

**Decentralisation of hotel and tourism industry: Effects of
blockchain technology in hotel booking systems**

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ABSTRACT

Blockchain technology is a decentralised, distributed ledger that has become popular (Kwok & Koh, 2019). Various industries have accepted the popularity of blockchain technology (BCT) and initiated the search for alternative use cases such as digital payments, inventory management, capacity planning, and credential management (Kwok & Koh, 2019). The tourism sector is one of the sectors that is increasingly affected by the emergence of BCT and organizations are looking for ways to integrate BCT to improve the above-mentioned use cases (Thees et al., 2020). This study explored how the integration of BCT into hotel booking systems can impact customers, especially their economic benefits and satisfaction. The outcome of the study aims to trigger increased adaptation of BCT by helping the hotel and tourism industry to acknowledge the potential benefits of the technology. This study utilized a qualitative research approach underlined by social constructivism. It utilized netnography and document analysis to look at over 1600 user-generated content and 25 organizational documents. The results of the study showed that BCT will be viable to adapt in some use cases while increasing economic benefits and satisfaction. On the other hand, the execution of BCT is very limited due to a lack of adaptation in the industry. In conclusion, it was found that even though theoretically it is possible to increase guest satisfaction and economic benefits, there are lots of grey areas inside the hotel and tourism industry related to BCT.

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LIST FOR ABBREVIATIONS AND SYMBOLS

Blockchain Technology: BCT

Central reservation systems: CRS

Global distribution systems: GDS

Information and communication technologies: ICT

Online travel agents: OTA

Proof of Stake: POS

Proof of Work : POW

Smart Contracts: SC

Single point of Failure: SPOF

Thematic Analysis: TA

User generated Content : UGC

ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signed:

Name: Yanki Tepe

Date:10/07/2022

Chapter 1. Introduction

1.1 Background

This study aims to explore the impact of decentralisation on the hotel and tourism industry, specifically looking at the effect of blockchain on hotel booking system. This study was inspired by suggestion of Önder and Treiblmaier (2018) that blockchain technology would lead to an increase in decentralisation in the hotel and tourism industry and called for further study in this area. This study explores the specific impacts of blockchain technology on the hotel booking system to fill the gap in current literature. It adopts a qualitative methodology to gather and analyse data from user-generated content through netnography. In addition, data was also obtained from organisational documents using document analysis. While identifying the impacts of decentralised systems, this research aims to understand the potential economic benefits of decentralised booking systems and whether there is an increase in guest satisfaction due to integration of decentralised systems into the current hotel booking system.

Hotels and tourism providers are constantly searching to find new distribution ways to enhance awareness and increase sales (Stangl et al., 2016). Hotel inventory distribution channels are responsible for facilitating the sale and successful delivery of the product itself. According to Falk and Anderson (2020), a distribution channel is a set of intermediaries or businesses a product passes through until it reaches the consumer. The distribution channels have gone through significant changes, especially after the commercialisation of the internet marketplace where internet adaption makes the communication between customers and hotels easier (Kracht & Wang, 2010). The evolution of the ways of distributing the tourism inventory helped the channels to transform, which has resulted in a more extensive inventory for customers, increased competition for distributions, and an increasingly tangled market structure for the industry itself (Wang & Qualls, 2007). Hotel inventory distribution never had a simple structure starting from the beginning of the distribution channels; however, the commercialisation of the web has brought more layers of intermediation instead of decentralisation (Kracht & Wang, 2010).

Three decades ago, a traditional distribution system partner was a mix of traditional retail travel agents, corporate travel agents, tour operators, and destination management organisations (Kracht & Wang, 2010). Currently, there are six different primary distribution channels that hotels can actively utilise. These are hotel websites, voice calls, direct to hotel (walk-ins, e-mails), global distribution channels (GDS), online travel agents (OTA), and Metasearch websites (Falk & Anderson, 2020). Under the current model, reliance on traditional intermediaries is very low (Law et al., 2015). The demand for online distribution is rising from the hotel's perspective as they hope to benefit from increased visibility and alternative distribution channel options (Pal & Mishra, 2017). However, there are also some impacts of using online distribution systems. Thus, the fact that OTAs have become one of the most significant online distribution channels has resulted in a decrease in revenue for hotels. Moreover, besides OTA's enhanced marketing quality which generates additional revenue, OTAs have also created some financial difficulties for hotels (Martin-Fuentes & Mellinas, 2018). The increased online distribution also formed a platform for guests to share their recommendations related to the tourism entity (Del Chiappa & Dall'Aglio, 2012). User-Generated Content (UGC) has become more critical for hotel managers, and the anonymity option of the internet pushes guests to give more honest options. However, the anonymity of the procedure also encourages some guests/users to lie as well (Martin-Fuentes & Mellinas, 2018). The authenticity and reliability of those online hotel reviews are therefore debatable (Treiblmaier, 2020).

Blockchain Technology (BCT) can enable industry experts to imagine a new way of distribution for the hotel industry where the intermediaries lose their value in the distribution equation, and BCT can push the hotel inventory distribution industry towards decentralisation (Önder & Treiblmaier, 2018). According to Treiblmaier (2018), blockchain is "a digital, decentralized and distributed ledger in which transactions are logged and added in chronological order with the goal of creating permanent and tamper-proof records." (p.547). Previous studies show that some of the specific use cases of BCT inside the hotel and tourism industry where organisations aimed to see changes in decentralisation, payments, tracking and service customisation, inventory management, identity/credential management, and verified review system (Kizildag et al., 2019; Önder & Treiblmaier, 2018; Treiblmaier, 2020). By identifying problems related to the centralised ways of current booking systems, this study outline how the hotel booking systems could be decentralised

using BCT and examine how this new system would affect customers/ affect customers' booking experience.

1.2 Aim of the research

Due to the increased competition between direct and indirect channels, hotels are continually searching for new innovative ways to execute distribution flow (Stangl et al., 2016). This research aims to explore the impact of decentralisation on the hotel and tourism industry. Specifically, the study is concerned with the effects of blockchain technology on hotel booking systems from the customer perspective. Thus, this research aims to understand the potential economic benefits of decentralised booking systems to end users and whether there is an increase in guest satisfaction due to BCT based hotel booking systems.

The overarching research question that guides this study is:

Q1: How does the integration of blockchain technology to hotel booking systems impact customers?

This overarching question was broken down into two more specific research questions to allow for a deeper and more focused analysis of the data:

Q2: Can the decentralisation of the hotel booking systems create economic benefits for consumers?

Q3: Can the integration of blockchain technology into hotel booking systems help increase guest satisfaction?

1.3 Overview of the dissertation

This dissertation is composed of six separate chapters. The first chapter presents the introduction to the research, including the background to the study and the research questions. In the following chapter, existing literature related to the research topic is reviewed. Chapter two is divided into three sections: Hotel distribution channels, guest satisfaction, and Blockchain technology. The chapter begins by laying out the context of hotel inventory distribution, providing overall information related to distribution channels, direct vs indirect channels, and other online channels. The next section of the chapter explores different definitions of guest satisfaction and discusses guest dissatisfaction due to lack of personalisation and privacy, and overall satisfaction problems related to intermediaries. In the last section, Blockchain technology is examined in detail, including Blockchain in tourism context and blockchain based hotel reservation systems, digital identity, and digital identity in tourism context. The third chapter outlines the research design including an overview of the philosophical stance for this research as well as the research methodology, methods, and data analysis. The fourth chapter presents the results of collected user generated content and organisational papers related to the impacts of blockchain based hotel booking systems on customers. This chapter presents excerpts from the chosen documents and reviews that are mostly related to guest satisfaction and the potential economic benefits of using Blockchain technology-based hotel booking systems on customers. The fifth chapter summarises the key findings of the research and the final chapter features a conclusion as well as a discussion of the limitation of the study and some recommendations for future research.

Chapter 2. Literature review

2.1 Hotel distribution channels

Nowadays, hotels and other tourism providers operate in a very competitive market, and the increased efficacy in technology and adaptation of the internet increased the rivalry between hotels and the middleman (Sharma & Nicolau, 2019). The competitive advantage in the hotel reservation network depends on how much control the party has over critical resources, its allies and supports, and how centrally positioned themselves in the distribution network (Ford et al., 2012). Tourism distribution channels are responsible for facilitating the sale of tourism products. According to Falk and Anderson (2020), a distribution channel is a set of intermediaries or businesses where a product passes through until it reaches the consumer. Consumers are one of the biggest influencers of the distribution channels together with advancements in devices, technology, and competition. A hotel distribution channel is a way for hotels to sell their rooms or services using intermediaries (Kracht & Wang, 2010). Distribution channels have gone through significant changes, especially after the commercialisation of the internet marketplace. The mainstream usage of the internet for hotel reservations shifted the market power and unequally affected the stakeholders inside the distribution network (Werthner & Ricci, 2004). Some parties inside the distribution network gained more power than others, resulting in hotels being over-dependent to these parties inside the hotel distribution systems.

The evolution of tourism distribution helped the channels to transform, which resulted in offering more extensive inventory for customers, increase competition for distributions, and an increasingly tangled market structure for the industry itself (Wang & Qualls, 2007). Tourism distribution never had a simple structure starting from the beginning of the distribution channels; however, the commercialisation of the web has brought more layers of intermediation instead of decentralisation (Kracht & Wang, 2010).

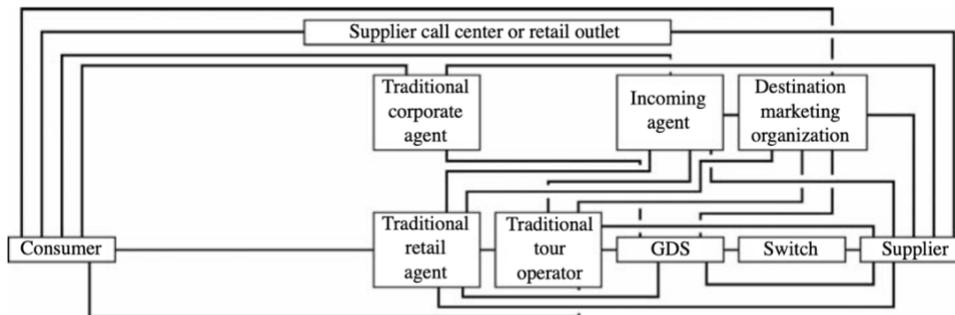
The integration of the internet and evolving information and communication technologies (ICT) with tourism distribution also helped the industry disintermediate certain parties from the equation

while creating reintermediation where customers communicate with suppliers through different channels. The traditional intermediaries, the brick-and-mortar stores, started to be bypassed by the customers; however, with the emergence of new technologies some existing players embraced approaching ICT and re-intermediate themselves with (Buhalis & Law, 2008).

It is also essential to understand the meanings of intermediation and reintermediation in the hotel distribution systems. In this context, “disintermediation” is used to explain the partial or total substitution of a middleman, whereas “reintermediation” is used for a company or an organisation acting as a middleman initially, losing their position (disintermediation), and then regaining their intermediary role by adapting their business approach (Kracht & Wang, 2010). In the tourism industry, intermediaries are responsible for payments for travel and reservations, such as entertainment services, accommodation, and transportation services (Farris et al., 2021).

Prior to the internet marketplaces becoming mainstream in customers’ lives, distribution was done by traditional travel agents, tour operators, destination marketing organisations, corporate travel agents, and global distribution systems (GDS) (Falk & Anderson, 2020). The GDS was founded by American Airlines in the 1960s, and afterward, it was connected to hotel bookings systems with Switches technology. The integration of GDSs to the hotel booking system with switches created an additional intermediary level. On top of this, incoming travel agencies were handling the travel packages created by tour operators. Before the internet, most connections between the suppliers and the tours/customers were provided by travel agents. (Kracht & Wang, 2010). Suppliers tried to disintermediate the pre-web era distribution systems with direct connections and sales to the consumers. Hotels created their toll-free numbers to facilitate disintermediation. The Sheraton hotel group is the first organisation to create electronic reservations systems and a toll-free number (Falk & Anderson, 2020).

Figure 1: Distribution channels of pre-web era.



Note: The figure is taken from Kracht and Wang (2010). It represents the distribution channels of pre-web era.

Comparing the pre-web era distribution channels to contemporary trends of hotel distribution, the industry acknowledges increased complexity with the incumbent technologies. Online bookings keep progressing continually, and the total online booking growth was 7% in 2016 in Europe, which is three times higher than the increase in overall bookings in the hotel market (Dadić et al., 2021). By 2017, 52% of the income from travel in Europe was generated through the web (Dadić et al., 2021). The numbers for the USA are 45%, 37% in Asia, and 27% in Latin America (Dadić et al., 2021). This shows us the impact of the internet on hotel bookings. However, while the internet and ICT support the progress and the improvement of hotel distribution, traditional travel agencies also still process a big portion of the bookings (Dadić et al., 2021). In the online market of direct bookings, the hotel industry realised the advantage over online travel agents (OTA). According to Dadić (2021), the market share of direct online bookings has been increasing since 2016, and in 2018 the market share of direct bookings on online platforms was 59%. According to Pilar et al. (2019), along with offering direct online bookings hotels also tend to offer their rooms in the OTAs and other indirect channels. Hotels accept to lose money with commissions which they pay back to travel agencies for every sold room over OTA. Recently, chain hotels responded to the increased government taxes and commissions from travel agents; therefore, organisations started to modernise their websites and forward customers towards direct channels (Pilar et al.,

2019). The following section focuses on the differences between direct and indirect bookings and an explanation of different hotel distribution channels.

2.1.1 Direct vs Indirect channels

The hotel distribution mix is a combination of whole distribution channels where hotels try to sell their products. According to Dadić (2021), there are two different ways to distribute the hotel's inventory to the tourism market. The first way is the direct distribution, where consumers directly communicate with the accommodation provider. The second way is indirect distribution, when mediators charge commissions for their services between accommodation providers and end-users. There are different ways that distribution channels can be categorised. Direct distribution channels can facilitate the bookings online or offline. Online direct channels are the hotel's website, or an application created by the hotel that allow guests to book directly. Offline direct methods are fax, e-mails, direct calls, and walk-ins (Falk & Anderson, 2020). On the other hand, GDS, OTA, CRS tour operators, and metasearch websites are recognised as indirect channels. Hotels must identify their target market audience and allocate the proper inventory to accurate offline, online, direct, and indirect channels (Gazzoli et al., 2008).

2.1.2 Indirect channels

2.1.2.1 Online travel agents

OTAs are third-party websites that allow customers to search and book their stays seamlessly. The internet created this ecosystem where end-users, suppliers, and intermediaries can access many information they would like to have related to the hotels such as room categories, check-in/check-out times, and room rates. (de Carlos et al., 2016). OTA started to become popular with the advent of the internet around the early 1990s, and they are still very crucial for the online inventory distribution market (Schegg et al., 2013). Respectively, they started to offer airline tickets, accommodation, and travel products from various suppliers straight to the individuals who would like to make a booking. The current OTA market situation shows that a handful of giant players

present themselves under different brand names for different product segmentation (Stangl et al., 2016). The two organisations, Priceline Group and Expedia Group, hold the most significant market share for bookings made through OTAs. These OTAs started to become popular due to the perception of the guests that they could find lower prices online (Gazzoli et al., 2008). Also, it gives guests various options to compare the properties in which they would like to stay. OTAs also provide the service of being a review website, allowing guests to share their experiences and give out points/rankings to the hotels. (Martin-Fuentes et al., 2020). These online ratings not only help customers to choose their hotel according to other customer's experiences, but they also increase the hotel's visibility and help them rank higher than other hotels (Nieto-Garcia et al., 2019).

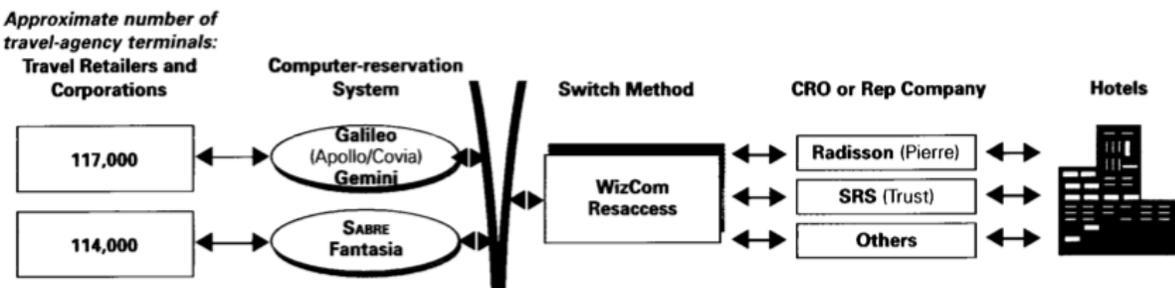
While OTAs help properties with their inventory distribution, they reduce the income of the properties by charging them commissions. On average, OTAs charge 18% commission to properties; however, this amount can go up to 35% in some places (Martin-Fuentes & Mellinas, 2018). OTAs not only charge commissions for the simple intermediary service but they can also execute a trade-off with hotels by offering increased visibility of their property on their site in exchange for a higher commission percentage. According to Ling et al. (2014), due to their small market size and customer base, some hotels would be willing to pay additional commission to be on the first pages of the search screen, which has been proven to lead to higher clicks and more attention from customers (Ling et al., 2014). According to Carroll (2003), OTAs create a disadvantageous position for hotels by pushing them to sell a large portion of their inventory at a discounted price. On top of this, OTAs generally have enormous budgets for marketing and technology and have novel ways to reach guests. OTAs are taking advantage of data mining and as a result of this, they gain the knowledge related to customers which then enables OTAs to specifically target different groups with direct mail campaigns, loyalty programs, reducing the hotels' control over their products (Stangl et al., 2016). This eventually shifts the market share of bookings directly from hotels towards OTAs. Because the customers are more involved with the third party websites to finalize their bookings, hotels started to have limited influence with the experience that guests have at the initial stages of the reservations (Falk & Anderson, 2020).

