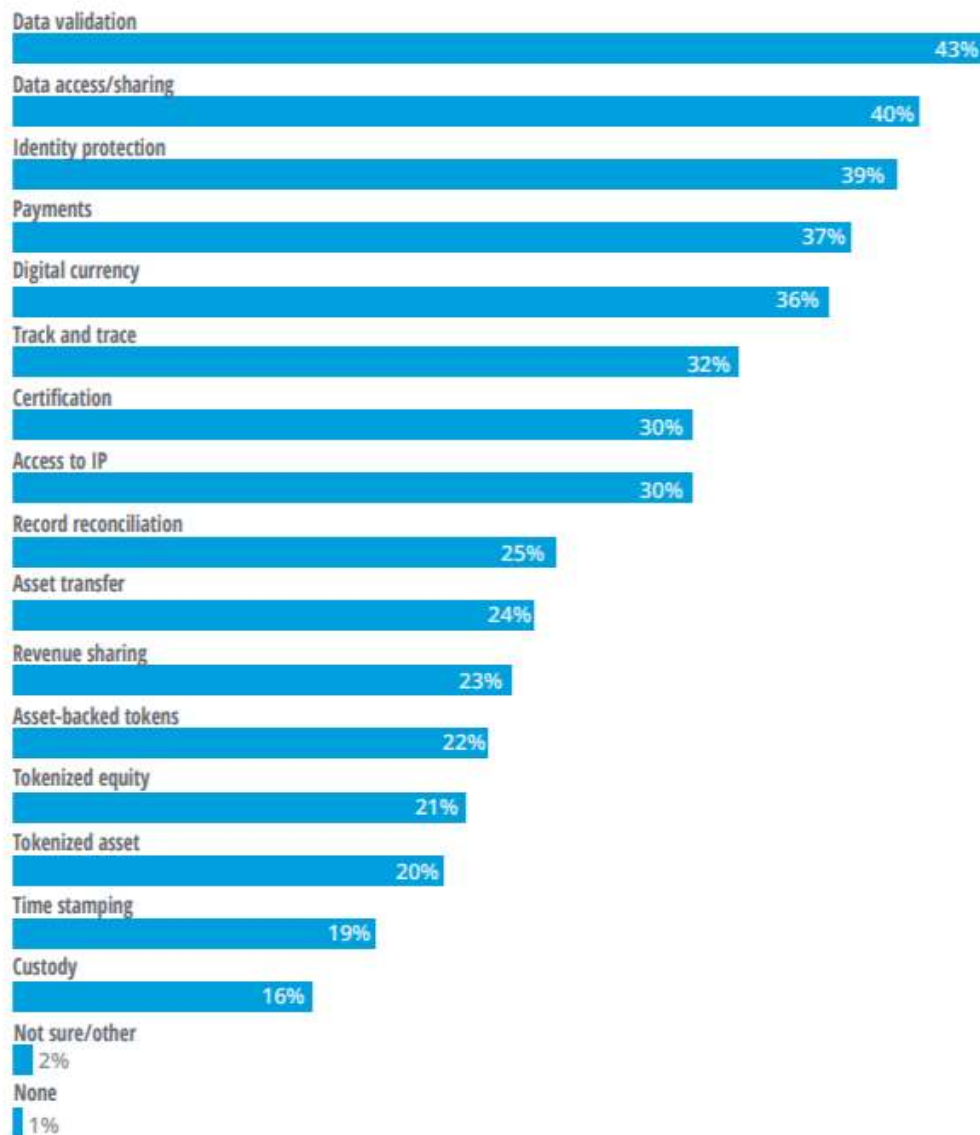


Figure 9. Deloitte 2019 blockchain survey report blockchain use cases in all sectors. Adapted from Deloitte 2019, Blockchain Survey

Source: https://www2.deloitte.com/content/dam/Deloitte/se/Documents/risk/DI_2019-global-blockchain-survey.pdf

As it can be seen from the results of Deloitte survey (2019), the main usage is of the blockchain industry is data validation. In fact, it is not surprising to see such a result in terms of usage areas. Due to immutable nature of this technology, the best possible way to validate a data is to add it to the blockchain. Thus, any invalid data or data manipulation can be easily detected compared to traditional security methods which are often bulky and deliver late results. Data access/sharing and identity protection are ranked after data validations. Other use cases are listed as payments, digital currencies, track and trace,

certification, access to IP, record reconciliation, asset transfer, revenue sharing, asset-based tokens, tokenized equity, tokenized asset, time stamping and custody. In line with the purpose of this thesis, only identity protection, data access/sharing and payment can be the options in the tourism industry. Other usage areas of blockchain technology are related to technology, media and telecommunication, banking and finance and government applications.

1.5. Blockchain and Peer-to-Peer Payment

Because there is no third-party intermediary, Bitcoin transactions are substantially cheaper and quicker than traditional payment networks. And because transactions are cheaper, Bitcoin makes micropayments and other innovations possible. Additionally, Bitcoin holds much promise as a way to lower transaction costs for small businesses and global remittances, alleviate global poverty by improving access to capital, protect individuals against capital controls and censorship, ensure financial privacy for oppressed groups, and spur innovation (Brito & Castillo, 2013, p.10)

1.6. Blockchain and Immutable Records

The immutability is emphasised as the most important aspects of this technology. IBM (2020) defined the immutability of a blockchain and a distributed ledger as the property that prevents tampering with the data. None of the participants of the blockchain has the authorisation to change the content of the data recorded to each block of the blockchain. This provides a high level of security against any possible attempts to change the data recorded on the chain. While this increases the security of the records, any case of error might lead to a problem. However, to correct an error on the blockchain, the participants must add a new block that corrects the error. In this case, both the error and the solution are visible across the blockchain.

1.7. Trust between participants

The trust between the participants of the blockchain is called consensus. According to Merriam-Webster online dictionary, consensus is defined as “*general agreement, unanimity*”. The consensus in the blockchain technology has the same meaning. Watanabe

(2015) proposed a contract type in the blockchain that ensures consensus between each participant. In fact, there are various means of consensus in this field. Currently, there are different practices to ensure consensus between the participating parties. The first concept that emerged in this field was proof of concept. In fact, proof of concept has been commonly used in the industry and especially in the manufacturing industry for a long time. Singaram and Jain (2018) defined proof of concept as the practice undertaken to test an idea. This idea can be a physical product or even an abstract idea. This concept has been widely adopted in the blockchain field. The proof of concept shows whether a blockchain is feasible in a given sector.

In the following years, this was followed by proof of stake and proof of work were introduced as a consensus mechanism. In fact, these concepts are related to the mining procedure. At the end of these processes, participants earn a certain reward. However, the procedure for proof of work and proof of stake are different.

Proof of Work is considered to be the original consensus algorithm formed for the Bitcoin. This is in fact a form of data. The production of the data is challenging. On the other hand, participants can easily verify the data. Hashcash (2020) which was invented by Adam Back in 1997 is the main proof of work algorithm of Bitcoin. Later, proof of stake was introduced as a more advanced form of proof of cash algorithm. Investopia (2019) explained that in the proof of stake consensus, the number of validations for a miner is limited with the amounts of Bitcoins that miner is holding. One of the main advantages of proof of stake over proof of work is the required amount of energy. Proof of stake requires less energy than the proof of work consensus algorithm.

Schatsky, Arora and Dongre (2018) express that there are new attempts including proof of burn, proof of capacity and proof of elapsed time are some of the concepts proposed to ensure consensus between the parties (p.3). It is clear that new consensus algorithms will continue to emerge as blockchain and cryptocurrencies continue to be popular across different participants. These consensus algorithms aim to decrease energy consumption, increase the speed and increase the security of the chain.

2. TOURISM AND HOSPITALITY INDUSTRY

Tourism and hospitality industry are one of the industries with the highest revenue around the world. Statistics provided by Statista (2018) showed that both the direct and the indirect impact of this industry was around \$7.6 trillion US in 2016. This impact includes various different areas such as accommodation, transportation, food services as well as tour services. When the hotel industry is analysed alone, a striking increase is visible. The data showed (2018) that the number international tourists have increased from 528 million tourists to 1.19 billion tourists from 2005 to 2015. Furthermore, the global contribution of this industry to GDP has experiences significant increase. The increase in the last decade can be seen in Table 1.

Table 1. Contribution of tourism industry to GDP between 2008-2018 (billion US dollars)

Year	Direct Contribution to GDP	Total Contribution to GDP
2008	1,928.47	6,259.57
2009	1,794.88	5,803.03
2010	1,911.51	6,108.56
2011	2,157.06	6,925.29
2012	2,207.37	7,094.29
2013	2,304.81	7,432.19
2014	2,388.31	7,674.79
2015	2,320.93	7,444.04
2016	2,381.1	7,650.17
2017	2,567.88	8,240.74
2018	2,750.65	8,810.96

When the data in Table 1 is analysed, it can be clearly seen that the contribution of the tourism industry to GDP have double in one decade. Majority of the generated GDP is accounted with tourists. The main elements are accommodation, transportation and other services such as restaurants and travel agencies. In this sense, tourism and hospitality industry offers huge opportunities in the different fields of the industry.

2.1. Traditional Tourism and Hospitality Industry

Traditional tourism and hospitality industry can be defined as the industry using traditional methods for sectoral activities for booking or for advertisement. In the tourism and hospitality literature, there are various definitions for tourism and tourism industry. These definitions have evolved from a more traditional perspective to a more innovative perspective. Such evolution is in line with the technologies introduced to this sector. Theobald (2005) defined tourism industry as the field of business that focused on selling tourism-related products (p.26). At this point, tourism-related products can have a wide range.

As Georgoulas stated in 1970, tourism is an industry where the main activity is undertaken in destination area. These areas can have different properties including natural features as well as man-made features. In this practice, non-local individuals are attracted to complete different activities in this destination. Based on this definition, it can be seen that traditional sense of tourism focuses on the destination rather than the consumer or the quality of the activities.

United Nations World Tourism Organisation - UNWTO (2011) defined tourism as a term that includes demand side as well as the supply side. Furthermore, the definition provided by UNWTO is elaborated by expressing that visitors, who are the individuals undertaking the tourism activities, are individuals who visit a place other than their main destination for the purpose of business, leisure health or education. From this definition, it can be seen that tourism activities can have different purposes. This is an important indicator that traditional sense of tourism that involves visiting certain destination for recreational purpose is changing.

One of the main indicators of this change from traditional sense of tourism can be expressed as follows. Buhalis (2000) stated that perceptions of tourists play a key role in

terms of destination and attractiveness of that destination. The perception of the tourists can depend on various factors including purpose, education level, the previous experiences as well as cultural level of the tourists. When this new form of tourism is considered, it can be seen that consumer experience is starting to play an important role in the tourism business. Figure 10 below shows the monthly hotel occupancy rates between 2015 and 2019 to better illustrated the high demand to the tourism industry around the world.

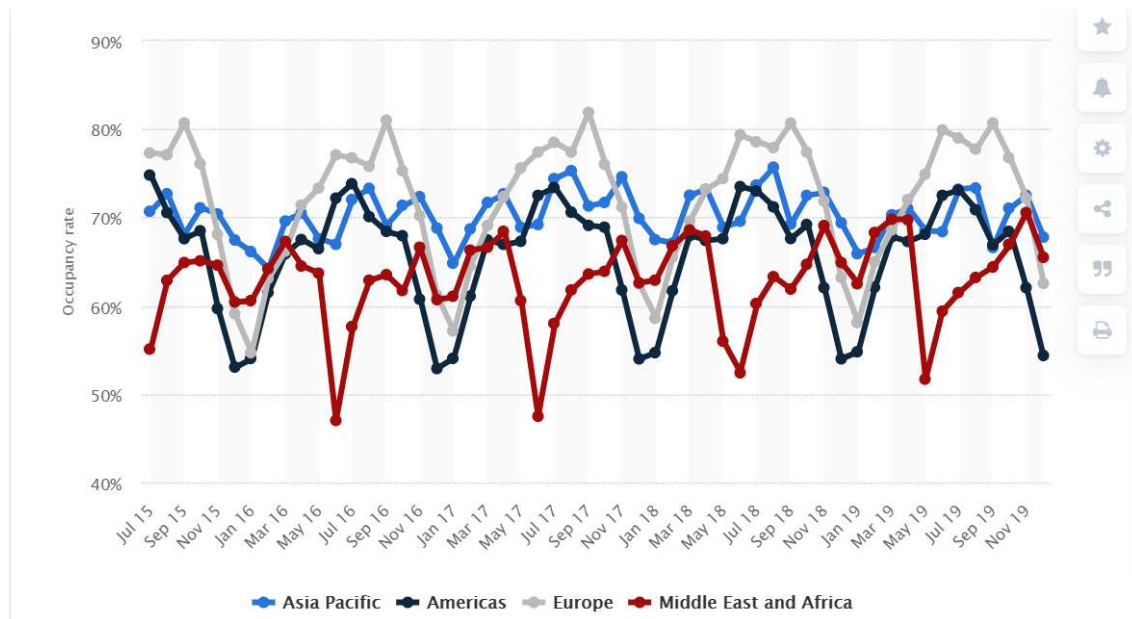


Figure 10. Monthly hotel occupancy rates between 2015 and 2019. Adapted from Statista. 2020.

Source: <https://www.statista.com/statistics/206546/us-hotels-occupancy-rate-by-month/#:~:text=Monthly%20occupancy%20rate%20of%20hotels%20in%20the%20U.S.%202011%2D2020&text=The%20occupancy%20rate%20of%20hotels,to%20the%20previous%20year's%20figure.>

When Figure 10 is analysed, it can be clearly seen there are differences between occupancy rates of four main regions which are Asia Pacific, Americas, Europe and Middle East and Africa. While Europe has significantly high occupancy rates that reach up to 80% during high season, Middle East and Africa experiences problems in terms of hotel occupancy rates. While some of the fluctuation is due to seasonal changes, it is clear that Europe is an attractive touristic region compared to other regions. Yet, these figures show that tourism promises a significant revenue and opportunity in terms of accommodation. Furthermore, accommodation is not the only aspect of what tourism and hospitality

industry can offer. All these hotel accommodations are linked with other aspects including transportation, tourism services and food services.

2.2. Stakeholders in Traditional Tourism and Hospitality Industry

To entirely analyse a sector, it is important to identify the key stakeholders as well as the key participants of the sector. Freeman (1984) defined stakeholders in general as individuals or organisations of any type that are engaged in or affected by a business. Similarly, such individuals and organisations are widespread across the tourism industry as well. Especially in terms of technology adaptation such as blockchain technology, it is important for the stakeholders of the industry to understand and apply these new technologies. Without stakeholder adaptation, it is almost impossible for any innovation or technology to flourish in any given industry or business.

In terms of stakeholders in the tourism industry, there have been different approaches. In fact, the stakeholders in the tourism and hospitality industry depend on the area of analysis. For example, Cooper et al. (2005) identified the main stakeholders in the tourism industry as local residents, tourists, the industry itself, public sector and others. On the other hand, Duanerst (2014) provided a broader scheme to identify the key stakeholders in the tourism and hospitality industry. Based on this scheme, the key stakeholders in the tourism and hospitality industry can be analysed under four main categories.

These categories are listed as the private sector, public sector, civil sector and local community and customers. All of these categories involve different stakeholders with different roles. For example, Duanerst (2014) listed the key stakeholders in the private sector as tourism suppliers, intermediaries, transport, private sector without including tourism business and professional associations. The public sector stakeholders were identified as government, local and regional administrations and tourism organisations. On the civil sector, NGOs (non-governmental organisations) as well as vocational education can be seen as the key stakeholders of this industry. Lastly, at local community and customers level, local community and the tourists are the key stakeholders.

Byrd (2007) expressed the need for a new approach to identify the key stakeholders in the tourism and hospitality industry. Since there is a shift from traditional resource-, marketing- and planning-based tourism to customer-based approach, it is important to re-

evaluate the stakeholders in this industry. What is more, as new technologies such as blockchain and online travel agencies (OTAs) are introduced in the industry, the general structure of the industry is changing significantly. For example, blockchain applications aim to decrease the number of intermediaries in the sector. If these intermediaries are completely eliminated, this stakeholder group will no longer be a stakeholder. However, it is possible to introduce new stakeholders as the tourism and hospitality industry evolves further.

2.3. Tourism and Hospitality Industry After Internet

Internet has revolutionised almost every sector. Tourism and hospitality industry are also affected from this change induced by the internet. In today's world, consumers can book a hotel or a flight with just few clicks. Additionally, it is possible to compare thousands of accommodation options and transportations methods by using online comparison websites. Law, Leung and Wond (2004) expressed that internet has become the major communication and distribution means in the tourism industry. Internet has supported travel suppliers all around the world and minimised the number of mediators between the consumers and the service provider. Technology and internet applications in the tourism and hospitality sector have been one of the most popular research topics. The number of studies in this area are increasing every day.

In a recent research, Sharma et al. (2020) investigated how tourism sector adopts digital marketing practices especially for the Indian market. Sharma et al. (2020) found that almost 32% of the study group did not have any digital marketing tools. Additionally, this study revealed that Facebook, WhatsApp and Instagram were the most popular marketing channels in tourism industry respectively.

On the other hand, traditional word of mouth marketing was found to be the most effective means of marketing when it comes to tourism business. The results of this study are striking in many ways. While digital communication channels are adopted by the tourism business, there is still a low adaptation rate where 32% of the participants had no channel for digital marketing practices. Furthermore, while digital channels are effective in many ways, the traditional recommendations or word of mouth still remains to be one of the effective marketing tools among consumers.

Integrating internet to the tourism and hospitality industry have gained importance across different business in this sector. The importance of this integration is emphasised by Baggio and Del Chiappa (2014) as the authors stated that technological infrastructure should be inherent in destination with the aim to create a digital environment such that this environment encourages cooperation as well as knowledge sharing. When different participants of the industry share their existing knowledge, the chance to create better service environment and to increase customer satisfaction can increase.

Buhalis and Amaranggana (2014) stated that destination system is experiencing a change in terms of technology and social space as new stakeholders are added and the experience of the tourists are increased with better information and knowledge exchanges. When all these factors are considered, it can be seen that technology integration in the tourism sector involves various different components. Therefore, any implementation of technology in this field should consider all possible effects on all possible factors. Ignoring one of these factors especially on the stakeholder side can have serious consequences.

A more recent research by Jovicic (2017) stated that as smart destinations are involved more in the marketing practices of the destination compared to traditional marketing tools such as leaflets and traditional advertisements, the organisations involved in destination market can experience better capacities. Internet and online tools indeed provide some important opportunities for the promotion of the destination. Recently, both researchers and practitioners are focusing on the technology and innovation aspects to change their promotion and advertisement schemes in the tourism and hospitality industry.

2.4. Experience Sharing in Tourism

In recent years, experience has become the most important term in many sectors. In tourism industry, experience had become more important than other components of promotion and advertisement. With new social media platforms such as Instagram and Snapchat, increasing number of tourists are sharing their experiences with others.

Wang, Park, and Fesenmaier (2012) and Lewis, Pea and Rosen (2010) reported that social media as a tool to share the travelling experience acts as a means to be with friends without being in the same place physically. This is one of the reasons that travel posts on social media platforms have increased. Other aspect of tourism experience is related to the

process of travel. Recently, it is seen that the preparation step as well as the travel itself have become a part of the entire experience.

Kim and Tussyadiah (2013) showed that tourism experience has changed meaning to include a broader timeframe from dreaming, collecting travel information, actual travelling to talking about the trip after coming back. This process has some important insights in terms of the direction of the new tourism experience. Increasingly, travellers are having longer travel experiences that change the meaning of travel at the first place. Including technology more to the travel experience further changes the nature of the actual travelling activity. Some individuals are travelling to share rather than enjoying the unique feeling of travelling. Burke, Kraut and Marlow (2011) stated that social media is changing how individuals share their travel experiences. Rather than sharing genuine experiences, this expression has turned into updates and posts.

