# Master's Degree Thesis

**LOG950 Logistics**

## Tourism Sustainability Reporting using Blockchain

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Number of pages including this page: 79

Molde, 22/05/2023

Molde University College
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# Acknowledgement

This thesis was completed as part of Molde University College's MSc Logistics programme with a concentration in Supply Chain Management. The study was conducted between December 2022 and May 2023.

I would like to express my deepest appreciation towards my supervisor, Professor Bjørn Jæger, and my co-supervisor, Nikhil Varma, for their valuable support. Their encouragement and in-depth subject knowledge provided me with tremendous motivation, knowledge, and perseverance. I appreciate their willingness to listen and respond to my concerns. They mentored me in the most effective manner imaginable. I value their input and dedication to my thesis. Their guidance has steered me in the correct direction.

I would like to thank Fredrik Emil Gosch, Founder and Chief Executive Officer of DMO Spesialisten, whose assistance allowed me to work on and complete this endeavour. I value the time he devoted to this research project.

I would like to thank all my professors, lecturers, and classmates for their contributions to my education over the past two years. Finally, I would like to express our deepest gratitude to my family especially to my father and my mother for their unwavering support and encouragement throughout my study period. I was able to keep my focus and finish the study because of their constant encouragement and steadfast backing.

## Abstract

The hotel sector is well on its way to becoming an energy and waste efficiency leader. There is immense pressure on the tourism and hospitality industry to adopt and evolve sustainability practices. The purpose of this research was to examine the sustainability challenges faced by hotels and to analyse the use of blockchain technology to support services by hotels that offer travellers trustworthy information for selecting sustainable offerings. It has been examined that the hotel sector is interested in many sustainability-related concerns, including social, environmental, and economical. The expense of upkeep, upgrades, and renovations required to fulfil sustainability requirements is a major contributor to the hotel industry's lack of economic sustainability. A detailed review-based secondary qualitative analysis has been conducted to examine the sustainability challenges faced by the industry and to present the use of blockchain for addressing these challenges. By increasing sustainability reporting in the tourism sector, blockchain technology has the potential to significantly advance the concepts of decentralisation and sustainable tourism. A key benefit of blockchain technology is its capacity to keep a secure and impermeable record of transactions. Data related to sustainability might thus be safely saved on the blockchain. Due to blockchain technology, the tourism sector can be more ecologically friendly and will now be closely monitored.

## Contents

# CHAPTER ONE: INTRODUCTION

## *1.1 Overview*

Sustainability has become a crucial issue in today's world, and it is essential to ensure a sustainable future for all. To encourage sustainable growth and safeguard the planet, the United Nations has established 17 Sustainable growth Goals (SDGs). Climate change, poverty, inequality, and biodiversity are only a few of the many areas of sustainability addressed by the SDGs (Jamal and Higham, 2021). The tourist industry is only one of several that must work together towards these goals. To put it simply, sustainability is crucial to the continued existence of humanity and the earth as a whole. To be sustainable means to provide for the requirements of the current generation without jeopardising the ability of subsequent generations to do the same (An and Alarcon, 2020). The SDGs are a guide for achieving a sustainable future by governments, corporations, and individuals. Sustainable practices encourage the conservation of natural resources, lessen negative effects on the environment, and bolster societal and economic growth (Jiménez-García et al., 2020). By adopting sustainable practices, we can create a more equitable and prosperous world for all, while preserving the health of the planet for future generations.

## *1.2 Sustainability and its importance*

Sustainability is the capability to satisfy the requirements of the current generation without jeopardising the ability of future generations to do the same. Striking a balance between economic, social, and environmental concerns is essential for long-term resource sustainability (Gimenez and Tachizawa, 2012). Sustainability in the context of the environment refers to minimizing human interference with the environment while protecting resources for future generations. This might entail cutting back on greenhouse gas emissions, encouraging the use of renewable energy sources, protecting biodiversity, and lowering waste and pollution. In terms of the economy, sustainability entails encouraging long-term, sustainable economic

growth and development (Wiltsey Stirman et al., 2012). This may entail making investments in renewable energy, fostering environmentally friendly agriculture, and encouraging people to travel in environmentally friendly ways. Sustainability, from a social perspective, is working to increase social justice and better everyone's standard of living (Caradonna, 2014). To do this, it may be necessary to reduce inequality and poverty, expand access to fundamental services like education and healthcare, and encourage social inclusion and diversity. The goal of sustainability should be to ensure that future generations will be able to fulfil their requirements without jeopardizing our current standard of living (Winter et al., 2019). It calls for a unified effort from people at all levels of society and from governments at all levels of society and the government. So-called port sustainability encompasses the reduction of negative environmental externalities, the management of economic growth, and the satisfaction of social demands. Put another way, sustainability takes into account not just financial but also ecological and societal factors (An & Alarcon, 2020). The sustainability of the port is also relevant here. Externally, the port extends sustainability to landside mobility and cargo along the coast, just as it does within. Ports are useful in reducing environmental impacts associated with shipping and logistics. Due to growing scrutiny and pressure to act and reduce externalities through sustainable and cleaner operations, the search for port sustainability has quickened (Jamal and Higham, 2021). This kind of stress encourages and drives ports to develop strategies that are both robust and sustainable, rather than solely focused on generating revenue.

Sustainability ensures that resources are used in a way that does not harm the environment or deplete its resources. By reducing pollution, greenhouse gas emissions, and deforestation, we can help protect our planet for future generations (Trisic et al., 2021). Sustainable practices can improve the health and well-being of individuals and communities. Clean air, safe water, and access to nutritious food are all vital components of a sustainable future. Ultimately, sustainability is about ensuring that we meet the needs of the present without compromising

the ability of future generations to meet their own needs (Winter et al., 2019). It is a crucial framework for decision-making and action, one that is essential for building a more just, prosperous, and sustainable world.

Sustainability is crucial because it allows us to meet our needs without sacrificing the needs of future generations or harming the environment. The SDGs provide a road map for achieving sustainability and promoting a better world for everyone. The demands of tourists, the tourism sector, the environment, and host communities are all taken into account when planning tourism projects (Lane et al., 2022). Sustainable tourism is the practise of planning and carrying out tourist operations in a way that is good for the economy, the environment, society and culture. It entails fostering tourism that is sensitive to and supportive of host communities and their traditions, history, and environment. Sustainable tourism development, as defined by the United Nations World Tourism Organisation (UNWTO), provides for the needs of both current visitors and host communities while also safeguarding and expanding prospects (Coros et al., 2017). This means that tourism should be developed in a way that benefits all stakeholders involved, including residents, tourists, businesses, and the environment. Sustainable tourism requires the involvement and cooperation of all stakeholders, including government authorities, tourism businesses, local communities, and tourists themselves. It is a collective effort that requires a long-term perspective and a commitment to responsible tourism practices (Ngoc et al., 2021). All types of tourism, including mass tourism and the numerous specialist tourist segments, must follow sustainable tourism development standards and management practises.

A healthy equilibrium between these three factors is necessary to keep tourism growing in the long run. The environmental, economic, and social/cultural aspects of this progress are what sustainability principles allude to (Jamal and Higham, 2021). Sustainable tourism development necessitates the well-informed participation of all relevant stakeholders and strong political leadership to enable wide involvement and the formation of consensus. Sustainable tourism

development is an ongoing process that requires constant monitoring of impacts and the implementation of remedial or preventative measures as necessary (Ngoc et al., 2021). Sustainable tourism should keep visitors happy and provide them with something they can take away with them, all while educating them about environmental issues and encouraging them to adopt eco-friendly practises. Important ecological processes, sustainable tourism, and protecting biodiversity and the natural world's heritage all need the usage of particular environmental resources (Nekmahmud et al., 2022). It is important that it promotes intercultural understanding and respects the sociocultural authenticity of the host communities by preserving their traditional values and creating and living cultural assets.

### *1.3 Tourism Sustainability*

Long-term economic sustainability, equal socioeconomic benefits for all stakeholders, including stable employment, income-generating opportunities, social services for host communities, and a decrease in poverty are all hallmarks of sustainable tourist business. UNWTO stepped up its efforts to aid the governments of countries hit by the tsunamis of 2004 and 2006 in rebuilding their tourism infrastructure (Asmelash and Kumar, 2019). To better understand the connection between tourism and biodiversity, the UNWTO assesses how the industry can contribute to conservation efforts and bolster biodiversity's role as a major resource for tourist hotspots. Tourism is both a major source of greenhouse gas (GHG) emissions (which drive global warming) and a very vulnerable sector to the effects of climate change. Therefore, the tourism industry's resilience must speed up climate action. UNWTO/ITF's most recent estimate, published at UNFCC COP25 in December 2019, projects that CO2 emissions from tourism would increase by 25% from 2016 levels by 2030, even under the most optimistic scenario considered to date (Chong and Balasingam, 2019). Given that emissions might rapidly rise once operations resume and that the long-term cost of inaction on

climate would be greater than the cost of any other issue, the tourism industry must improve its climate action immediately.

The ability of the tourist industry to choose a low-carbon path and cut emissions by half by 2030 is seen as critical to the sector's long-term viability. Over the past ten years, tourism has grown steadily, making it one of the economies with the fastest growth rates worldwide. Over the past ten years, the business has experienced an increase in foreign tourist arrivals of 59% (Carrillo and Jorge, 2017). The number of visitors from outside the country increased from 880 million in 2009 to 1.5 billion in 2019. With the emergence of distinctive tourist activities, travel and tourism are seen as important areas for social and economic progress. In 2019, the tourism sector contributed $8.9 billion, or 10.3%, to the worldwide G.D.P. (Purwanda and Achmad, 2022). It's also important to keep in mind that tourism employs one in ten people worldwide.

The potential for tourism to provide jobs, accelerate economic growth, and foster cultural interchange makes it an important contributor to the global economy. However, tourism may also have detrimental effects on society, the environment, and the economy, including resource overconsumption, pollution, and the deterioration of social and cultural norms (Coros et al., 2017). To minimise the negative effects of tourism while maximising its beneficial effects, responsible tourist practises must be promoted. This is where the idea of sustainable tourism is relevant. To minimise detrimental effects on the environment, society, and economy while maximising beneficial effects, tourism must be sustainably managed. All parties involved in the industry, including travellers, firms engaged in the tourism industry, and governments, must embrace sustainable tourism practises (Purwanda and Achmad, 2022). Sustainable tourism practices include reducing carbon footprint, conserving natural resources, promoting cultural heritage, and supporting local communities.