One last important factor related to OTAs is rate parity agreements. It was mentioned earlier that price discrepancies between distribution channels had created the perception among customers that there are better deals available (Gazzoli et al., 2008). According to Haynes and Egan (2005), a rate parity agreement is the sales of the same product, to the same guest, at the same price across all distribution channels. According to Tso and Law (2005), hotels should be consistent with their pricing strategy. It is vital to offer the best deals on the hotel's websites; however, most major hotel companies have agreements with OTAs, ensuring that rate parity is applied to all distribution channels. As a result, it also guarantees that OTAs provide the lowest rate through their website (Gazzoli et al., 2008). Due to high commission rates and rate parity agreements, there is a rivalry between hotels and OTAs; however, properties are also dependent on OTAs for further sale of their inventory (Buhalis, 2000).

2.1.2.2 Global distribution systems

GDS is a worldwide computerised system for reservations between travel agents, online reservation sites, and most large corporations. GDS was developed by the aviation industry in the 1950s and started to be used by hotel bookings in the 1970s. Nowadays, the GDS market is mostly used by transient business travellers (Falk & Anderson, 2020). It is beneficial for companies when their employees need to travel for business; they can access flights, hotels, and car rental information with GDS, making it easier to reserve all travel products (SiteMinder, 2019). For hotels to be able to use GDS systems, automatic switching methods were created, such as THISCO and ResAccess; these switches connect the hotel's central reservation systems (CRS) straight to the GDSs. Once the connection with switches is enabled, travel agencies can have instantaneous information and confirmation from CRS (Emmer et al., 2003). Figure 2 shows that once the travel agent wants to make arrangements, this information passes through many intermediaries. GDSs are also helpful when hotels are not willing to connect with each OTA individually. In these cases, they can create a connection with a GDS, which allows different OTAs to access the hotel's inventory (Falk & Anderson, 2020). Like OTAs, GDSs also charges commissions between \$4 - \$5 and a 10% agent commission (approximately) for each reservation (Emmer et al., 2003). Amadeus, Sabre, Worldspan, Abacus, and Travelport are some of the examples of the most extensive global distribution system networks (Emmer et al., 2003)

Figure 2: An example of a GDS network for creating reservations



Note: Taken from Emmer et al., (2003).

2.1.2.3 Metasearch websites

Recently, the hotel industry has started using metasearch websites as a distribution channel. In a way, metasearch websites hinder the dependency of the hotels on OTAs and display different reservation alternatives for the same property (Anguera-Torrell & Langer, 2021). Metasearch websites assist guests to compare properties on the same website from different distribution channels; hence, it creates an environment where OTAs and hotels' direct channels promote prices on the same webpage. According to Olenski (2015), guests want to compare prices quickly and efficiently, which increases the usage of the metasearch websites. Metasearch websites acquire data from different websites (hotel's own website, OTA, GDS) so that they can show the lowest price per room per night from each website. The ease of use and the option to see all the inventory from different channels on the same web screen is what distinguishes metasearch websites different from other distribution channels (Dudás et al., 2017). However, unlike OTAs and other distribution sites, metasearch websites do not allow guests to finalise their bookings with transactions. The business model of metasearch websites relies on redirecting the customer to the source website (OTA, hotels brand.com) via rereferral links. Metasearch providers gain their commission regardless of the guest's decision to finalise the booking or not. When the potential customer visits the websites, the metasearch provider receives the payment in accordance with the pay per click model (Dudás et al., 2017). Regarding the customer's experience during the reservation phase, the hotel does not have any control over it (Falk & Anderson, 2020).

2.1.3 Direct distribution channels

There are different ways that a customer can directly contact the property to make their reservation. According to Falk and Anderson (2020), one of the most common ways to make a reservation directly is through the hotel's website (brand.com), and direct channels in general also have the least associated cost for the hotels. Contacting the hotel directly via the internet is very cost-effective and much cheaper for the hotel than indirect online bookings. The second way involves voice channels where customers can contact call centres, and individuals accessing the hotel's CRS to make their booking directly.

We can categorise these types of bookings as property direct, and they are any booking handled on the property, including direct calls, walk-ins, group bookings, and contracts (Falk & Anderson, 2020). Stangl et al. (2016) study on dependencies and the relationships between distribution channels demonstrated that direct distribution diminishes the risk of the dependency, and 10% of the participants who attended the survey were not selling their inventory via OTAs to avoid dependency and high commission rates. Ip et al. (2011) mentioned that the best outcome for hotels is when travellers book directly with the hotel, and this can be achieved through well-positioned websites and attractive loyalty programs to increase the value gained by the customers throughout the booking journey.

2.1.4 Conclusion

In conclusion, hoteliers are looking for various alternatives to enhance their business models by increasingly drawing on ICT technologies. One of the most crucial determinants for increased revenue is a fully accomplished distribution mix. According to Zhang et al. (2005), hotels need to weaken their reliance on third-party websites while maintaining healthier and less dependent relationships. While reducing their dependency on third-party websites, suppliers will tend to gravitate towards more direct booking; thus, hotels' commission rates will reduce accordingly, and hotels can be more in charge of the customer's reservation journey. On the other hand, third-party websites successfully engage with the end customer and increase the visibility of the inventory;

therefore, a healthy distribution mix is needed if hotels cannot achieve enough sales via direct channels.

2.2 Guest satisfaction

In today's competitive hospitality world, service quality is one of the leading components of success (Armstrong et al., 1997). To stay competitive and economically sustainable, hospitality organisations must increase their service quality to meet customer's expectations and demands. Researchers have debated using the terms *satisfaction* and *quality* interchangeably; however, according to Brady and Cronin (2001), they are fundamentally different from each other. Quality generally focuses on the aspects of the service given, and perceived service quality is a component of customer satisfaction. Satisfaction is a broad concept usually influenced by perceptions of service quality, product quality and price, personal preferences, and situational environment. According to Padma and Ahn (2020), one of the earliest definitions of service quality that helps measure customer satisfaction is the difference between expected and perceived service. This suggests that organisations can easily create and increase guest satisfaction if they know more about their consumer, their preferences, and the expected service perceptions at the end. These expectations might also include individual needs and personal preferences, likes, and desires. For example, research on guests with disabilities showed that guests face challenges in both the physical environment and service interactions in the hospitality environment (Padma & Ahn, 2020). Having more information related to the guest's preferences, disabilities, allergies, or simply their likes can prompt changes to the service to better accommodate the guest. Also, other researchers defined service quality as a comparison of what customers feel a service provider should offer with how the provider performs. (Bitner & Hubert, 2003 as cited in Al-Alak, 2014). In that sense, the two components, quality of service and personal preferences that directly enhance guest satisfaction, are highly related (Al-Alak,2014).

The meaning of satisfaction refers to the guest's state of getting sufficiently awarded with purchasing a service/product for money they spent (Al-Alak, 2014). There are many different models to explain customer satisfaction. One of the most widely accepted definitions was proposed by Oliver (1980). According to Oliver (1980), customer satisfaction is an attitude formed by the

customers comparing their pre-purchase expectations to what they received. While satisfaction is a broader concept, researchers examined it under two different categories that directly affect overall satisfaction, namely transaction-based satisfaction, and experience-based satisfaction.

Liang et al. (2018), proposed that transaction-based satisfaction is encountered satisfaction, which represents the satisfaction of the consumer when encountering a service such as an appointment with a doctor, a discussion with a tradesperson, or a hotel reception. It is essential to understand that each business model might include different parties in their customer journey; hence, these parties might affect individuals' satisfaction. According to Nugroho and Hati (2020), when hotels use e-commerce to distribute their rooms, the entities responsible for the distribution are effectively involved in the satisfaction equation. In these indirect distribution situations, customers are faced with two different parties: the distributor company (OTA, third party reservation websites) and the host (accommodation provider). The other category, experience-based satisfaction, can also be measured related to a specific experience, where the consumer can compare their previous experiences with the current one to identify their level of the satisfaction (Liang et al., 2018).

2.2.1 Guest dissatisfaction due to non-personalised services and privacy issues

One of the critical components of achieving customer satisfaction is identifying customer needs, likes, and expectations (Li et al., 2013). In the accommodation industry, customer satisfaction and service quality should always be defined from the guests' perspective (Al-Alak, 2014); hence, hotels are entitled to study their guests' preferences to achieve customer satisfaction. The primary identifier of poor service for many guests relates to the lack of a personal touch and how the staff deals with the complaints (Mohsin & Lockyer, 2010).

Personalisation is crucial in hospitality, but it is also a global trend wherever ICT is involved. To personalise services in the tourism context successfully, hotels must be familiar with the interests and preferences of the potential guests. This knowledge can be accessible in an explicit or an implicit form. Implicitly, an understanding of customers' preferences can be determined automatically by software that examines data about past user behaviour from the internet;

alternatively, such information can be gathered explicitly via user questionnaire forms (Shpolianskaya et al., 2020).

With the creation of big data, the volume of available information online has grown massively, and the information is disseminated through the web (Boudet et al., 2019). The current massive data availability can be acknowledged as an advantage and a disadvantage. However, tourism organisations are having some difficulties in successfully extracting the implicit data from the internet. According to the ARM's treasure data survey (2019), half of the participants stated that the biggest challenges for gaining insights about customers is that the customer data is fragmented. Other issues included a lack of data and being confused by too much data. Therefore, organisations that have limited resources for capturing customer data as they lack know-how on data mining and extracting the personal preference data will suffer from their inability to create personalised offers. In an industry where service excellence is defined by a touch of personalisation (Padma & Ahn, 2020), a limited data extraction and exploitation capacity will eventually produce lower-quality service and decrease customer satisfaction.

One other possible problem with personalisation that might lead to dissatisfaction is customer data privacy. Hospitality as an industry where personalisation and service greatness is achievable with acquired customer data (Padma & Ahn, 2020). In a situation where hotels have more customer related information from their guest, they can have better service excellence. However, this becomes a concern for consumers and brands. Organisations that are benefiting from personalised offers and the innovation of personalisation are more likely to create privacy concerns for their guests. According to Tyan et al. (2020), tourism destinations struggle with privacy issues and are eager to find solutions to hide tourist's real identities. The proactive concerns and creation of customer privacy regulations can assist organisation with being transparent about the data that will be used, limiting the processing of personal data, securing the data against theft, and granting customers the right to be forgotten. Even though many companies take data privacy seriously, the McKinsey report has mentioned that 46 percent of the customers wanted increased governmental regulation to protect their data in online transactions (Boudet et al., 2019).

2.2.2 Guest dissatisfaction due to intermediaries in the hotel booking industry

Another area that can lead to guest dissatisfaction is intermediation in the tourism e-commerce market. With the increasing power shift towards the OTA market, intermediaries have become more assertive against the hotels. The declining power of hotels has changed the relationships and the structures in tourism e-commerce (Cetin et al., 2016). OTAs have opted to increase their commissions, use rate parity agreements, and even limit the guests' and hotels' access to each other to sustain their monopoly positions. Large OTA companies started to act as gatekeepers without officially auditing the hotel's legitimacy, and some of the OTA's ranking systems are unreliable, according to Cetin et al. (2016). For example, if the commission rates are low, no matter how good quality service hotels deliver, they rank below other hotels (Costa et al., 2021). et al., 2021). Hoteliers think that OTAs would have less incentive to sell the low commission margined hotels because they can make less money out of that hotel. This notion is supported by Withiam (2011), who pointed out that almost all the OTA transactions happen on the first page of the search, and half of the volume is made through the transactions made with only the top-five hotels.

Customer's perception and expectation related to the service was redefined in the literature, and five crucial qualities were identified. The SERVQUAL model was developed by Parasuraman et al. (1988), and the model includes tangibles, reliability, responsiveness, assurance, and empathy as crucial qualities. The tangibles category is related to the quality of physical facilities, equipment, and appearance of the personnel. Reliability stands for the ability to perform the promised service dependably and accurately. Responsiveness is the willingness to help customers, and assurance is related to the knowledge of the employees and their ability to inspire trust and confidence.

Finally, the empathy category is related to the qualities of care and individualised attention for the customers (Parasuraman et al., 1988). Several service quality attributes related to platforms and websites, like information quality, trust in an intermediary, and trust for an online platform, became important attributes for identifying service quality (Ju et al., 2019). In online settings, service quality can be different from offline settings. For example, if we look at the Airbnb case, the website acts as a third-party online inventory distributor, and it is a key service platform that guests encounter. In booking through Airbnb, the guest is involved with three different components

that can affect the overall service quality and hence their satisfaction: the website/mobile (intermediary), host, and the accommodation facility (Ju et al., 2019). Once the intermediaries (OTA, middleman, AirBNB, etc.) start to manipulate the information and rankings to gain more revenue with the commissions (Cetin et al., 2016) and create unfair competition, the effects of this manipulation will be reflected in the hotels and the customers negatively. When the hotel rankings and the information customers obtain through the website are altered by the OTA depending on the paid commission percentages, this will reduce the trust and reliability consumers have in the platform (Cetin et al., 2016) and eventually reduce the service quality by creating discrepancies in expected service and perceived service (Padma & Ahn, 2020).

2.2.3 Conclusion

In conclusion, the above part about guest satisfaction mainly examined the possible dissatisfactory results related to non-personalised offers, privacy issues, and intermediaries. Overall, the integration of intermediaries into hotel inventory distribution and the shift in the power dynamic of the e-commerce market for hotel inventory created some widespread problems. This paper's approach to understanding guest dissatisfaction due to non-personalised offers is mainly related to the inefficient extraction of data from online platforms, limited know-how of hoteliers, inaccurate guest information, and the government's privacy regulations. Overall, it can be seen that some operations between hotels and OTAs are inclined to damage the customers' trust towards hotel's reliability due to unrealistic and manipulated rankings of hotels.

2.3 Blockchain technology

2.3.1 Overview of Blockchain technology

Blockchain technology (BCT) emerged in the last 10 to 15 years by creating decentralised computer networks and communication security. BCT is firstly discussed in the white paper of one of the earliest cryptocurrencies, called Bitcoin, and BCT constitutes the foundations of Bitcoin (Thees et al., 2020). With the alias of Satoshi Nakamoto, a person or persons wrote the white paper of Bitcoin, a "peer-to-peer electronic cash system" (Nakamoto, 2008) where BCT is developed as

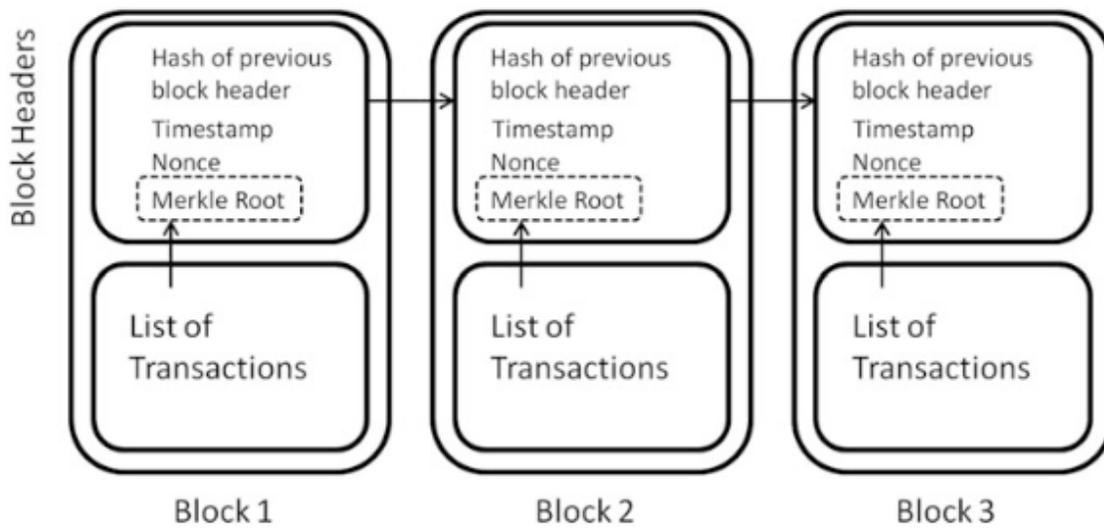
a solution for Bitcoin cryptocurrency. Cryptocurrencies were the most common way to use Blockchain technology initially; however, BCT's use spread rapidly. Cryptocurrency is a digital currency that uses Blockchain technology to transfer value without an intermediary. These stored transactions are held in computers across the world enabling decentralisation which reduces single point of failure (Hameed, 2019).

According to (Treiblmaier, 2020), BCT can be defined as "a digital, decentralized and distributed ledger in which transactions are logged and added in chronological order with the goal of creating permanent and tamperproof records" (Treiblmaier, 2018, p. 547). The consensus protocol for BCT are the participants who perform transactions and peer-to-peer network nodes that validate the transactions that are made and decides what can be added on blockchain or not. Once the transaction is written to the block and validated, it will be added on top of the Blockchain. While each node verifies the newly added block in the Blockchain, it creates a real-time synchronised copy of the whole database. Finally, blocks keep the information in chronological order with timestamps and a hash function (Kizildag et al., 2019).

Fundamentally, BCT is a decentralised database that helps record transactions or information on a series (chains) of distributed computers (Murray et al., 2021). Figure 3 shows the Bitcoin structure as an example of a public blockchain. In this ledger, individuals can find lists of transactions bundled together with a hash function calculated for each one of them. It will generate a number that can be used to represent one block, and according to this number, blocks connected into the chain. All the hashes inside the same block are connected to that block's Merkle root hash. Merkle root hash is the hash number of all the transactions that are happened inside a block in a network (Treiblmaier, 2020). Merkle root information is contained inside the block headers, and a slight change in the underlying data leads to an altered hash function value. If the information is altered, it is easy to spot changes within the original data. Block headers where the Merkle root information can be found also contain information like a nonce and a timestamp. The nonce is a 'number only used once,' a random number that blockchain miners are trying to solve. Miners try a variety of numbers, and the possibility of solving the nonce depends on the miners' computing power. Once the miners identify the nonce, which will approve the authenticity of the solution, they will be rewarded (Treiblmaier, 2020).