Munar and Jacobsen (2014) expressed that destinations and tourism businesses are increasingly affected from social media. Authors tried to identify the motivation of travellers to post on social media and at what level are these travellers willing to create and share content about their holiday. Results of this study showed that travellers prefer to share content with visuals rather than just texts. The main motivation for the travellers was to show their experience rather than to inform the other potential visitors. In this sense, destination marketers and tourism businesses need to carefully identify the reasons of sharing on social media by the travellers. Providing and offering incentives to share more content might benefit both of the stakeholders.

2.5. Online Booking Period in Tourism

As internet has become one of the main channels to book holidays and travels, the ratio of online booking is increasing in the tourism and hospitality industry. According to Statista data (2018), the digital travel sales around the world has reached \$564.87 billion US dollars. The online tourism agencies have become the leaders in the industry as well. Figure 11 illustrates the revenue generated by some of the leading online tourism agencies around the world.

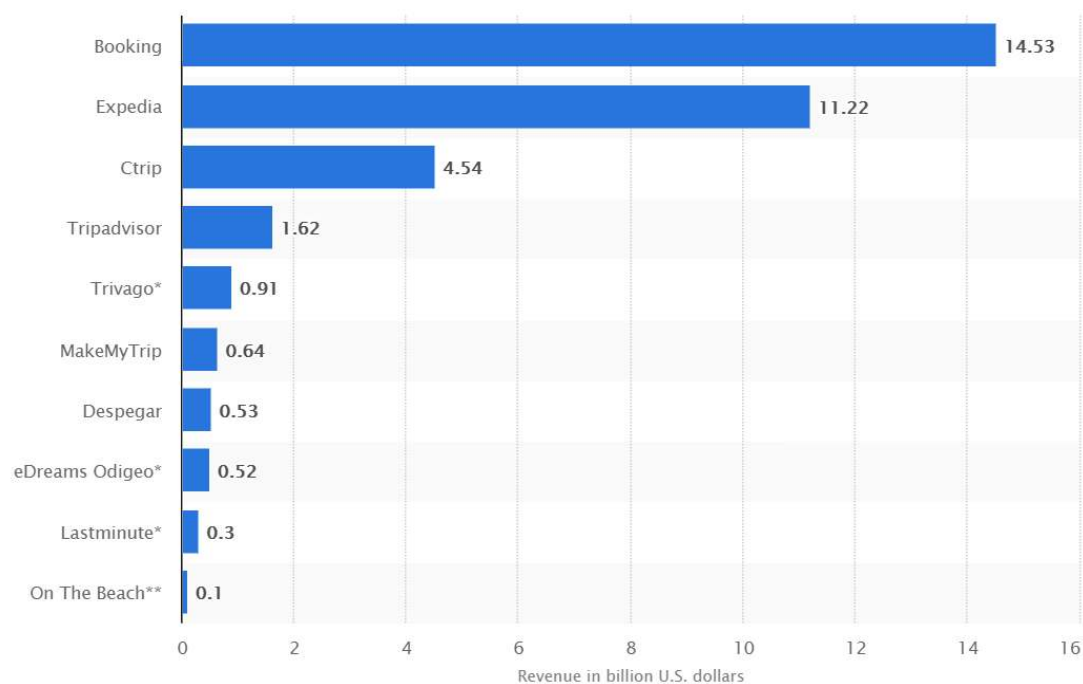


Figure 11. Revenue of leading online tourism agencies in 2018 (\$US billion). Adapted from Statista. 2020.

Source: <https://www.statista.com/statistics/934995/revenue-of-leading-otas-worldwide/>

As it can be seen from Figure 11, online travel agencies such as Booking, Expedia, Ctrip, TripAdvisor have generated more than 1 billion US dollars in 2018. Additionally, there are some relatively smaller online travel agencies with significant influence in terms of booking. When these data are considered, it is clear that online travel agencies will continue to be one of the most important stakeholders in the industry.

There is one important thing to be noted here. As new technologies such as blockchain are introduced to the tourism sector, there will be a disruption in the sector. As expressed above, blockchain eliminates the mediators in the application field. Since online tourism agencies act as mediators between the service provider and the consumer, it is clear that these agencies will be eliminated or in a more optimistic scenario change form. In either case, it is clear that blockchain will eliminate some of the players in this sector.

2.6. Shared Accommodation Period in Tourism

In addition to experience sharing and online booking, the accommodation side of this industry is changing as well. In the past, the main accommodation option in the tourism and hospitality sector was hotels, hostels and B&Bs. As the internet has become widespread and integrated to the tourism industry, the nature of the accommodation has changed as well.

While there are various benefits in financial terms, sharing a house also has some risks factors. Mittendorf (2016) explained that when an individual share his/her private property, the risk and complexity increase. In this case, both participants must have trust each other (p.8). In fact, this area of tourism industry has an important opportunity for the blockchain applications. Since both parties must form a relationship based on trust, this trust-based relationship can be achieved by using a blockchain applications.

An application can be designed where both the property owner and the traveller registers. Later, an identity verification process can be initiated. In this process, it is possible to check the background or any criminal records of both parties. Furthermore, the payment can be facilitated with this application. At the end of the accommodation experience, both parties can review each other. The home owner can rate how clean and noisy the traveller was and the traveller can rate the overall experience with the property. Since the records on the blockchain will be immutable, the reviews of the both parties will be permanent and unchangeable. This could increase the trust between the parties and significantly decrease the risks involved in accommodation sharing.

2.7. Integrating Technology to Tourism and Hospitality Industry

Integration technology to tourism and hospitality industry might seem challenging at the beginning. However, when the current situation is considered, it can be seen that there is a seamless integration around the world. Airbnb, Expedia, TripAdvisor and many other websites offer a comprehensive experience to the travellers. In this respect, Buhalis et al. (2019) identified seven key technological advancements that can be utilised in the tourism and hospitality industry.

These key technologies are listed as mobile devices and wearables, 5th gen mobile network, artificial intelligence, radio frequency, applications (APIs) and cryptocurrency and blockchain. In fact, all of these technologies have unique benefits and challenges. When we consider these technological advancements, mobile devices and wearables are the most familiar form of technology. Recently, APIs are gaining more importance in the online world. Blockchain and cryptocurrencies have been in the field for approximately a decade. While these technologies are lesser known than mobile devices and smartphones, they offer an important opportunity for the sector.

2.7.1. Mobile Application Integration

The world is increasingly becoming mobile. Pew Research (2019) statistics show that 96% of the individuals in America either own a cell phone or smartphone while the ratio of smartphone owners is 81%. Although this data provides information for the individuals in the US, the rest of the world has similar frame.

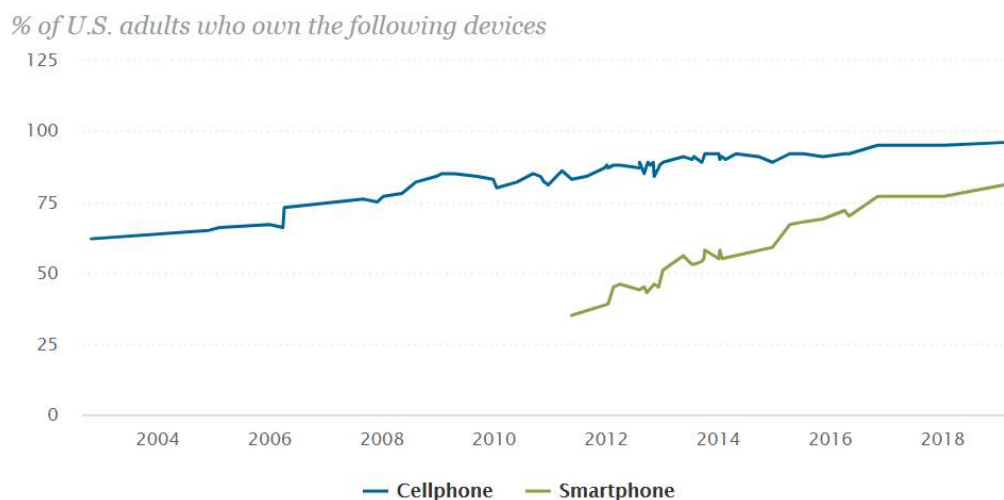


Figure 12. Cell phone and smartphone ownership increase among adults in US. Adapted from Pew Research Centre. 2020.

Source: <https://www.pewresearch.org/internet/fact-sheet/mobile/>

Statista (2019) reported that there were 4 billion unique mobile users around the world. This accounts for more than half of the world population. The number of people using mobile devices are increasing every day. Such increase provides unique

opportunities of businesses in different sectors. Tourism and hospitality industry can benefit from the advantages of the mobile devices as well.

Mobile devices are small and easy-to-carry devices which individuals are taking to everywhere. With the increasing use of social media, the smartphones have been used actively more than ever. Individuals are willing to share their experiences including their travel experiences. Additionally, increasing number consumers are using mobile applications to book their next travel. With this trend, different tourism sector stakeholders are investing in the mobile application side of this industry.

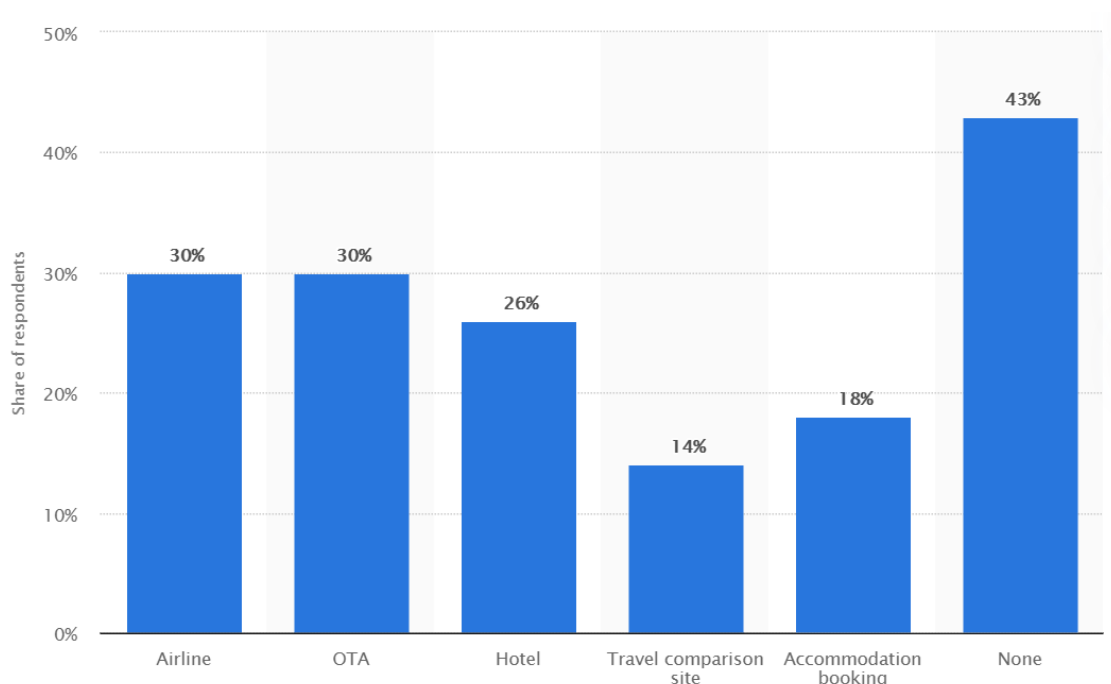


Figure 13. Mobile application download percentages. *Adapted from Statista, 2020.*

Source: <https://www.statista.com/topics/1002/mobile-app-usage/>

When Figure 13 is analysed, there is a significant number of consumers who do not download any of the tourism-related mobile applications. In fact, this data shows a huge potential in the mobile application area. The share of airline and online tourism agency mobile application download rates are equal. Based on these statistics, it can be deduced that majority of the tourism consumers prefer to book a flight or do all travel-related operations by using mobile applications. This is followed by the hotel mobile applications which might signify that consumers prefer to use mobile applications for convenience.

2.7.2. Blockchain Integration to Tourism

The applications of the blockchain technology in the tourism and hospitality sector have been limited. There are only few studies focusing on this special area. However, majority of the studies are considering either the theoretical background or application proposal options.

Nam et al. (2019) stated that DApps (decentralised applications) as the latest implementation field of blockchain offers opportunities for the tourism industry especially in terms of smart tourism and smart destinations. Since these applications are similar to the mobile applications used in every day life, the adaptation rate might be higher. Furthermore, tourism sector stakeholders might have positive perspectives towards these applications.

In most cases, users tend to use and spread an application that has easy to use interface, easy commands and user-friendly structure. A wider adaptation for majority of the social media platforms was due to the user-friendly design. A complex concept such as blockchain might be burdensome for majority of the tourism participants when it is considered that tourism is mainly a leisure activity. In an environment where user experience is increasingly becoming the focal point, it is important to design a user-centric application to attract more users. In case of blockchain applications in the tourism and hospitality sector, DApps might provide this desired user-friendly design.

There are few Dapps in the tourism sector. Locktrip (2020) offers a zero-commission booking experience to do travellers. It is possible to book different hotels and flights by creating a membership on the applications. Locktrip Dapp is similar to a normal online booking agency or online travel agency such as Booking.com and Expedia.com. However, it is possible to pay with the native cryptocurrency of the platform with is LOC. There are also other DApps utilised in the tourism and hospitality industry which will be analysed in more detail in the following sections.

2.8. User Experience Focused Tourism

In recent years, user experience has gained attention around the world. With the introduction of social media platforms and digital marketing, users and consumers can

easily share their experiences online. As stated above, this online sharing habits creates a strong impression across the consumers. Furthermore, as internet have become widespread in many aspects of life, many consumers are purchasing tourism products by using online services. The increasing use of online tourism services and online tourism purchasing channels have led many tourism businesses to focus on the online side of the business. Amaro and Duarte (2015) expressed that online travel providers need to increase their efforts to guide travellers to purchase online by showing the value and the advantages. Individuals who purchase online tourism services or products mainly focus on the financial advantages of using such services.

For example, as Amaro and Duarte (2015) express, different hospitality and accommodation businesses are emphasising their low price offers by organising different campaigns. Intercontinental Hotels Groups launched a campaign where when a guest finds cheaper prices, the hotel gifts the first night. Such incentives ensure the best price offers for the consumer. On the other than, when the business side is considered, the hotels and other accommodation facilities can eliminate the mediators such as travel agencies or online travel agencies by offering the best prices on their own websites. This not only enhances the number of booking; it also increases the brand loyalty as consumers will perceive better rates and better services when they use the main service provider rather than the mediators.

Accordingly, it is important to understand the decision-making journey of a traveller. This is especially important to adapt the traditional purchasing behaviours to the online world by adding specific incentives to attract the consumers.

TRAVELLER'S DECISION



Figure 14. Factors influential on traveller decision. Adapted from Zsarnoczky, (2017a).
The Digital Future of the Tourism & Hospitality Industry <

Source: https://www.researchgate.net/figure/Influencing-factors-of-travelers-decision-Source-Zsarnoczky-2017a_fig1_325989297

When the decision circle by Zsarnoczky [2] is analysed, it can be seen that there are four main areas that direct the decision of a travel. These can be listed as price, offer, value and disposable mode. The connection between each of these factors will depend on various factors as well. For example, offer and price are related to education and family commitments.

On the other hand, offer and value are connected with perceptions and cultural environments. Socio-economic commitments and motivators are the link between value and disposable mode. Lastly, disposable mode and price are linked with group influence and attitude. All of these factors should be understood in detail to better craft a campaign that attracts different type of consumers.

Zsarnoczky (2018) further elaborated that innovations such as discount airlines had entirely changed the tourism sector. Currently, different websites such as Expedia and Kayak enable travellers to find and compare different rates for the flight tickets. As expressed above, the majority of the concern on the consumer side is related to the financial benefits. When new technologies such as blockchain are considered, implementation to the tourism and hospitality industry can pose significant improvements.

Since blockchain eliminates the mediators in almost all implementation areas, this could help decreasing the overall costs associated with travelling. For example, without mediators such as online travel agencies, hotels or airlines can offer better prices. Furthermore, when banks are eliminated for the transaction of the money between the supplier and the consumers, the prices can be decreased even further. From this perspective, blockchain offers significant benefits in the tourism and hospitality industry for both on the supplier and on the consumer side.

This thesis study aims to investigate the blockchain applications in tourism sector as a novel field of research and measure how tourism participants and stakeholders perceive blockchain applications in the tourism sector. By understanding this perception, it is possible to reorganise and plan the innovations in this sector.

Turkey. There are few studies on how blockchain or even Bitcoin is implemented in the tourism sector. Generally, the studies are focusing on measuring the knowledge of potential and current tourism product users regarding blockchain and Bitcoin. Also, there is not study that focuses on the hotel manager and hotel employee side of the blockchain application. Leung and Dickinger (2017) investigated whether Bitcoin was used by European travellers in their travelling purchases. Their study tried to identify some of the factors that influence the consumers about their decision to use electronic payment technologies.

In today's world, there is an increasing number of technology adaptation in the payment sectors. The Local (2018) reported that some countries such as Denmark might become cash free in the near future. This means that there will be no cash circulation in the market economy. In fact, such possibilities clearly show us that there is a future where all the payments and transactions are completed in an electronic environment without exchanging any money.

To better understand the current environment in the tourism and hospitality industry in terms of blockchain applications, this section tries to explore certain aspects of this technology. In this section, blockchain applications in tourism and hospitality industry will be investigated. Then, current payment methods in the tourism sector will be explored. These payment methods can show us the potential of the transition to a complete electronic payment system in the tourism sector. Furthermore, review and scoring methods in the tourism and hospitality sector will be analysed. Reviews are the most important aspect in this sector as almost all of the consumers and guests decide on these reviews and points. In this sense, a reliable review system is necessary in the entire business. Afterwards, potential and perceived benefits of blockchain in the tourism and hospitality industry will be explored.

The potential benefits can give insight about the potential implementations. In addition to the potential benefits, deficiencies and gaps in the sector will also be explored. These deficiencies and gaps can give a general idea about the direction that needs to be adopted to better position blockchain in the tourism and hospitality sector. This section will be completed with offering possibilities offered by the blockchain technology and real and potential implementations in the tourism and hospitality sector. Analysing all these

components is important to understand the gaps in the sector. This way, it is possible to correctly gauge the perspectives of the hotel managers and hotel employees and to better position the blockchain technology in the tourism and hospitality industry.

3.1. Blockchain Applications in Tourism and Hospitality Industry

Blockchain has become a highly popular topic in different sectors. As more secure, more trustworthy and faster payment systems are required, the technology has evolved to meet these needs. As the technology have gained traction, new method to employ this technology in different sectors have been discussed. Without any supporting application, it is almost impossible for blockchain to be adopted at the public level. The underlying technology is rather complex. Therefore, a user-friendly and simple design is necessary for a larger mass to adopt and frequently use this technology. Before giving details about the current and possible applications of the blockchain technology, it is important to considered the current landscape of the tourism and hospitality industry.

It is important to understand the current situation in a sector to offer solutions. This analysis can enable identifying the gaps in the sector, deficiencies and any rooms for improvement. Thus, new systems can be designed or existing systems can be improved by utilising the information gained from an extensive analysis. In this sense, next section will look into the payment methods in the tourism sector.

3.2. Payment Methods in Tourism Sector

Tourism and hospitality industry are one of the payment-intense sectors around the world. Visitors and tourists make payment at every stage of their travelling experience. Payment is involved in flight booking, hotel booking, visiting a touristic place or buying food in the tourism destination. Purchasing souvenirs as one of the most popular tourism activities is also involves payment. In this sense, it is possible to say that almost every step of the tourism industry involves some type of payment. From purchasing a flight to visiting a touristic attraction, visitors need to use one of the payment methods. There are different payment methods adopted and used around the world.



Figure 16. Evolution of payment methods over time. Adapted from RWC Group, 2020.

Source: <https://www.rwc.com/>

Payment industry have passed a long way since the coins and banknotes. As seen from Figure 16 above, there is a significant difference between 100.000 years ago and now. Naturally, evolution is inescapable. As in the other areas of life, technology and science are evolving as well. Every day, new methods and technologies are found and tested. However, the payment systems accelerated in the last five decades and changed form. Especially in the last two decades, physical money has been almost completely replaced with electronic means of payment. Majority of these payment methods are somewhat applied in the tourism and hospitality sector. With the changing consumer habits, preferred payment systems are changing as well. Consumers want more convenient and faster means of payment in their purchasing processes. Exchanging physical money poses different challenges such as coins, carrying lots of banknotes and coins and increased chance of theft. The Figure 17 below shows the preferred online payment methods around the world. While this figure is not specific to tourism industry, it can still provide a general overview of the payment methods in general.