### *1.4 Tourism Sustainability Practices*

One of the tourism sectors that have a significant impact on tourism sustainability is the hotel industry. Hotels are responsible for a significant amount of energy consumption, waste generation, and water usage. Therefore, hotels must adopt sustainable practices to minimize their negative impact on the environment and society (Sharpley, 2020). Hotels must also commit to reducing their carbon emissions and supporting sustainable transportation options for their employees. Research papers suggest that the need for more transparency regarding sustainability practices in the hotel industry is a significant problem. A study published in the Journal of Sustainable Tourism found that while many hotels claim to have sustainability practices in place, there often needs to be more transparency regarding the specific actions taken and their impact (Asmelash and Kumar, 2019). This lack of transparency makes it difficult for consumers to make informed decisions when choosing a hotel and for stakeholders to hold hotels accountable for their sustainability commitments. Another study published in the Journal of Cleaner Production found that while there is a growing awareness of the importance of sustainability in the hotel industry, there still needs to be standardized sustainability reporting and a need for more transparency regarding sustainability practices. The need for more transparency regarding sustainability practices in the hotel industry has been identified as a significant problem in the literature. A study found that many hotels claim to have sustainability practices in place, but there is often a lack of transparency regarding the specific actions taken and their impact (Murphy and Price, 2012). This lack of transparency makes it difficult for consumers to make informed decisions when choosing a hotel and for stakeholders to hold hotels accountable for their sustainability commitments.

The lack of transparency in the hotel industry has also been attributed to a lack of standardized sustainability reporting. In a study, researchers presented that there is a growing awareness of the importance of sustainability in the hotel industry, but there is still a need for more

standardized sustainability reporting (Harris et al., 2012). The lack of standardized reporting makes it difficult for stakeholders to compare the sustainability performance of different hotels and for hotels to benchmark their sustainability performance against industry standards. Another factor contributing to the lack of transparency in the hotel industry is the complexity of sustainability reporting. According to research, sustainability reporting requires a comprehensive understanding of sustainability concepts and metrics, as well as the ability to collect and analyze data from various sources (Ngoc et al., 2021). Many hotels may not have the resources or expertise to undertake this process effectively, leading to a lack of transparency in their sustainability practices. The lack of transparency in the hotel industry not only affects consumers but also has implications for the industry's reputation and credibility. It has also been found that hotels' sustainability performance has a significant impact on their reputation and image (Pan et al., 2018). Therefore, hotels that need to be more transparent about their sustainability practices risk damaging their reputation and credibility.

### *1.5 Lack of transparency in hotel*

To address the lack of transparency in the hotel industry, there have been calls for more standardized sustainability reporting and certification schemes. Researchers argue that standardized sustainability reporting would allow for better comparability of sustainability performance across hotels and facilitate benchmarking against industry standards (Safari and Areeb, 2020). Certification schemes, such as the Green Key certification, provide a standardized framework for hotels to assess and improve their sustainability performance and communicate their sustainability practices to stakeholders (Pan et al., 2018). In conclusion, the need for more transparency regarding sustainability practices in the hotel industry is a significant problem that affects consumers, stakeholders, and the industry's reputation. The lack of standardized sustainability reporting, the complexity of sustainability reporting, and the need for certification schemes have been identified as contributing factors (Persic et al., 2015). To

address this issue, more standardized sustainability reporting and certification schemes have been suggested as potential solutions. By implementing these measures, the hotel industry can improve its sustainability performance, provide greater transparency to stakeholders, and enhance its reputation and credibility. The need for more transparency regarding sustainability practices in the hotel industry poses a significant challenge for consumers and stakeholders in making informed decisions and holding hotels accountable for their sustainability commitments (Safari and Areeb, 2020). Despite increasing awareness of the importance of sustainability in the industry, many hotels need more standardized sustainability reporting, making it difficult for stakeholders to compare sustainability performance across hotels and for hotels to benchmark their performance against industry standards.

Additionally, the complexity of sustainability reporting may prevent hotels from effectively communicating their sustainability practices to stakeholders, further exacerbating the lack of transparency. This lack of transparency and accountability in the hotel industry not only affects consumer decision-making but also has broader implications for the industry's reputation and credibility (Elkhwesky, 2022). Hotels that need to be more transparent about their sustainability practices risk damaging their reputation and may be perceived as insincere or lacking in commitment to sustainability. To address this problem, there is a need for greater standardization and transparency in sustainability reporting within the hotel industry. Specifically, there is a need for standardized sustainability reporting frameworks and certification schemes that provide a comprehensive, comparable, and trustworthy assessment of hotels' sustainability performance. These measures will not only enhance transparency and accountability in the industry but also improve the industry's sustainability performance, reputation, and credibility (de Villiers and Alexander, 2014). The problem at hand is how to achieve sustainable tourism in the area of hotels. Specifically, the challenge is to develop and implement strategies that promote sustainable practices in the tourism industry, particularly in

the operations of hotels. The scope of the problem is focused on the tourism industry, particularly the hotel sector. This includes hotels of all sizes, ranging from small boutique hotels to large international chains.

### *1.6 Solution to Achieve Tourism Sustainability*

The issue of sustainability encompasses a wide range of areas, such as energy and water conservation, waste management, responsible tourism practices, and social and economic development. Achieving sustainable tourism requires the collaboration of multiple stakeholders, including hoteliers, tourists, government agencies, and local communities (Sharpley, 2020). The scope also includes the impact of tourism on the environment and the local communities. This involves the preservation of natural resources, the protection of cultural heritage, and the well-being of the local population. In addition, the scope encompasses the economic impact of tourism, particularly in terms of job creation and income generation for local communities (Hoang and Nguyen, 2020). Ultimately, the goal is to develop and implement strategies that ensure the long-term viability of tourism while minimizing negative impacts and promoting sustainability. In recent years, there has been a growing awareness of the importance of sustainable tourism, particularly in the hotel sector. Hotels are significant contributors to the tourism industry, and as such, have a significant impact on the environment and local communities (Purwanda and Achmad, 2020). Therefore, it is essential to develop and implement strategies that promote sustainable practices in the hotel industry. One way to achieve sustainable tourism in the hotel sector is through the adoption of green practices. This involves reducing energy and water consumption, minimizing waste, and promoting responsible tourism practices. By implementing green practices, hotels can reduce their environmental impact and minimize their carbon footprint. Low-flow showerheads and toilets, as well as recycling, are just a few examples of how hotels may reduce their environmental

impact (Persic et al., 2015). Hotels may lessen their negative effects on the environment and boost their bottom line by adopting these measures.

Another way to achieve sustainable tourism in the hotel sector is through the involvement of local communities. Communities may reap substantial economic benefits from the tourist sector. However, it also has the potential to negatively affect society and culture. For this reason, it is crucial to include locals in tourist project planning and growth (Zolfani et al., 2015). By involving local communities, hotels can ensure that tourism activities are culturally sensitive and respect local customs and traditions. This helps to ensure that tourism benefits local communities and contributes to their long-term economic and social development. Moreover, hotels can also support sustainable tourism by partnering with government agencies and non-governmental organizations (NGOs). These partnerships can help hotels to access funding and technical support for sustainable tourism initiatives (Murphy and Price, 2012). For instance, hotels can partner with NGOs that promote sustainable tourism practices, such as the Global Sustainable Tourism Council. In addition, hotels can work with government agencies to develop policies and regulations that promote sustainable tourism. Such partnerships help to create a supportive environment for sustainable tourism and promote its adoption in the hotel sector. In conclusion, achieving sustainable tourism in the hotel sector requires the collaboration of multiple stakeholders, including hoteliers, tourists, government agencies, and local communities (Carrillo and Jorge, 2017). By adopting green practices, involving local communities, and partnering with government agencies and NGOs, hotels can promote sustainable tourism and contribute to the long-term viability of the tourism industry.

# CHAPTER TWO: LITERATURE REVIEW

## *2.1 What's Decentralization?*

Decentralization is the concept of distributing power and authority away from a central authority or organization to local or regional entities. This idea is often associated with governance, but it can also be applied to various other fields, such as economics, technology, and social organization. The goal of decentralization is to promote greater autonomy, participation, and efficiency by allowing decisions to be made closer to the people or resources affected by them (Yakymchuk et al., 2021). Decentralization can be defined as the transfer of authority, responsibility, and resources from the central government to sub-national levels of government or non-governmental organizations (NGOs) or private organizations. It has been argued that decentralization can take various forms, including political administrative, fiscal, and market decentralization, depending on the nature and scope of the functions being decentralized (Kimbu and Ngoasong, 2013). They note that decentralization can be driven by various factors, such as the desire to improve service delivery, enhance accountability, promote democracy and participation, or foster economic development. One key benefit of decentralization is that it can promote greater participation and representation in decision-making. By devolving power to local or regional entities, decentralization can enable citizens and communities to have a greater say in how resources are allocated, and services are provided (Zraunig et al., 2019). This can enhance accountability and responsiveness by making decision-makers more directly accountable to the people they serve. As presented by researchers, decentralization aims to bring the government closer to the people so that they can better understand and participate in decision-making processes.

Another advantage of decentralization is that it can promote more efficient and effective resource allocation. By delegating decision-making to lower levels of government or organizations, decentralization can enable decisions to be made based on more localized

knowledge and needs. This can lead to better-targeted and more responsive policies and services, as well as greater innovation and experimentation (Lockwood, 2015). Decentralization is often seen as a means of improving the efficiency and effectiveness of government by making it more responsive to local conditions and needs. However, decentralization has its challenges and risks. One potential downside is that it can lead to fragmentation and inequality, particularly if there is a lack of coordination or capacity at the sub-national level (Rondinelli, 2017). This can result in uneven service provision or resource distribution or even conflicts between different local entities.

Moreover, decentralization can sometimes lead to the concentration of power and resources in the hands of local elites or interest groups rather than promoting greater participation and representation. Hence, decentralization is a complex and multifaceted concept that has been the subject of extensive academic and policy debate (Mookherjee, 2015). While decentralization can offer numerous potential benefits, such as greater participation, representation, and efficiency, it also poses significant challenges and risks. As such, any effort to decentralize authority and resources should be carefully designed and implemented to ensure that it achieves its intended goals and minimizes its unintended consequences.