Mining can be defined as a process in which users compete to validate the data that can be recorded inside the Blockchain, and in return, the miners who successfully validate the authenticity of the data will be rewarded (Hameed, 2019). Mining is a validation way for Proof of Work (Pow), a consensus protocol that plays an essential role in BCT fundamentals (Sriman et al., 2021). There are several different consensus protocols; the POW mechanism needs computing power and willingness to reward individuals with the best processors. This is different to the Proof of Stake (POS) mechanism, where validators place a portion of money into an escrow where they would stake this money, and individuals who authenticate the data can lose their portion of the stake if they verify a fraudulent transaction.

Figure 3: Bitcoin block structure as an example for a public blockchain



Note: Figure taken from Treiblmaier (2020).

BCT's core characteristics, which are listed below in Table 1, make this technology very attractive to established industries such as banking and commodities trading that are highly interested in technology (Murray et al., 2021).

Table 1: Blockchain characteristics

Characteristic	Explanation
Immutability	Data inside the blocks cannot be changed unless the majority of the network decides to do so. Changed data/information can be easily identified.
Transparency	Information kept/written inside the blocks is visible to identified users, they all have access to the same data.
Programmability	Blockchains allow automatically executed specific rules called smart contracts if the preidentified conditions occur.
Decentralization	In BCT there is no central point of control, consensus protocols define how communities/users will agree on what should be kept on the blockchain and hence recognized as the true information.
Anonymity	The visibility of identifying information and the individual that publishing the information ranges from full anonymity over pseudonymity to full identity.
Consensus	Consensus mechanism is applied to mutually achieve an agreement on the state of the network or authenticity of the transactions.

Note: Table 1 is influenced by (Treiblmaier, 2019)

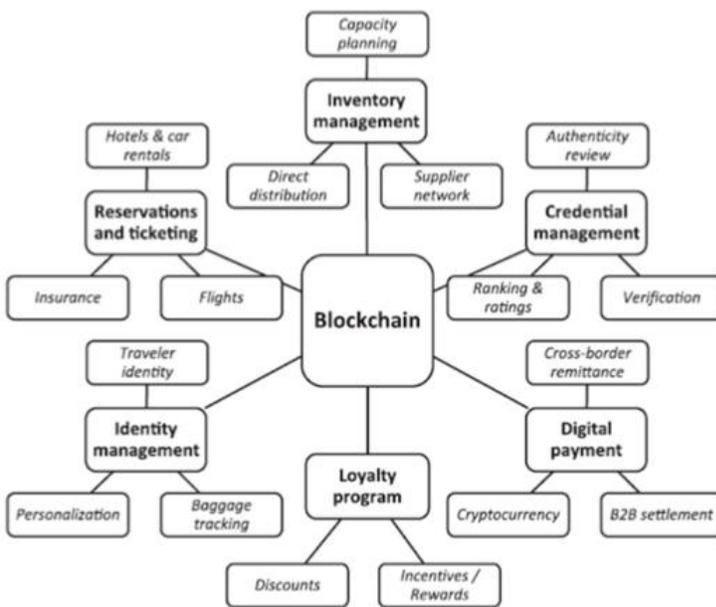
The immutability of blockchain shows that new information/data can only be added to the blockchain unless the majority of the users decide to do so, and even if the information is altered, it can easily be spotted. With public blockchains, all users can view the same data; however, in private blockchains, users can be restricted, and access is needed to view the data. Individuals can also program the softwares and create decentralised applications (Treiblmaier, 2020). Initially, the first blockchains have had simple scripting languages; however, throughout the years, the scripting language of the blockchains evolved as well (Treiblmaier, 2019). Smart contracts (SC) was firstly defined by Nick Szabo (1996) and it is fundamentally a computerised transaction protocols which executes the terms of the contract. Smart contracts are decentralised applications and the programmability of BCT helps organisations like Ethereum to work with different languages and introduce smart contracts. Ethereum is one of the biggest and commonly used BC network which enables users to builds decentralised applications (Pothavarjula & Sirisha, 2022). SC are no different than normal contracts but are written in a computer code and placed in a decentralised

infrastructure (Zupan Korže, 2019). These computerised transactions are protected by computer protocols and ready to be executed if the prerequisite of the contract occurs, at which point the clauses of the contract will automatically be activated (Zupan Korže, 2019).

One other characteristic and advantage of BCT is decentralisation. According to (Aghaei et al., 2021), BCT is decentralised because its system operates successfully without an intermediary, central manager, or third-party organisation. Centralised systems are more prone to hacking or fraud, and operations with centralised systems are time-consuming and costly. The last deterministic characteristic of the BCT is the process of reaching a consensus inside the decentralised network. Tasks such as authenticating transactions or determining which data to add to the blockchain are established through consensus protocols (Treiblmaier, 2020). The fact that the system is decentralised creates trust; there is no need to inspect the intermediaries. Transactions can be individually evaluated, verified, and processed (Aghaei et al., 2021).

2.3.2 Blockchain technology in tourism

Figure 4: an overview of key blockchain applications to boost tourism



Note: taken from Kwok and Koh (2019)

The tourism industry has seen a prolonged integration of BCT, and trends suggest that entities and organisations are willing to create more efficient and effective methods to accommodate guests and increase network connections between different stakeholders, including governments (Nam et al., 2021). The tourism industry is an information sensitive market where operations depend on ICT. Because of that, it seems reasonable to capture and take advantage of the value of the newly emerging technologies inside the tourism industry (Zupan Korže, 2019). With an increase in the demand for efficient and sustainable living, the tourism and hospitality industry is particularly concerned about the development of more integrated services and solutions for holistic tourist adventures (Nam et al., 2021). Generally, the integration of BCT creates a seamless and holistic tourism experience and a journey for the tourist. Figure 4, was obtained from Kwok and Koh (2019), whose paper identified the key tourism applications that blockchain applications might be able to enhance.

The commercialisation of this newly emerging technology slowly started to move to the real-world problem-solving stage where big organisations search for potential applications that can improve their operations in terms of the supply chain, transportation, contracts, and payments (Kwok & Koh, 2019). In their recent research, Thees et al. (2020) discussed the possible use cases of blockchain in tourism and their integration into the tourism value chain:

1. It has been stated that blockchain will shape the first stage of the customer journey where travellers create their itineraries, and that it will improve the automatisisation and search algorithms of the initial online booking phase.
2. BCT will improve reservations and ticketing by replacing outdated incumbent technologies, allowing fast, secure, low-cost booking options, and increasing value that customer gets.
3. The technology is forecasted to affect inventory management and capacity planning and improve the backstage supplier network. In addition to inventory management, credential and identity management will improve with digital identifiers where all customer data can be saved on blockchain and increase the usage of e-passports while creating seamless traveling options for the guests.

4. The technology has already simplified loyalty programs that offer universal platforms to claim accumulated points while creating value from accurately obtained customer information via digital identity. (Erceg et al., 2020; Kwok & Koh, 2019; Thees et al., 2020)

Questions occur related to existing BCT literature on how tourism sector can implement this emerging technology inside in tourism operations. (Kizildag et al., 2019). While some agents already use BCT and smart contracts to improve the tourist's journey from beginning to end and tourism service quality, other tourism and hospitality providers use or plan to use BCT to cut down on intermediary costs and travel agent fees (Zupan Korže, 2019). Also, one other reason for tourism companies to adapt blockchain is to benefit from the hype of the technology and use blockchain's name to increase their market value. According to Cahill et al. (2020), due to the substantial uncertainty and the positive relationship with fundamental value, researchers expect companies to adapt BCT to benefit from an increase market value.

BCT also allows customers to transact any type of information that holds value such as their loyalty points. Facilitating loyalty programmes with blockchain will help companies to save costs due to BCT enables an efficient system and transaction management and loyalty programmes are likely to result in customer acquisition. On top of this, customers will be able to redeem their rewards much faster or can be able to exchange points between each other which is going to reduce the liabilities on companies' balance sheets. Allowing customers to trade loyalty points and enabling them to use loyalty points for different organisations will create a loyalty network that would also offer a solution for unused loyalty points which creates huge liabilities on companies balance sheet in the aviation and hospitality industries (Agrawal et al., 2019).

According to Aghaei et al. (2021), parties can interchange anything of value with BCT-based technologies, such as an asset, a service, property, money, ticket, or visa issuance, and these exchanges are conducted in a protected in a safe digital ecosystem through smart contracts. All the parties can see the information added to the smart contract which creates transparency, disables the need for a third party such as a lawyer or booking agent, and thereby reduces the cost of mediation. With the disintermediation of the incumbent systems, the global payment systems are also predicted to be affected by the rise of BCTs (Kwok & Koh, 2019). Once the digital peer-to-

peer payment is enabled between parties, the need to pay transaction fees to banks disappears. Currently, the parties involved in a transaction rely on multiple banks to transfer the money, the exchange rates are not finalised until funds are deposited in accounts which makes the transactions slower; however, the emergence of BCT makes it possible for international payments to be made directly and faster (Aghaei et al., 2021). According to Erceg et al. (2020), some of the leading motivators for end-users to purchase tourism products with BCT are low transaction costs, privacy, disintermediated transaction process, universal usability, easy verification, and that it is an intriguing technology. However, it is vital to understand that although the intermediaries charge no commission fees, a transaction cost still exists, and due to the highly volatile environment of cryptocurrency exchange rates, costs are seemingly unpredictable (Valeri & Baggio, 2021).

2.3.3 Blockchain technology-based hotel systems

As hotel distribution and industry are becoming more and more complex, it is likely that the implementation of BCT will have to tackle many challenges (Wang & Qualls, 2007). Many travel agencies and hotel chains have started to use BCT (Aghaei et al., 2021), and in the upcoming years, BCT will become an essential and central element of the tourism sector. With an increase in ICT usage and individual start-up projects that develop BCT applications, the hotel booking industry will have many more options to choose from when selecting a service provider (Erceg et al., 2020). Below are some examples of current organisations working to implement BCT in hotel/accommodation booking systems.

The Winding Tree organisation offers a B2B decentralised travel marketplace for a decentralised access to hotel inventory. According to Winding Tree, the travel industry has its own market makers that create very high transaction costs, ensuring high entry barriers. (Izmaylov, 2021). They aim to bypass the intermediaries such as travel agents and GDS and connect users directly with the service providers such as hotels and airlines, while charging only minimal usage fees and cutting commission costs for both parties (Erceg et al., 2020). Winding Tree is a non-profit company from Switzerland, and their network is built on Ethereum while they are also using their token called Lif. Lif token can be acknowledged as organization's currency. The Lif token enables parties to successfully pay for the usage fees and become a registered business in their own "know-

your-business" system they created called ORGiD. ORGiD is a self-sovereign identity for organisations that are implemented on Ethereum Blockchain, and it offers a global, decentralised business register with a built-in KYC process (Izmaylov, 2021).

Travala.com was founded in 2017, and they are a cryptocurrency-friendly travel booking service. Travala.com aims to solve false discounts offerings, trust issues between customers and service providers, limitations in customer booking experience, loyalty reward claiming, limited payment options, and higher prices than usual commissions. They propose that the part of the solution is launching a decentralised technology where consumers will have fewer hidden fees, fair prices, and verified reviews and content. Their way to achieve this is to create peer-to-peer travel services without any control of a central authority where property owners complete their listings and arrange their fees (Travala, 2021). Travala.com stated that booking commissions still drive the companies' business model; however, they will keep the commission rates lower than their competitors. To enhance Travala.com's direct connections with users, the organisation created the Direct Contracting Program and Decentralised Salesforce, where individuals can sign up for different properties to support decentralised peer-to-peer connections and be incentivised by the native token AVA (Travala, 2021).

According to their white paper, Dtravel is a travel ecosystem that supports the community by building a platform where a truly decentralised marketplace between hosts and guests occurs for home-sharing (Dtravel, 2021). Dtravel uses BCT to take advantage of cryptocurrencies, smart contracts, and decentralised governances that support hosts' and guests' interests without intermediaries. They aim to use BCT and the key components mentioned above to sustain the fees and lower them compared to other short-term and long-term home-sharing platforms. By saying that, the collected fees will be transferred to a community treasure, which will create a value proposition for their token holders (Dtravel, 2021).

Locktrip is another platform that will leverage BCT to distribute travel products. According to the LockTrip white paper, their projects consist of three components; a travel marketplace where customers can get a 20% discount for hotel bookings, a distributed database, and LockTrip Blockchain (LockTrip, 2021). The project's primary goals are to give the control of the pricing

back to the hotels while the distributed database makes it possible to charge 0% commission. Also, the LockTrip distributed database will be located on the LockTrip blockchain, eliminating the single authority, and the hotel can directly connect to the LockTrip database to set their prices while keeping everything transparent. In their words, this will provide an equal opportunity to all affiliated booking sites. Their blockchain will be open for everyone and continue to be working as long as the blockchain exists (LockTrip, 2021).

TUI Group is the world's largest tourism and travel company, and recently they started to integrate BCT into their operations (Willie, 2019). TUI group has more than 1.600 travel agencies, six airlines, more than 380 hotels, and 16 cruise liners. While their current blockchain BedSwap is a private one, they aim to open their BCT to the public so that agents and guests can access it to reserve their travel bookings (Marr, 2018). BedSwap will allow the TUI group to optimise the control of their inventory between different sale points and flexible selling margins based on the demand in real-time. They aim to use BCT to create smart contracts with hotels, hence improving the organisation's inventory (Zupan Korže, 2019). In their latest update, the TUI group explains how they will integrate their hotel's inventory to blockchain completely by using 'Plug and Play Centre'. By doing that, the hotel rooms would be directly sold to the guest, and the excursions and activities would be involved in direct sales (Demirel et al., 2021)

Webjet is an Australian travel agent who recently started operating with BCT in a corporation with Rezchain (Nam et al., 2021). Webjet develops Rezchain, and it permits users to eliminate discrepancies in hotel bookings; they aim to minimise the out-of-pocket costs related to booking data differences and price discrepancies. Rezchain software primarily focuses on removing anomalies and aligns the available information between travellers, hotels, and agents regarding pricing, booking status, currency conversion rates, room type, and special requests (Kapil & Kapil, 2022). According to Demirel et al. (2021), these out-of-pocket costs associated with booking data discrepancies can affect up to 5% of the total hotel bookings.

IATA Travel pass application is a current industry use case which combines digital identities with SSI model to create global standards to verify identity and test/vaccine information (IATA Unveils Key Design Elements of IATA Travel Pass, 2020). IATA Travel pass gives full control over the

data to its users and builds on the highest standards of GDPR while enhancing contactless travel opportunities. BCT will enable increased tracking functions for customised services, integration of seamless and contactless travel, and most importantly a very secure way of sharing information.

2.3.4 Digital identity

Tobin and Reed (2017) pointed out that the internet's current addressing system could only identify machines on a network, and the internet was created without an identity layer. That is why there is no way to identify people on the internet uniquely. Websites and applications do identity checks with usernames and passwords in our daily lives. While individuals use different websites and applications, their identity is only meaningful inside that organisation; it will become irrelevant if they stop using the specific website/application. Different organisations have scattered information about individuals where the person has no control over their scattered identity information (Tobin & Reed, 2017). Digital identity is an entryway to the internet world for a person, entity, or device, and a digital entity holds a set of accreditations that assist in identifying a specific individual, organisation, or device in the digital world. Newly created models are directed towards granting complete control of identity and personal data ownership to the individuals, creating a user-centric approach with better security and privacy (Naik & Jenkins, 2021).

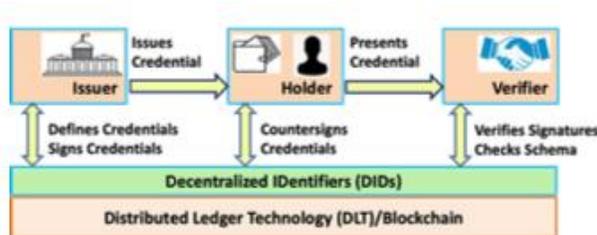
One of the newly emerged models is called the "Self-sovereign Identity" (SSI) model, and this model offers a sovereign, everlasting, and portable digital identity for an organisation or device without needing a centralised authority (Kondova & Erbguth, 2020).

2.3.5 Self-sovereign identity and decentralized identifiers

In recent years, GDPR (General Data Protection Regulation) has become crucial for organisations where "data minimisation" and collecting the minimum amount of personal data is necessary for operating with particular services (Mukta et al., 2020). Self-Sovereign Identity (SSI) is an identity management system that allows individuals and organisations to own and manage their digital identity in a decentralised way. While individuals can freely present their digital identity to anyone they would like to interact with, the idea of SSI can be extended to IoT devices where these devices can manage their identities (Bartolomeu et al., 2019). The sovereignty of the information is to embrace all parts and actions related to identity and personal data. Individuals can store their real-

life identities and personal data in their digital wallets inside their devices. The confirmation of this information happens with the use of the BCT in a decentralised way. Therefore, the SSI model allows individuals to act in a decentralised way without needing approval from a third party when trying to confirm the information. (Naik & Jenkins, 2021)

Figure 5: Self-sovereign identity ecosystem



Note: Figure from Naik and Jenkins (2021)

As illustrated in Figure 5, the SSI model has three essential components. The connection between the issuer, holder, and verifier constitutes the ecosystem. The issuer is the one who creates the credentials for the identity holders and substantially an issuer is most likely a trusted entity. The holder owns the identity issued by the issuer and claims the credentials they wanted from the issuer. The identity holder keeps their information in the digital wallet, and when needed, an individual can present themselves to the verifier. And at last, the verifier is the service provider that requests the identity holder's credentials. The confirmation and the verification of the credentials process happen with BCT (Soltani et al., 2021).