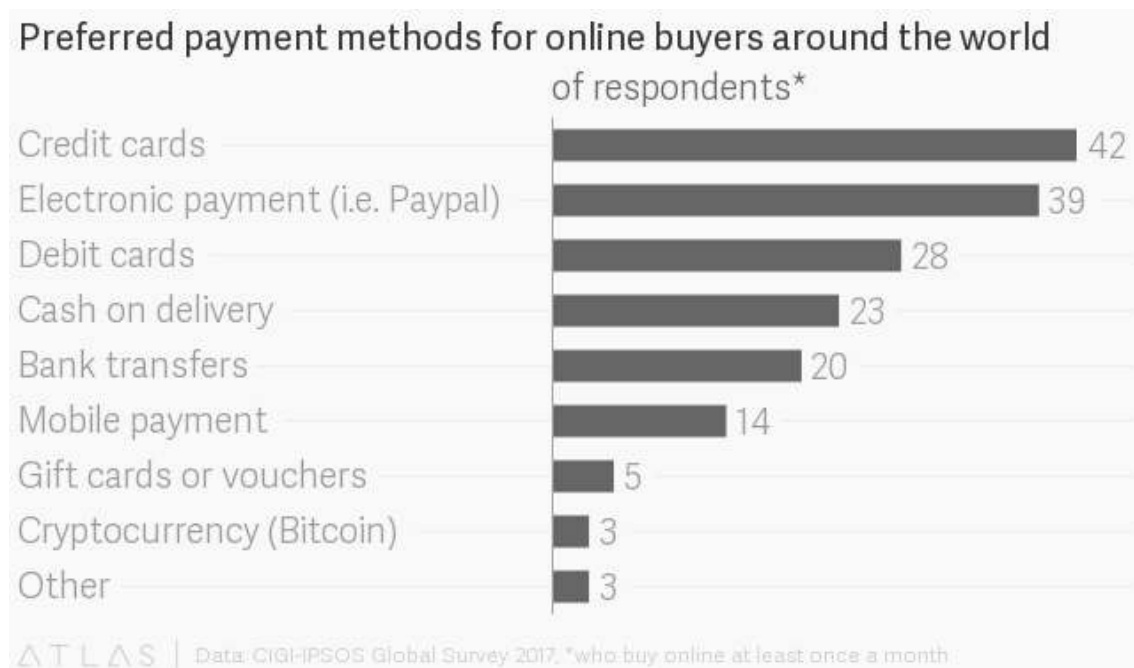


Figure 17. Preferred online payment methods around the world. Adapted from Atlas, 2017. CIGI-IPSOS Global Survey 2017.

Source: <https://theatlas.com/charts/S1TXb0y1-> >

When Figure 17 is analysed, it can be seen that credit cards are the most preferred online payment methods around the world. This is because of the widespread adaptation of credit cards around the world as well as the convenience and security of the credit cards. These are followed by electronic payments like PayPal, debit cards, cash on delivery, bank transfers, mobile payment and gift cards or vouchers. Using cryptocurrency as an online payment method has a low share in terms of online payments around the world. While these statistics are not specific to the tourism and hospitality industry as expressed above, the numbers still can provide a general overview of the sector.

There is a promising trend in the tourism and hospitality industry in terms of adopting different payment methods for online and on-site payment methods. Gössling (2017) expressed that information technologies is one of the possible solutions in the tourism and hospitality industry. In general, information technologies can be accepted as the antecedent of blockchain technology. As payment method shifts from cash-based environment to credit card or technology-based payment environment, it is possible to experience more convenient, faster and safer payment across the sectors. In this sense,

blockchain has a promising outlook to be implemented in the tourism and hospitality industry.

This thesis study will focus on the tourism sector in Turkey. Therefore, it is important to understand the preferred payment methods in Turkey as well. In case of Turkey, preferred payment methods have a slightly different outlook than the global online payment trends. Figure 18 below shows the preferred online payment methods in Turkey.

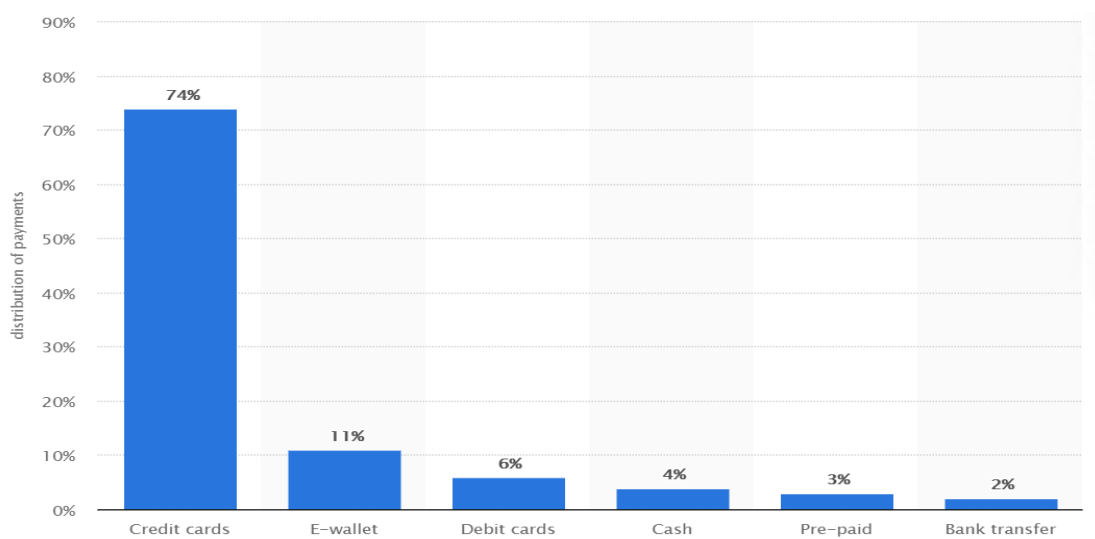


Figure 18. Preferred payment methods in Turkey. Adapted from Statista, 2020.

Source: <https://www.statista.com/statistics/458525/preferred-digital-payment-methods-in-turkey/>

When Figure 18 is analysed, it can be clearly seen that the general outlook of the preferred online payment methods in Turkey are slightly different than the global trends. It can be seen that electronic payments have almost no share in the preferred payment method figure in Turkey. There is one significant reason for the lack of this trend. In Turkey, the major electronic payment system PayPal is banned. Therefore, neither users nor businesses can use and accept this means of payment. Accordingly, credit cards are followed by e-wallets. Other preferred payment methods in Turkey include debit cards, cash, pre-paid and bank transfers. High ratio of e-wallets is promising in terms of blockchain adopting rates in Turkey. Since cryptocurrency use e-wallets as discussed in the previous sections, users in Turkey are familiar with how to use an e-wallet. This familiarity

might prevent an important barrier in terms of using blockchain applications across different sectors.

3.2.1. Payment with Credit Card

Payment with credit card has become widespread since the first credit card was used. MacDonald and Tompkins (2017) stated that first credit card was used in 1950s in The Diners Club Card. In fact, the credit card was used by a name Frank McNamara who forget his wallet at home while travelling. In the light of this information, it is possible to say that first credit card around the world has used in the tourism and hospitality industry. From 1950s to 21st century, credit cards and usage areas of credit cards have experienced significant evolution. Currently, credit cards are used in different sectors including tourism and hospitality industry. Figure 19 below shows global credit card use for 2019 and credit card use in the US for 2000, 2008 and 2019.

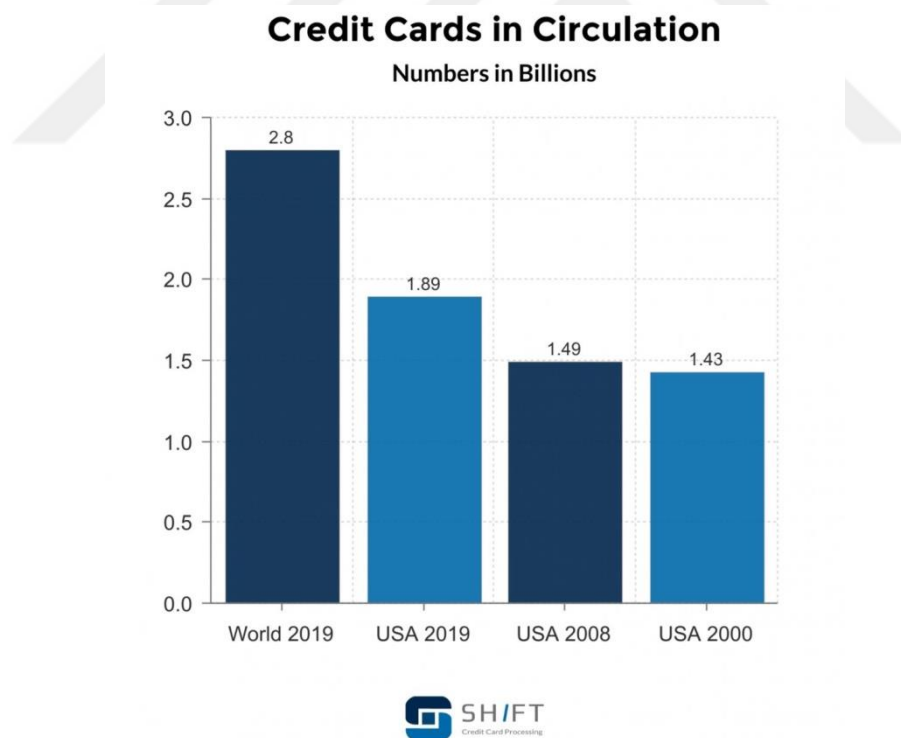


Figure 19. Global credit card uses. *Adapted from Shift, 2020.*

Source: <https://shiftprocessing.com/credit-card/>

As seen from Figure 19, there has been a significant increase in the number of credit card users in the US from 2000 to 2019. In 2000, the number of credit card users in the US was 1.43 billion individuals. This number increased to 1.89 billion users in just 19 years. The number of worldwide credit card users have reached 2.8 billion individuals by 2020. These numbers indicate a huge potential for the tourism and hospitality industry. As increasing number of tourists and guests use credit card as online and offline payment, the industry can benefit from higher revenue generation.

3.2.2. Payment with Mobile Methods

Mobile payment has become one of the most commonly preferred payment methods across the world. Statista (2020) reported that there are approximately 3.2 billion mobile users by 2019 around the world. There is an increasing trend across users regarding mobile phones especially smart phones. Statista (2020) further projected that the number of mobile users will reach 3.5 billion people by the end of 2020 and 3.8 billion people by the end of 2021. World Travel and Tourism Council (2019) reported that mobile payment has becoming widespread especially in Asia and China. The report stated that mobile devices has become an essential part of the travel journey for 83% of the travellers (p.1). Travellers and tourists are taking their mobile device wherever they go including touristic places. Thus, mobile devices have become an integral part of the entire tourism journey.

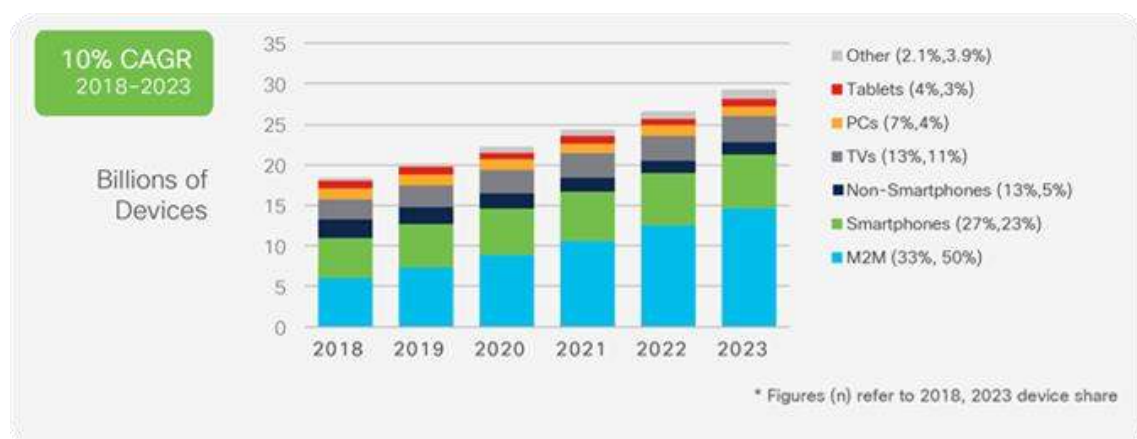


Figure 20. Device usage trend estimation between 2018-2023. Adapted from Cisco, 2020. Cisco Annual Internet Report (2018–2023) White Paper

Source: <https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html>

Figure 20 shows the device usage trends for smartphones, TVs, PCs, tablets and other devices. As it can be seen from the figure, it is estimated that number of devices will increase from approximately 18 billion devices in 2018 to approximately 29 billion devices around the world. When the number of world population is considered, every individual on the world has 2.5 devices. By 2023, it is estimated that every individual will own almost 4 devices. These numbers show an important potential for every sector. Users are using smart devices more than ever. They are using these devices to do lots of things including watching television, reading books, booking hotels, surfing the internet, chatting and finding travel information.

As travellers and tourists carry their mobile device more often than ever, the tourism businesses and organisations started to utilise from mobile devices in different terms. For example, accommodation facilities such as hotels and B&Bs are starting to launch their own applications on the mobile devices. On these applications, hotels are offering special discounts, rewards or free upgrades to the guests. Additionally, different touristic attractions can be viewed online by using different applications. These mobile applications enable visitors to construct their entire trip from the beginning to the end. Furthermore, visitors and tourists can explore their holiday destination without even needing a guide anymore. Mobile guide applications can provide comprehensive information about the destination. Moreover, some specialised apps can offer a local guide opportunity to discover the touristic destinations like a local.

In the light of this changing landscape of tourism and hospitality industry, the payment methods are changing as well. This change is natural and inevitable as in all other fields experiencing development and improvement. As discussed above, credit cards have been the most preferred payment method in tourism industry as well as in other industries for the last decade. However, this payment method is replaced by mobile payment methods. Figure 21 below shows the smartphone penetration and credit card penetration for selected Asian countries. Asian countries are selected to set an example due to high population and high technology adaptation rates across the population.

	POP'N (IN MILLIONS)	POP'N WITH SMARTPHONES (IN MILLIONS)	SMARTPHONES PENETRATION (AS A % OF POPULATION)	CREDIT CARD PENETRATION RATE (AS % OF AGE 15+ POPULATION)	MERCHANT READINES (POS TERMINALS AS % OF POPULATION)	DEGREE OF COMPETITION IN THE MOBILE LANDSCAPE	KEY MOBILE PAY PLAYERS
CHINA	1371.1	795.3	58%	21%	1.7%	High	Alipay / WeChat Pay
INDIA	1311.1	300.1	23%	3%	0.2%	High	Paytm / MobileKwik
INDONESIA	257.6	54.1	21%	2%	0.4%	Medium	DOKU Wallet / Cash
JAPAN	127	49.5	39%	68%	1.4%	High	Osaifu Keitai / Android Pay
MALAYSIA	30.3	19.7	65%	21%	1.1%	Medium	Dash / Apple Pay
SINGAPORE	5.6	5.8	104%	49%	1.7%	Low	M2U Pay / CIMB PAY

Figure 21. Smartphone and credit card penetration statistic for selected Asian countries. Adapted from Nikkei Asia, 2020. Credit cards fall behind in Asia's race to go cashless.

Source: <https://asia.nikkei.com/Business/Business-trends/Credit-cards-fall-behind-in-Asia-s-race-to-go-cashless>

When the numbers in the Figure 21 are considered, it can be clearly seen that smartphone penetration rate is high for most of the selected Asian countries. While Singapore has the highest smartphone penetration rate, Malaysia and China show significantly high number in terms of smartphone penetration rate. It is believed that Singapore has the highest rate for smartphone penetration rate due to tech-savvy environment of the country. Pillia (2019) reported that start-ups in Singapore have managed to attract S\$13.4 billion investment from venture investors in the first three quarters of 2019. This high amount of investments in the country have also supported the people to adopt technology more than other countries in the neighbouring region.

3.2.3. Payment By Using Blockchain Technology

Payment by using blockchain technology is still at its infancy. While there are some attempts to integrate blockchain as a main payment method, there are limited number of applications. For example, as Rejeb and Rejeb (2019) explained, FAT, a Taiwanese airline company, started to accept some of the digital currencies as a payment method to purchase

flight tickets. Furthermore, AirBaltic from Latvia and Peach Air from Japan followed this trend by integrating payment by digital currencies.

As increasing number of airlines companies are implementing different means of payment, they are offering different choices to consumers as well. In addition to some airlines, there is a larger platform that attempts to integrate the blockchain technology into the tourism and hospitality industry. TripEcoSys is a decentralised platform where blockchain technology is applied to facilitate and complete cross-border travel transactions.

The decentralised platform eliminates the mediators during the transaction process while providing high level of security as well as traveller information protection. All of these factors show the possible benefits of using blockchain as a payment method in the tourism and hospitality industry.

3.3. Reliable Review and Scoring Methods

In tourism and hospitality industry and especially in the accommodation sub-branch of the industry, user reviews and comments play a significant role. As explained in the above sections, internet has significantly changed how people make purchasing decisions and purchase products. In today's world, online reviews are as important as and even more important than any advertisement. A good word-of-mouth can generate better results than any online or offline advertisement efforts. However, this important role of online reviews and comments have created certain problems in different sectors.

There is an increasing number of fake reviews in the hospitality sector. Hotels and other tourism-related businesses are paying individuals to post fake comments to promote that hotel and tourism businesses. The next section shows some of the problems related to fake reviews and scoring and possible solutions to prevent these reviews.

3.3.1. Problem of Fake Reviews and Scoring

When it comes to tourism sector, fake reviews and fake scores are one of the most important problems of the sector. Choi et al. (2016) expressed that the number of fake reviews is increasing for tourism business where different individuals have different motives to post such fake reviews. Moreover, tourism businesses are offering incentives to

individuals to post fake reviews about their competitors. While this is not the best practice in the sector, it is possible to see high number of such examples.

Guardian (2019) recently reported that TripAdvisor, the giant travel website, fails to prevent fake reviews on hotel profiles. In this case, the reviews were fake positive reviews about the hotel. While fake negative reviews can damage the image of a competitor, fake positive reviews can mislead the potential guests. In either case, fake reviews pose a great threat against the tourism industry. Both academicians and practitioners try to find a solution to prevent such fake reviews and incorrect scoring on online travel websites. But this area is challenging as it is almost impossible to prevent fake comments with traditional technologies.

3.3.2. Possible Solution for Fake Reviews and Scoring

One of the possible solutions for fake reviews and fake scores is blockchain driven applications. Dapps, which were explained in detail in the previous sections and which will be explained in more detail in terms of tourism in the following section, can offer an applicable and feasible solution to prevent fake reviews in the tourism industry. Since blockchain is known for immutable records, it poses an important solution to be applied to fight against fake reviews.

When a guest visits a hotel, that guest can review the hotel by using the native blockchain-based application of that hotel. In this case, the application should only permit reviews by guests who have booked the hotel and stayed in that hotel. During check-in process, the hotel can activate a certain code in the application where the guest can later upload his/her comment or review about the hotel. This review will be permanently recorded on the blockchain and cannot be altered either by the guests and the hotel.

3.4. Benefits of Blockchain Applications in Tourism Sector

As expressed in the above section, blockchain-driven app for hotel reviews can provide important benefits both for the hotel and the guests. Since the reviews posted by the guests will be immutable, hotels will do their best to provide the best services to the guests. Thus, guests can enjoy their accommodation experience more. On the hotel side,

hotels can protect themselves from any fake negative reviews that might damage their online reputation.