### *2.2 Centralization of data*

Centralization of data refers to the practice of collecting and storing data in a single location or system. This can be advantageous in terms of efficiency and convenience, as it allows for easier access and management of data. However, it also poses a significant risk in terms of security and privacy. With centralized data, a single breach can compromise the entire dataset, potentially leading to widespread harm (Choi and Luo, 2019). One major concern with data centralization is the potential for abuse by those in power. When a single entity control all of a particular type of data, they can use it to further their interests, potentially at the expense of others. For example, a government that controls all internet traffic data can use it to monitor

and suppress dissent, or a cooperation that controls all customer data can use it for targeted advertising without consent. Research has also shown that the centralization of data can lead to biases and discrimination (Shafagh et al., 2017). This is because centralized systems are often designed to reflect the perspectives and interests of those in power, which may be different from the population as a whole. For example, facial recognition technology has been shown to have significant biases based on race and gender, which can lead to harmful consequences for those who are misidentified or unfairly targeted (Chih-Lin et al., 2014). There are, however, alternatives to centralized data systems that can mitigate these risks.

One approach is to use decentralized systems, where data is stored across multiple locations or nodes. This can help to reduce the risk of a single point of failure since data is not all stored in one place (Shafagh et al., 2017). Blockchain technology, for example, uses a decentralized ledger to track transactions, which makes it more secure and transparent than centralized systems. In conclusion, while centralization of data can offer certain benefits in terms of efficiency and convenience, it also poses significant risks in terms of security, privacy, and fairness. As such, it is important to carefully consider the potential risks and benefits of centralization when designing data systems and to explore alternative approaches that may be better suited to particular use cases (Mahmoud, 2011). Centralization is a problem that affects many different industries and sectors, including the field of tourism sustainability data.

### *2.3 Centralization in Tourism Sustainability Data*

When authority and decision-making are consolidated into the hands of a few, it's usually at the price of the bordering community or society, a phenomenon known as centralization. Significant negative effects on sustainability, local communities, and the future of the tourist sector might result from data centralization (Mou et al., 2020). One of the main concerns with centralization in the tourism industry is that it can lead to a lack of transparency and accountability. When decision-making power is concentrated in the hands of a few individuals

or organizations, it can be difficult for others to understand how these decisions were made and to hold those decision-makers accountable for their actions (Tsai and Chen, 2011). This can be especially problematic when it comes to issues of sustainability, as decisions that prioritize short-term profits over long-term environmental or social sustainability can have significant negative impacts on the broader community. Another issue with centralization in the tourism industry is that it can lead to the exploitation of local communities and resources. When decision-making power is concentrated in the hands of a few powerful actors, they may be more likely to prioritize their interests over those of the local community (Choi and Luo, 2019). This can lead to the overuse of natural resources, the displacement of local communities, and the degradation of local culture and traditions. In addition, centralization can limit innovation and creativity in the tourism industry. When decision-making- power is concentrated in the hands of few individuals or organizations, there is less room for new ideas and approaches to emerge. This can be particularly problematic when it comes to sustainability, as finding new and innovative ways to promote sustainable tourism practices is essential for the long-term health of the industry (Yen and Teng, 2013). Several strategies can be employed to address the problem of centralization in the tourism sustainability data context. One approach is to promote greater transparency and accountability in decision-making processes to make them more open and accessible to the broader community, as well as establish clear standards for sustainability and hold decision-makers accountable for their actions. Another approach is to promote greater decentralization of decision-making power in the tourism industry. This can involve giving local communities and stakeholders more say in how tourism is developed and managed, as well as supporting the development of smaller-scale, locally-owned tourism enterprises (Kimbu and Ngoasong, 2013). Tourism is one of the fastest-growing industries globally, contributing to the economy of many countries. Centralization is one of the factors that affect the sustainability of the tourism industry. Centralization in the tourism industry refers to the

concentration of tourism activities, such as tourism planning, development, and management, in a particular area or region.

Centralization of tourism industries can have severe environmental impacts. The concentration of tourists in one area can lead to overcrowding, which puts pressure on natural resources, such as water, land, and air (Guo and He, 2012). This can lead to environmental degradation and loss of biodiversity, which can negatively impact the tourism industry in the long run. According to a study, the overexploitation of natural resources caused by tourism activities can lead to a decline in the attractiveness of a destination, which can negatively affect the sustainability of the tourism industry. Centralization can also have economic impacts on tourism sustainability (Kimbu and Ngoasong, 2013). When tourism activities are concentrated in a particular area or region, it can lead to uneven distribution of economic benefits, with some regions benefiting more than others. This can lead to economic inequalities and social unrest, which can negatively affect the sustainability of the tourism industry. According to WTO, the decentralization of tourism activities can lead to a more equitable distribution of economic benefits and promote sustainable tourism. Centralization of tourism activities can also have cultural impacts on tourism sustainability (Shoup et al., 2014). When tourism activities are concentrated in a particular area or region, it can lead to the homogenization of cultures, as tourists tend to seek familiar experiences. This can lead to the loss of cultural diversity and authenticity, which can negatively impact the sustainability of the tourism industry. According to a study by UNESCO, the over-commercialization of cultural heritage sites can lead to the loss of their cultural value, which can negatively affect the sustainability of the tourism industry (Škrabić Perić et al., 2021). Centralization of tourism activities can also have infrastructure impacts on tourism sustainability. When tourism activities are concentrated in a particular area or region, it can lead to the overuse of infrastructure such as roads, airports, and hotels. This can lead to congestion, overcrowding, and increased pollution, which can negatively impact

the sustainability of the tourism industry. According to a study, the overuse of infrastructure caused by tourism activities can lead to a decline in the quality of infrastructure, which can negatively affect the sustainability of the tourism industry.

Centralization often results in an uneven distribution of tourism resources which can lead to imbalances in economic development across regions. This is because resources are often concentrated in urban areas, while rural regions are neglected. As a result, tourism development in these areas is often unsustainable. In addition, centralization can lead to a lack of local involvement and ownership in tourism development. When decisions are made at a central level, local communities may feel left out of the process and disengaged from tourism development. This can lead to a need for more support for sustainable tourism practices. Another problem with centralization is that it can lead to a homogenization of tourism products and experiences (Guccio et al., 2018). When decisions are made at a central level, there is a tendency to create standardized tourism products that cater to mass markets. This can result in a loss of unique cultural and natural attractions, which can negatively impact sustainable tourism development.

Centralization can also lead to a lack of innovation and creativity in tourism development. When decision-making is centralized, there's less room for experimentation and new ideas, which can stifle innovation in the tourism industry. This can limit the potential for sustainable tourism development. Additionally, centralization can lead to a concentration of tourism activities in a few popular destinations (Guccio et al., 2018). This can put pressure on these destinations and lead to overcrowding, environmental degradation, and social issues. Sustainable tourism development requires a more dispersed approach to tourism, with a focus on spreading tourism activities across a wider range of destinations. Centralized can also create barriers to entry for smaller tourism operators. When decisions are made at a central level, it can be difficult for a small business to compete with larger, more established operators. This

can limit the diverse tourism products and services, which can negatively impact sustainable tourism development (Chen et al., 2020). In addition, centralization can lead to a lack of coordination between different levels of government and different sectors of the tourism industry. This can result in conflicting policies and a lack of coherence in tourism development. Sustainable tourism developments require a coordinated approach, with collaboration between different stakeholders. Another problem with centralization is that it can lead to a focus on short-term economic gains at the expense of long-term sustainability (Chen et al., 2020). When decisions are made at a central level, there is often pressure to deliver quick results and generate immediate economic benefits. This can lead to a disregard for the long-term impacts of tourism sustainability, including environmental, social, and cultural impacts. Centralization can also lead to a lack of accountability in tourism development. When decisions are made at a central level, it can be not easy to hold decision-makers accountable for their actions (Shoup et al., 2014). This can result in a lack of transparency and a lack of democratic participation in tourism development.

### *2.4 Idea of Decentralization*

Decentralization refers to the distribution of power and authority from a centralized authority to different levels of an organization or society. In a decentralized system, decision-making and control are spread out among multiple actors rather than being concentrated in a single entity. Decentralization has become a popular idea in recent years due to its potential to address the problems of centralization (Gadenne and Singhal, 2014). One of the main advantages of decentralization is that it can help to mitigate the risks associated with centralized decision-making. In a centralized system, decisions are made by a small group of people at the top of the hierarchy, which can lead to a lack of diversity in perspectives and a tendency toward group thinking. Decentralization can address this problem by allowing decision-making to be distributed more widely, which can lead to a more diverse range of opinions being considered.

This can help to reduce the risk of errors and improve the quality of decision-making (Atzori, 2015). Decentralization can also increase the efficiency of an organization or system. In a centralized system, decision-making can be slow and bureaucratic, as decisions must be made at higher levels of the hierarchy.

Decentralization can allow decision-making at a lower level, leading to faster and more efficient decision-making. Another advantage of decentralization is that it can help to increase accountability. In a centralized system, holding decision-makers accountable for their actions can be difficult (Kimbu and Ngoasong, 2013). Decentralization can address this problem by making decision-makers more visible and increasing the number of people responsible for making decisions. This can make it easier to identify and address problems when they arise. Decentralization can also help to increase participation and engagement in decision-making processes. In a centralized system, decision-making can be opaque and distant from the people affected by the decisions (Kyriacou et al., 2015). Decentralization can allow decision-making to be made at a more local level, which can increase the involvement of local communities in decision-making processes. This can help to ensure that decisions are made in the best interests of those affected by them. Furthermore, decentralization can promote innovation and experimentation. In a centralized system, there can be a tendency toward risk aversion and resistance to change. Decentralization can encourage experimentation and innovation, as decision-making is distributed more widely, and there is greater scope for trying out new approaches (Chih-Lin et al., 2014). However, decentralization is not without its challenges. One of the main challenges is the potential for duplication and overlap of functions. In a decentralized system, there is a risk that different actors may duplicate each other's efforts or work at cross-purposes. This can lead to inefficiencies and confusion. Another challenge of decentralization is the potential for unequal distribution of resources and power. In a decentralized system, there is a risk that some actors may have more resources or power than

others, which can lead to inequalities and a concentration of power in certain areas (Smoke, 2015). Decentralisation is the practise of dispersing authority, control, and decision-making among a network or group of people as opposed to a single entity. It is a theory that has gained popularity recently, especially in the fields of technology and finance where it has been hailed as a viable remedy for the centralization issue. Centralization, on the other hand, refers to the concentration of power, control, and decision-making in the hands of a single entity or group, which can lead to a variety of problems, such as inequality, corruption, and inefficiency (Chen et al., 2020). One of the main benefits of decentralization is that it can lead to greater transparency and accountability. When decision-making is distributed across a network, it becomes much more difficult for any one individual or group to act in their self-interest at the expense of others. This is because there are more people involved in the decision-making process, and each individual has a stake in the outcome (Lockwood, 2015). In a centralized system, on the other hand, decision-making is often opaque and centralized, which can lead to corruption and abuse of power. Another benefit of decentralization is that it can lead to greater innovation and creativity. When decision-making is distributed across a network, it allows for a wider range of perspectives and ideas to be considered. This can lead to new and innovative solutions to problems, as well as more efficient and effective ways of doing things (Nam et al., 2021). In a centralized system, on the other hand, decision-making is often top-down and rigid, which can stifle creativity and innovation.