It is essential to understand the critical points in the SSI model as they represent the difference between current identity management systems (IMS) and the possible future ones. BCT is responsible for the trust relationship in the IMS and decentralised identifiers (DIDs) are responsible for creating universally unique identifiers connected to an identity that can be formed without any organisation or service provider (Naik & Jenkins, 2021). According to Fedrechski et al. (2020), the digital identifiers created until now are either centralised or non-resolvable; therefore, to solve these problems, the World Wide Web Consortium (W3C) started to develop

DIDs, and they are a crucial part of the SSI model. DIDs are a cryptographic identifier scheme that does not rely on a centralised agency to oversee the identifiers but instead uses distributed ledger technology like Blockchains (Soltani et al., 2021). The assumptions about SSI are that the service providers and users will cooperate in implementing the SSI and DIDS successfully. According to Kuperberg (2020), analysis and ownership of information are crucial in data-driven ecosystems, and they are huge assets.

On top of reducing the available data on the web, SSI will also be designed to prevent the creation of fragmented identity data. Currently, in the era of the digital economy, a considerable amount of fragmented identity data is spread between online siloes where companies keep details from individuals. Duplicated identities, misinformation, and outdated data create difficulties for service providers. The lack of universal standards and interoperability between identity siloes makes it impossible for providers to store, keep, use, delete or share personal data (Soltani et al., 2021). The SSI model can also help with identity fraud and theft. Data breaches cause millions, if not billions, of hacked data every year. In 2018 alone, more than 900 breaches caused 3.3 billion stolen records. A potential implication of the SSI model will improve privacy and create a potential solution for fraud and identity theft (Soltani et al., 2021).

2.3.6 Digital identity in tourism

Digital identities inside tourism is one of the biggest perks of BCT if it is implemented correctly. BCT creates unique openings for parties inside the travel industry which can boost the identification of customer preferences and needs while creating more personal, peer-to-peer connections and therefore increasing loyalty and satisfaction (Treiblmaier, 2019). The authentication of identity holds immense value in tourism. Identifying an individual and integrating the digital identity can help confirm products, services, and items, record every transaction, and create a traceable digital history for anything that travels related to tourism (Aghaei et al., 2021). By integrating digital identity technology into their system, organisations can take advantage of the automated identification process, which would reduce check-in times, and create more seamless traveling options (Thees et al., 2020). In addition, increasing customer service with personalisation is achievable by improving the credibility of the data that hospitality companies can obtain from the customers via digital identity programmes (Willie, 2019).

According to Willie (2019), integrating digital identity into the tourism industry will significantly enhance the quality of the data related to customer history. All the information related to the guests, purchases they made, length of their stay, individual tastes and preferences, and total expenditures can be instantly shared safely with the other properties that the guest is planning to stay in. Integration of the digital identity into the SSI model, the tourism and hospitality industry can start examining how to enhance customer management and guest experience while creating better-personalised offers for guests (Kizildag et al., 2019).

According to (Kizildag et al., 2019), SSI can prevent cyber identity theft. Once the digital identity is fully integrated, SSI will enable guests to bring their data for their stays without fearing identity theft. Privacy breaches and system hacks are not uncommon in the hospitality industry. In the last 2018 Marriot hacking, the information of more than 5.2 million Marriot Bonvoy loyalty program members was stolen (Wired, 2020). Certainly, in these situations, the importance of GDPR and personal data privacy becomes crucial. The SSI model not only constructs advantages for the industry due to BCT and distributed ledger technologies but also enables customers to have the freedom to regulate the level of disclosure of their personal data information with service providers (Kizildag et al., 2019). With the successful use of zero-knowledge proof methods, individuals can prove a specific value to a service provider without disclosing the actual information (Fedrecheski et al., 2020). The zero-knowledge proof is a type of method which enables the prover of an information to induce the verifier that the statement which the prover claims to be correct without disclosing the information itself (Wu et al., 2020). For example, a traveller need to be over a certain age to stay in at a specific hotel and with the usage of ZKP, reception can identify if the guest is over that specific age without actually knowing the date of birth. Therefore, intermediaries will not have access to the information, and there will be no invasion of privacy concerns from the guests' perspective.

The accurate and immutable data will also assist the current struggles of the aviation and hospitality industries with inspecting health credentials and COVID – 19 passes. A digital identity of an individual can hold information of COVID-19 test results and vaccination passports and they can act similarly as a standard passport which guarantee the identity and citizenship of the traveller as well as their health credentials (Shuaib et al., 2021). Travellers pass through different registration and controlling points while booking or boarding a flight, during their stays at the hotels, or on

general cross-border trips. This registration and identification system is currently very time-consuming and necessary at every stage of the customer's journey (Thees et al., 2020). Integrating mobile and biometrics technology into BCT can seamlessly reduce the check-in times and queues with fingerprint or retina scans while keeping all the data related to the traveller encrypted and safe (Zupan Korže, 2019).

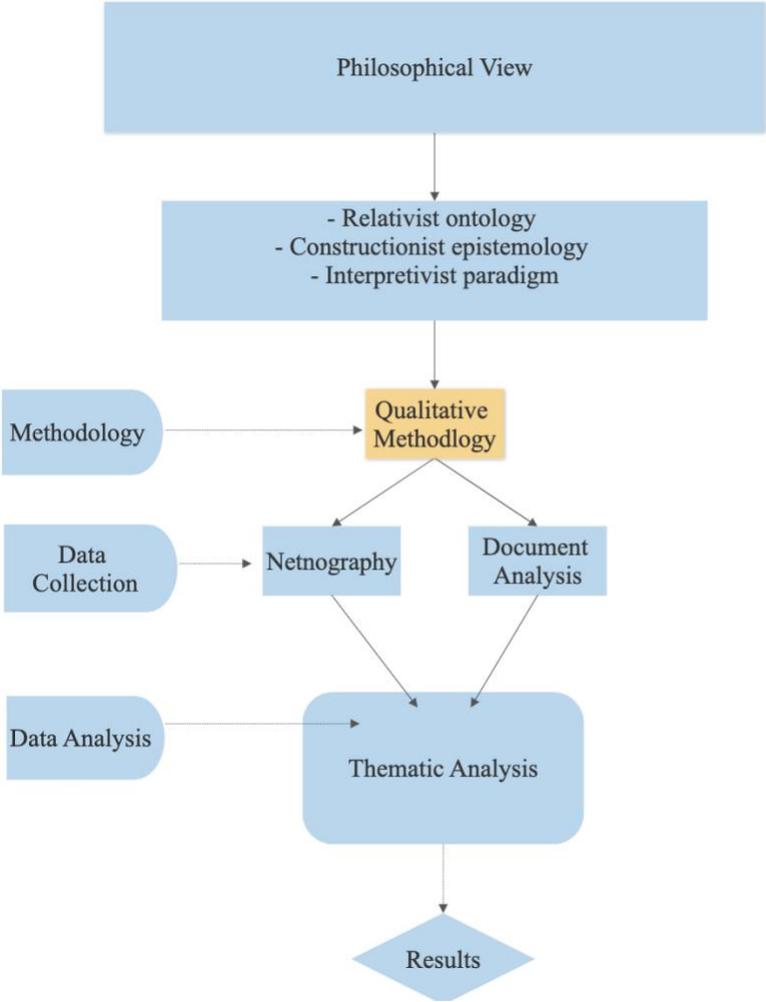
2.3.7 Conclusion

In conclusion, with the integrated services being part of travellers' lives, guests started coming across with sustainable and efficient travelling, while BCT can increase the seamless travel experience that guests desire. Above, several use cases which execute a holistic seamless travel experience for guests were presented. The integration of BCT into the tourism value chain would allow for improved customer journeys with automated itineraries. It can also replace the current payment technologies with faster, more secure, and low-cost alternatives where technology creates transparency, while at the same time disabling the middleman and thereby lowering the third-party costs. Inventory management, capacity planning, enhanced loyalty schemes, and digital identity were identified as areas that are likely to benefit from the introduction of BCT, which would intensely affect the end-user and motivate guests to take advantage of this novel technology. On the other hand, universal regulatory requirements, unpredictable transaction costs of cryptocurrencies, and potential conflicts between suppliers and retailers might decline the integration process.

Chapter 3. Research design

This chapter presents and explores the selected research paradigms, methodology, and methods with the ontology and epistemology underpinning the research. The research is based on an analysis of online reviews and organisational documents. This study will explore the behaviours/opinions voiced in cybercultures and communities through the analyses of User Generated Content (UGC) on Web 2.0 and Web 2.5. The study focuses on the users' perspectives and experiences of BCT based hotel booking systems to gain insights into the potential economic benefits of a decentralised booking systems to end-users in order to determine whether there is an increase in guest satisfaction due to these newly adopted systems. Websites such as Reddit, Medium, and Quora were explored as data sources due to their reputation as one of the best technology information/news sharing websites. Aside from UGC, the researcher also examined and collected data from organisational reports, blogs, and Q&As to develop a rich and in depth understanding of the subject matter.

Figure 6 : Research design flow chart



3.1 Ontology and Epistemology

The research philosophy enables the researcher to justify the research they conduct at the end, and the paradigm is the researcher's view with the researcher's personal values, beliefs, and attitudes reflecting on their own research (Crotty, 1998). When the researcher starts designing their research design, looking into how reality is constructed. (Gray, 2021). Ontology is the study of being, which refers to "what exists" (Crotty, 1998). While ontology tries to understand what constitutes reality, epistemology refers to what it means to knowing something, which has an influence on what type of knowledge and data to examine to answer the research question (Gray, 2021). Epistemology is mostly interested in ways of knowing and understanding the world and what type of knowledge should be acquired (Ritchie et al., 2003).

Paradigms can inform research methodologies and guide how the research itself should be conducted. Research paradigms are a set of ideas or a view of the world that guide researchers with generating the information. Researchers adopt these sets of assumptions and strategies and to understand and observe the researched topics (Fossey et al., 2002).

Relativist ontology and constructionist epistemology with an interpretivist paradigm are chosen for this research which can be identified as social constructionism. Social constructionism argues that individuals construct knowledge as they pass through the world (Willig & Rogers, 2017). An individual's understanding of the world highly depends on their cultural background and the relationships they have experienced (Coghlan & Brydon-Miller, 2014). Crotty (1998) believed that "all knowledge, and therefore all meaningful reality as such is contingent upon human practices, being constructed in and out of an interaction between human beings and their world and developed and transmitted within an essentially social context" (p.42). The interrelatedness of the different aspects of an individual's past is also an important focus in qualitative research, with all social-cultural, psychological, and historical components playing a crucial role in an individual's understanding of the world (Ritchie et al., 2003). Thus, since the study researched a phenomenon that is subjective, social constructivism becomes an appropriate paradigm of this study; the views of individuals are able to be captured from their subjective perspectives. Also, this study aims to

contribute to the overall understanding of hoteliers in BCT context, which can then be used to increase the adaptation of BCT inside the hotel industry. . That is why understanding the possible benefits from the consumer's point of view would indicate clearly whether there is a possibility for the overall adaption of a BCT-based hotel booking system inside the hotel industry. Therefore, to understand the impacts on customers, this research will analyse the data in the context of the customer's background. To understand the impacts of the hotel booking systems with Blockchain technology on the customers, the researcher will be executing qualitative research which would effectively establish patterns, consistencies, and meanings after gathering the data and analysing them (Gray, 2021).

3.2 Research methodology

3.2.1 Qualitative research

The purpose of qualitative research is to answer questions and understand the aspects and meanings of the dimensions of our lives and social worlds. Qualitative research comprises of different methodologies, and it can be used as a broad naming for methodologies that concerned with individuals' experiences, behaviours, and interactions with each other in the social context (Fossey et al., 2002). One of the crucial strengths of qualitative research which influenced its adoption for this research is that it provides a framework to study individuals in their natural settings and observe them in their territory while interacting with them (Pope & Mays, 2006). The researcher was aware that obtaining information related to the impacts of BCT based hotel booking systems on consumers was going to be challenging due to the limited number of community members interested in the phenomenon at this stage of the technology. Therefore, from the onset, the strategy was to reach the individuals as they interact in their natural settings; hence ethnographic methods have seemed very compatible with the research goals. Ethnographic research assumes that meaning is constructed inside the specific societal and cultural context, and it is explored within the community where the phenomenon takes place (Rice & Ezzy, 1999 as cited in Fossey et al., 2002).

3.2.2 Netnography

Netnography is also known as a digital ethnography or online ethnography. The results of netnographic research can uncover secret aspects of experiences, habits, cultures, and expectations because online platforms give people the freedom to express themselves fully and openly (Tavakoli & Wijesinghe, 2019).

Netnography was created by Kozinets (2002) to be able to study online communities with an ethnographic method. While ethnography usually requires researchers to follow their participants in order to observe their behaviour and possibly interview them about their experiences (Rice & Ezzy, 1999 as cited in Fossey et al., 2002), netnography analyses people's online behaviour; in this case, customers' feedback on BCT based hotel booking systems.

Netnography offers information about customer purchasing/behaving patterns based on their online behaviour. According to Tavakoli and Wijesinghe (2019), customers unwittingly started to impact and influence other potential customers due to increased social media and internet usage. Tavakoli and Mura (2018) stated that Netnography in the tourism industry is helpful in understanding the experiences of suppliers, tourists, and developers by analysing uninterrupted access to freely posted public reviews and providing thereby increasing our understanding of the discourse between tourists (Jeffrey et al., 2021). Once tourists share their experiences on the internet, they directly impact destination marketers and other potential tourists.

One of the advantages of netnography over ethnography is that it does not require the researcher to physically follow participants or attend and record gatherings to be able to describe their behaviour; instead, in netnography, the researcher has access to vast amounts of freely available written online data. This results in lower search costs than face-to-face ethnography (Kozinets, 2002). According to Kozinets and Gambetti (2020), netnography comes into prominence with efficiency while requiring less time and effort when it is compared with ethnography. One of the reasons for choosing netnography is that the research aims to understand the impacts on customers of using a specific technology, therefore, customers' experiences are highly relevant.

3.2.3 Document Analysis

Organisational documents have been part of qualitative research for years. While most of the insights of this research were gained through a netnography of customer experiences, the study also undertook a document analysis approach to provide a crucial and deeper picture of the phenomenon. In recent years, the use of document analysis has become mainstream, and it has increasingly gained prominence among researchers (Bowen, 2009). Document analysis is a procedure of examining documents to understand their meaning and develop empirical knowledge of researched topic like all the other qualitative approaches (Bowen, 2009). The role we have chosen within our document analysis method is having a supporter role for our netnography and will attempt to provide corroborating proof for identified themes and codes (Siegener, 2018). Also, according to Denzin (2017), document analysis is often used with other qualitative research methods such as interviews and participant or non-participant observation. Due to the nature of the newly emerging blockchain technology, the document analysis method is aptly suited to complement the data gathered from the netnography. While primary textual data can be collected with organizational papers it can be analysed with document analysis, it can also include various document types such as organisational q&a, organizational reports, etc. (Merriam, 1988), which also assisted in uncovering meaning and developing further understanding of impacts on the customers.

3.3 Participants

Firstly, “user-generated content” (UGC) was collected from online discussion forums and the data mostly acquired from individuals who had booked their hotels/rooms/trips with organisations operating with Blockchain technology. A second data set of documents was collected from organisations and their blogs, reports, and Q&As. These specific organisations from which the data had been collected were chosen due to their affiliation with BCT hotel booking systems and because being industrial pioneers in the tourism blockchain area.

For UGC, a total of 1600 user reviews were observed from various websites which stated in the data collection part of this dissertation and those reviews related to the impacts on customers

because of the technology itself. Secondly, the organisational data, 25 organisational papers were collected, including different type of reports, blogs, Q&As covering different aspects of the BCT-based hotel booking system's impacts on customers.

3.4 Procedure

According to Schmallegger and Carson (2008), travel blogs and UGC are becoming more popular research sources in tourism research, and with analysing these insights from organisations and travellers, findings can bring more sincere and demonstrative ways than other traditional market research methods. Identifying and choosing online communities and websites to execute the research was a crucial step for the foundation of data collection (Bertilsson, 2014). While preparing for the data collection and identifying the websites and online communities, the researcher adopted the position of a non-participant, which is a complete observer who passively analyses the community (Kozinets, 2002). As part of this research, the researcher chose not to become a member of the online sites from which he collected the data and did not initiate conversations with other members. The main reason for the researcher to choose to become a non-participant observer while collecting the data was to capture organic conversations in line with netnography's principles (Kozinets, 2002). According to Kozinets (2002), when the researcher is choosing the websites to study using netnographic methods, researchers should consider the traffic on the website, the presence of research question specific information, if detailed and descriptive rich data is available on the site, and if member interact.

The researcher started looking for organisational papers, Q&As, blogs, and reviews published starting from 2017. With the increased popularity of BCT in 2018, the researcher wanted to cover both the popular and unpopular areas of BCT. Before collecting the data, the researcher familiarised himself with the organisations operating in the BCT-based hotel booking area. This is because to research the impacts of BCT-based hotel booking systems, the researcher needed to find operating organisations to identify the effects. The researcher made a list of the organisations with their roles inside the industry and, after that, planned to obtain reviews from the users of these organisations in order to collect genuine UGC from actual people who have used BCT. Once the researcher had identified several organisations operating in the area, he started to search for

websites, blogs, chat rooms, and company specific websites which gives insights from industry/organization to identify on which websites the researcher could access UGC and organisational papers related to the chosen organisations. As criteria for his selection, the researcher chose websites with a higher traffic volume and the primary language is English. All websites the researcher collected data from were public, and the language was English. It was essential to search the data in English since it is the most common language, and most of the technology and tourism blogs were written in English. Also, the researcher can save time by transcribing the data because data can easily be copied from online resources.

The plan was to take advantage of the expertise of some users of the UGC. When the researcher identified the websites, he observed the general traffic of messages and the depth of the knowledge related to the research questions. Since BCT hotel booking systems are a newly emerging tourism area, few chat rooms and member community websites were available. As a result, contributions in the existing websites/threads/chatrooms were very detailed and descriptive as most of the members were experts and very enthusiastic about the technology. At the same time, the researcher analysed organisational blogs, reports, and Q&As to gain additional insights about the research questions. At this stage, the researcher chose organisations from the technology and tourism industries related to the chosen field—the aim was to obtain documents including white papers, field studies, documents from consultancy companies, and institutional research papers.