Another benefit of blockchain applications in tourism sector can be lowered prices for the guests. Since mediators such as payment processors will be completely eliminated or decreased to some degree, hotels can offer better prices to guests as they no longer need to pay additional commission rates to the mediators. Furthermore, guests can benefit more personalised loyalty programs. Hotels can offer tokenised rewards which can be used as discounts, free room upgrades or free breakfast.

When other tourism and hospitality businesses are considered, blockchain can offer different benefits as well. Identity verification can decrease the overall costs of the airline companies. When boarding a plane, identity verification can take time and labour. However, by using blockchain technology in flight ticket purchasing process, identification can be completed beforehand. Also, transactions to purchase different tourism products can be secured due to the encrypted nature of the blockchain technology.

3.5. Deficiencies of Blockchain Applications in Tourism Sector

While the blockchain technology seems positive and desirable, there are certain problems regarding implementation to real-life situations. As explained in the above sections, blockchain transactions take a long time compared to traditional payment methods such as credit cards and electronic payment. There are attempts to accelerate the number of blocks processed per second. However, these attempts fail to reach the capacity of the transaction per second rate of credit cards.

On the other hand, user knowledge regarding blockchain technology and its applications pose a huge barrier against the mass adopting of this technology. There are promising results for new generations. Yet, the main spenders of today's world still lack awareness regarding this technology. Majority of the tourism participants still prefer traditional online payment methods due to convenience.

When the business sides of blockchain applications in tourism sector are considered, again there is a low level of awareness across the participants. It is believed that hotel managers have low level of understanding about the technology and about how to

implement this technology in their daily work. Furthermore, there might be issues to process the requests received by the hotel managers and hotel staff from blockchain-based Dapp applications.

In this thesis, the main objective is to measure the perception of hotel managers and hotel staff about blockchain technology in general and blockchain technology use in the tourism and hospitality industry in detail. It is believed that low level of awareness across hotel managers and hotel staff in Turkey and especially in the Mediterranean region is one of the main barriers in front to blockchain to penetrate to tourism industry in Turkey.

3.6. Promises of Blockchain Applications in Tourism Sector

It is clear that there are certain deficiencies and perceived problems in this field. However, blockchain applications offer a wide range of options for the tourism sector. As Glaser (2017) expressed, blockchain technology can be applied to any sector that involves two or more participants. As blockchain and cryptocurrencies are considered as peer-to-peer payment, this technology is promising in the tourism and hospitality field. Naturally, the promises of blockchain applications in the tourism and hospitality sector are more than just peer-to-peer payment. There are other benefits and potential applications regarding this technology.

Different countries are taking steps to use blockchain in their tourism sector. As the entire world transforms to a smart industry structure, tourism is also affecting from this transformation. In today's world, countries that can use technology better can be one step forward in the highly competitive business environment. According to Arabian Business (2018), Dubai is preparing for a new era of tourism called tourism 2.0 by utilising from the power of blockchain. The main objective of this program is to form a link between the participants and hotel operators to benefit from the promises of the blockchain technology. In terms of the sector, implementation and integration of blockchain can offer various opportunities for both the guests and tourism businesses.

3.6.1. Creating Well-Informed Industry Participants

As blockchain becomes widespread in the tourism and hospitality industry, participants can gain more knowledge about the tourism businesses, tourism destinations and tourism services. Before creating well-informed industry participants, it is important to create well-informed service providers. Treiblmaier and Önder (2019) approached blockchain in tourism from service provider perspective and investigated the transaction transparency in the tourism sector by conducting a survey on tourism professionals.

Rejeb and Rejeb (2019) further emphasised the important of transparency to better inform the participants. To achieve such trust and transparency across the tourism industry, immutable and unchangeable nature of the blockchain can provide significant benefits. Well-informed industry participants on the user and business side can benefit the entire sector. As participants have more knowledge, it is possible that they will be more willing to participate to the industry and even spend more. This could increase the overall revenue generated by the tourism industry.

3.6.2. Easier and More Secure Payment Methods

Another possibility offered by the blockchain in the tourism industry is easier and more secure payment methods. Önder and Treiblmaier (2018) explained that tourism participants need to have certain level of trust as money is transferred between participants in different countries which involves cross-border payments. The problem with cross-border payment is the high number of transactions involved in the entire process. Such high number of processes increase the chance of a problem that might lead to losing the entire money in the transaction.

However, if the number of processors is decreased between the sender and receiver party, the chances for any problem or money loss will decrease as well. Furthermore, as Avital et al. (2016) stated intermediaries such as Booking.com and Airbnb can be eliminated from the tourism field. By eliminating the intermediaries, tourism business can offer better rates as their commission payments will decrease.

3.6.3. Decreased Fake Reviews and Scoring Problem

As Cancelas (2019) explained, blockchain is based on mutual trust and operated with immutable records. As explained in the Section 1 of this thesis study, blockchain completely operates on trust system. In fact, the main pillars of this technology entirely depend on trust of each participants. In this sense, the technology promises an important application area in terms of publishing real reviews and comments and preventing all fake reviews and comments.

There are different studies on the trust components in blockchain applications in tourism sector. For example, Dubovitskaya, Schegg, Schumacher (2019) explained that there is need for trust between tourism participants to purchase accommodation and other tourism products. Furthermore, tourism mediators such as TripAdvisor and Booking have occupied a major share in the tourism market. Yet, as expressed above, there has been problems with fake reviews on these mediator websites. Fake reviews have been one of the greatest problems in the accommodation sector especially for hotel businesses. When hotels pay for non-guests to post fake positive reviews, the entire trust system collapses. However, trust can be considered as one of the major components in the tourism industry. Rejeb and Rejeb (2019) explained that tourism participants want to be involved more in the tourism field and gain more control over their travel information and data. All of these require certain degree of trust between tourism participants.

3.7. Potential Blockchain Applications

In the light of this information above, it is important to consider some of the potential blockchain applications in the tourism sector. Potential applications can give important insights about how tourism and hospitality industry can evolve with the changing conditions. In line with the purpose of this thesis study that attempts to uncover the perception of hotel managers and hotel staff in Turkey towards blockchain applications in the tourism sector, understanding the potential applications can provide better perspective to approach these hotel staff.

Blockchain in tourism sector can be used for different purposes. While the usage purposes are different, the common aim for this technology is to decrease the number of intermediaries, commission fees and to connect guests and service providers. However,

there seems to be only one option in terms of physical applications which is Dapps. The detailed definition of DApps have been provided in the section above. Based on the definition above, it can be seen that DApps are in fact similar to regular applications that user encounter in their everyday lives. These look like an ordinary desktop or mobile application which requires almost no knowledge regarding how the underlying system operates. In general, Dapps have a user friendly and intrinsic interface. Thus, any user with limited or knowledge about the blockchain can easily use these applications once getting accustomed to the general logic of these applications. Here, this section will explain Dapps in tourism sector. Also, possible implementation area of blockchain in the industry will be discussed.

3.7.1. DApps

According to the Financial Crimes Enforcement Network (FinCEN) (2019), DApps are a type of software program on a blockchain platform without the control of an individual person or a group. As DApps are a type of software, they highly resemble to regular software or mobile applications. Blockgeeks (2019) suggests that tourism and hospitality industry can utilise from DApps to adapt the blockchain technology into a user-friendly application. In fact, there are generally agreeing views on how Dapps can be utilised in any sector. Since majority of the DApps look like a regular mobile app, it is often easy to use for any regular user. There is no need to have a specific knowledge about blockchain or any other underlying technology.

Özdemir, Ar and Erol (2019) compared some of the important tourism Dapps to better understand the potential and deficiencies of these applications. Although their study is recent, some of the Dapps they have analysed no longer exists. This shows us the rapid change in the blockchain industry and applications. As the competition is high in this sector as well, it is possible to experience rapid changes in terms of new applications and outdated applications. Furthermore, Nam et al. (2019) expressed that Dapps can be seen as the latest blockchain application in the tourism industry. These applications can enable smart tourism to be applied across the entire industry. Smart tourism can decrease the overall costs in the tourism and hospitality industry. As the industry benefits more from the technology, the intermediaries will decrease. Also, operational costs can be decreased by eliminating intermediaries.

State of the Dapps (2020) gives a general overview about all the Dapps on the market. This website has an extensive database that shows Dapps based on keyword search. In line with the purpose of this thesis study, this section will provide the list of Dapps in the tourism and hospitality sector. The search is conducted by using “travel”, “tourism”, “flight” and “traveling” keywords.

Table 2. Dapps in tourism and hospitality industry.

Keyword	Number of Dapps	Dapps
Tourism	0	-
Travel	13	DTrip Reidao Emphy savemyluggage TravelFeed Trippki Etherisc Flight Delay Insurance TOURISTTOKEN Travala Atlas TravelChain Steemitworldmap Let's Eat
Traveling	7	GlobalMiles CryptoCrib Emphy TravelFeed Travala AirBits Atlas
Tourist	1	TOURISTTOKEN
Flight	8	Flight Assurance Etherisc Flight Delay Insurance InsurETH QR Code Analytics Kato HODL My Beer Blocknative savemyluggage

As it can be seen from Table 2, some of the DApps are overlapping for different keywords. This is due to using multiple keywords to tag each application. There were no Dapps marked with tourism tag. This might be due to using tourism keyword less frequent than travel or traveling keywords. In addition to these DApps, Nam et al. (2019) reported some other Dapps for smart tourism as well. For example, Globaltourist is an Instagram-like application where travellers post user-generated content to earn coins. Additionally, LockTrip aims to replace the traditional travel agencies as this application acts as an online

travel agency without any commissions. Trippki enables users to book hotels, flights by using smart contracts. Roomdao also offers similar services by targeting small businesses in the tourism sector. When these applications are compared, there is one common point among all of them while the main idea behind the applications are similar. All of these applications are powered by blockchain, completed an ICO process whether it was successful or not and have their own cryptocurrencies. Therefore, these applications try to eliminate different payment methods to purchase different services and unite all payments on the same platform and by using the same currency.

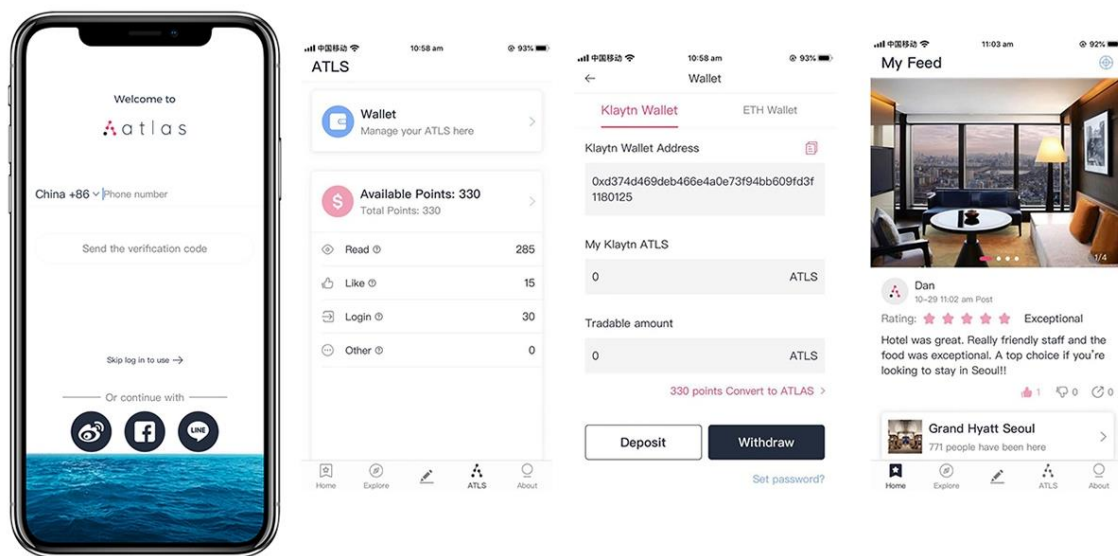


Figure 22. Atlas DApps general overview. *Adapted from Atlas, 2020.*

Source: <https://www.dapp.com/app/atlas> >

Figure 22 shows a general overview of Atlas Dapp. As it can be seen from the images above, this application looks like a smartphone application. A user needs to create an account by entering a valid phone number. Then, a verification code is sent to this phone number. Users can also prefer connecting with Facebook or Line. After creating an account, the user will log in to the application. The log in process is the same as any normal smartphone or desktop application. The user needs to add a digital wallet on the application. The most challenging part of using a Dapp can be this part. Users need to create a digital wallet which operated on the blockchain. Afterwards, users can load money to their accounts and start using their accounts to pay for their travel expenses. As users pay for hotels and flights by using the Atlas Dapp, they will at the same time earn reward

points. These reward points are collected on the application interface. Later, after completing a flight or staying at a hotel, users can review these services. All reviews are recorded on a blockchain which produces immutable records. Moreover, users can see the comments generated by other users in their news feed.

When this application structure is considered, it can be seen that Dapps are in fact almost same as regular applications on the App Store or Google Play. A regular application user can easily discover and use these Dapps.

3.7.2. Dapp Implementations in Tourism Industry

As stated above, there are different Dapps in the tourism industry. However, when Table 2 is considered, it can be seen that the options are limited for tourism participants. All of the applications are targeting end-users in other words travellers. But tourism sector has other participations such as suppliers, hotel staff etc. Accordingly, there is a huge gap in the sector in terms of blockchain applications. On the other hand, there are few studies on the theoretical application of blockchain in the tourism and hospitality sector by considering the service provider side. Dogru, Mody and Leonardi (2018) expressed that blockchain applications for the hotels can enable better customer tracking from the flight to check-in to the hotel. When guests are tracked from the beginning to the end, it is possible to decrease the time losses experienced during the travel. Less waiting times can both increase customer satisfaction and decrease the costs associated with waiting.

Another possible application of blockchain technology in the tourism and hospitality industry can be considered as the loyalty programs. Loyalty programs are common across the entire tourism and hospitality sector. In these programs, guests or users are encouraged to choose the same brand in their future experiences. As guests or users choose the same brand, they earn points for their repeated selection.

In case of hotels, these loyalty points can be used for upgrading the room, having free breakfast or in some cases staying one night for free. For airline companies, frequent flyers can have class updates, use the premium lounges or purchase reward tickets by using their award points. All of these incentives encourage customers to choose the same brand. For this reason, brands in the tourism and hospitality industry opt for using loyalty programs to increase brand loyalty and the number of repeated customers.

This field also has a potential application area for the blockchain technology. Deloitte (2016) conducted a research and found that in tourism sector, digital wallets pose an opportunity to be implemented in the loyalty programs. Guests can use these digital wallets to collect the earned points from hotels or airline companies. Blockchain-based digital wallets can safely store the loyalty points and guests can use these points to earn rewards. In these digital wallets, guests who stay in a particular hotel can gain reward tokens.

Another possible application is proposed by Rejeb and Rejeb (2019) as baggage tracking. Lost baggage has been one of the most common problems in the aviation industry. BBC (2019) reported that 25 million baggage has been mishandled in 2019. While the numbers decreased from 46.9 million in 2017 and 24.8 million in 2018, the number is still high. In this case, mishandled baggage means either lost or incorrectly delivered baggage. Blockchain-based applications can significantly decrease the number of mishandled baggage. As this technology offers an immutable record and stores every information without alteration, the baggage can be recorded at the beginning of the journey and delivered safely without any mishandling situation.

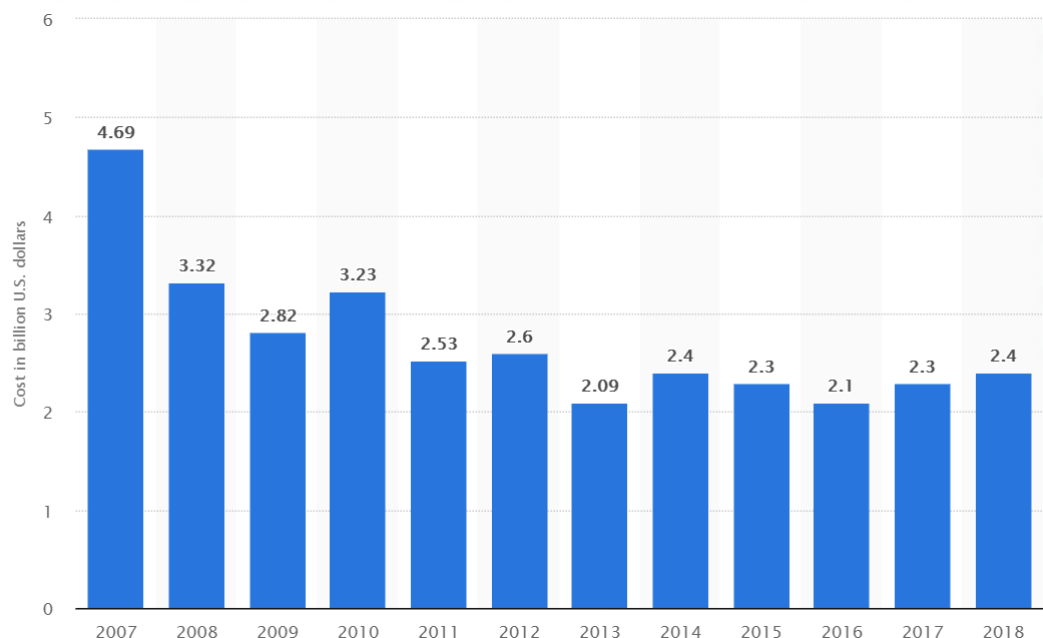


Figure 23. Cost of mishandled baggage from 2007 to 2018 (in billion US dollars). Adapted from Statista, 2020.

Source: <https://www.statista.com/statistics/268276/costs-for-the-airline-industry-due-to-mishandled-bags-since-2007/>

Figure 23 shows the statistics for the cost of mishandled baggage between 2007 and 2018 in terms of US dollars. As it can be seen from the figure, there has been a decrease in the cost since 2007. However, the numbers are still high. To reduce these numbers, higher traceability offered by blockchain technology can be a solution.

In the light of this information, blockchain has a great implementation potential in the tourism and hospitality industry. However, it is important to consider the perspectives of tourism industry participants to better understand how successful will the implementation of this technology be in this industry. As in all other technologies, blockchain needs to be adopted across different participants of the industry. The participants involve guests as well as suppliers and service providers. In general, previous studies have focused on the guests and travellers and how these participants perceive blockchain technology especially in the tourism sector. But without considering the service provider side, it is not possible to achieve the desired implementation results. Therefore, this thesis study aims to investigate the knowledge and awareness level of hotel managers and hotel staff in Turkey towards blockchain and blockchain implementation in the tourism and hospitality industry.

4. DATA COLLETION AND DATA ANALYSIS

This thesis study aims to understand the perception of hotel employees regarding blockchain and blockchain applications in the tourism and hospitality sector. For this purpose, this thesis study adopts a qualitative research method to better uncover the perception of the hotel employees. Accordingly, it is believed that qualitative research method presents empirical data about the perception of the hotel employees. In line with the purpose of this study, data collection forms an important section of this study. In this sense, before the data collection process, the research question is developed in line with the study purpose. Since this study aims to analyse the perception of hotel employees towards blockchain applications in the tourism and hospitality industry, the research questions are formed to better uncover this study problem. The main consideration in this process was to ask questions about the current blockchain, cryptocurrency and Dapp knowledge of the hotel staff. It is believed that their current knowledge level could provide important insights for the future of these applications in this sector. Furthermore, general perceptions of the hotel staff were tried to be investigated in order to understand how change and new applications in the sector might be met throughout the sector.

4.1. Data Collection and Sampling

This thesis study adopts an exploratory survey method pattern. As expressed by Nardi (2014), exploratory research methods enable the researcher to gain and gather information about a topic which is not known at a comprehensive level. This thesis study aims to discover whether blockchain and blockchain-related applications are known in the accommodation and hospitality industry and if they are known, to what extend do these applications penetrated to this industry. For this purpose, a survey with four different sections are designed. The survey designed by the researcher is applied as the main data collection tool of this study.