Decentralization can also lead to greater resilience and adaptability. Distributing decision-making across a network allows for a more flexible and responsive approach to problem-solving. This is because decisions can be made quickly and easily at the local level without the need for approval from a centralized authority (Nam et al., 2021). In a centralized system, on the other hand, decision-making can be slow and bureaucratic, which can make it difficult to respond quickly to changing circumstances. Another benefit of decentralization is that it can

lead to greater inclusivity and participation. When decision-making is distributed across a network, it allows for a wider range of voices to be heard and for more people to participate in the decision-making process. This can help to ensure that the needs and concerns of all stakeholders are taken into account rather than just those of a select few (Khartishvili et al., 2019). In a centralized system, on the other hand, decision-making is often dominated by a small group of individuals or institutions, which can lead to the marginalization of certain groups. Decentralization can also promote greater competition and diversity. When decision-making is distributed across a network, it allows for a wider range of actors to participate in a given market or ecosystem. This can help to prevent the concentration of power and wealth in the hands of a few dominant players and can lead to a more dynamic and competitive marketplace (Thirumaran et al., 2014). In a centralized system, on the other hand, decision-making is often dominated by a single entity or group, which can lead to a lack of competition and diversity. Another benefit of decentralization is that it can lead to greater privacy and security. When data and information are stored and processed across a network, it is much more difficult for hackers and other malicious actors to gain access to sensitive information. This is because the information is distributed across multiple nodes rather than being stored in a centralized location (Rondinelli, 2017). In a centralized system, on the other hand, data and information are often stored in a single location, which can make it much easier for hackers to gain access. Decentralization can also reduce costs and increase efficiency. When decision-making is distributed across a network, it can help to reduce the costs associated with bureaucracy and centralization. In conclusion, decentralization has become a popular idea in recent years due to its potential to address the problems of centralization (Harguindéguy et al., 2021). Decentralization can help to mitigate the risks associated with centralized decision-making and increase efficiency, accountability, participation, and innovation. However, decentralization is not without its challenges, and careful attention must be paid to ensure that

resources and power are distributed fairly and that functions are not duplicated or overlapped (Guccio et al., 2018). Decentralization is a concept that has gained increasing attention in recent years as a potential solution to the problems associated with centralization. Decentralization involves the distribution of power, control, and decision-making across a network or a group of individuals rather than in a centralized authority. This can lead to a variety of benefits, including greater transparency, accountability, innovation, resilience, inclusivity, competition, diversity, privacy, security, and efficiency.

### *2.5 Decentralization and Concept of Blockchain*

These benefits have been explored in numerous research papers and articles, highlighting the potential of decentralization to solve the problems of centralization in various domains such as technology, finance, governance, and more. Decentralization has good potential nowadays. One of the key technologies driving decentralization is blockchain (Aderibole et al., 2020). A blockchain is a decentralised, distributed ledger that eliminates the need for a central authority to perform safe, transparent, and tamper-proof transactions. From banking to health care to supply chain management, this technology can completely transform many different industries. The capacity of blockchain to establish a trustless, decentralised network is its main breakthrough (El Faqir et al., 2020). By using a combination of cryptography and distributed consensus algorithms, blockchain networks can ensure that transactions are verified and recorded in a way that is secure, transparent, and tamper-proof. This eliminates the need for a central authority to oversee transactions, as the network itself serves as a decentralized ledger of all transactions that have taken place. One of the most widely known applications of blockchain is in the realm of cryptocurrency (Aderibole et al., 2020). Bitcoin, the first and most well-known cryptocurrency, uses blockchain technology to facilitate peer-to-peer transactions without the need for a central authority. Other cryptocurrencies, such as Ethereum and Ripple, also use blockchain technology to facilitate transactions and enable decentralized applications.

Blockchain technology is being investigated as a potential solution to a variety of issues outside of cryptocurrencies. Blockchain technology, for instance, has the potential to make cross-border payments quicker, cheaper, and more secure. Financial institutions can save costs and delays related to conventional cross-border payments by leveraging blockchain technology to build a decentralised network for executing transactions (Zarrin et al., 2021). In the realm of healthcare, blockchain technology is being explored as a potential solution to the problem of traceability. By using blockchain technology to create a secure, tamper-proof ledger of all transactions in a supply chain, companies ensure that products are sourced and handled ethically and sustainably (El Faqir et al., 2020). In the realm of supply chain management, blockchain technology is being explored as a potential solution to the problem of medical record keeping. By using blockchain technology to create a secure, tamper-proof ledger of patient data, healthcare providers can ensure that patient data, healthcare providers can ensure that patient data is kept private and secure while also making it easier to share information across different providers. In the realm of supply chain management, blockchain technology is being explored as a potential solution to the problem of traceability (Bashir, 2017). By using blockchain technology to create a secure, tamper-proof ledger of all transactions in a supply chain, companies can ensure that products are sourced and handled ethically and sustainably.

Beyond these specific applications, blockchain technology has the potential to enable a wide range of decentralized applications. For example, smart contracts, which are self-executing contracts that are coded on a blockchain, can be used to automate a wide range of processes, from insurance claims to real estate transactions. However, despite its potential, blockchain technology is not without its challenges (Cali and Fifield, 2019). One of the main challenges facing blockchain adoption is scalability. As the number of transactions on a blockchain network grows, the network can become slow and congested, making it difficult to conduct transactions promptly. To address this challenge, researchers are exploring a wide range of

solutions, including sharding, sidechains, and layer two protocols. Another challenge facing blockchain adoption is interoperability (Lee, 2019). As the number of blockchain networks and applications grows, it can become difficult to ensure that different networks can communicate with one another. To address this challenge, researchers are exploring a range of interoperability solutions, including cross-chain bridges and standardization efforts. Despite these challenges, blockchain technology continues to evolve and mature, with new use cases and applications emerging every day (Gamage et al., 2020). This technology has the potential to revolutionise a variety of sectors as it develops and to make the world more decentralised, safe, and transparent. First, it's crucial to highlight how frequently the phrases "decentralised" and "decentralisation" are used in discussions of blockchain technology and digital currency.

### *2.6 Blockchain Implementation*

Before they ever leave the house or board an aeroplane, travellers may utilise blockchain technology to instantaneously alter their hotel reservations. Customers will have to check in faster, which will improve hotel management effectiveness. Additionally, hotels may improve their services and please their consumers by keeping track of their patrons' locations. Health experts in many nations currently use blockchain technology in hospitals' electronic medical record systems, and they view the permission of data sharing as the ideal way to facilitate peer consultations with patient involvement. The blockchain system makes it possible to categorise security issues relating to health, analyse preclusion techniques, and speed up and significantly affect decision-making (Lee, 2019). Blockchain, automation, and digitization are important factors to take into account as businesses look for ways to reduce costs and increase productivity. As businesses become more networked, "hyper-automation" is making headlines throughout the globe. How to make sure that information is accurate, trustworthy, auditable, secure, and can be shared among parties is a major difficulty when several parties need to collaborate. As a promising and revolutionary technology, blockchain has been gaining

increasing attention from various industries in recent years (Raj, 2019). One of the biggest challenges that businesses face when implementing blockchain is a need for more technical expertise. Blockchain technology is a relatively new and complex field, and finding professionals who possess the necessary skills and knowledge to work with it can be difficult. Additionally, training existing staff to work with blockchain technology can also be time-consuming and expensive. Another major challenge with blockchain implementation is scalability. As more data is added to the blockchain, the size of the database grows, which can lead to slower transaction times and higher costs. Additionally, the larger the blockchain, the more difficult it becomes to maintain and secure. Another challenge with blockchain implementation is navigating the complex regulatory landscape.

Different countries have different regulations governing the use of blockchain technology, and complying with these regulations can be time-consuming and costly. Additionally, because blockchain is still a relatively new technology, there may be a lack of clarity about how it is regulated in some jurisdictions (Gamage et al., 2020). Blockchain implementation can also be challenging due to interoperability issues. When it comes to protocols and standards, different blockchain platforms frequently have their own, which can make it challenging to move data and assets across them. Furthermore, integrating blockchain technology with current systems can be difficult and may call for substantial infrastructure upgrades (Aderibole et al., 2020). Security is another major challenge with blockchain implementation. While blockchain is often touted as being highly secure, there have been instances of hacks and security breaches in the past. Additionally, because the blockchain is an immutable ledger, once data has been added to the blockchain, it cannot be deleted or modified (Rondinelli, 2017). This can be problematic if sensitive data is accidentally or maliciously added to the blockchain. Another challenge with blockchain implementation is governance. Because blockchain is a decentralized technology, there often needs to be a clear authority or governance structure in place. This can make it

difficult to resolve disputes or make decisions about the direction of the technology. Resistance to change can also be a significant challenge when implementing blockchain technology (El Faqir et al., 2020). Many businesses may be hesitant to adopt new technology, particularly if it requires significant changes to existing processes or infrastructure. Additionally, there may be a lack of understanding or education about blockchain technology, which can lead to resistance. Implementing blockchain technology can also be costly (Gamage et al., 2020). In addition to the cost of hiring technical expertise and training staff, there may be significant infrastructure costs associated with implementing blockchain technology. Additionally, because blockchain is still a relatively new technology, the cost of implementing it may be higher than more established technologies.

In addition to scalability, blockchain implementation can also face performance issues. Transactions on a blockchain network require validation by multiple nodes before being added to the blockchain, which can lead to slower transaction times. Furthermore, as more data is added to the blockchain, the size of the database grows, leading to slower performance and higher costs (Zarrin et al., 2021). However, new technologies such as sharding and off-chain solutions are being developed to address these performance issues. While blockchain is touted for its transparency and immutability, privacy can be a significant concern when implementing the technology. Because transactions are visible to anyone with access to the network, it can be difficult to keep sensitive data confidential (Bashir, 2017). Several privacy-focused blockchain solutions have emerged to address these concerns, including zero-knowledge proofs and privacy-focused blockchain networks. Network effects can also pose a challenge to blockchain implementation. As with any network technology, the value of a blockchain network increases as more users join the network (Harguindéguy et al., 2021). However, getting enough users to adopt the technology can be difficult, particularly if there are competing blockchain platforms or established technologies in place.