The researcher started to collect the data from the beginning of February 2022 and focused on information that were related to the research questions, which is a crucial step in choosing sites/information according to Kozinets' guidelines (2002).

3.5 Data Collection

UGC was collected from Reddit.com, Google Play Store reviews, AppStore Reviews, Trustpilot.co.nz, Medium.com, and these organisation's Discord channels. The collected data focused on customers' experiences with and opinions about the BCT-based hotel booking system used. The data collection phase took 1 month; during this month the researcher identified past reviews to collect as well as reading the chat rooms and Discord channels of the organisations

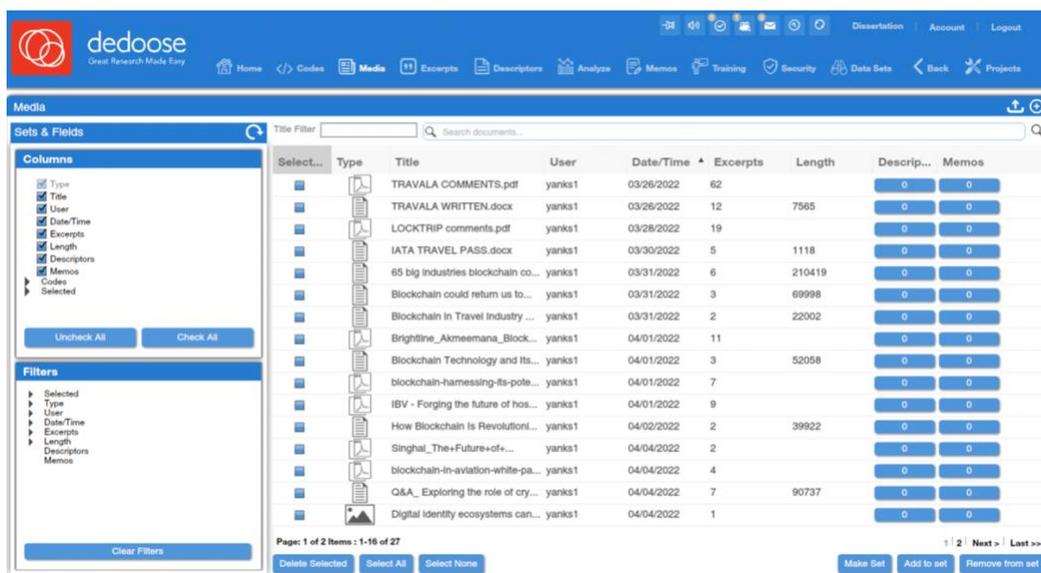
where users/staff constantly discuss recent improvements, updates, and problems of their system. To gain a more in depth understanding, organisational reports and Q&As were mostly collected from organisational white papers, forums, PhocusWire, and research institutes. The researcher collected data from Winding Tree, Travalala.com, Locktrip.com, Amadeus, TravelCoin.com, IATA, and TUI. These organisations are actively operating in the tourism industry, and they experience with hotel booking systems that use BCT. Moreover, the researcher also collected some data from organisations like PhocusWire, World Economic Forum, IBM, Deloitte, Decentralised Identity Foundation, and some other smaller scale organisations such as the Blockchain Research Institute. These organisations mostly sharing insights from the tourism industry and possible integration of BCT in to the sector. The organisational data and the UGC was saved to the computer and transferred to Dedoose.

Dedoose is a mixed-method research software alternative to other qualitative data analysis software (Dedoose, 2020). Collected organisational data saved and imported into the software as a webpage or PDF. However, some of the UGC was copied into Microsoft Word before being imported into Dedoose. Collecting the data in Microsoft Word enabled the researcher to organise the data properly before adding the files to the software. For example, for collecting UGC from customer reviews, the researcher found it more efficient to copy and paste all the data from the websites for each organisation into the same Microsoft Word document and then import it inside the Dedoose for further data analysis. The collected UGC has not been altered hence all the wording of the UGC belongs to the users.

According to Fossey et al. (2002), traditional data gathering methods can be reinforced by combining them with different data gathering techniques. This way of obtaining the data is chosen purposely to develop a better understanding of the researched topic, and it is called triangulation. Triangulation of the methods and data gathering ways enables comparison of the perspectives of different accounts, which can create corroborating evidence for the researched topic (Fosset et al., 2002). It is vital to understand the chosen methods' effectiveness by evaluating whether they enhance the subjective meaning and social context related to the research question (Fossey et al., 2002). By triangulating the below research question, this paper aims to understand the phenomena from two different sides. Firstly, the study considers the impacts of BCT based hotel booking

systems from the consumer's side; secondly, the issue is then explored further by analysing the organisational papers and what organisations believe the impacts will be on their customers. Triangulation also attempts to provide more credibility by collecting the data through different methods. This can reduce the potential bias that might happen in a single method study (Bowen, 2009). Figure 7 below was created to guide the researcher at the initial stages of the data collection.

Figure 7: Transferred media to the Dedoose software getting ready for coding.



3.6 Analysing the data

Thematic analysis (TA) was employed to analyse the data gathered. Thematic analysis can be used with different types of theoretical frameworks (Terry et al., 2017, p.7). One of the reasons for employing TA for the research was because it is not tied to a specific epistemology/ontology (Maguire & Delahunt, 2017). This creates flexibility for the researcher while working around the research question and theoretical framework.

According to Aronson (1995), TA starts with acknowledging themes and patterns of behaviour or living, and therefore conversations can be understood better while using TA. Since the collected data consists of organisational Q&As, blogs and UGC, which feature many conversations between

parties, using TA will help this research with understanding and identifying written resources related to the research question (Maguire & Delahunt, 2017, p.3). TA is a rigorous and accepted as a valid means of analysing tourism data, especially where the whole's meaning and importance may be more than the total sum of small sections (Walters, 2016). The appropriate usage of TA in tourism research occurs when descriptive passages, narratives, and visual text are analysed (Walters, 2016), which applies to this research's examination of UGC. According to Braun and Clarke (2006), two different levels of analysing the themes exist. The semantic level approach focuses on the explicit meanings and does not look further than what the data says on the surface. In contrast, on a latent level, the researcher tries to identify the data's underlying meanings, assumptions, and conceptualisations. In this research, TA identified latent themes that look beyond what has been said in the data and tried to identify the underlying ideas or ideologies (Braun & Clarke, 2006).

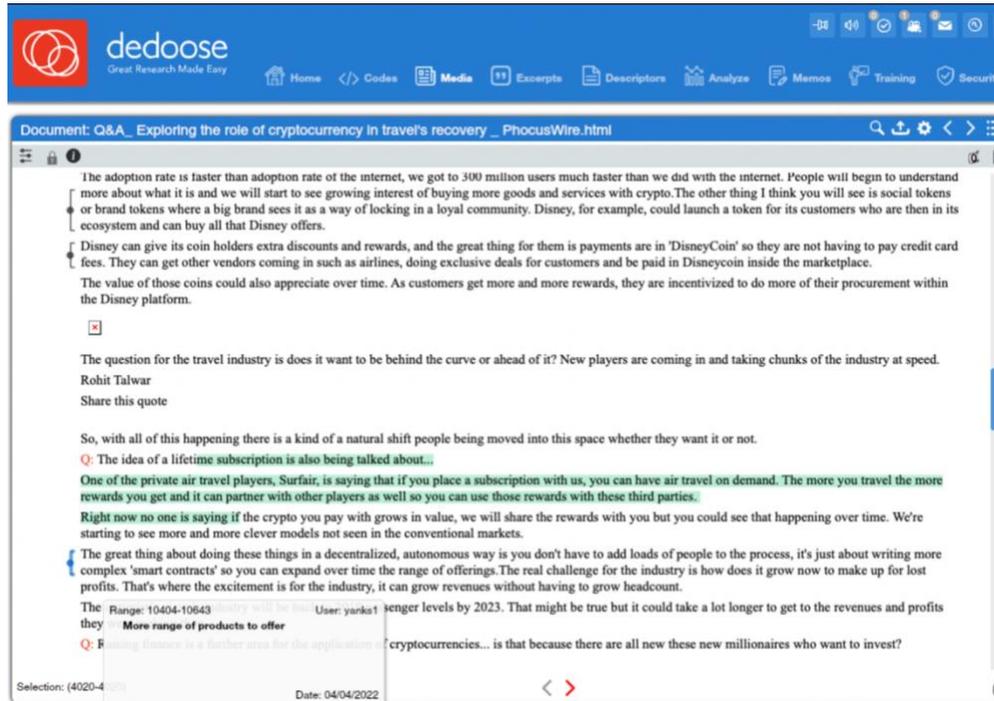
In this dissertation, a top-down, deductive, or theoretical TA approach is applied, which reflects the researcher's analytic interest in the area. Braun and Clarke (2006) identified two ways to do thematic analysis. Top-down (deductive) is where the themes are created according to the specific research question. The bottom-up (inductive) way is related to the data itself, and researchers code their themes regardless of the results of previous research on related topics. Since the researcher approached the data with a specific research question related to the impacts of the BCT-based hotel booking systems on the customer, the deductive approach was deemed more suitable in the sense of creating a more detailed analysis of some aspects of the general data (Braun & Clarke, 2006).

Braun and Clarke (2006) created a six-step guide to conducting a thematic analysis. However, according to Maguire and Delahunt (2017), the thematic analysis journey is not a linear process but one that requires back and forth between each step, especially if the researcher is dealing with complex data.

Step 1 in Braun and Clarke's (2006) six-phase framework for conducting TA is becoming familiar with the data set the researcher has collected. In this step, the researcher reads the data

set repeatedly to become very aware of the collected data. It is also mentioned that the researcher can take brief notes while familiarising themselves with the data as shown in Figure 8 below

Figure 8: Generalised note taking inside the data set



After briefly taking general notes on the data set, the researcher started to get ideas for codes that might be relevant to explain the data. Because the researcher approached the data with a specific research question and analysed the data with having a specific study in mind, the researcher coded each piece of data as if it was relevant to the research question. The researcher initially coded all UGC data and carried on the coding with organisational papers. When the coding finished and all the data had been coded, the researcher started to search for themes. According to Walter (2016), finalised codes should slowly evolve into basic themes. At this stage, the researcher had many different codes available, and he benefited from Dedoose's visuality options, which helped him comprehend the prospective themes. While the researcher was analysing the codes, he used the "Chart Selection Reviewer" below. Chart Selection Reviewer assisted him with observing each code and the actual excerpts highlighted under each code together. Seeing the codes separately helped the researcher see the bigger picture and develop

overarching themes that capture different codes (Braun & Clarke, 2006). Once the overarching themes began to grow, they were reviewed more often, and some of the themes merged while some disappeared due to insufficient data to support them. During the review process of the themes, the researcher tried to identify whether the themes made sense in relation to the research questions and if there was enough data to support them or not. Also, some themes were found to collide with each other the more they have been reviewed. For example, after the initial reviewing and analysis, the theme “Personalisation”, which accounted for the increased personalisation the resulted from the BCT technology, was absorbed by the theme “Customer Experience” after further reviewing and examing the data.

Figure 9: Example of a code “More options with Loyalty Schemes” and the highlighted excerpts

The screenshot shows the 'Chart Selection Reviewer' interface. At the top, it displays 'Selections: More options with Loyalty schemes'. Below this, there are two tabs: 'Matching Excerpts: 5' and 'Matching Resources: 4'. The main area lists five matching excerpts, each with a document icon, a resource title, a date added, a username, and a code count. The excerpts are as follows:

Resource	Added	Username	# Codes
How Blockchain Is Revolutionizing the Hospitality and Travel Industry.html	04/04/2022	yanks1	2
How Blockchain Is Revolutionizing the Hospitality and Travel Industry.html	04/04/2022	yanks1	2
blockchain-harnessing-its-potential-in-travel (1).pdf	04/01/2022	yanks1	4
Blockchain Technology and its Uses in the Hospitality Industry _ Revfine.nl.html	04/01/2022	yanks1	2
TRAVALA WRITTEN.docx	03/28/2022	yanks1	3

At the bottom of the interface, there are three buttons: 'View Text Excerpts Full', 'Export Excerpts', and a set of three buttons: 'Make Active Set', 'Add To Active Set', and 'Remove From Active Set'.

3.7 Ethics

According to Kozinets and Gambetti (2020), it is impossible to verify the identity of the participants in netnography since most participants use pseudonyms or participate anonymously. Within the netnographic tourism research field, the "lurker" approach started to become trendy where the researcher stays passive and does not notify the participants about their purpose (Jeffrey et al., 2021). In this study, the researcher has only used publicly available data from websites that do not require a password/login. Any specific information that might reveal the writer's identity was changed to pseudonyms to increase identity protection. Since the researcher was not involved and did not participate in the discussions related to the topic, there is no chance for the researcher to know the real identity of the writers/bloggers who have published the selected data. Therefore, this research needed no ethical consent.

Chapter 4. Findings

This chapter presents the findings of the study in the form of themes generated through thematic analysis of the UGC and organisational documents. From the two sets of data collected, three main thematic themes emerged: (1) Customer experience, (2) Financials, and (3) Booking and travel journey. These themes reflect the impacts on customers' experience while using blockchain-based hotel booking systems and the organisations' assumptions regarding possible impacts on customers while engaging with the Blockchain-based hotel booking systems. In addition, further analysis of the three main themes produced subthemes that enabled deeper exploration of the effects of BCT-based hotel booking systems on customers. This chapter starts with analysing the excerpts that reflect the impacts on customers' experiences and describing the identified subthemes: (1) accurate information, (2) efficient personalisation, and (3) privacy. Then it will move on to discuss the next theme, financials, as well as the subthemes of (1) rewards and (2) loyalty programmes and room prices. At the end, the findings for booking and travel journeys are presented and factors associated with the convenience that comes with (1) revolutionised settlement options as well as (2) frictionless journeys are explored.

4.1 Customer experience

The first major global theme of the impacts of the BCT-based hotel booking systems on customers is customer experience. Previously in this dissertation, customer satisfaction has been explored, and several factors identified that could change the customer's experience in general. After cross analysing both the UGC and the organisational documents, a number of factors are acknowledged that can contribute to the experiences of guests. Therefore, these specific factors were accepted as the subthemes for the customer experience section. It emerged from the analysis that successfully using BCT-based hotel booking systems will shift how accurate the general information is, improve personalisation, and create secure and well-thought-of customer privacy.

4.1.1 Information Accuracy

According to Travala (2021) and LockTrip (2021), the guest/hotel information shared via distributed ledgers is more accurate and very difficult to manipulate. The information's accuracy and authenticity have been vital in different stages of the customer experience when booking with the hotels. The importance and the effectiveness of accurate hotel information, honest guest reviews and ratings had been mentioned below.

According to the LockTrip white paper (2021), due to the decentralised nature of BCT, hotels do not pay for commission for each visitor or to appear at the top of a search and thereby get more views. This means that guests can be sure that the intermediary is not altering the information to be able to make more commission yield.

“NO COMMISSIONS, NO BIASED ALGORITHMS - The fact that we do not take any commissions from our operations also removes the conflict of interests described in section 1.4. From our perspective, any inventory yields the same benefit, which makes us indifferent to customers' choices.”

LockTrip (2021)

As captured below, it is believed by IBM that authentic information related to the stakeholders involved in the travel journey is vital for customers interested in the source of the food they are eating and items they are buying.

“Today's consumers also want to know the origin of what they're eating or buying, the authenticity and quality of ingredients and materials, and whether it was responsibly sourced. With the immutable transparency of blockchain, such product characteristics can be clearly and easily communicated to customers.”

IBM (2021)

Another parameter that impacts customer experience is the availability and the accuracy of information that is relevant to customers. The information about the hotels, such as guest reviews for hotels, is crucial for customers. This was mentioned in the World Economic Forum (2018), which discusses the significance of previous travel data of the customers :

“Digital Identity that includes Biometric, Biographic and Travel history data of the customers enables the traveller to authorize entities in traveller journey to access selected information about them to allow for risk-rating, verification and access which enables extensive and upfront structured information sharing with entities.”.

World Economic Forum (2018)

Previous travel data related to the travel history of the individual customers are crucial for a healthier connection between hotels and customers. It is important to know information related to customer due to marketing reasons and most of the third party organizations are willing to limit the communication/data flow between service providers and end users just to keep their competitive advantage alive. With the integration of Digital Identity, hotels will be sure about the authenticity of the information that customers share with properties and customers will be in charge of their information that they would like to share.

“I think OTAs provide a lot of value and they can continue to by providing that personalized experience. But if any organization thinks that by locking in customer data - when other companies are allowing their customers to bring their data and have it be interoperable.”

PhocusWire (2022)

“Now let’s just say you make a hotel reservation, as an example. And you might also supply your preferences about wanting a high floor or maybe you’re a vegetarian, and also your credit card information... Then I might make another reservation at exactly the same hotel a month later. With decentralized digital ID, I’m sending them the golden record every single time I make a reservation. They don’t need a customer database full of toxic customer information that is subject to GDPR and all the other legal scrutiny around the world, because I’m sending them -

every single time with a simple reservation - who I am so they can trust the information.”

PhocusWire (2021)

On the other hand, even though the information can technologically be immutable and authentic, some customers found discrepancies between the information available through BCT-based hotel bookings systems and the reality. The guests mentioned less transparency regarding available room options, inclusions of rates, and prices of the rooms as examples of the inaccurate information sourced through BCT-based hotel booking systems.

“Lesser booking options compared to Makemytrip and Booking.com:

... I checked out Locktrip.com, to compare the prices between Booking.com and Makemytrip.com and Locktrip.com, for booking a hotel in Bangalore. While I found that the prices are lesser on Locktrip than the other two portals, the hotel I had selected, was offering separate Full board and B&B options on the other two portals, while Locktrip had only the standard B&B option available for all the rooms. Just wanted to point out this issue. Also, there's a lack of transparency in terms of Taxes & Other Charges. While Booking and Makemytrip give the break up of the final price as Room price + Taxes & Other Charges, Locktrip gives the final price as Room price + Other Charges. No mention of Taxes, which makes it less transparent.”