In line with the purpose of this thesis study, purposive sampling method is adopted. Since the main objective of this study is to measure the perceptions of the different level employees in the accommodation and hospitality industry, the universe and sample of this method are selected among the professionals working in this industry. Purposive sampling enables the researcher to choose the participating members and to test the research

question on the relevant participants rather than randomly chosen participants. The survey designed for this study consisted of four parts. First part aims to gather data about certain properties of the hotel employees. For this purpose, the first part of the survey is designed to gather demographic information about the hotel employees. The survey consisted total of 4 sections and 28 questions. The scale is designed as a 5-point Likert type scale and each question in the second, third and fourth section are marked as 1-Completely Agree, 2-Agree, 3-Neutral, 4-Disagree and 5-Completely Disagree. The first section aims to collect demographic information about the employees in the hotel sector. Therefore, a demographic information collection survey is designed and implemented.

The first sections consisted of five questions which were asking about the duty of the employee in the hotel, the region of the hotel, the experience in the current hotel, the experience in the tourism sector and how do these employees perceive their current hotel compared to another hotel in the same segment. The purpose of these questions is to determine the role of the employee and their experience in the tourism and hospitality industry. Understanding the role of the hotel staff can provide important insights about how the level of change can be implemented in the hotel. It is believed that seniors tend to have lower willingness to adapt to changes compared to lower level staff. Sirkin, Keenan and Jackson (2005) stated that when organisations try to change, the failure rate can reach up to every two companies in three companies. In this sense, change at the organisational level might be challenging. In tourism and hospitality industry, change can be initiated with a top to bottom approach.

The second part of the survey aims to investigate the satisfaction level of the employees in their hotel. It is assumed that as the satisfaction with their work increases, employees will be more open to new technologies such as blockchain and Dapps. Axtel et al. (2010) stated that when employees are exposed to new technologies at high level, openness of these employees to change might increase. However, authors also expressed that the exposure to new technologies might increase the complexity of the job which might lead to a decreased job satisfaction. In these terms, it is important to analyse the job satisfaction level of the employees in the accommodation and hospitality industry to better predict their perception towards a new technology such as blockchain and Dapps. For this purpose, the second part of the survey investigates whether employees are interested in their job, they could use their abilities and skills in their current job, they have reasonable

workload, they are satisfied with the general system of the hotel, they are satisfied with the technology use in the hotel system, they feel accomplished in their current job, they feel dynamic in their current job and they feel technology will decrease their workload. At this point, it is especially important to understand whether these employees are satisfied with the technology use in the hotel system and whether technology will decrease their workload. Having an existing technology system in the hotel management might lead these employees to be more positive about the new technology implementations such as Dapps. Furthermore, a decreased workload perception might also lead these employees to adapt new technologies faster.

The third section of this survey aims to discover the blockchain knowledge of the employees. Low level of knowledge might prevent newer technologies to penetrate to the existing system. As individuals will be afraid of the things, they know a little about, these individuals tend to escape from implementing new things in their life. When it comes to blockchain, it is a new technology as comprehensively explained above. Therefore, it is important to understand what hotel employees know about this technology. For this purpose, this section of the survey asks if hotel employees have heard about blockchain, heard about Bitcoin in particular, have good knowledge about blockchain, know how a digital wallet works, know some Dapps with blockchain technology in different sectors, know some Dapps with blockchain technology in the tourism and hospitality sector, actively use one of the Dapps and positive about integrating blockchain in my work. These questions uncover the knowledge of the tourism and hospitality employees towards blockchain and DApps.

The fourth section of this survey is designed to understand the perceptions of the tourism and hospitality employees towards blockchain integration in tourism and hospitality sector. Accordingly, questions such as I believe blockchain integration is possible in the tourism and hospitality sector, there is need for awareness about blockchain before implementing in the tourism and hospitality sector, I am looking forward to seeing some blockchain implementations in the tourism industry, I don't know how to reach if I have to use one of these Dapps powered by blockchain technology, I am confident about learning more about Dapps if they are integrated to the tourism industry, I believe blockchain can decrease my current workload, I believe blockchain can help us to offer better service for customer satisfaction and I believe blockchain implementation can have

positive impacts on our wage. Thus, hotel staff has good knowledge about blockchain, has good knowledge about Bitcoin, has good knowledge about Dapps, enthusiastic about applying DApps in the tourism and hospitality, confident about finding, using and implementing Dapps in the tourism and hospitality, open to learn these Dapps and how they are implemented, believed that DApps can decrease their workload and increase their wage and Dapps can increase the customer satisfaction in general research question generated for this study were tested by using the survey created by the researcher to reveal in-depth data regarding the perceptions of the hotel staff towards blockchain implementation in the tourism and accommodation sector. Understand how new technologies are perceived in a sector can reveal important data about the directions to be followed to turn the implementation process into successful results. Furthermore, by understand the perception of the staff, it is possible to organise training or other supportive material to make the implementation and transformation process a seamless experience.

In general, in line with the purpose of this study, it is important to investigate whether the hotel staff has good knowledge about blockchain or more specifically about Bitcoin, whether the hotel staff has ever heard of Dapps, whether they feel excited to implement DApps in the tourism and hospitality and in their hotel, what is their confidence level to find, use and implement Dapps in the tourism and hospitality, how open are they to implement these Dapps and learn about how to use these applications, whether DApps can help them in terms of workload and wage and Dapps can increase the customer satisfaction in general.

4.2. Data Analysis

The data are collected by applying the survey to selected participants. The survey is sent to 150 participants with different roles in the tourism and hospitality industry. Each survey is designed and implemented online. Participants are informed about the purpose of this study and all 150 participants of this study were volunteers. Four sections of the survey are distributed and collected simultaneously. Data collection process took approximately 1 month. In the data collection process, four sections of the survey were created by the researcher. Before sending to the participants, the survey was sent to an expert to receive an expert view. After receiving feedback from the expert, the survey was organised in the final form. The survey was applied in the English language to better test the research

question. In data collection process, the survey was sent to the participants in the electronic format. Each participant was informed about the purpose of this study as well as how to complete the survey. The instructions regarding the survey were sent with the survey itself as an electronic attachment. All participants were included in the study voluntarily. Participants were asked to complete all the answers to avoid any missing data. However, one participant failed to complete one of the survey questions. To prevent any problems in the data analysis process, the researcher contacted the participants by using the electronic mail address information provided by the participant and the missing information was completed. The detailed process about analysing this missing data is explained in detail below. After all the answers are collected, data analysis stage is initiated. In the data analysis process, IBM SPSS version 26 was adopted. All the data collected from the participants are analysed. Collected data are tested for the research question given below.

4.3. Research Question Testing

In the data analysis process, total of 5 research questions were tested. These research questions were formed in line with the study purpose. The main purpose of this study is to understand how the employees in the tourism and accommodation sector view blockchain and its applications called DApps. It is believed that blockchain has become one of the most popular and adopted fields in the last decade. Since the internet, blockchain and cryptocurrencies are the second most important and ground-breaking subjects in the digital world. Accordingly, it is believed that the individuals working in the tourism and accommodation have good knowledge, interest, motivation and positive views about this topic. Based on this assumption and the purpose of this study, the following research questions were formed and tested in the following sections of this study.

1. There is a good knowledge about blockchain and Bitcoin applications among hotel staff in tourism and hospitality.
2. Individuals working in the tourism and hospitality sector are enthusiastic about blockchain implementation in the tourism and hospitality sector.
3. Individuals working in the tourism and hospitality sector are confident about how to use DApps in the tourism and hospitality sector.
4. Individuals working in the tourism and hospitality sector are open to learn more about blockchain and blockchain implementations in the tourism and hospitality sector.
5. Individuals working in the tourism and hospitality sector believe that blockchain can decrease their workload and increase their payment and can significantly increase the customer satisfaction.

5. FINDINGS

This section provides the findings obtained from the data analysis. The data collected from the survey were analysed with SPSS package program version 26. The first section provides the general demographic properties of the hotel staff. Learning more about the demographic properties of the hotel staff can provide more detailed information to interpret the data obtained from the participants. The second section tests the research question presented above and shows whether the results match with the research question. The main research question tested in this study in line with the purpose of this study were hotel staff has good knowledge about blockchain, has good knowledge about Bitcoin, has good knowledge about Dapps, enthusiastic about applying DApps in the tourism and hospitality, confident about finding, using and implementing Dapps in the tourism and hospitality, open to learn these Dapps and how they are implemented, believed that DApps can decrease their workload and increase their wage and Dapps can increase the customer satisfaction in general.

Table 3. Hotel staff employment status.

Duty in Hotel			
		Frequency	Percent
Valid	Hotel Manager	50	33.3
	Hotel Director	40	26.7
	Staff	31	20.7
	Other	29	19.3

As seen from Table 3, majority (33.3%) of the hotel staff participated in this study works as a hotel manager. This is followed by hotel director (26.7%), hotel staff (20.7%) and other personnel in the hotel (19.3%). According to this data, it is possible to understand the views of the upper management in the tourism and accommodation sector towards blockchain and DApps as 60% of the participants have an upper management role.

Table 4. Hotel distribution by region.

Hotel Region			
		Frequency	Percent
Valid	Mediterranean	52	34.7
	Aegean	37	24.7
	Marmara	18	12.0
	Black Sea	23	15.3
	Other	20	13.3

Table 4 shows the hotel distribution in this study. According to this data, it can be seen that 34.7% of the hotels are in the Mediterranean region, 24.7% are in the Aegean region, 15.3 are in the Black Sea region, 13.3% are in other regions (Central Anatolia, Southeast Anatolia, East Anatolia) and 12.2% are in Marmara region.

Table 5. Work experience in their current hotel.

Experience in Current Hotel (in years)			
		Frequency	Percent
Valid	Less than 1 year	48	32.0
	1-5 years	56	37.3
	5-10 years	27	18.0
	More than 10 years	19	12.7

Table 6. Work experience in the tourism and hospitality industry

Experience in Tourism and Hospitality Industry			
		Frequency	Percent
Valid	Less than 1 year	25	16.7
	1-5 years	46	30.7
	5-10 years	48	32.0
	More than 10 years	30	20.0
	Total	149	99.3
Missing	System	1	.7

Table 5 and Table 6 shows the experience of the hotel staff in their current hotel and in the tourism and hospitality sector respectively. Table 5 showed that 37.3% of the hotel staff had 1-5 years of experience, 32.0% had less than 1 year of experience, 12.7% had more than 10 years of experience and 18.0% had 5-10 years of experience. These results show that hotel staff in general have low level of experience in their current hotel. Table 6 shows that 32% had 5-10 years of experience in the sector, 30.7% had 1-5 years, 20% had more than 10 years and 16.7% had less than 1 years of experience.

There was one missing answer in this question. The missing data was only observed in the general work experience in the tourism and hospitality industry. Missing data can lead to a problem during the data interpretation and data analysis process. For this purpose, the staff participant was notified about the missing data and asked to complete the data. The participant was later contacted and the missing answer to this question was collected. After contacting the participant, the missing data was completed. Accordingly, the data analysis was conducted by replacing this missing data with the actual data. However, the initial missing data condition is presented here to reflect how this situation was corrected.

Table 7. Perception of the hotel staff about their hotel.

Current Hotel Perception Compared to Other Hotels in the Same Segment			
		Frequency	Percent
Valid	Superior	24	16.0
	Better	93	62.0
	Same As	25	16.7
	Worse	8	5.3

Although the majority of the hotel staff (69.3%) has less than 5 years of experience in their current hotel, most of them tend to perceive their hotel better than another hotel in the same segment. Perception about the hotel is an important property to analyse the data obtained for further analysis. If a hotel staff is not satisfied with the current hotel, that staff might perceive every component as negative. Therefore, having a generally positive view about the hotel they are working in can benefit to the results of this study. Furthermore, an individual with positive attitude towards the work environment might be more open to changes in that environment. Wanberg and Banas (2000) stated that low job satisfaction might lead to low change acceptance levels. Accordingly, it is important to achieve a high job satisfaction level to ensure changes in the organisation are propagated and accepted faster. To measure the satisfaction levels and job satisfaction perceptions of the hotel staff, the perception of the hotel staff regarding their hotel were asked. It is believed that individuals who perceive their hotel better than other hotels have higher level of job satisfaction compared to individuals who perceive their hotel worse than others.

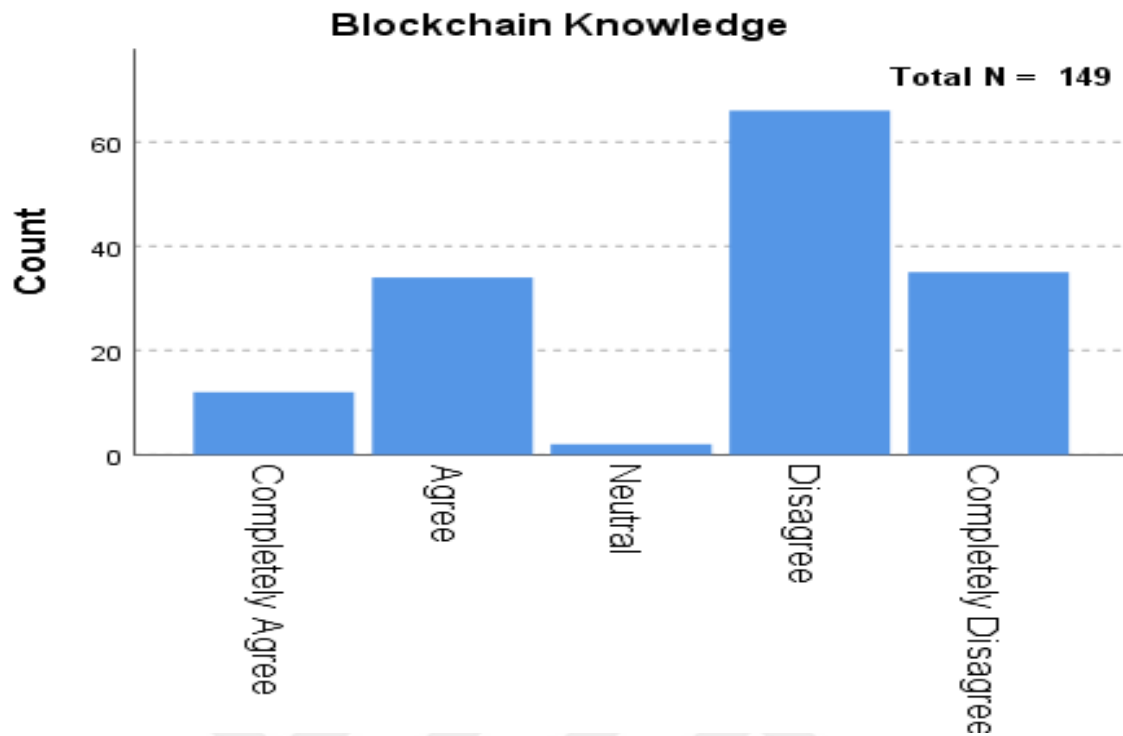


Figure 24. Blockchain knowledge of the hotel staff

The perception of the hotel staff working in the different regions in Turkey were measured and analysed with a 5-point Likert type scale. The research question was tested with one-sample test. In H1, it is assumed that hotel staff have a good blockchain knowledge. However, as seen from Figure 24, total of 67.3% had not heard about the blockchain technology before. On the other hand, total of 30.7% of the participants have somehow heard about this technology. Based on these results, it can be clearly seen that employees in the tourism and hospitality sector has low level blockchain knowledge. In terms of departments, the individuals working as staff had better blockchain knowledge than the individuals working as a hotel manager or hotel director. However, the difference was not statistically significant ($p < 0.05$). The reason for this might be the free time the staff had compared to the higher levels or the willingness to make more money from a side job. However, the questions designed for this study do not aim to measure the underlying reasons for this difference. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff in the Mediterranean and Marmara region had better knowledge than the hotel staff in Aegean, Black Sea or other regions. The main reason for this might be due to the fact that the hotel staff working in the Mediterranean and Marmara region are more open to technologic developments and

tourists from different countries. The hotel staff working in these regions might have learned about blockchain technology from the customers talking about this technology at their hotel. Since the hotels in Aegean, Black Sea and other regions in Turkey serve more to local tourists, the knowledge of the hotel staff in these regions might be at low level.

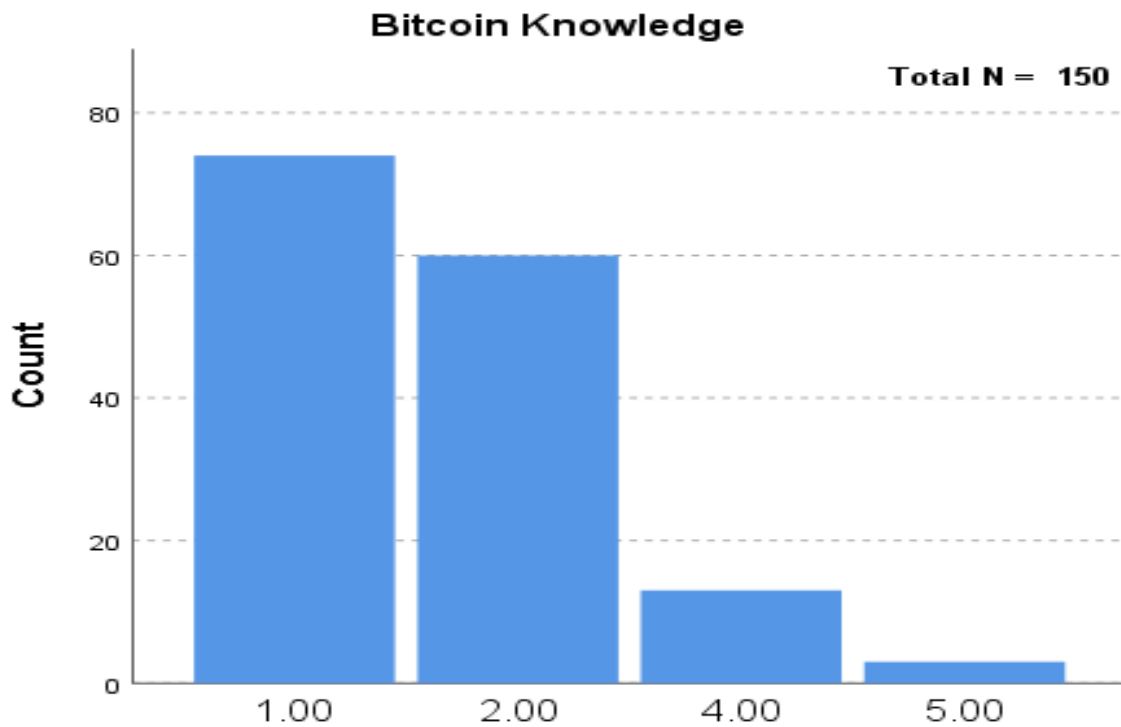


Figure 25. Bitcoin knowledge of the hotel staff.

On contrary to blockchain knowledge, majority of the hotel staff (89.3%) have heard about Bitcoin. Only 10.7% of the staff have not heard about Bitcoin. In fact, Bitcoin is a by-product of the blockchain technology. Yet, as the data indicated, hotel staff fails to associate the blockchain technology and the Bitcoin. The reason differences between the answers to blockchain knowledge and Bitcoin knowledge might be caused by this lack of association. H2 was supported with the data collected from the participants. While the hotel staff had insufficient knowledge about the blockchain, it can be clearly seen that the Bitcoin knowledge of the hotel staff is at higher level. This might be due to being exposed to Bitcoin in their daily life such as news, internet or their conversations with their friends. On contrary, exposure to blockchain might be at low level as this topic is less covered in the traditional media and social media compared to Bitcoin and other cryptocurrencies. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions had sufficient

knowledge about Bitcoin. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for Bitcoin knowledge as almost all the hotel staff knew about Bitcoin.