This challenge can be addressed by focusing on the development of robust use cases and partnerships to build momentum around the technology. Integrating blockchain technology with existing systems and processes can also be challenging. In some cases, significant changes to existing infrastructure may be required to fully realize the benefits of blockchain technology (Lee, 2019). However, this challenge can be mitigated by taking a phased approach to implementation, focusing initially on smaller projects and gradually expanding the use of the technology as the organization becomes more familiar with its capabilities. Education and awareness of blockchain technology can also pose a challenge to its implementation. Many businesses may need to fully understand the technology or its potential applications, which can lead to resistance to its adoption (Raj, 2019). This challenge can be addressed through education and outreach initiatives, including training programs and partnerships with blockchain experts and organizations. Another challenge with blockchain implementation is the potential displacement of intermediaries such as banks and other financial institutions.

While blockchain technology can enable peer-to-peer transactions without the need for intermediaries, this can pose a significant challenge to existing business models and structures (Zarrin et al., 2021). However, this challenge can be addressed by working collaboratively with existing intermediaries to develop new business models that incorporate blockchain technology. Finally, blockchain implementation can also raise sustainability concerns, particularly in terms of energy consumption. Blockchain networks require significant computing power to validate transactions and maintain the blockchain database, which can lead to high energy consumption and carbon emissions (Cao et al., 2019). However, new energy-efficient blockchain technologies and sustainable mining practices are being developed to address these concerns. In conclusion, while blockchain technology holds immense promise, implementing it can be challenging. From technical issues such as scalability and performance to regulatory hurdles and network effects, there are many obstacles to overcome.

However, by addressing these challenges with innovative solutions and collaborative approaches, businesses can realize the benefits of blockchain technology. One of the most significant challenges with blockchain implementation is the lack of technical expertise. Blockchain is a complex technology that requires specialized knowledge and skills (Rikken et al., 2019). However, by investing in training programs and partnering with experts, businesses can develop the expertise they need to implement blockchain successfully. Another significant challenge is regulatory hurdles. Blockchain technology operates in a legal grey area in many jurisdictions, and regulatory frameworks are still being developed (Zarrin et al., 2021). However, by working collaboratively with regulators and industry groups, businesses can help shape the regulatory environment and ensure that blockchain technology is properly regulated. Finally, education and awareness are critical to the successful implementation of blockchain technology (Aderibole et al., 2020). Many businesses may need to fully understand the technology or its potential applications, which can lead to resistance to its adoption.

## CHAPTER THREE: DEVELOPING THE RESEARCH QUESTION

The tourist sector is a big employer and a key source of revenue for many nations, and it also makes up a sizeable portion of the worldwide economy. Nevertheless, tourism may also have detrimental effects on the environment and neighbourhood residents, such as garbage production, energy and water use, and the deterioration of cultural and natural resources. The term "sustainability" in the context of tourism refers to attempts to reduce the industry's negative effects while maximizing its positive contributions to environmental, social, and economic objectives (Bramwell and Lane, 2011). The use of renewable energy sources, waste reduction and recycling initiatives, and the preservation of natural and cultural resources are examples of the practices and programs that may be implemented to promote sustainability in the tourist industry. To manage sustainability in the tourist sector, a variety of stakeholders, including local governments, businesses, and communities, must work together in a complicated and varied process (Flynn & Morris, 2006). A growing corpus of literature on sustainability in tourism has been produced, including studies on the many efforts and methods used by tourist firms as well as the potential and difficulties of attaining sustainability in the sector. Understanding how hotels manage sustainability and how guests perceive sustainability in hotels is crucial, given the significance of sustainability in the tourism sector (Garrigos-Simon et al., 2018). Hence, this research focuses on these aspects. So, research questions are developed in this section, which will be answered after the completion of this research.

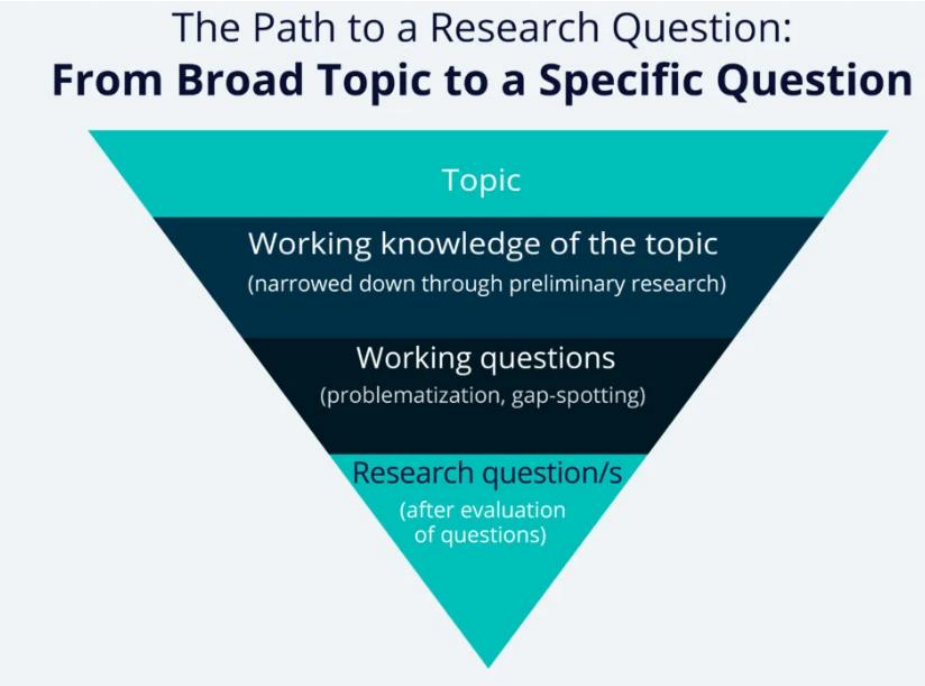
The majority of governments have put policies and measures in place, notably technology-driven ones, to revive the tourism sector during COVID-19 and promote the recovery of the sector. Technology-driven initiatives include things like electronic immunisation records, crowd management systems, and touchless service delivery (Treiblmaier et al., 2021). Identity theft, cyberattacks, financial fraud, and other data misuses are on the rise along with the use of digital technology, automation, and online transactions. The travel industry can benefit greatly

from blockchain technology. Blockchain technology eliminates the requirement for a trusted third party by producing an "immutable distributed ledger" in which all transactions can be verified as being made up of separate, encrypted digital data blocks (Irannezhad and Mahadevan 2021). It provides transparent, secure, reliable, and interoperable solutions, whether used alone or in conjunction with other technologies. To solve issues like openness and trustworthiness of information, fraud, opportunistic behaviour of intermediaries, and worries about foreign money that have emerged as a result of the COVID-19 outbreak and are pervasive in the tourism business, blockchain is a perfect match. Blockchain technology, for instance, can boost trust in the integrity and validity of digital vaccination data (Leal et al., 2020). The many companies, contracts, and transactions that make up the tourist value chain might also be unified via blockchain.

As a consequence of the increasing global population, resource depletion, and environmental repercussions of these events, businesses increasingly give sustainable solutions a higher importance. One of the most significant economic sectors in the world is the tourism sector, which has a significant impact on the environment. The tourist sector doesn't do a good job of appropriately addressing social, economic, and environmental challenges despite how important it is to the global economy (Jiménez-García et al., 2020). It is thought that these issues may be resolved with the help of some technical platforms that would enable those operating in the tourist industry to establish sustainable tourism on a worldwide scale. Businesses involved in the tourism industry are being pushed harder to evaluate how their activities are affecting the environment. The tourism sector is a complex web of relationships encompassing a wide range of businesses and services, all of which collaborate to offer a complete tourist offering for the benefit of their customers (Mondal and Samaddar, 2021). The goal of this project is to investigate how a decentralized technical platform may be used to support a service that offers travellers trustworthy information about sustainable tourism

practices and gives them the option to select sustainable tourism products. The service may include elements of conventional online stores, where customers may sort items based on price and quality, among other factors.

A research subject is an initial step in any inquiry or study. Decentralisation, sustainability, and the blockchain are the primary research foci here. Moreover, despite the relevance of the solid structure of these questions, there has to be instruction on how to construct a fresh research topic. Developing good research questions is not a skill automatically possessed by all researchers. However, the ability to formulate a research question is teachable (Barbic, 2013). As its name implies, research is typically used to back up a research topic. Because of this, the questions are broad enough to be altered as needed during the literature review and the development of the study's design. Larger studies often ask several research questions, whereas smaller studies or research projects may just ask one question.




Source: (Bouchrika, 2023)

The steps mentioned in the image above are implemented in this research to develop a clear research question. The main benefit of creating a research question is that it focuses attention on a particular area of study by reducing a broad subject of interest (Bouchrika, 2023). Hence, as this study revolves around the concept of decentralization and tourism to support a service that offers travellers trustworthy information about sustainable tourism practices, a clear and concise research question is developed here. There are two types of research questions: qualitative and quantitative. The focus of qualitative inquiries might be broad or specific. However, unlike their quantitative cousins, qualitative research questions are fluid, agnostic, and more adaptable. The objectives of the research questions in a qualitative study are exploratory (Sunil, 2022). While Quantitative questions support or contradict a researcher's hypothesis by explaining, contrasting, and creating connections. The topic choice or further questions may be influenced by the responses to these queries. The research question for this research comes under the category of exploratory (qualitative) questions. Hence, the question is developed after following proper steps so that it is clear and interesting.

The first step is to start with a broad topic which in this study was decentralization and sustainable tourism. After selecting the topic and narrowing down the concepts which needed to be focused on in this research, the research question was developed (Riva et al., 2012). It is important to keep in mind the research question, which means that a conclusion or response to a research question is reached through the study of supporting data. The finest research topics pique the interest of the researcher as well as their colleagues and the general public. This passion fuels the researcher's desire to find the solution to the question. Because it concentrates on the key ideas of the new era including decentralisation and blockchain, the research topic for this study is also brief, original, and intriguing. Additionally, it emphasises the tourism sector, one of the world's largest sectors. In addition to being exciting and novel, the research issue should also be relevant to the scientific community and individuals working in the field

of study (Ratan et al., 2019). If at all possible, the research question should be one that the general audience would be interested in. The overall research question for this study is:

**"How can blockchain technology support services by hotels that offer travellers trustworthy information for selecting sustainable offerings?"**

Furthermore, after this question, there are some sub-questions created for this study that are answered after analysis. These include:

***RQ 1: What are the challenges related to sustainability in the hotel industry?***

***RQ2: How can blockchain technology contribute to a service that addresses these challenges?***

***RQ3: What are the inter-relationships between decentralisation, sustainable tourism, and blockchain technology?***

Hence, these research questions are developed for this research. The study aims to answer them after following a proper collection and analysis method. Upon the completion of this research, the answers to these questions are presented.