(Majestic_Bit_5821, Reddit, 2020)

4.1.2 Efficient Personalisation

According to the analysed organisational papers, the authenticity of the obtained information will increase and create a foundation for better-personalised customer services. Having access to the correct information related to customers' likes, dislikes, and preferences via Digital ID improves the hotel's chance to know their customers better.

“Organizations want to build direct relationships with their customers to entice them to share more data. Identity is important in helping organizations build these relationships because user centricity is key to a frictionless and positive user experience...This allows for greater personalisation because the customer can choose how to share information to enhance or simplify their experience. Digital identity ecosystems provide this more seamless user experience by enabling individuals to choose whether to re-use their identity credentials in multiple places, replacing the need for duplication of verification.”

Christine Leong (2021)

While analysing some organisational Q&As, it was found that by creating verifiable credentials about customer preferences and distributing them to the relevant parties inside the travel journey, hospitality organisations can increase the overall experience for guests. It has been mentioned that integrating hotels, car rentals, and airlines into the same scheme would expand the quantity of possible data acquiring points over the course of the travel journey, hence improving the availability and depth of the information.

“...All these verifiable credentials can then be kept in a digital wallet. That's the first piece. The second piece is just providing a much more personalized experience. So if I like staying on high floors and away from elevators when I stay at hotels, when I go check in at a hotel for the first

time, I can give them access to this wallet that I have and the hotel can know that this is what I prefer. I get a room on a high floor, away from the elevator, and that experience is better for me.”

PhocusWire (2022)

When customers are owning their own identity, there will be no concerns regarding privacy issues and the information flow will be smoother. Customers can see more relevant deals, while users can choose what and with who they would like to share personal information with.

“...With the consumer owning their identity combined with a better information flow of property attributes, consumers like Bob can choose a hotel in Atlanta that fits their location and services their needs. A single SSI for Bob also should yield an industry-scalable common shopping process across supplier and intermediary sites provided the site can interact with the SSI. The customer may get a better targeted or more relevant offer from a supplier that has a more complete view of their potential value, even beyond a specific stay. Bob can choose which suppliers and intermediaries with which he wants to share specific aspects of his personal information.”

Decentralized Identity Foundation (2021a)

4.1.3 Data privacy

Guests using the Travalala website mentioned that they had enjoyed the service due to feeling safer with their data even though they were paying slightly more for the same service. Sharing less information and being able to do this securely was a significant motive for some customers. Integrating blockchain-based technologies such as Digital ID and Self-Sovereign Identity into the guest’s travel journey might enhance data security while also protecting the source's identity at the same time.

“[...] enjoyed the service – ...it was probably \$3 more expensive, but that’s okay for me because it was paid via crypto. There is no kyc (know your customer), although yes you enter your passport number, no selfie or anything else required.”

(John, Trustpilot)

“Blockchain can help maintain data source integrity and make customer insights portable across the experience while protecting data privacy... Its network validation and enhanced data security also helps maintain data source integrity while protecting privacy”

IBM (2021)

In some of the organisational papers, the importance of data privacy has been mentioned with regard to when individuals have to share their health credentials due to the pandemic. Several different stakeholders along their travel journey need to have access to health credentials, and since health credentials include sensitive information about customers, Self-Sovereign Identity could be a good solution for transmitting the data across different databases.

“For the hospitality industry, earning trust is the precursor to stimulating demand. ... What’s really needed is a way to verify identity, health status, and a host of related issues that touch each part of a hospitality experience. Blockchain’s characteristics make it perfect to enable this..”

IBM (2021)

“One of the most exciting potentials uses for the blockchain within the hospitality industry is related to identification and security services. Passengers are required to provide ID at various stages of their journey, but industry-wide adoption of the blockchain could potentially allow for a shared digital database, with passengers providing, for example, a finger print to quickly and seamlessly verify who they are...”

Revfine.com (2022)

4.2 Financials

Overall, the “Financials” theme has accumulated the most excerpts from the UGC, and users mentioned different aspects of the financial gains they had obtained through BCT-based hotel booking systems. The financial themes consists of two sub-themes; (1) Loyalty Programs and (2) Room prices.

4.2.1 Loyalty Programs

Users mentioned that loyalty programmes that use Blockchain technology could enable their users to share and exchange their loyalty points with each other and create an additional demand from the individuals who want to spend cryptocurrencies. While this may require guests to do more work to claim their loyalty points it also means that they can spend their points in a wider selection of products from different companies, which had been mentioned in several organisational papers.

We at Deloitte believe that blockchain, as a distributed ledger with a fundamentally new way to transact and maintain records in a secure, trustless, digitized interlinked network, will eliminate many inefficiencies. We will discuss how it will reduce costs while benefiting the needs of different types and sizes of loyalty rewards programs, all while significantly improving customer

experience by allowing customers to access most, if not all, of their loyalty rewards programs in one digital wallet.

Deloitte (2016)

In line with the above-mentioned organisational document, some guest reviews are supporting the variety of loyalty rewards as well as their attractiveness. This is captured in the following statement from customers and reviewers:

“Smooth experience, had a wonderful stay in Bali. The app is so convenient to use and the price after all the discounts and loyalty rewards turned out to be better than on other websites.”

(Z.J., Trustpilot)

“Cheapest prices, loyalty rewards and discounts. It makes sense to be a SMART member.”

(M., Trustpilot)

“Got the room I wanted at a great rate. Love the Travala and the loyalty program. My first place to shop on anything travel related.”

(L., Trustpilot)

“The Travel Coin project and the TCOIN token attached to it represent the first ecosystem in the world that uses blockchain technology to offer an international reward system among all hospitality service providers, worldwide without limitations”

(Travel Coin, 2022)

It is also mentioned in Amadeus (2017) that the seamless peer-to-peer transfer options inside the Blockchain technology organisations have investigated loyalty point transfers between companies such as two airlines or taxi companies. The quote below mentions the cost savings

with universal loyalty schemes.

“Today, if a scheme wishes to partner with another there is a complex and costly set up procedure. ... The Loyyal platform seeks to address this challenge by improving interoperability between schemes. All loyalty schemes can share its single ledger on blockchain, which makes transferring a traveller’s points simple, fast and cost-effective.”

(Amadeus, 2017)

With regard to the introduction of a rewarding digital marketplace, users mentioned the availability of possible bonus options with each purchase. These bonuses seem to be perceived as substantial economic benefits by users; on some platforms, users mentioned the how they enjoy receiving these rewards these rewards, such as referral and review bonuses. One other common rewarding alternative is cashback, and they simply reward customers when they finalise a transaction with a BCT-based hotel booking system. Customers can be rewarded on the native token of the blockchain or with some other cryptocurrencies related to universal loyalty schemes.

cryptokyle on reddit:

“...additionally from this the vision of Travala is to put crypto currency into the hands of many and with our giveback, SMART program, review rewards and referrals we believe we are going to be able to achieve this. By providing a user friendly experience we will educate user who do not understand the crypto side within the system itself.”(Cryptokyle, Reddit)

“All the process of the booking went smooth. Also, I have saved some money on this trip as I paid less than my friend who booked his room directly at the same hotel. Oh and got my chargeback in AVA as well.”

(V., Trustpilot)

*“Found best price. Excellent customer service -
Got a better deal than elsewhere and also cashback was a bonus”*

(E.M., Trustpilot)

4.2.2 Room Prices

One of the most significant impacts of BCT-based hotel booking systems on customers is reflected in the price differences related to room rates. Guests found direct connections and cutting off the middlemen to be cheaper to make transactions without paying commissions to the other third-party websites. The second theme under Financials is therefore concerned with the room prices and how users of BCT-based hotel booking systems are able to source cheaper rooms compared to other OTAs. It is assumed that BCT based system can offer cheaper rooms because of the commissionless bookings.

“The primary accommodation partner in Amsterdam, DoubleTree by Hilton, agreed to make inventory available for Win to facilitate the first on-chain hotel bookings. This enabled us to save 20 000 Euros for the travellers attending Devconnect conference in Amsterdam. Even with a bit of a late launch, the ETH community travellers managed to make 100 nights reservations with close to a 50% discount.”

Novikov (2022)

*“Also people don’t realize they’re getting like 45% discount
Maybe we should create like a little image of Booking.com and Hilton side by side With Links,
etc.”*

(DK., Trustpilot)

50% discount is crazy how can give they such a big discount? What are their margins and how did you get them on win.so?"

(P.S., Winding Tree Discord Channel)

"The best app for hotel reservations! I've already saved so much money with their lower hotel room prices! They are safe and trustworthy! Thank you for the incredible experience"

(V.N., Locktrip Googleplay)

Customers believe that the idea of the reduced room prices is associated with the disappearance of the middle man according to some UGC.

"Cutting off middlemen for the benefit of the customer"

"LockTrip is my favorite hotels/homes booking engine since a few months. The savings and user experience it provides are unbeatable. Thank you for your commitment, Locktrip team!" "

(C.Q., Trustpilot)

Table 2: 21 days comparison of prices between OTA and BCT-based hotel booking systems.

Travala.com came out the clear winner for every room. Over the 21 days this came to just under 20% savings and over \$1150 USD.

Location	Nights	Hotel	Booking.com Price	Smart Travala.com Price	Smart Giveback
London	4	Park Plaza Victoria London	888	819.77	40.9885
Paris	5	Saint Severin-Paris Notre Dame	754.03	721.75	36.0875
Amsterdam	3	Camp Inn Hotel Amsterdam	755	677.6	33.88
Prague	3	Four Seasons Hotel Prague	2206	1599	79.95
Venice	2	Ca' Dei Polo	382	355.73	17.7865
Dubrovnik	4	Hotel Lero	822	726.89	36.3445
Total	21		5807.03	4900.74	245.037
Total after Giveback			5807.03	4655.703	

Note: The table above was taken from Medium.com where a guest compared pricing for the same hotel rooms for 21 days between different third-party websites and found that pricing on

the Travalta.com website was much cheaper than Booking.com pricing. From Citation as per format above (Xen, 2019)

One of the most common issue guests experienced when using BCT-based hotel booking systems was unexpectedly being charged a transactional fee while finalising a booking. On BCT-based hotel booking websites there are two ways of transactional fees may be charged. Some guest reported being charged a higher credit card fee than normal, which ultimately made the room booking itself more expensive. Other reviewers mentioned that they had encountered increased transactional fees due to cryptocurrencies' volatile market structure.

“Credit card fees are too expensive”

(S.A., Trustpilot)

“Unpredictable Transactional Fees – Within one month, transaction fees have seen volatility of 700%. Unfortunately, it was not a single event. Fees can turn out to be much more volatile than the underlying currency it self. It results from the underlying fee determining mechanism, which is based on an auction system.”

(LockTrip, 2021)

In addition to above mentioned unexpected transactional fees, customers also stated that they had seen higher prices on the BCT-based hotel booking websites than on other OTA even though it is advertised that the BCT-based sites were cheaper. Some of the commentators have mentioned that BCT hotel booking websites forward bookings from the other OTAs and add commissions; hence it is more expensive, and customers mostly disagree with the best price guarantee as advertised.

*“The inventory is still growing. They are trying to create synergies with other inventory supplier in ASIA and will probably get better with time. At the moment though Booking.com is one of their supplier which I seriously think they need to move away from because they charge quiet high fees!!
(twitchyfoo, Reddit)*

*“Wow. Almost double the price of practically any other booking site. Contacted support, couldn't confirm if they use geo pricing and just recommended that they have price match via email but I'm not going to contact them for every booking just to price match. 5% more expensive would be OK but 40%.... Come on.”
(J.A., Google Play)*

*“... I could book Travalala for 370 Euros for three nights. Booking had the same room for 220 Euros! Asked how that could be, reply: write an Email to us and we might reimburse you within our price guarantee. Exactly, I book a room for more than 100 Euro more. And then I hope that the customer service will accept and reimburse me maybe? Are you guys serious? Price Guarantee at its best?”
(S., Trustpilot)*

*“absolutely terrible. They are using data from Booking, Expedia etc. Then they put that data from of the customers and say: “look we do not take commissions and we guarantee 60% off of the price” which is a really big and fat lie. They are using distribution channels to make 2-3% of each reservation, which the big OTA's paying them for each reservation made through locktrip. This is not only unethical, but illegal.”
(X.X., Trustpilot)*

Also, in some organisational papers, authors have mentioned the fact that BCT-based hotel bookings systems are forwarding bookings from other major OTAs.

“In a lot of parts of travel there are layers of costs that go to various intermediaries so we're seeing examples of people saying we can do this differently. Travala is one example. It provides an online platform and accepts more than 60 cryptocurrencies. It's earning more than \$1 million a week in revenue and 70% of its bookings are in crypto. Because of partnerships with companies such as Expedia and all sorts of others, it has access to three million products.”

Linda Fox (2021)

4.3 Booking and travel journey

The last main theme from the analysed data is the current impacts customers face on the booking and travel journey while using BCT-based hotel booking systems. Under this main theme, UGC mostly referred to payments process, which focused on the benefits and the practicality of cryptocurrencies. Collecting data related to the payments and travel journey was an effortless process for the researcher since cryptocurrency as a topic is mainstream and publicly discussed under website reviews. However, other aspects of the travel journey that might reduce inefficiencies and frictions in the booking and travel journey did not feature in many reviews from UGC. In the end, under the booking and travel journey main theme, two sub-themes were identified: payments and frictionless journey.

4.3.1 Payments

Based on the UFC, customers believed that BCT was promoting unmatched protection and transparency due to the nature of the network via smart contracts, which had been used for automatic payment settlement and peer-to-peer direct payment models in the tourism industry. Besides the impacts of payments which are related to the technological aspects of the BCT, customers also mentioned the effects of alternative payment options, seamless usage of

cryptocurrencies, the speed of the transactions settled by cryptocurrencies, ease of use, and effortless cash-back claims via cryptocurrencies.

“Customer checks out, after which the payment is automatically made to the hotel. This allows customers to initiate a dispute if the hotel does not fulfil its promise. The smart contract acts as an automated escrow account”

LockTrip (2021)

“...the potential for streamlining, creating lean, smooth processes, and reducing manual checks and balances, combined with the power of smart contracts and distributed applications, and easy access to huge amounts of data, will improve the customer experience...”

Akmeemana (2017)

“Great experience – crypto yes! Glad you accept crypto currency!!! I could have bought travel credits with other crypto but took advantage of purchasing with AVA for the cash back discounts” (E.M., App Store)

*“Very fast transaction! Really appreciate that they accept cryptocurrency as a payment!”
(Customer, App Store)*

*“Easy to use, I could pay with crypto”
(J., Trustpilot)*

*“...Travel credits are such a quick and easy way to book! It took me two clicks of a button and it was done. I’ve never booked on any website as quick as Travala...”
(L., Trustpilot)*

There were also few comments in the UGC collected that mentioned the downsides of cryptocurrency payments which reflect the opposite stance of those taken in most organisational papers.

Bitcoin transactions are always timing out or trying to process difficult tool to use if your not an experienced bitcoin person

(M.M., Trustpilot)

I have more real experience with Travala.com.

The price was little cheaper than booking.com and on Travala web page was information that this price included all fees. I could choose one of the several room which were both available on booking.com and travala.com. So, I choose one which suit me, fill few columns with not many details about guests and made my first Nano purchase. The next step was information, that this room is not available, and I will receive my Nano back shortly. So, I reloaded page and there were no rooms available at all. While still many rooms were still available on booking.com I try search same apartment again and it give me result with only 2 rooms available. I choose one, sent another payment and it was successful....

It is not best service compared to other sites, it has lack of information about place, facilities, special rules etc. But you can check it anywhere else. But I would expect that it will let you book only available room so you do not need to make any claim.

Because it is only one option to spend Nano anywhere near me, I will use Travala also next time and I hope that they will improve their service.

(Kuna_shiri, Reddit)

4.3.2 Frictionless travel

Inside this main theme, the researcher identified how leaving the control of the IDs in the hands of the travellers will impact the travel journey and make it smoother during travel. Organisations

mostly discussed the trusted and immutable environment of the BCT and how, in a way, it affects the identification of travellers during their journey.

“Passengers are required to provide ID at various stages of their journey, but industry-wide adoption of the blockchain could potentially allow for a shared digital database, with passengers providing, for example, a fingerprint to quickly and seamlessly verify who they are, reducing waiting times.”

Revfine.com (2022)

“Having been able to pre-vet the majority of passengers, via an opt-in system, would enable these travellers to have a more seamless and efficient experience, with less time queueing at border and security checks. Business travellers would experience a faster, more seamless experience, saving companies time and money.”

World Economic Forum (2017)

Table 3 below is taken from the World Economic Forum (2018), which emphasises the value of the “Known Traveller Digital Identity” concept concerning secure and seamless travel. World Economic Forum (2018) breaks down the “shaping the future of security in travel” into different levels, stating that seamless and secure travelling constitutes the level 1. The table below shows the stages of the travel journey and how the Digital Identity concept enables new settings, according to the World Economic Forum. As a result of these new settings that Digital identity concepts reveal, guests will see an increase in some vital performance indicators such as securer verification, risk assessment, and access validation. Regarding an increased value in seamless travel, the concepts discover changes in the following indicators: reduced time spent on value-added activities, increased responsiveness to the emotional needs of the guests, more accurate information, and increased ability to cater to emotional needs of stakeholders in the journey including guest’s travel.