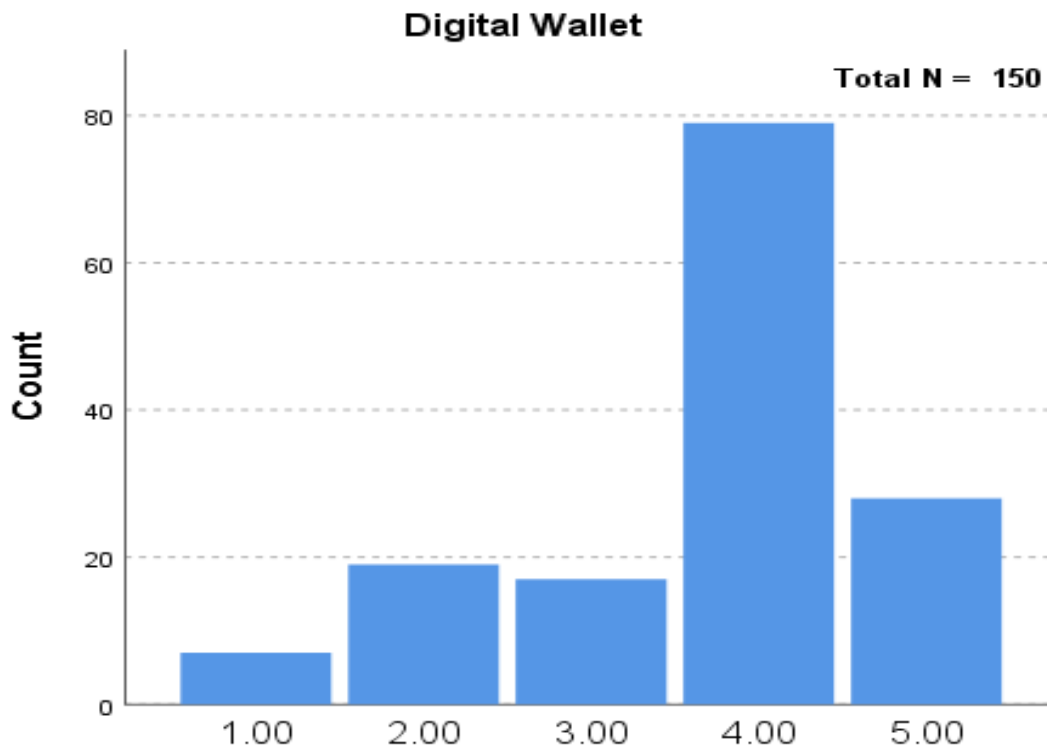


Figure 26. Digital wallet knowledge of the hotel staff.

As seen from Figure 26, the digital wallet knowledge of the hotel staff is at low level. 71.4% of the participants had no knowledge about the digital wallets. Only 17.4% of the participants had knowledge about the digital wallets. On the other hand, 11.3% had heard about these wallets but do not have detailed knowledge about how to use a digital wallet or what a digital wallet looks like. This knowledge is important in two aspects. First, digital wallets are one of the blockchain applications that are required to use and store the cryptocurrencies. Therefore, individuals need to know and use these wallets in order to utilise the blockchain technology. Second, the knowledge about the digital wallets is also an integral part of the blockchain and Dapp knowledge. Most of the Dapps use digital wallets as expressed in the previous sections of this study. Therefore, anyone who will use and integrate a Dapp to any sector must know about these wallets and how to use them. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions had almost no

knowledge about digital wallets. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for digital wallet knowledge as almost all hotel staff had no knowledge about the digital wallets.

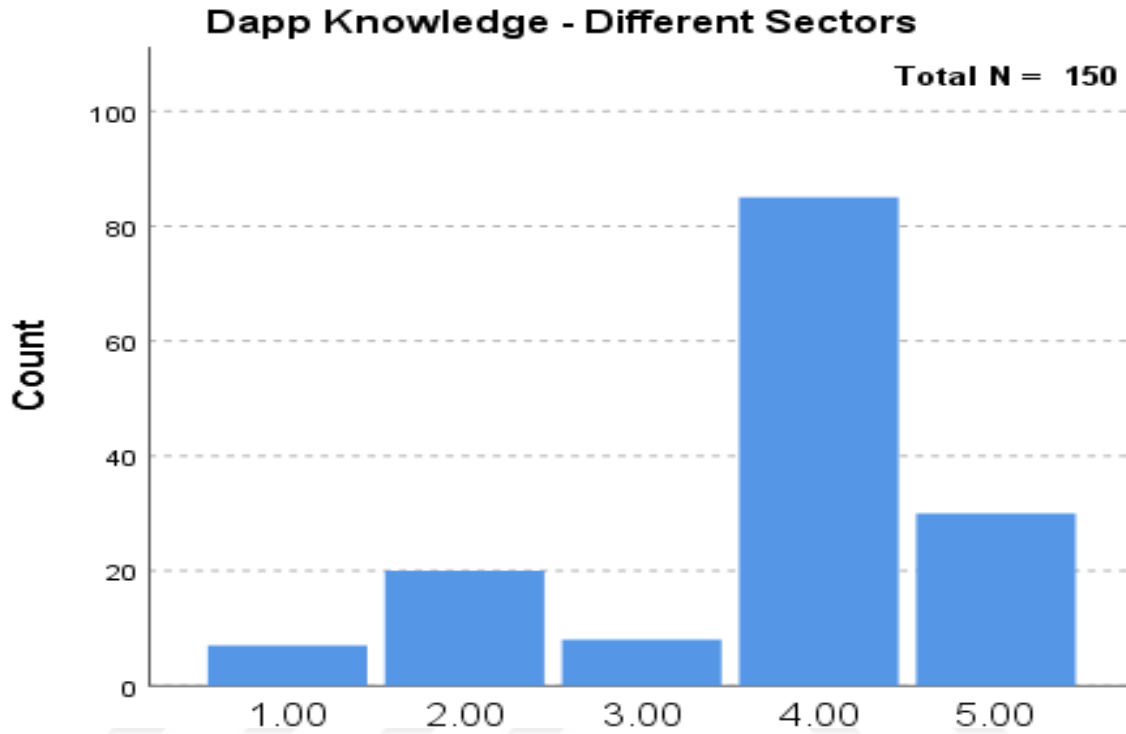


Figure 27. Dapp knowledge of the hotel staff.

Figure 27 shows that the hotel staff has a limited knowledge about Dapps in tourism sector as well as in other sectors. The data revealed that 76.7% of the hotel staff had no knowledge about any DApps in different sectors. In terms of tourism and hospitality sector, this percentage increase to 79.4%. It can be seen that the number of hotel staff who has knowledge about Dapps in other sectors is less than the number of hotel staff who has knowledge about Dapps in the tourism and accommodation sector. H3 expressing that hotel staff has a good knowledge about Dapp was not supported by the data collected from the participants. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions had almost no knowledge about Dapps. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for Dapp knowledge as almost all hotel staff had no knowledge about Dapps

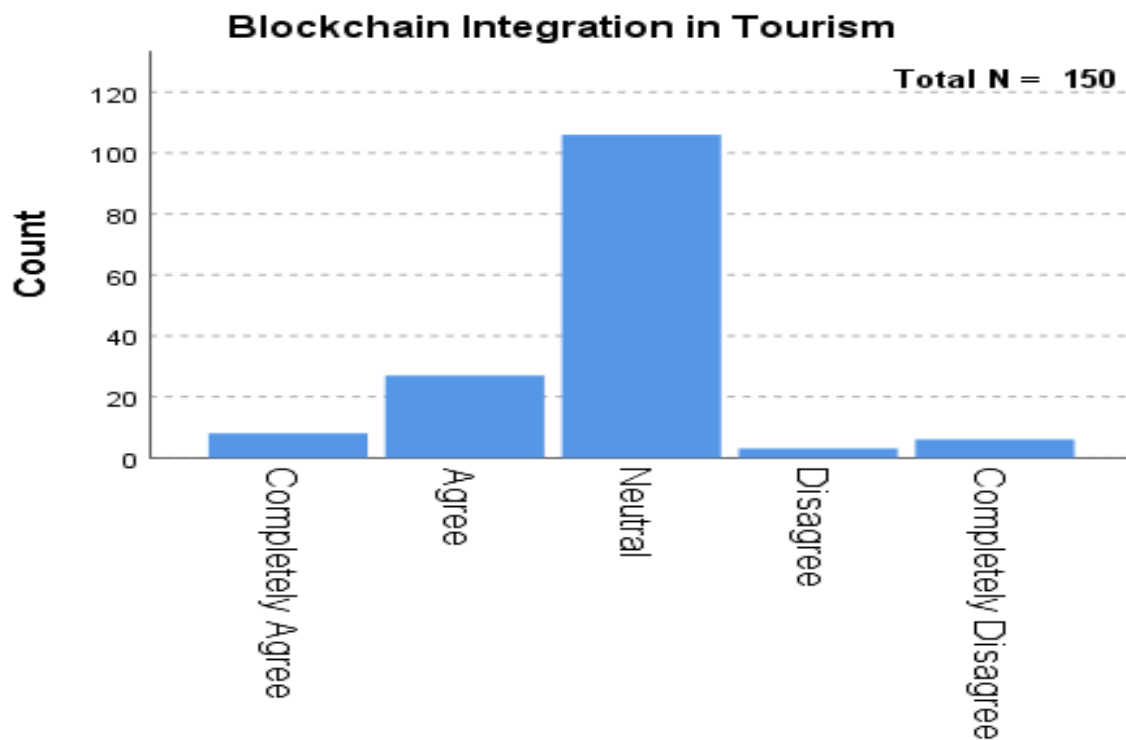


Figure 28. Perceptions towards blockchain integration in tourism and hospitality sector.

As seen from Figure 28, majority of the participants (70.7%) are neutral about the blockchain integration in tourism and hospitality sector. Only 23.3% of the participants agree that blockchain can be integrated in the tourism and accommodation sector. However, only 6% believe that such integration is not possible. H4 argued that hotel staff were enthusiastic about the blockchain integration in this sector. Yet, the data revealed data hotel staff are indecisive about such integration. This might be caused by several reasons. As expressed above, the blockchain knowledge is at low level compared to Bitcoin knowledge. This low knowledge level might be one of the key reasons for the indecisive approach of the participants. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions were neither positive nor negative about blockchain application in the tourism industry. However, the individuals working at the lower levels of the staff completely agreed or agreed with that fact that blockchain integration into tourism sector can introduce benefits. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for blockchain integration in the tourism sector as the hotel staff from all regions were neither positive nor negative about blockchain application in the tourism industry

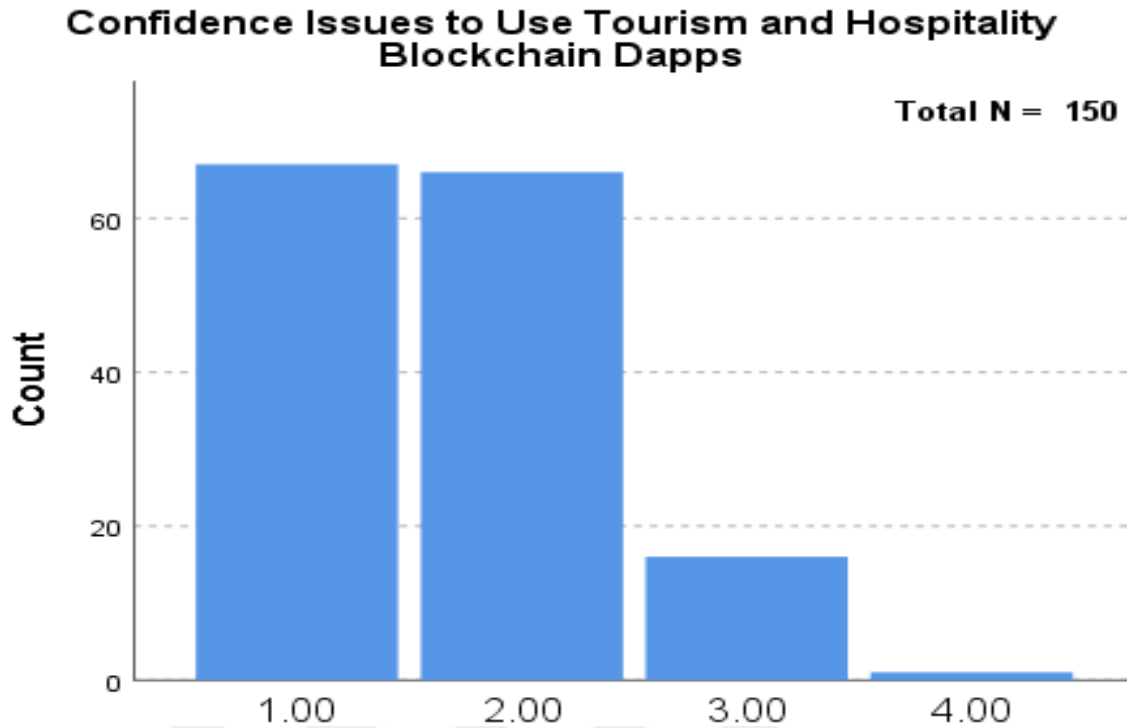


Figure 29. Confidence about finding, using and implementing about Dapps in tourism and hospitality sector.

As it can be seen from Figure 29, participants have low confidence level about finding, using and implementing about Dapps in tourism and hospitality sector. 88.7% of the participants expressed that they do not have any knowledge about how to find, use or learn about these DApps. Only 1 participant expressed that it is possible to find, use and implement Dapps. When this data is considered, this might be highly related to low blockchain and Dapp knowledge level. Participants have low level of Dapp knowledge not only in the tourism and hospitality sector but also in other sectors as well. This lack of knowledge might lead to decreased self-confidence about finding, using and implementing new technologies such as Dapps. Furthermore, as the participants are experienced in this sector for a long time, they might not opt for changing the existing systems in their operations. Accordingly, H5 that expressed confidence about Dapp applications was not supported. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions had concerns and doubts about blockchain integration in the tourism industry. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for concerns about blockchain in the tourism sector as the hotel

staff from all regions has certain doubts and concerns blockchain application in the tourism industry. Since the survey was not designed as an open-ended survey, the nature of the concerns and issues related to blockchain application in the tourism industry are unknown.

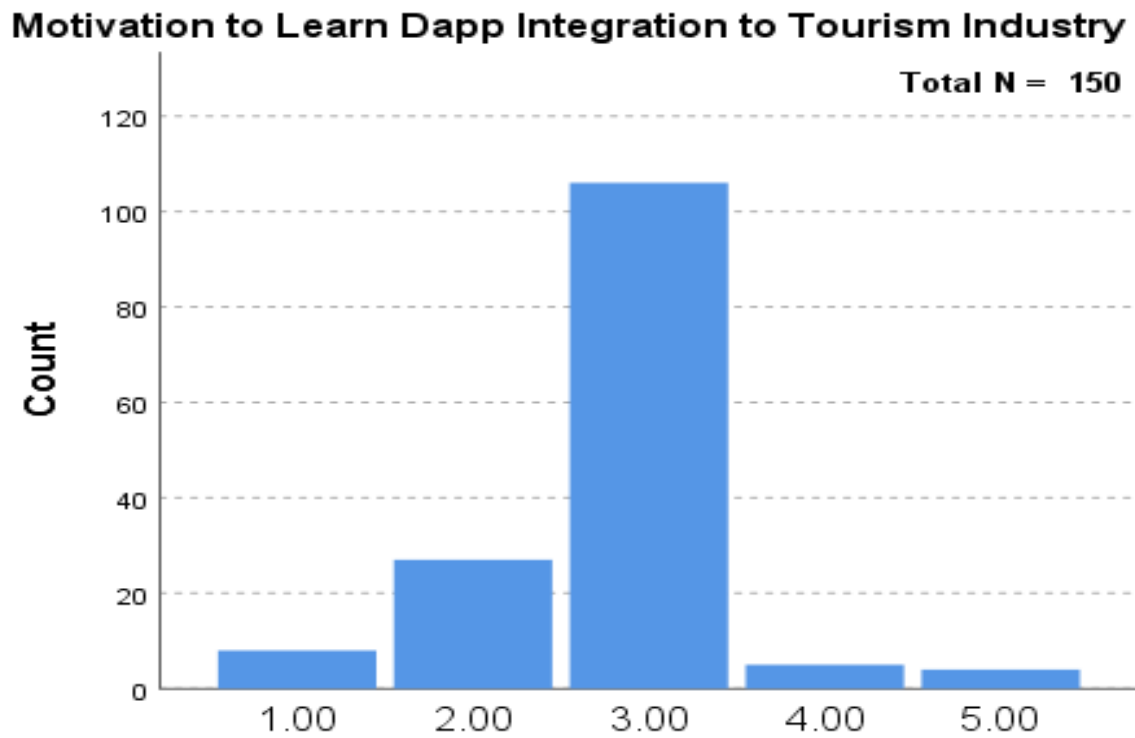


Figure 30. Motivation to learn how to integrate DApps in tourism sector.

Although the motivation of the hotel staff to learn the integration and usage of Dapps in the tourism sector was not investigated as a research question, it is important to show the obtained data to complement the 5 research questions expressed above. The data obtained from the analysis showed that 70.7% of the participants do not have the sufficient motivation to learn and implement these applications. Only 23.3% of the participants expressed to have a high and extremely high motivation to learn and implement Dapps in their sector. Lack of knowledge and closeness to new technologies might be the main reason for this result. Furthermore, as majority of the participants perceived their hotel to be superior or better than other hotels in the same segment, these participants might prefer to sustain the existing technology and systems in their hotel. Accordingly, these participants might not be open to change or do not have the sufficient motivation to challenge their existing knowledge and practices. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions had neither positive nor negative motivations about

learning Dapp integrations in the tourism industry. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for motivation to learn Dapp integration in the tourism sector as the hotel staff from all regions were neither positive nor negative about the motivation to learn Dapp integration in the tourism sector.

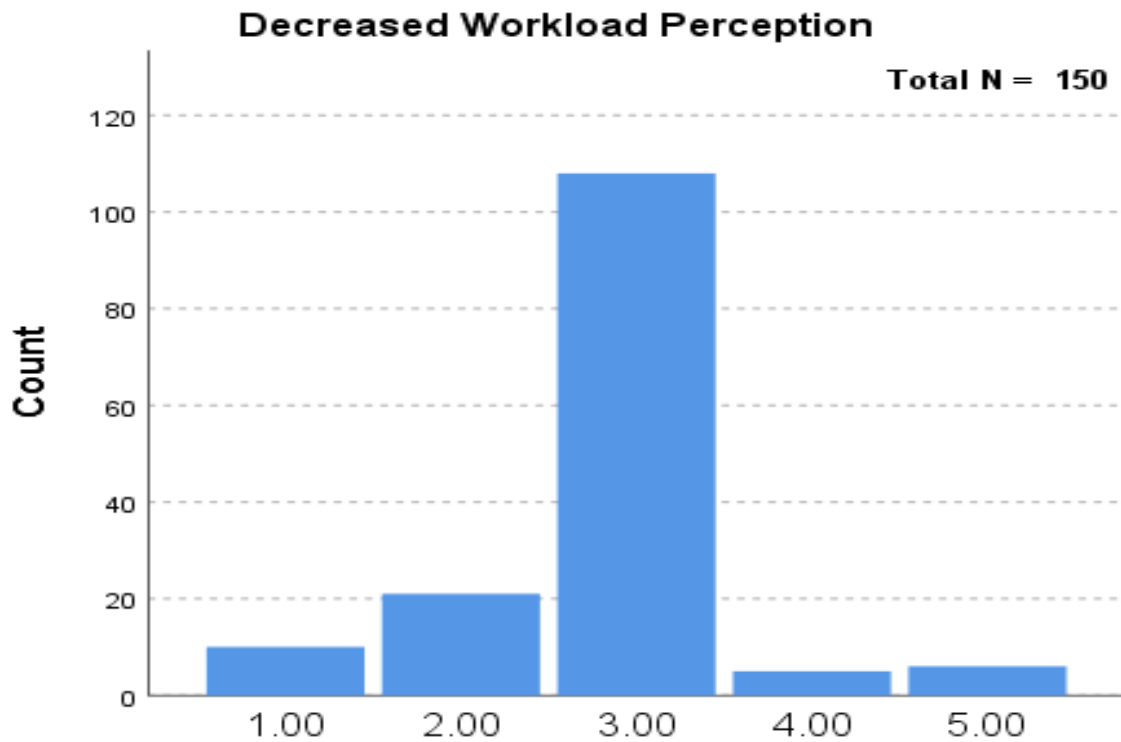


Figure 31. Decreased workload with Dapp application in tourism and hospitality sector.