# CHAPTER FOUR: RESEARCH METHODOLOGY

## *4.1 Introduction to the chapter*

The purpose of this chapter is to present an analysis of the methods and techniques that are used in this research to evaluate the findings and produce the results. The data collection and analysis methods are presented. Furthermore, the details of the research design and approach used for this research are explained in detail.

## *4.1 Research design*

The research design refers to the model, plan, and assessment of the research question for the management of variation (Bloomfield and Fisher, 2019). Three primary categories of research design exist mixed method, qualitative, and quantitative. This study focuses on the decentralised models and their applications in the tourism sector, mainly in Norway. The research methodology for this study involves a qualitative approach. A research question or hypothesis serves as the foundation for mixed-method research designs, which employ both quantitative and qualitative techniques to investigate the study topic (Halcomb and Hickman, 2015). While qualitative approaches acquire non-numerical data (such as observations, interviews, or focus groups) and analyze it using methods like theme analysis or discourse analysis, quantitative methods collect numerical data and analyze it using statistical techniques (Caruth, 2013). The use of a qualitative research design for this study is justified because it provides an in-depth understanding and flexibility in the research. It paves the way for in-depth studies of human sociality and psychology. The goal is to collect extensive information that will allow for a thorough investigation of the problem. Qualitative research may delve into the intricacies of human behaviour and social relationships using techniques including interviews, observations, and focus groups (Tenny et al., 2017). It allows for many approaches to data gathering and analysis. As new information becomes available, researchers are free to modify their strategy and pursue additional avenues of investigation. This adaptability allows scientists

to probe unanticipated directions, modify study strategies, and collect data from a more diverse set of participants.

### *4.2 Research approach*

According to Ustun and Tracey (2020), a research approach is a technique utilized by the researcher to collect, analyze, and interpret data. The investigator prioritizes one of two primary research approach types, including inductive and deductive approaches. This research utilizes an inductive approach. One of the research methods utilized for qualitative research is the inductive research approach. This method starts with a set of observations or data, and the researcher then attempts to create a hypothesis or explanation to explain the facts (Woiceshyn and Daellenbach, 2018). In contrast, the deductive approach starts with a theory or hypothesis, which the researcher then tries to evaluate via actual data. The use of the inductive approach in this research is justified because qualitative research employs the inductive technique. When conducting qualitative secondary research, the inductive method might be useful. Bottom-up in nature, inductive research involves drawing broad conclusions from narrower evidence. New hypotheses or frameworks can be developed through a process of mining the data for commonalities, trends, and insights (Randall and Mello, 2012). Analysing and synthesising previously acquired qualitative data is what secondary qualitative research is all about. Studies, reports, interviews, ethnographic field notes, and other forms of publicly available qualitative data are all fair game. To find trends, patterns, and new understandings, the researcher systematically reviews and analyses the current data (Woiceshyn and Daellenbach, 2018). Using an inductive strategy, a researcher conducting secondary qualitative research might learn something new about the topic at hand, come up with a new theory, or verify an existing theory.

### *4.3 Data collection*

According to Roh, Heo, and Whang (2019), data collection refers to the methods and instruments utilized to gather data for the goal of performing the research. The data collection

in this research is done through secondary data collection. This data is collected because it provides many benefits, including enhanced reliability, increased validity, and increased depth (Willson and Miller, 2014). Additionally, useful information that complements or improves the original data is provided by secondary data. Secondary data is information that has previously been gathered and analysed by another researcher or is available to the public. Published literature, reports, databases, organisational records, governmental papers, and internet archives are all good places to look for secondary data (Alshenqeeti, 2014). The secondary data in this research is collected through articles, journals, and organizational reports. Proper keywords are used for finding relevant articles regarding sustainability in the hotel industry. The methods adopted for data collection in this research according to the research questions are mentioned below. The available literature on sustainability initiatives in hotels is thoroughly reviewed to provide a solution. The data is collected from peer-reviewed articles and they provide in-depth insights into the challenges and successes of adopting sustainability measures in hotels. A literature study of prior studies including a sample of hotel guests or case studies regarding this aspect is used to answer this research question. It provided an in-depth analysis and unique viewpoints on the subject. Specific keywords such as customers in the hotel industry, and sustainability in the tourism industry were used to find relevant authentic articles. Limitations in measuring and reporting sustainability performance are assessed, along with difficulties, including a lack of standardization, comparability, transparency, assurance, and inadequate understanding of customers' opinions and experiences with sustainability reporting. Qualitative techniques build hypotheses by combining current data presented by industry experts to address this subject. These business flow processes are codified using a decentralized and distributed model to enhance tourism services, lower carbon footprints and contribute to environmental sustainability, eliminate inefficiencies and issues, assist companies in improving customer experiences, and enable trustless transactions without third parties. It

has been examined how government incentives and legislation impact these problems and hotel sustainability.

### *4.4 Data analysis*

After the collection of data through primary and secondary sources, data analysis is done. A variety of tools and procedures are employed in data analysis as a way to understand, evaluate, and draw conclusions from the information presented (Washington et al., 2020). The method of analysis that is used in this research for analysing the secondary data is content analysis. For the examination of qualitative data, such as text, photographs, or video, content analysis is a well-liked data analysis method. Finding patterns, themes, and links, entails a methodical and objective procedure of examining and interpreting the content of the data (Drisko and Maschi, 2016). Hence, the information collected on the decentralization, blockchain, and tourism industry is analysed through the use of the content analysis method. A coding scheme or collection of categories is utilised to methodically classify and code the information in this approach. The data may be broken down into more manageable chunks by applying coding categories, which are essentially sets of standardised labels or codes (Prior, 2014). The research goals should inform the development of these categories, which should be all-encompassing and mutually exclusive. Each piece of the data (paragraphs, words, photos) is assigned a code based on the coding scheme's categories. This process is going over the information meticulously and labelling or coding each section according to its significance or substance. Inter-coder dependability is a measure of how well different coders agree on each other's work. This is done by determining the degree of agreement between the coding judgements made by several coders on a sample of the data. It eliminates inconsistencies and clarifies any grey areas in the coding procedure (Neuendorf, 2017). Results from the content analysis are discussed in light of their relevance to the stated goals of the study. This investigation considers the ramifications of any observed patterns, correlations, or trends uncovered by the study. An

exhaustive and nuanced analysis of the material's meaning based on the research results is finally provided. To analyse enormous datasets and get useful insights, the content analysis provides a systematic and organised technique. It finds extensive use in the domains of social science, communication, marketing, and media studies, among others.

### *4.5 Ethical considerations*

Ethical consideration in research is a collection of guidelines that assist direct study designs and procedures (Husband, 2020). Certain ethical issues emphasize some of the study's fundamental concerns. As this research utilised secondary data, ethical considerations are important to focus on the collection of this kind of data too. Data subjects' or providers' privacy and confidentiality were protected throughout this study. Data was presented in a way that does not allow people or organisations to be identified, and all personally identifying information has been encrypted. It also took into account whether or not the original data providers had gotten participants' informed permission. Obtaining appropriate authorization for data collection, prospective sharing, or secondary use is crucial if the data contains personally identifiable information about individuals (Arifin, 2018). The secondary data was also appropriately acknowledged and credited. Academic citation guidelines were followed, and any appropriate authors or organisations whose data was used were credited. The setting, facts, rules and regulations at play can all affect the ethical considerations that must be made. Hence, this research ensured all of these ethical considerations in collecting the data to make it authentic, reliable, and ethical.

## CHAPTER FIVE: DATA ANALYSIS AND FINDINGS

This part presents the qualitative analysis of data that has been collected from the literature. The method of content analysis has been used for analyzing the data and producing the results. By applying content analysis, both quantitative and qualitative elements of data may be examined. The steps of content analysis include choosing the data source, determining the coding categories, creating a coding scheme, training coders, carrying out the coding process, evaluating the results, and so on (Drisko and Madchi, 2016). Hence, after collecting the data from secondary sources, regarding the research questions, it has been examined here through content analysis.

### *5.1 Management of sustainability in hotels*

Hotels are a major source of greenhouse gas emissions, along with the transportation and food and beverage sectors (Stylos and Vassiliadis, 2015). That is why hotel management must find solutions to the problems since doing so is both the right thing to do and a boon to the bottom line. When it comes to environmental responsibility, the hotel sector has recently shifted its priorities and adopted a more proactive stance. The sector is working toward promoting ethical business and tourism by doing things like improving energy and water management, phasing out single-use plastics, and reducing food waste (Claar, 2021). Companies have begun evaluating their sustainability strategies, shifting from lip service to efforts that actively battle climate change to more properly evaluate their effectiveness and give transparency to investors, consumers, and workers. The use of technology has allowed businesses to better understand and quantify the intangible indirect emissions that have a negative influence on the environment.

Alameeri et al. (2018) analysed that one of the most crucial activities in the hospitality industry is the adoption of environmental sustainability measures. Eco-labelling and financial contributions to local programs are two prominent ways that hotels care for the environment

and their guests. In addition, to appease their clientele, several hotels provide environmental data on the web (Rodríguez-Antón et al., 2012). Sustainable management is profitable in terms of productivity, customer satisfaction, and staff commitment. Workers and tourists of today and the future are some of the most influential customers in history, and they are more willing to back businesses with a social mission. Based on the findings of a study, the hotel sector must cut its carbon emissions per room by more than 90% by the year 2050 (Reymond, 2022). This is essential for preventing projected expansion from resulting in a comparable rise in carbon emissions.