Table 3: The value proposition of a Known Traveller Digital Identity

		Concept enables	Value for secure travel	Value for seamless travel
Pre-trip				
1	Pre-trip planning			
2	Visa application and screening	<ul style="list-style-type: none"> – Online visa/travel authorization application 	<ul style="list-style-type: none"> – Verification – Access validation – Risk assessment (real time, repeated <24 hrs prior to departure) 	<ul style="list-style-type: none"> – Effective time – Emotional needs – Ability to adapt – Information required – Stakeholders involved – Process components
3	Booking	<ul style="list-style-type: none"> – Auto-fill identity information 	<ul style="list-style-type: none"> – Verification – Risk assessment (PNR, general risk score) 	<ul style="list-style-type: none"> – Effective time – Information required
4	Airline check in	<ul style="list-style-type: none"> – Self-check-in 	<ul style="list-style-type: none"> – Verification – Risk assessment (based on Advance Passenger Information) 	<ul style="list-style-type: none"> – Effective time – Information required
On trip				
5	Transport and parking			
6	Arrival at airport			
7	Luggage drop-off	<ul style="list-style-type: none"> – Self-drop-off 	<ul style="list-style-type: none"> – Verification 	<ul style="list-style-type: none"> – Effective time – Emotional needs
8	Security screening	<ul style="list-style-type: none"> – Individual security assessment 	<ul style="list-style-type: none"> – Verification – Risk assessment (final before departure, includes behavioural detection and security enforcement) 	<ul style="list-style-type: none"> – Effective time – Emotional needs – Ability to adapt – Ability to predict
9	Departure gate and exit control	<ul style="list-style-type: none"> – Individual security assessment – Self-exit – Self-boarding 	<ul style="list-style-type: none"> – Verification – Risk assessment (final before departure, includes behavioural detection and security enforcement) – Access validation 	<ul style="list-style-type: none"> – Effective time – Emotional needs – Ability to adapt – Ability to predict
10	In flight			
11	Arrival and border security	<ul style="list-style-type: none"> – Individual risk assessment 	<ul style="list-style-type: none"> – Verification – Access validation – Risk assessment 	<ul style="list-style-type: none"> – Effective time – Emotional needs – Ability to adapt – Ability to predict – Information required – Stakeholders involved – Process components
12	Luggage reclaim and customs	<ul style="list-style-type: none"> – Secure reclaim 	<ul style="list-style-type: none"> – Verification 	<ul style="list-style-type: none"> – Emotional needs
13	Transport to hotel			
14	Check-in at hotel	<ul style="list-style-type: none"> – Self-check-in 	<ul style="list-style-type: none"> – Verification – Risk assessment (for example, where industry partners can participate in programmes like I-Checkit – see call-out box) 	<ul style="list-style-type: none"> – Effective time
15	Activities at destination			
After trip				
16	After stay	<ul style="list-style-type: none"> – Individual risk rating 	<ul style="list-style-type: none"> – Risk assessment (risk of overstay and whether individual left the country and acted appropriately on visit) 	<ul style="list-style-type: none"> – Emotional needs – Ability to predict

Note; from World Economic Forum (2018).

According to World Economic Forum (2017), traveller participation in the Digital Identity scheme would reveal the potential of a unique single application to an electronic system with augmented security prerequisites and biometric profiles, which will enable travellers to share their credentials before travelling. Organisations believe that automating this system and leaving the control of IDs to the traveller with biometrics and documentless travel would decrease frictions in the current system such as multiple check-in points and time spent. One good example from PhocusWire (2022) mentions how health credentials integration into Digital Identity would increase the travel experience by reducing queues at check-in points and minimising the risk of contamination in the current world of pandemic.

“Can you begin by explaining how digital, verifiable credentials can be used in the travel journey, beyond the current application related to health data?”

I think there are two pieces to it. One is how do we just make that traveler experience much more seamless, where they don't have to pull out any documents at any time. How do we combine your passport and your travel identity with, say, biometrics so that when you go through an airport, you get a facial scan and they know that this is Toby Berger, this is his passport, and he is from Canada and he's allowed entry into our country just based on the facial scan and matching that up with this digital travel document.”

PhocusWire (2022).

“Digital identity to support seamless travel

... As the industry does recover, enabling passengers to have a digital identity that is widely accepted across the travel ecosystem would support seamless travel, reducing friction and inefficiencies for all involved. It could also help accelerate touchless borders and increase travel by allowing verifiable identity data such as health status to be shared in advance of travel.”

Christine Leong (2021)

“And so it is that the need to show you don't have COVID-19 in order to fly has fast-tracked the concept of a digital health passport from concept to tangible reality. Passengers will be able to upload their passport and their data will be stored on their phone.

If you need a medical certificate, you will use this centralized identity too. We will refer to everything being “in the Blockchain”. There will be fewer queues at the gate which will also reduce the risk of contamination.”

Arturo Bris (2020)

Especially the situations where customers physically be such as hotel reception check-in or border control, the integration of Digital Identity could improve the accuracy of the customer information with enabling automation of the information exchange between parties. All organisations which are involved in the travel journey would have correct information and entities in the cycle could then take action accordingly. This in return would also benefit customers and according to IBM and WEF, this is especially true at the time of the pandemic.

“Improving service efficiency as front-desk representatives will not need to ask travellers for a passport, photocopy and file it, speeding up the check-in process, and improving safeguarding of customer data and ensuring accurate staffing at hotels through more accurate arrival/departure information”

World Economic Forum (2017)

“Once a person is vaccinated, for example, he or she would be issued a verifiable health credential via the IBM Digital Health Pass. It would be stored only in that individual’s encrypted digital wallet on their smartphone. But it could later be shared with trusted parties—an airline, a hotel or restaurant—to prove current health status when making reservations or when physically boarding a plane or entering a facility.”

IBM (2021)

“Travel disruptions are all too common, such as: flight delays and cancellations, traffic delays getting to an airport, security delays, rental car or taxi shortages, and overbookings of all types of travel components... The traveler, being the initiator of remedial actions, is provided greater visibility and certainty of process as actions to remediate the disruption are undertaken.”

Decentralized Identity Foundation (2021c)

“To facilitate the required interactions across travel suppliers during a business trip, Bob is required to present multiple different credentials (passport, boarding pass, visa, health status, hotel reservation, loyalty program number etc.) held in multiple H&T apps and on paper and plastic cards...Frequently, the same information is required by more than one H&T supplier (passport and health credentials at airport and hotels for example). To save time, and to minimize errors, Bob wishes that he could store all the information required for his trip securely in one place on his phone, and with one action, present just the information required for a specific interaction (airport immigration, plane boarding, hotel check-in) ...”

Decentralized Identity Foundation (2021b)

However, despite all the organisation’s mutual agreement on the positive impacts of the BCT-based hotel booking systems on the customers related to frictionless travel journey, the only current working Digital Identity application, IATA’s Travel Pass, is not as well executed as it was proposed in the organisational papers. Below, UGC related to IATA Travel Pass and comments about system difficulties and challenges related to the technology are presented. Consumers stated multiple times the problems related to the software and the lack of correlation between the stakeholders diminished the experience guests had.

“This is one of the worst app that I ever installed on my phone, it does not recognise Australian Government International Covid-19 Vaccination Certificate and Histopath Covid Test

Certificate QR.. not sure if this app has been tested before release, I feel like an Alpha version...”(T.T.T., Google Play)

“Biometric set up ok, facial recognise ok, passport scan ok, BUT, will not scan Australian international vax certificate QR code. Tried taking a photo of it, still no luck trying to read that QR”

(R.K., Google Play)

“This app is terrible. It's alarming that it's being relied upon by Airlines...I can imagine the nightmare at the airport as it locks me out for too many attempts. It can't be trusted, so don't rely on it. You'll need paper copies or other digital forms while travelling. In which case, don't bother. I might come back to it if they add code access, otherwise it's useless for me.”

(K.H., Google Play)

“Terrible. Assumes you have biometric capabilities on your tablets/phones. This instantly locks out a lot of people. Previous reviews indicate that even if I purchase a device with biometric capabilities there is no guarantee that the app will work reliably. Great idea but completely abysmal execution.”

(B.W., Google Play)

4.4 Summary

The three global themes of Customer Experience, Financials, and Travel Journey were discussed in the above part of this dissertation. Every single theme contained two or more sub-themes which had been collected from both the user generated contents and the organisational papers such as Q&As, Reports, and blogs. Following this detailed presentation of the data is the discussion

chapter, which compares the findings with previous research outlined in the literature review to identify differences and similarities for each theme.

Chapter 5. Discussion

5.1 Overview

In this chapter, the findings outlined in the previous chapter are discussed in order to answer the research questions (see Chapter 1) that guided the study. Both data from the UGC and organisational documents data sets were analysed simultaneously, and three main themes which are impactful on customers were found: customer experience, financials, and booking and travel journey. First, in accordance with the main research question, the data on the impact of BCT-based hotel bookings systems on customers are discussed and compared to previous studies. Then, the findings for the sub-questions regarding customer satisfaction and economic impacts are examined in relation to the previous literature

5.2 Impacts of Blockchain Tech. based hotel booking systems on customers experience

Immutability and transparency are seen as some of the core characteristics of blockchain technology (Treiblmaier, 2019), and these characteristics can be seamlessly extended to tourism applications. The data presented in Chapter 4 has shown that organisations claim their products guarantee information accuracy in their organisational documents. Locktrip (2021) mentioned that incumbent systems might jeopardise the guest's experience with biased algorithms due to a possible conflict of interest (Locktrip, 2021). In the organisational documents, it was stated that, while customers trust OTA's ranking and review systems about hotels, the algorithm is not a hundred percent honest and trustable. It has been proven that being on the front page of internet-based search engines creates more attention and clicks (Ling et al., 2014), and selling first-page visibility to the hotels, initiates a conflict of interest, according to some organisations.

While online tourism shopping became mainstream, OTAs founded review and rating systems for customers to help them with their choices and create higher visibility listings for the hotels if their rating is higher than other properties. When higher visibility is also achievable by paying higher commissions, the perception of first-page visibility does not automatically mean better quality anymore. The customer might book properties thinking they are booking the hotel with the best service; however, the hotel's higher percentage of commission payments might be the reason for the hotel's first-page listing. Therefore, this can create a significant discrepancy between the

expected service by customers and the actual perceived service. In support of the above, Oliver (1980) stated that customer satisfaction consists of comparing their prepurchase expectations of what they might receive from service with the actual performance and service received. The discrepancy between the two elements produces lower satisfactory results.

While incumbent OTAs are prone to disappoint customers with their amendable and interchangeable ranking system, organisations such as Locktrip, Winding Tree, and Travalala stated that by using BCT, reviews and rankings become immutable and decentralised, and trust is built inside the system. The algorithms cannot be altered; hence, rankings/reviews are credible. According to above-mentioned organisations, eliminating the issues that endanger the credibility of hotel rankings and reviews and incorporating BCT-based review systems into the incumbent systems can increase the information accuracy and create higher customer satisfaction.

Not only will the enhanced and accurate information related to hotels impact customers, but accurate information related to guests themselves might affect customer's experience. When the customers can create reservations using digital identity ecosystems, hotels can acquire clean and reliable information through individuals' online digital identities, which could help providers to better customise the guest's stay according to their preferences. While a digital identity ecosystem allows individuals to share information with different entities, it is guaranteed that the shared information can only be accessed by the hotel. Once the identity holder wants their information to disappear it vanishes from the hotel's database. Organisations acknowledge that having almost a golden record for each customer *would* increase the chances of creating better-personalised service for customers. (Soltani et al., 2021 ; PhocusWire, 2021), While obtaining and storing the previous travel history of a guest is currently also possible, the amount of data the hotel can store for this is challenging due to GDPR (Mukta et al., 2020). The amount of big data can facilitate additional challenges for properties and management teams regarding data being fragmented and scattered (ARM, 2019). Having guest preferences and information is highly crucial for the hospitality industry and it can mean the difference between running a successful or an unsuccessful hotel. Due to the nature of the hospitality industry, service excellence is nourished by personalisation (Padma & Ahn, 2020). With the integration of the digital identity ecosystem, previous travel data as well as accurately identified customer preferences can be enabled by the hotel, which will

increase the efficiency of the personalisation in a blink of an eye (IBM, 2021). The guests could send the exact information they are willing to share, including their preferences at the check-in, and hospitality providers can trust this information and can prove its authenticity without difficulty.

By receiving the so-called golden record, hospitality organisations would be able to better differentiate themselves from others and they could create personalised offers seamlessly due to the clean guest information they have obtained. In a sense, organisations would have information about who their guest will be at check-in rather than their identity in their ordinary life. For example, they might be a parent with full-time jobs in their daily life; however, on this occasion, the guest might be travelling with a group of friends from high school. The previously collected scattered data a hotel may collected about a guest over the years can easily misguide the hotel regarding the guest's needs (Smith, 2021). For instance, all the previous data might suggest excursions and activities involving kids would be of interest; however, if the high-school group is in search of a spa and a massage with a sea view, or just good quality food and a relaxed evening, it is highly possible that suggestions and preferences which are identified by the hotel would far of the mark. Organisations should understand how individuals would like to be seen at a specific time when they plan to be accommodated by service providers (Smith, 2021). When the service providers have access to the genuine needs of their customers, they will also gain access to the knowledge of what will satisfy them. Therefore, it is assumed by organizations like DIF and World Economic Forum ,that the use of digital identity in the tourism industry would increase the guests' overall satisfaction and the quality of the product served by providers compared it to the service guests with incumbent identity models receive - a notion that has also been reflected in the literature (Kizildag et al., 2019; Willie, 2019).

Both from the UGC and organisational documents findings, we can see that there are customers willing to share as little as possible about their identity and information (Trustpilot, 2021). These customers are ready to use booking tools that will require a minimum amount of customer information, even though they might have some downsides (John, Trustpilot, 2021). Nowadays, guests have their data scattered around the web as they have very little knowledge about who can access their information (Boudet et al., 2019). On top of this, with the increasing number of smart

environments and IoT devices in public areas, visitors generally struggle to protect their privacy (Marky et al., 2020). Overall, guests want to have increased data privacy regulations from governments (Boudet et al., 2019), and tourism destinations are also trying to hide their customers' real identities as much as possible (Tyan et al., 2020). It has been mentioned in the organisational papers and user reviews that, while current travel entities need access to sensitive information like health credentials (IBM, 2021), customers slowly started to reinforce sharing information with Zero-Knowledge Proof (ZKP). It has been highlighted that the digital identity ecosystem will enable customers to be in charge of their data while sharing it with service providers whenever they want. The digital identity scheme also eliminates any sensitive information regarding the customers from being stored in the provider's database (World Economic Forum, 2017). Firstly, customers can keep the information in their personal wallets, and they can decide what information is being shared for how long. Secondly, hotels would not need to store personal information because they can access authentic, pristine information related to customers if they ask them (Smith, 2021). By integrating the digital identity schemes with BCT-based systems, the privacy of the data will be in the hands of the customers and hospitality providers will not be holding liabilities for the possible stolen personal data. Minimising the providers' liabilities related to the customer information should increase customers' confidence and trust in the travel providers. By saying that, according to Parasuraman et al. (1988), assurance is acknowledged as a critical quality that affects general satisfaction, and once customers feel their online presence is secure, their perception of the service provider will improve.

5.3 How will the customer be impacted financially?

Being able to increase the usage of loyalty programmes seamlessly in an industry like hospitality which suffered from unused loyalty points (Agrawal et al., 2019) throughout the years would generate benefit in the industry and among the users of BCT-based hotel booking systems. This notion was also reflected in the UGC excerpts as guests have mentioned numerous benefits related to loyalty rewards such as cashback, monetary discounts, and non-monetary rewards. While most of these improvements have been acknowledged as economic benefits by customers, comparing current and BCT-based loyalty programmes with regard to satisfaction and economy is intriguing. With the current loyalty programmes, firms have struggled to provide different rewarding options and personalised rewards for their customers (Agrawal et al., 2019). BCT-based loyalty programs

are able to offer rewards from different organisations and even from different loyalty networks seamlessly (Amadeus, 2017). The consumers capitalised on the perception of instant gratification of cashback rewards. The idea of redeeming rewards from different organisations has been labelled as an attractive element of BCT-based loyalty systems (Travel Coin,2022). These cashback rewards can be redeemed via the native token of the blockchain that the company is using, which at the later stages can be exchanged for another cryptocurrency/fiat currency. The ability to use loyalty points almost near-real-time quickly decreases the cost per transaction, allowing customers to have free and complete control of their rewards and the management of the loyalty points. By giving complete control of the loyalty points to the customers, BCT-based loyalty schemes allow individuals to use loyalty points as a medium of exchange between themselves. It has also been mentioned in Strebinger and Treiblmaier (2022) that companies investing in blockchain-enabled loyalty schemes can eventually increase satisfaction overall, supporting the generally positive comment regarding the ease of cashback and the lure of alternative rewards reflected in the UGC data (Trustpilot, 2021).

As previous studies have pointed out, reservations and the ticketing divisions in the tourism context are likely to be one of the most promising and compelling areas for the application of BCT (Kwok & Koh, 2019). Fundamentally, blockchain technology as a shared database that records transactions or information which had been authenticated (Treiblmaier, 2018). The information shared inside the blockchain can be trusted without an intermediary's control (Murray et al., 2021). In saying that, the one characteristic that could create economic benefit for customers in the tourism context is the decentralised nature of the blockchains. Successful system operations without a third-party organisation or a central authority enable cost savings (Aghaei et al., 2021). While we are researching the impacts of the BCT-based hotel booking systems on customers, financial impacts advanced from our themes in different ways. As mentioned above, implementing blockchain applications into the reservations/bookings is planned to eliminate the middleman between customers and service providers. This middleman is currently located between travellers and hotels and takes a commission for each distributed hotel inventory (Martin-Fuentes & Mellinas, 2018).