Figure 32. Increased wage with Dapp application in tourism and hospitality sector.

As shown by Figure 31 and Figure 32 respectively, participants are neutral about whether Dapps in their industry can contribute to their work in any sense. As seen from Figure 31, 72% believed that Dapps implemented in their sector will not make difference in terms of workload. Only 20.7% believed that these implementations can have a positive impact on their workload and decrease their workload in general. Figure 32 shows that 73.3% of the participants believed their wage will not change if Dapps are implemented in the sector. 20.7% believed that Dapps in this sector might improve their wage. These might be caused by two main reasons. These data are important in two terms. First, lack of knowledge about blockchain might prevent the participants to completely evaluate the possible benefits of this technology. Second, as the participants have long experience in the tourism and hospitality sector, they might have seen that some of the new technologies tend to make no changes rather than creating a benefit in favour of the employee. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions believed that blockchain integration in the tourism sector will have no effect on the workload or wages. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference wage and workload benefits of the blockchain technology

integration as the hotel staff from all regions were neither positive nor negative about wage and workload improvement of the blockchain integration.

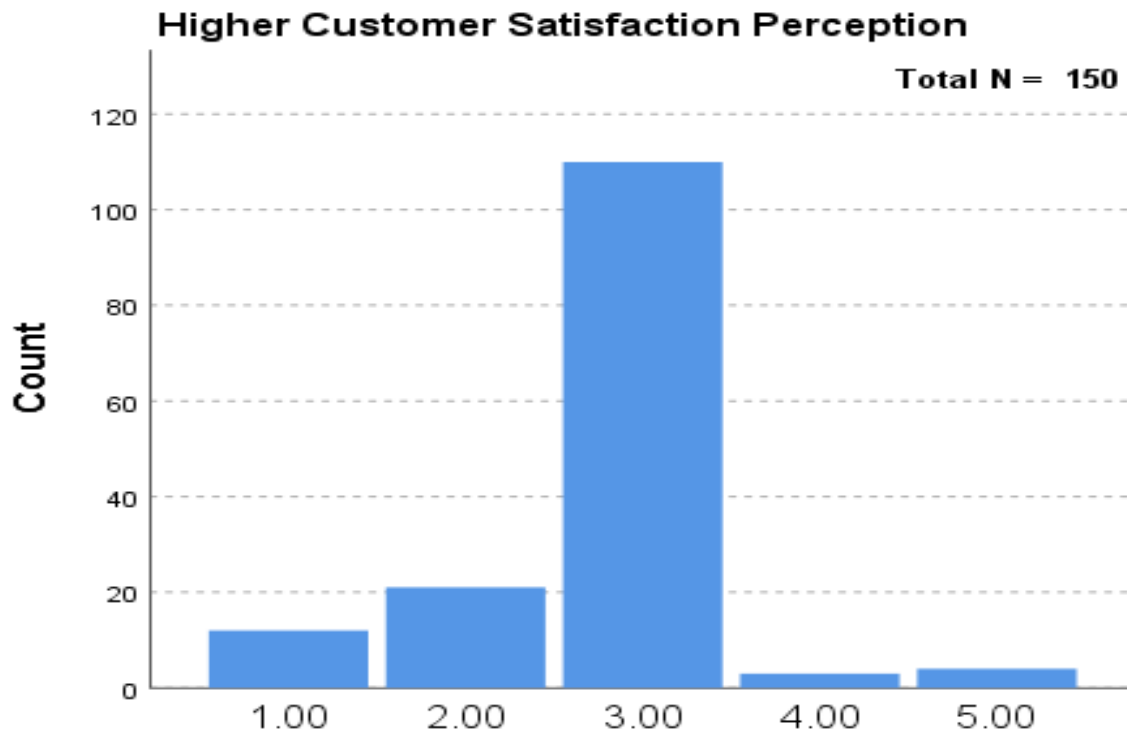


Figure 33. Customer satisfaction level with Dapp application in tourism and hospitality sector.

To support the 5 research questions of this study, additional questions were asked to the participants. One of these questions is related to the change in customer satisfaction level in case of Dapp applications are applied in the tourism and hospitality industry. Figure 33, 73.3% of the participants are neutral about this view. Only 22% of the participants believed that customer satisfaction can be increased with DApp applications. On the other hand, 4.7% believed that it is not possible to increase customer satisfaction by implementing DApps in the tourism and accommodation sector. When the results are compared in terms of positions at the hotel, there was no significant difference as the majority of the hotel staff from all levels and positions believed that blockchain integration will have no effect on the customer satisfaction. In terms of the hotel location (Mediterranean, Aegean, Marmara, Black Sea or other region), the hotel staff showed no difference for customer satisfaction that will be introduced with the blockchain integration to the tourism industry as the hotel staff from all regions were neither positive nor negative

about customer satisfaction that will be introduced with the blockchain integration to the tourism industry.

When the obtained data are considered, this study reveals surprising results. The research question of this study suggested that hotel staff has good knowledge about blockchain, has good knowledge about Bitcoin, has good knowledge about Dapps, enthusiastic about applying DApps in the tourism and hospitality, confident about finding, using and implementing Dapps in the tourism and hospitality, open to learn these Dapps and how they are implemented, believed that DApps can decrease their workload and increase their wage and Dapps can increase the customer satisfaction in general. However, when the data obtained from the participants were analysed, all of the research questions except H2 (there is good knowledge among hotel staff working in the tourism and hospitality) were not supported. Data obtained from the participants only supported the H2. When the findings of this study were considered, hotel staff had low level blockchain knowledge which was assumed to be high in the beginning of this study. On the other hand, Bitcoin knowledge among the hotel staff was high.

One of the main reasons for low level of knowledge might be due to high experience in the tourism and accommodation industry. Individuals who are working in this sector for a long time might be used to the current systems they are using. Any change in the existing system might decrease their overall efficiency as they will need to learn and adapt to new technologies and systems. Accion (2019) suggested that each business in the sector should find new ways to the changing technology as this could increase the general business effectiveness. However, this knowledge might not be present in the tourism and hospitality industry which might result in resistance against new technologies. Ellen, Bearden and Sharma (1991) stated that business need technological innovation in order to continue working in their sector. The authors showed that as the consumers use a new product better and more efficiently, these individuals tend to be more positive about the change and less resistant to new technologies changes. When the findings of the current study are considered, the results are similar to this finding. Majority of the participants responding to the survey in this study showed that they have limited knowledge about this new technology. Thus, these participants have low motivation to learn about this new technology, adapt this technology to their work and believe that this technology will provide benefits in terms of workload, wage and customer satisfaction.

6. DISCUSSION AND RECOMMENDATIONS

This thesis study explores how blockchain and blockchain applications were perceived by the employees in the tourism and accommodation industry. For this purpose, a survey was created and applied to the individuals working in the tourism and hospitality industry. Total of five research questions were created and tested in this study. These research questions aim to measure the new technology adaptation possibilities in the tourism and hospitality industry by considering the views of the employees in the sector. First, it was assumed that hotel staff has a good knowledge about blockchain and blockchain-related applications among hotel staff in tourism and hospitality. The second research question was that hotel staff has a good knowledge about Bitcoin among hotel staff in tourism and hospitality.

These two research question aim to measure the blockchain and cryptocurrency knowledge of the hotel staff. Without measuring this knowledge, it is not possible to assess the openness and willingness of the hotel staff to adopt blockchain applications in tourism and hospitality sector. The third research question was that individuals working in the tourism and hospitality sector should know more about blockchain and blockchain-related applications. The fourth one was individuals working in the tourism and hospitality sector are enthusiastic about blockchain implementation in the tourism and hospitality sector. The fifth research question aimed to measure Dapp usage in tourism and hospitality sector by stating that individuals working in the tourism and hospitality sector are confident about how to use DApps in the tourism and hospitality sector. All these assumptions were tested by collecting answers from the participants. Also, additional data to support five research questions are provided. This additional data aims to clarify the research question proposed in this study. The answer collected from the participants were analysed in a statistical package program as explained in the method section of this thesis study. Thus, when the answers collected from the participants were investigated, this thesis study revealed some important findings. Since there are limited number of studies on blockchain applications in the tourism and hospitality industry, it is believed that this thesis study will be an important starting point to the future studies in this area. This section presents the results obtained from this study, limitations of the current study and some recommendations for the future studies in the tourism and hospitality sector to analyse blockchain and blockchain related implementations.

This thesis study has been conducted in Turkey. Countries such as Turkey depend on labour-intensive service sectors such as tourism and accommodation. Without improvements and developments in these sectors, such countries will struggle to attract new customers and meet the evolving demands of these customers. Tourism is one of the major income areas of Turkey. Therefore, there is high interest and efforts to improve this sector in different regions of Turkey.

The number of international and domestic tourists accommodating in Turkey in 2016 were 14.269.381 and 22.676.261 respectively. The total number of international and domestic tourists in Turkey account for 36.945.642 in 2016. The numbers show that Turkey has a high potential in tourism and hospitality industry. Both international and domestic tourists prefer different accommodation facilities in Turkey. The data revealed by the Ministry of Tourism and Culture shows the distinction of the accommodation type in Turkey. The number of tourists visiting Turkey are at the highest level for tourists coming from Germany. Germany was followed by England, Russia and Holland. The number of tourists from these countries provide important insight about the direction of the tourism in Turkey. Germany, England, Russia and Holland have individuals with high technological knowledge level. Individuals in these countries tend to use technology in their life. Therefore, tourists and guests from these countries might be more open to see technological implementations such as blockchain application in the tourism and accommodation industry. The high level of technological knowledge of the hotel staff might increase the overall customer satisfaction. However, the results of this study showed that the blockchain knowledge of the hotel staff as at low level.

In this sense, it is believed that technology and new technological developments play an important role in the improvement of tourism and accommodation. Furthermore, it is believed that employees working in the tourism and accommodation sector should have a good knowledge about these new technologies and should be open to change that comes with these new technologies. The openness and good knowledge about new technologies such as blockchain can help these employees in the tourism and accommodation sector to better meet the needs of the new generation and tech-savvy guests. When the data revealed by the Ministry of Tourism and Culture is considered, it is believed that investment in technology in tourism and hospitality industry might lead to increased number of tourists as well as higher guest satisfaction in this sector.

In recent years, the world is evolving and changing with an unprecedented speed. New technologies are emerging all around the world. These technologies have been implemented in different sectors and industries. Increasingly, businesses and individuals are adapting these technologies in their daily lives. At this point, it is important for both businesses and individuals to have the skill set to adapt these changes. The world has been changing since the Industrial Revolution. There have been various turning points in the history that marked how technology affected our ways of life. Industrial Revolution has been the key turning point in the history of humankind.

There has been changes since 1794. There has been on going changes in terms of technology from that date until today. With the start of first Industrial Revolution in the 18th century, the manufacturing has significantly evolved. The mechanisation process as well as steam power and weaving loom were considered to be the major changes in terms of technology. Later in the 19th century, 2nd Industrial Revolution have changed the manufacturing once again. In that period, mass production, assembly lines and electrical energy increased the entire speed of manufacturing. With these developments, businesses were able to manufacture more products in shorter period of time. This accelerated production also led to increased consumption. Industry 3.0 which emerged in 1960 have changed the entire way of operations. Automation, computers and electronics introduced new means of manufacturing and consumption. In that period, consumption has shifted from products to services. The service industry started to gain importance and larger share in the market. Tourism as a service industry has also started to be more popular in that period. Industry 4.0 that marks today is related to technological advancements including blockchain, internet of things, cyber physical objects and networks. The current Industrial Revolution is the result of the internet. In the last two or three decades, internet has become an indispensable part of our daily lives. The consumers are using internet in every field of their lives from purchasing a product to booking an hotel. Accordingly, tourism and hospitality sector is facing significant shifts as technology penetrates to this sector as well.

Similar to all these changes around the world, different sectors are also being affected from such changes. Like many other sectors, tourism and hospitality is also being influenced from technological developments. Accion (2019) emphasised that businesses should explore new ways to utilise technology to increase the overall business effectiveness. This is also valid for the tourism and hospitality industry. While tourism and

hospitality industry is a labour-intensive service sector in general, technology has been integrated in different parts of the sector. For example, almost all hotel and accommodation facilities are using online booking services and customer management services.

If the businesses in different sectors and especially in tourism and hospitality sector fail to adapt to technological changes, there will be significant consequences. Ellen, Bearden and Sharma (1991) stated that to sustain any business in any sector, innovation and technological changes are required. Without such technological changes and innovations, businesses will fail to keep up with the ever-evolving technologies.

New technologies and innovations bring together different advantages to the businesses. While these new technologies offer advantages, the businesses should be able to utilise from these opportunities and advantages as well. World Economic Forum (2018) explained that technology and especially new technology can increase the speed of the business operations. In today's world, speed and efficiency are the two key elements to drive a business and a sector. Without speed and efficiency, consumers tend to choose the competitors who can deliver the speed and efficiency requirements. In this sense, technology can be regarded as a necessity to improve the business operations as well as the services provided to the customers. Businesses in different sectors must be open to changes and what these changes have to offer to their business and to their sector in general.

One of these technological advancements is the blockchain technology. While the blockchain technology is relatively new, it has gained attention in different sectors. C-level manager participants of Deloitte 2019 Blockchain Survey stated that the blockchain technology offers certain benefits when compared with the traditional business models. Furthermore, the report showed that the C-level managers perceived new business model and value chains as an advantage in terms of blockchain technology. While this report only reveals the views of the senior managers in different sectors, blockchain technology has been spreading at different levels. Both managers and employees at different levels are interested in the innovations that might be offered by the blockchain technology.

Accordingly, there has been an increasing interest towards blockchain and blockchain application both in the academic literature and in practice. However, the number of academic studies in this area are limited. The limited number of studies on

blockchain and blockchain applications is related to the subject being relatively new in the field.

There is limited knowledge on the implementation of the blockchain to physical sectors. Thus, the knowledge on this technology is often limited to technical studies that often involve new algorithms or new coding. It is clear that more research is needed in this field to better understand what blockchain is, to see how blockchain can be implemented to the physical sector and to explore the implementation areas that offer promising fields. In the light of all these data, this study investigated the knowledge about the blockchain technology and blockchain application in the tourism and hospitality sector.

The tourism and hospitality has different shareholders across the sector. Each of these different shareholders have different expectations, knowledge and perception towards the sector. Cooper et al. (2005) has conducted a study to determine the main shareholders in the tourism and hospitality which were found as locals, tourists, the industry itself, public sector and others. Yet, there has been different perspectives regarding the shareholders in the tourism and hospitality sector. Duanerst (2014) provided a broader scheme to identify the key stakeholders in the tourism and hospitality industry. In terms of innovation and technology in the tourism and hospitality, all of these shareholders should be included in the on-going process. However, it might be challenging to include both employees and customers in the same line. For this purpose, studies and researches that investigate the employee side, customer side and both sides are necessary.

The income generated by the tourism and hospitality can greatly benefit to the economy of the country. The domestic economy can gain strength as the tourists tend to spend foreign currencies in that country. Therefore, certain amount of investment and expenditures are required in the sector to improve the service delivery, customer satisfaction and service quality across the sector. However, it is believed that when a country invests in tourism and hospitality sector, the return of this investment is higher than the investment itself. While it might take some time and efforts to benefits from the advantages of such expenditure, the industry can greatly benefit from investment. In this sense, it is believed that investments in the technology and technologic implementations in the tourism and hospitality sector can increase the overall profits of the sector. Accordingly,

governments should make investment plans together with industry stakeholders to plan the investment scheme.

In this thesis study, the main scope of the research has been limited to the employee side of the tourism and hospitality sector. By analysing how the staff working in the tourism and hospitality perceive new technologies such as blockchain, a general perspective was gained when there is need for adopting new technologies. It is important to understand the general characteristic of the employees in the tourism and hospitality, their role in the tourism and hospitality sector and their general knowledge about the innovations around the world and especially in the tourism and hospitality sector. Thus, it is possible to position the brands and businesses in the tourism and hospitality sector by considering the technological implications and perceptions of the individuals working in this field. It is clear that without adopting a new technology at the core level, it is not possible to expand the use of technology in one sector at a broader level.

Another important point is to consider all of the shareholders that might have direct and indirect link with the tourism and hospitality industry. As expressed by Duanerst (2014) both private sector and the public sector has shareholders in the tourism and hospitality industry where these stakeholders included a broad range such as tourism suppliers, intermediaries, transport, tourism business and professional associations as well as the government, local and regional administrations, tourism organisations, NGOs (non-governmental organisations) and vocational education. All of these stakeholders play a significant role when it comes to implementation of new technologies such as blockchain. For instance, it is not possible to apply certain technologies without the government or local administration approval. Furthermore, private sectors must comply with the rules of the governments as well as international laws.

Therefore, when it comes to implementation of novel technologies such as blockchain and blockchain applications, both the private sector and the public sector must work in hand in hand for a seamless implementation process. In this sense, it is necessary to understand the needs of the private sector and what the individuals in the private sector need for a seamless implementation and integration process. Without necessary and sufficient knowledge, the individuals in the private sector especially in a labour-intensive

sector such as tourism and hospitality, employees will struggle to implement the technologies and use these technologies in their daily operations.

In line with these purposes, the first attempt of this thesis study was to investigate the roles of the staff in the tourism and hospitality sector. The role in one sector can be an important determinant for the decision-making processes. As expressed above, when an individual has a senior role in one sector or in one business, that individual might be more influential when it comes to applying and implementing the changes. Therefore, if any sector or any business desires to implement changes such as implementation of the blockchain technology, the first shareholders that should adopt the change should be the individuals in senior roles. Thus, individuals in senior roles such as hotel managers and hotel directors can influence the lower level employees such as individuals working in the reception or any other fields that require higher customer interaction. Accordingly, the results of the survey question revealed that the majority (33.3%) of the hotel staff participated in this study works as a hotel manager. This is followed by hotel director (26.7%), hotel staff (20.7%) and other personnel in the hotel (19.3%). Based on these results, it can be seen that the number of senior hotel staff in this study group was similar to the number of hotel staff working at medium or lower level.

In addition to the roles of the hotel staff, it is important to consider the distribution of the hotels in different regions of the country. In Turkey, some of the geographical regions drive more tourists than other geographical regions. This is due to the historical and natural properties of these regions. It is suggested that as the number of tourists increase in a region, the experience of the individuals working in that region will increase as well. With an increasing experience and more contact with the tourists, individuals working in an area with high number and density of tourists might be more open to innovations and new technologies. Moreover, as the individuals working in the tourism and hospitality sector contact with tourists from different countries and cultures, these employees gain the chance to learn more about these cultures and their differences with their own culture. For this reason, individuals working in a touristic area with higher number of tourists might be more open to changes.

Therefore, the second questions of the survey applied in this thesis study aimed to uncover the demographic regions of the hotels. According to this data, it was seen that 34.7%

of the hotels are in the Mediterranean region, 24.7% are in the Aegean region, 15.3% are in the Black Sea region, 13.3% are in other regions (Central Anatolia, Southeast Anatolia, East Anatolia) and 12.2% are in Marmara region. The Mediterranean region is the most popular touristic region in Turkey for both domestic tourists and international tourists. The Aegean region on the other hand is more popular among domestic tourists compared to international tourists. Nevertheless, since both regions are known for their summer vacation properties, the following results should be considered and evaluated by keeping this data in mind.

Another important finding of this thesis study that investigates the perception of hotel staff towards blockchain technology is the total experience of the hotel staff in the tourism and hospitality sector. In any sector including the tourism and hospitality sector, experience can provide certain advantages as well as certain disadvantages. In that sense, the sectoral experience was that 32% had 5-10 years of experience in the sector, 30.7% had 1-5 years, 20% had more than 10 years and 16.7% had less than 1 years of experience. When this data was considered, it can be seen that the general experience in the sector is less than 5 years. When an employee has low experience in one sector, the chance of that employee to implement changes might be low. As employees gain experience, it is possible for them to discover the problems and challenges in the sector. Without adequate experience, it is not possible to experience all aspects of a sector especially in a service sector such as tourism and hospitality industry.