To avert the worst consequences of climate change, hotels will need to go above and beyond to help keep global warming below 1.5 degrees Celsius. Some of the largest hotel businesses have even implemented environmentally friendly policies. Hotel chains such as IHG and Marriott, for instance, have phased out single-use toiletries. The effort resulted in annual savings of around $14 million for Marriott and 200 million tiny bottles for IHG (Oaky, 2022). There are different examples and case studies provided in the literature about sustainable management presented by different hotels, and they have been examined in this study. For example, the U.S. boutique hotel operator 1 Hotels has made sustainability a top priority from the very beginning of the company's operations (Reymond, 2022). They use seasonal and regional ingredients wherever possible in the food and drink preparations, and we educate and encourage our employees and visitors to do the same. Brazyte et al. (2017) presented an analysis of visitor evaluations that revealed a generally favourable attitude toward sustainability on the part of hotel patrons. evaluations that included references to sustainability were rated higher by customers than those that did not. it was found that only 6.8% of the feedback specifically mentioned sustainability. The research suggested that hotel owners and managers should inform customers about the environmental initiatives they have implemented (Brazyte et al., 2017). Business organizations in the tourist industry seldom make decisions

based on sustainability and social responsibility principles because of constrained rationality, cognitive constraints, and a stubborn pursuit of short-term economic rewards (Stylos and Vassiliadis, 2015). There is much to be gained in terms of competitiveness for four-star hotels that make strides in the economic/financial and social components of sustainable management.

### *5.2 The Use of Blockchain in tourism sustainability reporting*

The sustainability reporting process in the tourist sector might be vastly improved with the use of blockchain technology. A company's environmental, social, and economic performance are all factors that may be measured through sustainability reporting (Kashem et al., 2022). There are several advantages to using blockchain technology for sustainability reporting. By enabling stakeholders to independently check data, blockchain's distributed ledger technology may increase openness and accountability in sustainability reporting (Bellucci et al., 2022). The administrative load and expenses of sustainability reporting may be reduced via the use of smart contracts that can be created with the use of blockchain technology. Blockchain technology has a lot to offer the sustainability reporting process in the hotel business. It has been found that blockchain may enable hotels to demonstrate their commitment to sustainability by providing stakeholders with a secure, transparent, and irreversible database of sustainability data (Filimonau and Naumova, 2020). The ability of blockchain technology to maintain a safe and unchangeable record of transactions is a significant advantage. As a result, data about sustainability may be securely stored on the blockchain. This is of utmost relevance when it comes to reporting on sustainability, where accurate data is crucial.

Pizzi et al. (2022) examined that only a few businesses have used blockchain systems to guarantee the integrity of their data, even though academics and professionals have seen the benefits of its deployment. The results highlighted the chance for socially responsible businesses to make a statement about their commitment to sustainable development by using cutting-edge technology. The signalling effects of disclosing non-financial information have

been reduced due to the growth of non-financial reports issued on an obligatory basis (Pizzi et al., 2022). It has been analysed that with the use of blockchain technology, the sustainability performance of specific tourism products and services can be tracked across the supply chain. It has been analysed that hotel sustainability reporting processes may be streamlined with the use of blockchain technology. Utilizing smart contracts makes it possible for sustainability data to be automatically recorded on the blockchain, doing away with the need for human reporting and the errors that go along with it (Kashem et al., 2022). Additionally, it could enhance collaboration and communication among those involved in the hotel industry. Hotels can encourage sustainability across the industry by providing a secure and open data exchange platform for vendors, customers, and other industry participants.

To reach the United Nations' sustainable goals, supply chain sustainability must be improved. Supply chains that use blockchain technology are expanding. Park and Li (2022) examined that the blockchain platform is a digital system and database that uses distributed ledger technology to record transactions along the supply chain. When everyone in the supply chain is on the same page, information can be freely exchanged (Corazza et al., 2023). This distributed ledger of transactions improves supply chain management by increasing visibility, trustworthiness, and traceability. Not just the food and logistics industries, but also many others, including healthcare, energy, banking, and travel (including, for example, Delta Airlines and British Airways), have started implementing blockchain technology in their supply chains (Park and Li, 2021). Blockchain technology can help bring about a decentralized marketplace for sustainable tourism products and services, empowering tourists to make well-informed decisions about their vacations. This study has evaluated that supporting the expansion of sustainable tourism and contributing to the realization of the United Nations Sustainable Development Goals might be made easier through the use of blockchain technology in sustainability reporting.

### *5.3 Sustainability Reporting in Hotels*

It has been examined that a crucial component of sustainable tourism is reporting on performance in terms of sustainability, and lodging establishments that do so may demonstrate their commitment to sustainability and work toward a more sustainable future. Sustainability reporting describes the process of documenting a hotel's economic, social, and environmental performance. Sustainability reporting is becoming more and more crucial to provide investors, customers, employees, and the general public with precise and reliable information on a hotel's sustainability performance. When a hotel's sustainability reporting is integrated with the accounting information system, it boosts the hotel's overall financial performance.

Whether or not hotel sustainability reporting is required is a subject of significant debate. Levy and Park (2011) and Martinez and Rodriguez del Bosque (2013) both make the case that stakeholders are the primary beneficiaries of sustainability reporting while cost reductions are of less significance. According to Medrado and Jackson (2015), benefits for key stakeholders' economic and social well-being serve as the driving force behind sustainability reporting and action. For instance, the cost-savings thesis is supported by research by Eccles et al. (2014), Feng et al. (2015), Jackson and Singh (2015), and others in the hospitality industry. It is believed that because sustainability disclosure closes the knowledge gap between the firm and its principals (investors), the cost of equity financing may be reduced. This claim is supported by Du (2018), who argues that sustainability reporting is increasingly crucial for foreign investors looking to reduce information asymmetry. However, Kang et al. (2010) questioned the validity of the alleged cost reductions for the hotel industry. The researchers discovered that almost all of them, from both large and small businesses, mentioned people attraction as their top incentive, with cost reductions coming in lower. Furthermore, none of the experts had ever heard of sustainability reporting's costs and advantages being compared.

Al-Wattar et al. (2019) presented that the management at hotels may be encouraged to disclose more about sustainability issues due to a favourable correlation between reporting on such issues and financial performance in the business. Hotels can report on their sustainability using the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), or the Sustainable Development Goals (SDGs) of the United Nations. Sustainability reporting may improve the hotel's reputation and brand image as well as operational transparency and accountability, cost control, and the capacity to draw in socially aware travellers. Hotels that publish sustainability reports are more likely to adopt sustainable practices, such as creating less waste and using less water and energy, both of which have a beneficial impact on the environment and help achieve the SDGs. Pommier and Engel's data from 2021 indicated that it is at best unclear why the hotel business bothers to declare sustainability. More research is necessary, especially in terms of stakeholders.

### *5.4 Sustainability Challenges in the hotel industry*

It has been examined that environmental, social, and financial sustainability are all issues that the hotel industry is concerned with. The ecosystem is seriously threatened by the over usage of resources like water and energy (Dani et al., 2021). Due to the requirement for continuous lighting, climate control, and other services, hotels use a lot of energy. They also consume a lot of water, which can be an issue in areas that are prone to drought. Another significant environmental problem is the waste that hotels create. At hotels, food waste, plastic trash, and paper waste all build up to enormous volumes (Calisto et al., 2021). By burying this trash, pollutants and greenhouse gas emissions are produced. Two social sustainability issues in the hotel industry are how employees are treated and the impact that tourism has on neighbourhood communities (Khatter et al., 2021). Many individuals work long shifts at hotels for low pay and with limited opportunities for promotion.

Two other unfavourable effects of the tourism industry that may have an impact on the standard of living in the host town include overcrowding and the degradation of natural and cultural resources (Sajjad et al., 2018). The hotel industry's lack of economic sustainability is mostly caused by the high cost of maintenance, improvements, and renovations needed to meet sustainability standards. The initial expenditure necessary to adopt sustainable practices is prohibitive for many hotels, especially those that are privately owned. Jones et al. (2014) examined that while there is a wide spectrum of environmental, social, and economic concerns, the largest hotel chains' public statements on their sustainability pledges and successes vary widely. The authors argued that the global hotel industry is currently pursuing a weak rather than a strong model of sustainability because these commitments are driven more by the search for efficiency gains and are couched within existing business models centred on continuing growth.

Jankovic and Krivacic (2014) examined that most hotels still do not make enough use of assurance as a tool for bolstering credibility, and the assurance of sustainability reporting practice in the hotel industry is weaker compared to other businesses. Many hotels are also interested in finding sustainable sources for their meals and beverages. Hotels should offer environmentally friendly and wholesome dining alternatives for their customers, such as locally produced cuisine. As a result, the hotel may need to make significant changes to its supply chain and provide its kitchen staff with more training (Kim et al., 2019). Educating guests about their eco-friendly programs is another challenge for hotels. Although many tourists would like to stay in eco-friendly hotels, they might not be aware of the steps being taken right now to reduce the carbon footprint of the hospitality sector. Hotels must use effective communication strategies to make sure that their guests are aware of and supportive of the hotel's sustainability initiatives (Fukey and Issac, 2014). Numerous sustainability-related challenges face the hotel industry, but these challenges may be solved by exploiting

opportunities for originality and distinctiveness. Hotels that are committed to sustainability will be better able to draw eco-aware customers and stay competitive.

### *5.5 Solutions to Challenges of Sustainability in the hotel industry*

Researchers have analysed that sustainability in the hotel sector may be defined more by short-term financial considerations than by a long-term dedication to environmental responsibility (Kansakar et al., 2019). Various studies discussed and presented various solutions towards the sustainability and reporting challenges in the industry. Jones et al. (2016) looked at how the industry's incomplete treatment of materiality and external assurance hurts the credibility of sustainability reports. In addition, neither the academic literature on sustainability nor sustainability reporting inside the business includes any critique of the sector's dedication to economic development. Hole (2019) suggested effective legislation, regulations, and people management as solutions to the issues, claiming that these actions would assist to lessen the harmful consequences. To address the issues afflicting the tourism and hospitality sector, stakeholders, including lawmakers, governmental agencies, and industry businesses, need to be heard.

The hotel sector has made some commendable efforts towards greener practices. Delta Hotels, the largest independently owned hotel chain in Canada, has developed regulations and put systems in place to evaluate sustainability effectiveness in four key areas: energy and atmosphere, the environment, materials and consumables, and community participation (Jayawardena et al., 2013). This action-oriented approach is what's driving the present progress and tactics used to attain the 12 annual measurables. The carbon footprint, energy use, water use, waste generation, procurement, facilities, employee engagement, community involvement, and customer interaction are just a few examples of key performance indicators (Delta Hotels, 2012). Similar sustainability programmes have been created and implemented by other global hotel chains (such as InterContinental, Hilton, and Wyndham) with quantifiable goals that

require the adoption of sustainable practices. The tourism and hospitality industries, on the other hand, are still in their infancy when it comes to integrating sustainability concepts into daily operations (Jayawardena et al., 2013). To better safeguard and conserve natural and cultural resources of all sizes, there has been a move toward more intergovernmental collaboration and community involvement in recent decades.