From our organisational papers and UGC, we have seen two different applications of BCT in the division of the reservation. From the organisational papers, we have seen the cost-saving benefits of direct connections due to the nature of BCT-based hotel booking systems. In some cases, guests can facilitate up to 50% discounted prices while creating their reservations with BCT-based hotel booking systems (Novikov, 2022). In obtained UGC, it has also been mentioned that guests had access to better pricing in nightly room rates compared to other OTAs. The general perception of the lower room rates mainly was associated with non-existing agent commission fees (Locktrip - Trustpilot, 2020). Directly made reservation with BCT helped eliminate the commission fees and thereby created economic benefits for customers which had been concurrent in Zupan Korže (2019). That said, the above mentioned directly executed reservations were unprecedented before, but at the same time, they were very few. Bookings made directly with a hotel with a BCT-based system could have a revolutionary effect on how reservations and ticketing will be executed in the future while generating economic benefits for both customers and hotels.

On the other hand, there was a side of the story mentioned by the customers which had been only stated in a few organisational papers that this dissertation had examined. From the UGC, it was obvious that some of the bookings were created indirectly even though it has been advertised differently. These indirectly booked hotel room nights were forwarded from different OTAs to the customers. Thus, instead of decentralising and minimising the number of entities between customers and hotels, those indirect bookings added another intermediary. These indirectly executed hotel reservations occasionally had lower prices than other OTAs despite the increased amount of middleman in the inventory distribution. The reason is the lower margined commission charged by BCT-based hotel booking agents (Travala, 2021). There were also comments from the users that there have been higher nightly room rates on the BCT-based agent's website compared to other OTAs and third-party websites. When customers realised BCT-based hotel booking systems were forwarding reservations from other OTAs, working in partnership with other major OTAs and charging higher nightly room rates compared to them, many reviews written about the situation, mostly expressing frustration and disbelief. It is also essential to understand that, even though some of the reservations had created financial benefits for customers, this data had been analysed through netnographic lenses, which means that any report of financial gain or loss is solely based on the participants' accounts, not on objective and verifiable data. Thus, a small

margin of discount on the nightly rate might not be perceived as an economic benefit for the individuals; however, the misleading information related to the ways of distributing hotel inventory can create unsatisfactory results.

The above highlights immense hype of BCT and how some organisations would like to be associated with this technology only because of marketing/advertisement purposes. The companies association with BCT create higher market value, according to Cahill et al. (2020). The above notion can be identified in comparison with UGC and organisational papers; while some organisations who advertise and preach about the benefits of the BCT, essentially, they are not hundred per cent accurate and transparent about their booking process.

Reliability was accepted as a crucial quality inside the SERVQUAL model developed by Parasuraman et al. (1988). Reliability is the ability to perform a promised service dependably and accurately. For online platforms, it is essential to understand that service quality is measured with some specific quality attributes, which contain trust in the intermediary and in the platform (Ju et al., 2019). Both in the SERVQUAL model and the previous research from Ju et al. (2019), it can be seen that trust, accurate information and reliability are vital identifiers for service quality that significantly affect overall customer satisfaction. Therefore, research from Parasuraman et al. (1988) and Ju et al. (2019) supports that the overall misleading information related to how bookings were made, which is likely to shake the trust that customers have in the platform and thus jeopardize the customer satisfaction (Locktrip - Trustpilot, 2022).

At last, users who had finalised their bookings with BCT-based systems mentioned that they had seen higher credit card transactional fees than usual, which also had been mentioned in organisational papers. In addition to credit card transactional fees, organisational papers stated that transactional fees related to cryptocurrencies might be volatile, causing increased nightly room rates. Contrary to the economic benefits mentioned above, Valeri and Baggio (2021) mentioned that even though there might be no commission fees, the highly volatile nature of the transactional fees with BCT can create unpredictable costs for the users.

5.4 How would booking and the travel journey be impacted for customers?

It may be nearly impossible to avoid cryptocurrencies when discussing BCT. Currently, cryptocurrencies are the most common ways to use the BCT and adoption of the cryptocurrencies is crucial for the overall adoption of BCT (Hameed, 2019). Kwok and Koh (2019) mentioned about some of the blockchain applications that might boost tourism if integrated correctly. We have seen partial integration of some aspects of BCT from some organisations, while some BCT-based hotel booking organisations only choose to use on a some application. Regardless of what extent organisations use BCT, cryptocurrencies are always involved in these selections.

Therefore, a large selection from the organisational papers and UGC related to the impacts of digital payments. The above-mentioned “payments” sub-theme excludes anything related to financial aspects and purely focuses on the stability and security of payments, the ease and speed of retrieving transactions, charm of alternative payment options, automatic settlement, and effortless usage of cryptocurrencies in many ways. It has been mentioned in the organisational papers that entities are creating smooth processes while handling balances and automating the settlement of the bills through smart contracts, which allows the customer to dispute if the promised service is not received, and improves the speed of each transaction (LockTrip, 2021 ; Akmeemana, 2017). Demirel et al. (2021) also pointed out that how-automatic settlement is possible with smart contracts while integrating hotel services payments and contracts which can be uploaded on a blockchain.

According to Willie (2019), customer payment processing will be instantaneous with digital payments, while at this stage, it takes around three to five days for businesses to see the money in their account. We have seen from our collected UGC that some users that transact with cryptocurrencies had good experiences with overall transaction speed (both in payments and refunds), ease of use as well as with the alternative payment options of cryptocurrencies (Trustpilot, 2021; App Store, 2021; Trustpilot, 2022). The users had mentioned increased interest regarding alternative payment options for paying for vacations. Some BCT-based hotel booking systems users can get their cash-back discounts instantaneously, and many comments mentioned

how quickly the cryptocurrency payments were transacted (Trustpilot, 2021). This also had been discussed before in Aghaei et al., (2021), who commented on how BCT integration in tourism would speed up money circulation, increase the security for customers and in tourism in matters such as money transfer and peer-to-peer exchange.

However, it has also been seen in the other subthemes of this dissertation that similar characteristics are also quoted within negative excerpts. On the one hand, the users have fast and seamless experiences while using cryptocurrencies. However, on the other hand, we have seen users having trouble making payments with cryptocurrencies and when a slight problem occurs, reclaiming that money becomes time-consuming (scottysworldtv, 2019; Trustpilot, 2021). In addition, users are willing to use cryptocurrencies even though customers think they will have a bad deal out of it economically. Customers are happy to use it for different reasons, such as ease of use being willing to purchase with an alternative payment options, and improving the adaption of this technology (Kuna_Shiri, Reddit). According to Treiblmaier et al. (2021), the reason for overlapping positive and negative impacts is the technology's early stage. In the research conducted, researchers also saw similar results to the analysis mentioned above, where customers have positive and negative views on the usability of cryptocurrencies and the speed of the payment confirmation of transactions (Treiblmaier et al., 2021).

BCT will create value for customers and operators by reducing costs and easy access to real-life information. Current necessary operational requirements for identification and registration will reduce, and the process will be faster with BCT, according to Thees et al.(2020). Digital identity will boost the overall identification of the guest, including preferences and needs, and will create more peer-to-peer interactions between customers and providers (Treiblmaier, 2019). These peer to peer interactions can be tracked and are traceable in digital history. As of this moment, after analysing the operating companies of BCT-based hotel booking organisations, it can be seen that customers are benefiting from the reduced wait times in the areas related to customer identification. For example, the Known Traveller Digital Identity (World Economic Forum, 2018) concept enables faster, securer identity verification, which also had been mentioned by Thees et al. (2020). Thees et al. (2020) further noted that accommodation providers would create value by reducing

the wait times for their customers with identity management, allowing for digital-check-in and connecting traveller's data to other applications.

The pandemic and the requirements have provided the motivation to promote the use of digital identities in travel. Significantly depending on the health credentials for travelling and checking in to the hotels, the interest in SSI grew immensely (Shuaib et al., 2021). While travellers often have to share their health credentials, the findings suggest they fear data privacy issues. According to some organisational papers (Revfine.com, 2022), by integrating biometrics assisted with SSI and DIDs schemes, the identity of the travellers will be cryptographically secured, and the information underneath this encryption will not be shared with the service provider. Supporting information related to increased data privacy are mentioned in Shuaib et al. (2021), who point out that using Zero-Knowledge Proof efficiently ecosystems will increase the protection of personal information.

It has been mentioned that integrating biometrics and mobile technologies with BCT will increase the efficiency of documentless travel (Zupan Korže, 2019), generating faster and seamless service for the customers while increasing the traveller experience (PhocusWire, 2022). In addition to PhocusWire's (2022) propositions about documentless travel, Decentralized Identity Foundation (DIF) (2021), shared their use case related to profile sharing prior to travelling. It is mentioned that guests' personal information is duplicated between various hospitality and travel companies. Individual travellers must update their information manually for each provider if they want to amend personal information. The manual work is time consuming for the customer; therefore, it disincentivises the traveller to keep their information updated. Lack of guest knowledge by the travel providers leads to lower quality guest information hence a low-quality customer experience. According to the DIF use case, individuals can instantly push all their necessary information to all travel providers with digital identity solutions. The information will be used by different parties that require information related to guests, such as passport, boarding pass, visa, health status, preferences, loyalty programs, and allergies which will increase the speed of facilitation. This will save time for customers and enable them to seamlessly track their personal information while minimising the errors from the provider's side. According to DIF (2021b), individuals can store all their information in their digital wallets on their phones. With one action,

they can present just the information required for a specific interaction (hotel check-in, plane boarding, airport, health status of traveller). We have seen that overall, there are various effects on customers related to seamless check-in/travel, such as faster process times of queues, documentless travel, sharing traveller profiles in advance, and automated and accurate information. These benefits have also been mentioned in the existing academic literature which supports the organisational documents (Kizildag et al., 2019; Shuaib et al., 2021; Thees et al., 2020; Willie, 2019; Zupan Korže, 2019).

Contrary to the above excerpts that mainly were obtained from organisational papers and potential use cases, one of the current working digital identity applications faced struggles to ensure data from different sources are integrated and communicated between those involved in the travel journey. Insufficient collaboration between the travel parties hence could not keep up with the promises that the technology offers for customers. According to some UGC, stakeholders involved in the customer's travel journey are not efficiently collaborating within the Digital Identity aspect. Comments from the UGC data suggest that it needs we can understand cooperation between different governing bodies such as airlines, hotels, immigration, and government health authorities is needed. It has also been mentioned in the UGC that people from the reviews recommend that other travellers not trust the application and have paper copies of their documents with them when they are travelling (K.H., Google Play). When the whole purpose of the digital identity in tourism is to facilitate documentless, fast, trustable, and accurate travelling, the above comments provide the reality of the digital identity stages on the customer level in the tourism industry.

5.5 Conclusion

Both from the analysis of UGC and organisational papers and the comparison of these with the existing literature, we're used to develop a full understanding of the impacts of the BCT-based hotel booking systems on customers. From the examinations, possible economic benefits and guest satisfaction levels are revealed. Understanding these key points helped the researcher fully grasp the overall impacts of decentralisation, payments, tracking and service customisation, identity, and credential management, and verified review systems via BCT. The chapter also showed the importance of including UGC and organisational documents together in the analysis and how the organisations aimed to solve problems. However, in reality, the guest experience is different. Being able to triangulate research methods enabled the researcher to deeply examine the genuine impacts of the BCT-based hotel booking systems rather than just following what had been mentioned in the organisational papers. By comparing all the findings with the existing literature, this section highlighted the broader impact of BCT-based hotel booking system on customers and how using the technology changes the way travel journeys are booked.

Chapter 6. Conclusion

6.1 Research objective

The overall aim of the research was to understand the impacts of the BCT-based hotel booking systems on the customers. This research provided a two-pronged approach to understand the profound impacts of overall BCT-based hotel booking systems on customers and further to examine whether these impacts would increase guest satisfaction and benefit customers economically. This research examined the reviews and comments from online communities using BCT-based hotel booking systems and organisational papers operating in the tourism Blockchain area.

By using netnography and document analysis, thematic analysis was implemented to derive themes from data to understand the impacts of BCT-based hotel booking systems. Applying the thematic analysis to two different data sets highlighted the importance of the discrepancies between findings from organizational documents and UGC. This combination of two data collection methods was aimed to assist the researcher in gaining a deeper understanding of the issue, which is reflected in the thematic analysis results.

The research questions pertaining to the study were:

Q1: How does the integration of blockchain technology to hotel booking systems impact customers?

While the research study cover the impacts in general, the study was particularly interested in the economic benefits of BCT systems and the impact on satisfaction. These special interest areas are captured in two sub-questions.

Q2: Can the decentralisation of the hotel booking systems create economic benefits for consumers?

Q3: Can the integration of blockchain technology into hotel booking systems help increase guest satisfaction?

To answer the first question on how the integration of BCT to hotel booking systems will impact customers, the study reviewed and obtained customer reviews, contents, and organisational papers. The research acknowledged that BCT-based hotel booking systems are impacting the accuracy of hotels' and guests' information, providing options for customers to book without sharing sensitive information. The technology also offers bookings with alternative payment options and redemption of different loyalty rewards, peer-to-peer transactions of accumulated loyalty points and the option to spend them in different loyalty networks, cheaper room rates due to direct connections, ease and speedy financial transaction, and increased speed of travelling with automated and accurate customer information with faster processing times. It has been mentioned that none of these features are currently available with non-BCT systems. To answer this study's second and third research questions, the researcher examined the above impacts and looked more in-depth into the aspects that can affect customer satisfaction and economic benefits.

To resolve the second research question on whether the BCT-based hotel booking systems can create economic benefits for customers, this study investigated comments and reviews from guests related to pricing for their hotel bookings. The research acknowledged that the decentralisation with BCT and the direct connection between hotel and customer creates cheaper nightly hotel rates for customers. On top of this, because of the seamless execution of loyalty points, BCT-based hotel booking agents are more generous with cash-back and discount options, which are also accepted as a gained economic benefit by customers. With BCT and decentralised, peer-to-peer connection, all inquiries and actions (booking, settlement, ticketing, permitting etc.) can be made at the lowest possible cost. On the other hand, customers experience higher transaction fees with cryptocurrencies and increased exchange rates with credit card surcharges because of the volatile markets. On top of this, we have acknowledged that the amount of decentralised bookings is meager, and most of the finalised bookings by BCT-based hotel booking systems are executed in an old-fashioned way while forwarding reservations from other OTAs.

To answer the third research question on whether a BCT-based hotel booking system can increase customer satisfaction, this research investigated the definition of customer satisfaction in hospitality and possible dissatisfactory outcomes in hospitality settings. The findings of this study showed that obtaining accurate information, improved personalised offers, increased trust in review and ranking systems, reduced processing times, enabled and improved information security, and increased customer experience will eventually improve guest satisfaction. BCT-based hotel booking systems enable information to flow more transparently between hotel and customers and reduce information discrepancies between service providers and guests. With the usage of smart contracts, it will limit the unexpected outcomes in all aspects of travel while improving guest relations and building trust among tourists because the rules and procedures are already predefined and agreed upon between the parties due to the nature of BCT. While BCT is theoretically able to provide travellers with all the benefits listed above thus able to increase customer satisfaction, it has also been acknowledged that some organisations currently operating as BCT-based hotel booking agents take advantage of this technology's popularity. The organisations created false expectations by taking advantage of this hype, resulting in unsatisfactory results. The research also discovered that due to the technology being in the early stages of development, there is a lack of transparency regarding rooming options, inclusions of rates, and prices of the rooms, which is criticised by customers negatively. There is a lack of mutual agreement on the ease and speed of the transactions where some customers face latency with their transactions contrary to what had been promised. The inability to honour the promised facilities creates discrepancies between expected and perceived service and reduces guest satisfaction.

6.2 Contribution of the study

This study identified the impact of the integration of BCT-based hotel bookings on the customers and the decentralisation of the hotel and tourism industry in general. Thus, it heeds the call of Önder and Treiblmaier (2018) to embark on further research on BCT and the decentralisation of the hotel and tourism industry. Therefore, this study contributes to the on-going effort by scholars to fill the existing gap in the literature on BCT and decentralisation of the hotel and tourism. By so doing, this study contributes to the academic body of knowledge in

this area. Also, the findings of this study could help develop a framework on how to adopt BCT in the hotel and tourism industry to facilitate decentralisation and generally enhance the customer's experience. One other contribution of the study is to improve the knowledge of the hotel industry about the benefits and pitfalls of this technology, which might inform and encourage those businesses interested in the adaption of BCT.

6.3 Limitations of the research

There are some limitations to this study. The small number of organisations currently operating BCT-based hotel booking systems is a limitation. Thus, the richness of the UFC was only representative of customers' experiences with a small number of businesses operating in this field. However, effort was made by the researcher to increase the quantity and depth of the data by integrating document analysis of organisational documents. Although the document analysis brought some additional remarks and perspectives to the research, analysing the impacts on customers with rich UGC can develop more accurate outcomes.

Another limitation the researcher faced is that the technology is in the early stages of its evolution, and most organisations are very protective of their intelligence and information. This impacted on the amount of information obtained from the organisational documents. As most of the organisations are small and medium sized enterprises, they are highly dependent on the market conditions. Organisations look for the correct times to publish their information like when the cryptocurrency market is on the rise, which will increase the organisation's publicity and their chances to attract more customers. Therefore, it was a challenge to actually obtain all the relevant information from the organisations.

The last limitation that the researcher faced is that the technology is very fast evolving, and the findings of what can impact customer satisfaction are changing very quickly. This created an extra workload for the researcher where he needed to go back and forth between UGC and organisational documents, even when it was thought that the data collection phase was completed. There were plenty of newly created start-ups and events during the writing phase of this dissertation which significantly impacted the technological development.

6.4 Recommendations of further research

Blockchain technology is an area that should be researched further with regard to the hotel industry to encourage businesses to create new revenue streams and develop alternatives with their distribution channels. Due to the fact that a minimal number of organisations are currently operating in the area and the number of users are relatively small, it is important to carry out a follow-up research in the future, especially when the technology has developed further. Once the technology is matured, the number of organisations will increase, their protectiveness over their intelligence will reduce, and the pace of innovations will slow down. On top of this, when we reach the level where technology is well adopted, it would be interesting to execute a similar study in collaboration with accommodation providers, which will bring more depth and scope to the topic. This study also recommends conducting quantitative research, which would provide an opportunity to increase the scope of the study and introduce new perspectives to the existing findings.

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