In tourism and hospitality industry, employees from different levels have the chance to work in different sections. For example, an employee in tourism and hospitality sector might work in the kitchen, room services and the reception area during his or her career. The chance to work in different areas such as room service and reception gives the employee the chance to see how things work in these different areas. With this chance, it is possible for them to understand the problems faced by each section and to understand which solutions are necessary to solve these problems faced by different sections. Senior management in the tourism and hospitality sector has experience in diverse areas of the hotel. Therefore, it is possible for these individuals to see the problems and their respective solutions. Thus, these individuals might be more open to try different technological implementations such as blockchain. On the other hand, employees with less experience tend to be younger employees. In general, younger generations are more open to

technological changes compared to the older generations. Therefore, younger generation working in the tourism and hospitality might be more open to technological adaptation such as blockchain usage in the tourism and hospitality sector.

Another important answer obtained from the general demographic survey was the experience in their existing hotel. It is believed that employees who work in one hotel for a long time have higher loyalty to their hotel compared to those who work for shorter times. It was found that 37.3% of the hotel staff had 1-5 years of experience, 32.0% had less than 1 year of experience, 12.7% had more than 10 years of experience and 18.0% had 5-10 years of experience. These results show that hotel staff in general have low level of experience in their current hotel. Higher experience in one hotel can be beneficial in different ways. When an employee works in an hotel for a long time, that employee will work harder to develop and improve the hotel to offer better service to customers. This is closely linked with the loyalty of the employees towards their hotels. When the loyalty of the employees towards their hotel increases, their tendency to adopt new technologies might increase as well. Employees might believe that technology can improve their service and help their hotel in terms of finance and service quality.

After considering the demographic properties of the hotel staff, different research question was tested and the results of these tested research questions are presented. The thesis study developed 5 research questions to be tested to understand the perception of hotel managers and hotel staff towards the blockchain technology and blockchain applications called DApps. The main purpose of these five research questions is to measure the knowledge of hotel staff about blockchain technology, understand whether the hotel staff has any knowledge about the blockchain applications in different sectors and especially in tourism and hospitality sector and to discover whether hotel staff are open for applying blockchain applications to tourism and hospitality sector. For this purpose, the participants were asked if they have good knowledge about blockchain and blockchain-related applications among hotel staff in tourism and hospitality.

In line with the purpose of this thesis study, the research questions were created as follows. First, it was assumed that hotel staff has a good knowledge about blockchain and blockchain-related applications among hotel staff in tourism and hospitality. The second research question was that hotel staff has a good knowledge about Bitcoin among hotel

staff in tourism and hospitality. These two research questions aim to measure the blockchain and cryptocurrency knowledge of the hotel staff. Without measuring this knowledge, it is not possible to assess the openness and willingness of the hotel staff to adopt blockchain applications in tourism and hospitality sector. The third research question was that individuals working in the tourism and hospitality sector should know more about blockchain and blockchain-related applications.

The fourth one was individuals working in the tourism and hospitality sector are enthusiastic about blockchain implementation in the tourism and hospitality sector. The fifth research question aimed to measure Dapp usage in tourism and hospitality sector by stating that individuals working in the tourism and hospitality sector are confident about how to use DApps in the tourism and hospitality sector.

All five research questions constructed in this thesis study were based on understanding the general views in the tourism and hospitality industry. Also, additional data is collected with additional questions to support these five research questions proposed in this thesis study. The survey was designed and structured in Likert-type scale. The questions in the survey were prepared in English language and distributed to the hotel staff working in different regions in Turkey. The survey was distributed online by sending the link of the survey to the selected participants. Since this study targets the tourism and hospitality employees, the sample of the study was selected in line with the purpose of the study. Random sampling methods were not preferred as random sampling methods do not provide the desired data about specific target audience.

The first research question on blockchain knowledge of the hotel staff was tested. The results revealed that the total of 67.3% had not heard about the blockchain technology before. On the other hand, total of 30.7% of the participants have somehow heard about this technology. Based on these results, it is possible state that the blockchain knowledge among employees in tourism and hospitality industry is relatively low. Only 30% of the participants have heard about this technology and their knowledge about the technology is relatively low. The reason for low level of knowledge about blockchain might be due to the low coverage of this technology in the mainstream Turkish media. According to a news on Cointelegraph (2019), Turkey announced a blockchain strategy in its Strategy 2023 program. The document stated that “*Blockchain, which became popular with virtual*

currencies like Bitcoin, delivers a distributed communication infrastructure to provide trust between parties on transactions without the need for a central authority. This feature enables many different use cases that address transparency and reliability issues, from smart contracts to supply chains. Because it removes any intermediaries, blockchain technology builds new business models that will shape the future”. However, the only coverage of this technology can be seen in the online news portal. In this sense, there is only limited coverage level in traditional media which is still an important part of communicating in Turkey.

When a detail internet search is conducted, there is almost no other news about blockchain and blockchain applications. The lack of widespread information on blockchain and blockchain applications in Turkey may be the main reason for low level knowledge about blockchain and blockchain technologies. While there was announcement about digital Turkish lira by 2020, there has not been any concrete evidence showing any efforts of this digital currency. For this reason, the lack of media coverage might be one of the reasons for low level knowledge about the blockchain technology.

On the other hand, when it comes to Bitcoin, majority of the hotel staff (89.3%) have heard about Bitcoin. Only 10.7% of the staff have not heard about Bitcoin. The knowledge about Bitcoin is relatively high among hotel staff. This might be because of the high media coverage of Bitcoin. Also, there are different forums about Bitcoin. BTCturk.com is one of the leading Bitcoin forums in Turkey. In addition to this, trading websites such as paribu.com and koinim.com offer trading between Bitcoin and other cryptocurrencies and fiat money. This might be the main reason for higher Bitcoin knowledge compared to blockchain knowledge. While Bitcoin is one of the products of blockchain, it seems like hotel staff failed to find a relationship between these two concepts.

The knowledge about blockchain related technologies and blockchain applications was tested for the hotel staff in tourism and hospitality sector. The digital wallet knowledge of the hotel staff is at low level. 71.4% of the participants had no knowledge about the digital wallets. Only 17.4% of the participants had knowledge about the digital wallets. On the other hand, 11.3% had heard about these wallets but do not have detailed knowledge about how to use a digital wallet or what a digital wallet looks like. Digital wallets are the essential elements for implementations of blockchain applications Dapps.

Without these digital wallets, blockchain applications cannot function successfully. As explained in the introduction chapter of this thesis study, transaction units called cryptocurrencies must be stored in a digital entity. These digital entities are called digital wallets. In this sense, the implementation of blockchain applications in the tourism and hospitality require knowledge about the digital wallets as well as knowledge about how to use these digital wallets.

Technology implementation plays an important role as the world is becoming more and more digital every day. Businesses and brands that fail to catch up with the digital transformation will experience problems and challenges in the future. Baggio and Del Chiappa (2014) emphasised that technological implementation is important as digital environment created with a technological infrastructure can help supporting collaboration and knowledge sharing across the sector. Sectors with high customer interaction require knowledge sharing more than other less labour-intensive sectors. In tourism and hospitality sector, knowledge between hotels can be shared by implementing digital applications. At this point, Dapps driven by the blockchain technology have a strong potential as these applications operate on encrypted chains. Data security might be one of the most important problems in the tourism and hospitality sector as well as other sectors.

It is important to store and share customer data without compromising this data. However, traditional desktop and mobile applications have certain level of data breach risks. When it comes to blockchain technology, the risk for such data breach is significantly low. Furthermore, implementation of Dapps might benefit to the hotel staff in terms of decreased labour, organised data and better managed customer systems. However, the majority of the participants (70.7%) are neutral about the blockchain integration in tourism and hospitality sector. Only 23.3% of the participants agree that blockchain can be integrated in the tourism and accommodation sector. However, only 6% believe that such integration is not possible. This raises certain question marks about the blockchain application in the tourism and hospitality sector. It can be seen that the number of individuals who believe Dapp integration in tourism and hospitality sector is low. This might be caused by several reasons. First and most importantly, the average experience of the hotel staff in their current hotel is low. The lack of experience in one hotel might be the main barrier to identify the problems in that hotel. When hotel staff spend more time on one hotel, it is more possible for them to discover the problems and try to find solutions to

address those problems. On the other hand, the limited knowledge about the blockchain technology could be another reason for disinterest towards Dapp application in the tourism and hospitality sector. Individuals who do not have knowledge about certain topic might be afraid of change. Since Dapp application in the tourism and hospitality sector will bring new technology and new training process, hotel staff might be intimidated by this new cycle.

On the other hand, Nam et al. (2019) stated that DApps (decentralised applications) as the latest implementation field of blockchain offers opportunities for the tourism industry especially in terms of smart tourism and smart destinations. Accordingly, Dapps might be considered is one of the potential blockchain implementation areas in tourism and hospitality industry. For this reason, it is important to understand the knowledge of the tourism employees towards Dapps. Individuals working in the tourism and hospitality sector are confident about how to use DApps in the tourism and hospitality sector.

The data revealed that 76.7% of the hotel staff had no knowledge about any DApps in different sectors. In terms of tourism and hospitality sector, this percentage increase to 79.4%. When this data was considered, it can be clearly seen that there is almost no knowledge about Dapps in general. The lack of knowledge might be closely linked with the limited knowledge about the blockchain technology. While the employees know about Bitcoin which is a cryptocurrency, they fail to form a relationship between this cryptocurrency and blockchain technology. Therefore, they have almost no knowledge about the Dapps which are another product of blockchain technology.

The openness of individuals in the tourism and hospitality towards blockchain applications were tested. Individuals must be willing to find and test new technologies for the success adaptation process. The interest and curiosity of the individuals are the main drivers for a technology to be broadly applied in an industry. Without this interest and curiosity, it is not possible to encourage all sector participants to implement certain technologies. 88.7% of the participants expressed that they do not have any knowledge about how to find, use or learn about these DApps. Only 1 participant expressed that it is possible to find, use and implement Dapps. 70.7% of the participants do not have the sufficient motivation to learn and implement these applications. Only 23.3% of the participants expressed to have a high and extremely high motivation to learn and

implement Dapps in their sector. When this data is considered, it can be seen that hotel staff in the tourism and hospitality sector have low interest and curiosity level towards blockchain technology and blockchain applications. This might be due to the high workload of the employees in the tourism and hospitality sector. The high workload of the employees might leave no time for them to learn more about new technologies. Also, the lack of encouragement to search and apply new technologies might be another reason for low interest and curiosity levels towards blockchain technology and blockchain applications.

When workload and improved wages were considered, 72% believed that Dapps implemented in their sector will not make difference in terms of workload. Only 20.7% believed that these implementations can have a positive impact on their workload and decrease their workload in general. 73.3% of the participants believed their wage will not change if Dapps are implemented in the sector. 20.7% believed that Dapps in this sector might improve their wage. Again, there is disinterest towards Dapps in terms of wage and workload. This might be related to highly manual services in the tourism and hospitality sector. Since tourism and hospitality is a labour-intensive sector, individuals working in this area might not be automated. Welcoming the guests, restaurants and kitchen services and the room services might not be entirely automated. However, when the target of this study is considered, the results are not promising to adapt blockchain in the tourism and hospitality sector. The senior management jobs are more open to be automated as these jobs involve managing the guests, managing the employees and organising the system in the hotel. Furthermore, hotel chains can significantly benefit from this automatization and digitalisation process as they will find opportunities to share their data in a secure and faster way.

Another important finding of this study is related to customer satisfaction level and blockchain implementation. In tourism and hospitality sector, customer satisfaction is one of the most important elements to ensure guests prefer a hotel. Since the internet and online review websites have gained higher popularity, customer satisfaction has become more important than ever. A guest staying in an hotel can immediately post any problems with the hotel to an online review website. Later, future guests can see these comments and change their ideas about their hotel selection. Therefore, hotels and accommodation businesses are considering different aspects of customer satisfaction. In terms of increasing

customer satisfaction, 73.3% of the participants are neutral about blockchain applications increasing the customer satisfaction. Only 22% of the participants believed that customer satisfaction can be increased with DApp applications. On the other hand, 4.7% believed that it is not possible to increase customer satisfaction by implementing DApps in the tourism and accommodation sector.

Job satisfaction is one of the key components in every sector. Without job satisfaction, the businesses in different sectors might experience various problems. Some of these problems might be high employee turnover, burnout, employee dissatisfaction and low employee efficiency. When an employee is not satisfied with his or her job, their attitude towards other people might change. The attitude is important in service sector especially in tourism and hospitality sector that involves with customers and guests all the time. In addition to that, lower job satisfaction level might decrease the interest and curiosity of the employees to learn new technology and develop themselves in their work area. Wanberg and Banas (2000) stated that low job satisfaction might lead to low change acceptance levels. Accordingly, it is important to achieve a high job satisfaction level to ensure changes in the organisation are propagated and accepted faster. Tourism businesses should find new ways to increase the motivation of the staff to ensure higher productivity and higher job satisfaction levels. When the findings of this study are considered, the reason for low level of interest towards blockchain and blockchain applications might be linked with the low level of job satisfaction across the hotel staff. While the majority of the hotel staff stated that their workload is at acceptable level, the low satisfaction level might be linked with other factors such as low wage or irregular work hours.

This thesis study that analysed the hotel staff perception in terms of blockchain application implementation in the tourism and hospitality sector found some interesting results. While there is a good knowledge about Bitcoin which is a product of blockchain, the hotel staff had limited knowledge about the blockchain technology itself. Furthermore, there is low level of knowledge and interest in blockchain applications called Dapps. Hotel staff perceived almost no opportunities presented by blockchain application in terms of decreased workload, increased wage and increased customer satisfaction. In line with the findings of this thesis study, the limitations of this study and the recommendation for the future studies have been presented. It is believed that this thesis study had shed light to a relatively undiscovered area in the tourism and hospitality industry. By analysing this topic

in the tourism and hospitality sector further, it is believed that new possibilities can be uncovered. Furthermore, theoretical studies might lay ground for the implementations.

6.1. Limitations and Recommendations

This study that aimed to uncover the views of tourism and accommodation employees regarding blockchain and blockchain applications has certain limitations. One of the main limitations of this study is the limited academic literature related to blockchain and blockchain applications topic. There are no studies in blockchain applications or DApps. In addition to that, there are no studies in the tourism and accommodation sector in terms of blockchain. The lack of studies in this topic limits the knowledge on how blockchain is implemented to tourism and accommodation sector. Therefore, this thesis study was structured from a theoretical basis and the implementation was structured for the first time. It is believed that this thesis study will shed light to future studies in this field.

Another limitation of this study is the sample of this study. The current thesis study was limited with the hotel staff working in the hotels in Turkey. While it is not possible to reach all hotel staff in all the hotels in Turkey, the sample was selected to understand the views of these employees in general. The study might be expanded to different locations with intense tourism activities. Also, the main study group of this study were the senior managers working in the hotels. This might be seen as other limitations of this study. A larger sample including hotel staff from more diverse job positions could help understanding the perception of hotel staff towards blockchain and blockchain applications better. The employees in other segments of the tourism and hospitality sector are high in number. For example, the main employees in this sector consists of cooks, tourism and hotel staff, service staff and receptionists. In this sense, the majority of the participants in the tourism and hospitality were excluded from this study.

According to the findings of this study and the limitations of this study, certain recommendations have been provided. It is believed that these recommendations can benefit both to the academic researchers and the practitioners in this area. For the academic researchers, this study will show a new way to consider the blockchain topic in tourism and accommodation. Since there are no studies on blockchain in tourism and accommodation sector, it is important to analyse and investigate this topic. By analysing and investigating

blockchain in tourism and accommodation, researchers can better understand how tourism institutions should be positioned to adapt to changing conditions around the world. Furthermore, researchers can have the means to explore what new technologies such as blockchain and blockchain application can offer to the tourism and accommodation sector.

Thus, theoretical studies to apply new technologies in the tourism and accommodation sector could be developed. For the practitioners, possibilities generated by the implementation of blockchain in tourism and accommodation sector can be revealed. The practitioners can explore the new areas that might be opened by blockchain technology. Also, practitioners can help aligning the theoretical studies conducted by the academic researchers and the sector employees. In this sense, practitioners might act as a bridge between the theory and practice. The bridging purpose of the practitioners can help facilitating the implementation process of the blockchain technology. Similar to any other new technologic developments, implementation of a new technology requires efforts and expertise in the sector. Without any adequate knowledge about the sector, implementation of the new technology will inevitably be a failure. For this reason, a strong collaboration between the academic field and the practitioners is necessary for the successful implementation process. Moreover, the practical experience of the practitioners can guide the academic research field to consider the most important challenges and problems faced by the tourism and accommodation sector. Accordingly, it is believed that the following recommendation will provide important insights for both the academic researchers and practitioners in tourism and accommodation field.

The general outlook of the service sector is changing. These changes are also reflected to the tourism and hospitality industry. Munar and Jacobsen (2014) expressed that destinations and tourism businesses are increasingly affected from social media. Almost all travellers around the world are using at least one online tool to search a destination, hotel or to book a hotel or flight. Also, guests are gathering information about a hotel or a destination by using different social media websites such as Facebook, Instagram, Twitter and online travel agencies (OTAs) such as TripAdvisor and Expedia. In this sense, finding information about a hotel or a destination has become easier than ever.

In today's world, potential guests can type few keywords and find all the positive and negative comments about a hotel. However, this online reviewing systems have their

negative aspects as well. The most important challenge faced by the hotels is the fake reviews. There has been an increase in the number of fake reviews on different internet websites. It is possible to prevent these existing fake hotel review issue by using the current technology. As reported by IBM (2020) immutability of a blockchain and a distributed ledger can prevent changing any data. Accordingly, blockchain offers an important opportunity for the tourism and hospitality industry. To prevent the problem of fake reviews, a blockchain-based reviewing application can be implemented in the tourism and hospitality sector. This Dapp can link all the hotels and accommodation facilities in the sector on one application. This way, a guest accommodating in a hotel or in another facility can rate the hotel by authenticating his or her stay in that facility. In the light of these information, development of a hotel review Dapp for the tourism and hospitality can be recommended as a result of this study. The development process of this Dapp can involve both theoretical studies and implementations. Additionally, such implementation would require a strong collaboration between the researchers and the practitioners. Practitioners can benefit from the technical expertise of the researchers while the researchers can gain insights about the sector from the practitioners.

There has been different innovations and technological improvements in the tourism and hospitality sector. Buhalis et al. (2019) identified seven key technological advancements which were mobile devices and wearables, 5th gen mobile network, artificial intelligence, radio frequency, applications (APIs) and cryptocurrency and blockchain. In fact, all of these technologies have unique benefits and challenges. It is believed that technology can greatly improve a sector. However, as shown from the results of this study, the hotel staff as low level of interest towards learning about and implementing a new technology such as blockchain. In this sense, it is important to increase the motivation of the employees to be more open to the idea of applying new technologies. In addition to that, it was seen that hotel staff had low level of knowledge regarding blockchain, blockchain-related technology and blockchain applications both in general and in tourism and hospitality industry. In this sense, researchers can focus on developing training programs to increase the knowledge level of the hotel staff. The training programs can be planned with practitioners to handle the real challenges faced by the hotel staff in terms of technology and technology implementation. Furthermore, the

potential benefits of the blockchain and blockchain applications can be explained to the hotel staff.

Another challenge identified in the tourism and hospitality literature on blockchain was the limited number of studies in this field. There are almost no studies at international and domestic level on blockchain applications in the tourism and hospitality industry. Furthermore, there are only few studies in the different sectors in terms of blockchain applications. It is known that blockchain and blockchain applications are relatively new research topics in the academic area. Blockchain has been in our lives for the last decade. Therefore, there are many things unknown about this technology. The majority of the academic literature on blockchain technology focuses on the algorithms and the technical aspects of the topic. When it comes to the implementation side of blockchain, there are only limited number of attempts to investigate the topic. There has been blockchain applications in different fields including tourism and hospitality industry. However, the number of studies investigating the implementation and results of these applications should be increased. Therefore, it is recommended that future studies should focus on implementation and challenges of blockchain applications in tourism and hospitality industry.

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