Persic et al. (2013) analysed that establishing an internal reporting system following the standards of the triple bottom line is a prerequisite to implementing external sustainability reporting. With the support of these kinds of internal reporting tools, hotel management may be able to weather the economic storm. The carbon footprint and energy costs of a hotel may be significantly reduced by implementing energy-efficient practices (Willie et al., 2017). By utilizing renewable energy sources like solar power and putting in energy-efficient lighting, heating, and cooling systems, hotels may lessen their carbon impact. Utilizing water-saving techniques can reduce a hotel's water usage and costs. Programs for recycling towels and linens, the installation of low-flow fixtures, and quick leak repairs are a few examples of what may be done (Chen et al., 2010). By investing in environmentally friendly products like locally produced food, organic cotton bed linens, and eco-friendly cleaning supplies, hotels may decrease their harmful influence on the environment. The most crucial sustainability lesson is that we can set aside our differences and cooperate to save our natural resources for future generations. This is the fundamental component of lasting relationships built on tourism.

### *5.6 The use of blockchain contributing to the service addressing the challenges*

Hotels that provide guests with reliable data on sustainable amenities might benefit greatly from blockchain technology. Blockchain technology's distributed, unchangeable ledger promotes the openness and reliability of records. The blockchain may be used by hotels to record data about their environmental policies, certifications, energy use, garbage disposal, and other parameters (Irannezhad and Mahadevan, 2021). Because this information cannot be

changed, travellers may feel safe using it. Smart contracts are computer-enabled agreements with built-in logic for carrying them out and enforcing the terms they specify. Smart contracts between hotels and sustainability groups or certification agencies are possible. When hotels achieve the sustainability standards outlined in the contracts, the contracts are finalised, and the relevant data is added to the blockchain (Strebinger and Treiblmaier, 2022). Customers may check the validity of these agreements and make sustainable bookings with confidence. Guests at a hotel may share their thoughts on the establishment's eco-friendliness through a peer-to-peer review system made possible by blockchain technology (Flecha-Barrio et al., 2019). The blockchain may be used to record these evaluations, making them permanently accessible and immune to tampering.

Having access to these reviews allows visitors to make informed selections based on the insights of fellow travellers (Calvaresi et al., 2019). Complete material, energy, and waste management supply chain transparency are possible with blockchain technology. Travellers may learn about a hotel's commitment to sustainability by looking at its sustainable supply chain practices, which can be recorded and verified on the blockchain. This openness motivates both guests to make eco-friendly decisions and lodging establishments to implement these measures (Flecha-Barrio et al., 2019). Travellers who choose eco-friendly services may be rewarded through tokens or loyalty programs in blockchain-based systems. Guests of participating hotels may earn tokens that can be used for discounts, room upgrades, and other perks when they check out. As a result, more responsible decisions are made, and a positive feedback loop is created in the tourism sector (Calvaresi et al., 2019). Hotels, environmental groups, and other stakeholders can all work together safely and effectively thanks to blockchain technology. Using the blockchain, hotels may exchange information with sustainability-focused groups and market their green services as a group. Sharing information and working together to solve problems is a win-win for both hotels and guests (Miraz et al., 2020). Hotels

can give travellers trustworthy information about their sustainability practises by utilising the immutability, decentralisation, and transparency afforded by blockchain technology (Miraz et al., 2020). The result is a more sustainable travel sector as a whole since travellers will be better equipped to make decisions based on accurate information.

## RESEARCH CONCLUSION

This research aimed to analyse the implementation of blockchain to support services by hotels that offer travellers trustworthy information for selecting sustainable offerings. The research included two research questions which were answered through a detailed secondary analysis. After conducting a detailed qualitative analysis and analysing the findings and data collected from secondary resources, it has been analysed that the goal of both decentralisation and sustainable tourism is the same: to foster a more well-rounded and ethical strategy for the growth of the tourism industry. By looking at how these two factors interact, we can see how they can help one another and make the tourist sector more egalitarian and environmentally friendly. There is a mutual benefit between decentralisation and ecotourism. In addition to fostering ethical tourist practices, decentralisation helps local communities thrive (Özgit and Adalıer, 2022). In response, sustainable tourism reaps the benefits of decentralised techniques by making use of indigenous expertise, protecting priceless artefacts, and bolstering local businesses. By increasing sustainability reporting's veracity, trustworthiness, and accountability, blockchain technology is helping the tourist industry work towards its sustainability goals.

It has been examined that the tourist business can be made more robust, egalitarian, and ecologically sensitive if decentralisation is combined with sustainable practices (Kashem et al., 2022). In the tourist industry, decentralisation refers to the dispersion of authority and the removal of a monopoly on resources and decision-making. It encourages locals to take part in tourism's strategic planning, operational management, and benefit sharing. By removing the need for a centralised authority, we can create a tourism model that values the input of all parties involved. Sustainable tourism, on the other hand, works to reduce tourism's potentially harmful effects on local environments, communities, and cultures while maximising the good

ones (Erol et al., 2022). It stresses the importance of doing things like safeguarding biodiversity, preserving natural resources, honouring local traditions, and bolstering local economies.

The research presented a detailed analysis of sustainability management in hotels. One of the objectives of this research was to analyse the *challenges related to sustainability in the hotel industry*. it has been examined that there are numerous sustainability challenges in hotels. Studies show that hotels are responsible for 21% of all environmental harm brought on by the tourism industry (Nuryyev et al., 2020). Due to its inadequate waste management practices, the hospitality industry has had a disastrous impact on pollution levels and biodiversity. Global warming has been made worse by the hotel industry's significant carbon dioxide emissions and waste buildup. It also makes heavy use of resources like water and electricity. Hotels should thus target environmentally friendly sustainable growth. Oaky (2022) presented that 73% of tourists prefer eco-friendly hotels over those that haven't taken any steps to lessen their environmental effects. According to research, travellers are prepared to spend up to 75% extra per night for a hotel that practises environmental responsibility.

Hotels may decrease their environmental effect by embracing and putting into implementing sustainable practices. Furthermore, by making sustainable decisions at the hotel, it can provide its guests with a wonderful experience that aligns with their views and expectations given that people are becoming more and more concerned about climate change and the environment (Joo et al., 2021). The next objective of this research was to analyse the use of *blockchain technology to contribute to a service that addresses these challenges.* Blockchain technology is being researched for its potential to provide transparency and traceability in the waste management industry. By recording and tracking rubbish generation, sorting, recycling, and disposal using the blockchain, hotels can demonstrate that they are satisfying sustainability guidelines. Researchers have evaluated that by making agreements with waste management companies

simpler, smart contracts may promote more sustainable behaviour like recycling and material reuse (Nuryyev et al., 2020). Blockchain technology can assist hotels in managing their water resources better by tracking consumption, finding leaks, and improving efficiency. It has been analysed that by utilising blockchain to store and analyse water consumption data obtained from Internet of Things (IoT) devices and sensors, hotels may implement water-saving practises and reduce water waste (Tyan et al., 2021). Using blockchain-based platforms, hotels and visitors may collaborate to safeguard the environment. By utilising blockchain for transparent reporting and tracking of sustainability actions, hotels may involve their clients, employees, and local communities in their sustainability projects. Through the use of incentives and prizes like loyalty schemes and tokens, sustainable conduct may be promoted, and a sense of civic duty can be established.

This research has analysed that the goal of sustainable tourism is to secure the long-term profitability of tourist sites by considering all of these factors. It has been examined that there might be several sustainability challenges faced by hotels but blockchain can be used for addressing those challenges. The aims of sustainable tourism have a lot to gain from decentralization (Chinnasamy et al., 2019). It promotes a sense of ownership and responsibility towards tourist development by including local communities and stakeholders in decision-making processes. The ideals of decentralisation and sustainable tourism may both benefit greatly from the use of blockchain technology, which can play a crucial role in promoting sustainability reporting in the tourist industry (Garcia, 2020). The distributed ledger technology known as blockchain is trustworthy because it is open and transparent. Sustainable tourist locations may increase the trustworthiness of their claims by using blockchain-based methods for reporting. The tourist industry's efforts to be more environmentally responsible may now be tracked in detail thanks to blockchain technology. For instance, it may monitor the distribution chain to guarantee that goods and services are produced ethically. Stakeholders

may confirm the legitimacy of items and services by reviewing the blockchain records of their production and distribution (Calvaresi et al., 2019). Hence, this research has several implications for hotels and the tourism industry. A detailed analysis of the sustainability challenges and solutions for it through blockchain has been provided which can be used by hotels to present environment-friendly practices and for making the customers satisfied.

## LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This research provides a detailed analysis of tourism sustainability reporting through blockchain. The secondary analysis has provided an in-depth understanding of the topic, but there are some limitations which are presented here. Some future research directions are also presented which can be covered by other researchers to provide a good understanding of this aspect. One of the major limitations of this research is that it solely relies on secondary research. There may be a dearth of high-quality secondary qualitative data on the subject. This may limit the scope and detail of the study, making it harder to reach solid results. Researchers have less influence over the primary data-gathering phase while conducting secondary analysis. This may lead to biases, inconsistencies, or gaps in the data, all of which threaten the study's credibility and validity. It's possible that secondary qualitative analysis won't tell us everything we need to know about the original data's context in the collection. Because of this, it may be difficult to draw complete conclusions and use the data effectively in the Blockchain context for sustainability reporting in the tourist industry.

Furthermore, it is difficult to represent the current status of tourist sustainability reporting practises using Blockchain due to the possible inconsistency in the timeframes during which the relevant secondary qualitative data was collected. Because of this caveat, the results may not be generalizable to the current situation. When conducting secondary research, academics are cut off from the original data sources and cannot ask questions or get clarification. Because of the lack of communication between the researcher and the participants, it may be difficult to delve deeply into the issue at hand. Hence, the use of secondary data only is the major limitation of this research, because primary data could be used and provide more accurate results. furthermore, another limitation of this research was time constraints. There were problems of time in this research, though some of them were covered some were problematic.

When researchers are pressed for time, it might be difficult to gather an adequate sample of secondary qualitative data. They may have to choose which facts or sources to focus on, eliminating the possibility of gaining a more well-rounded grasp of the issue.

Time restrictions may limit the comprehensiveness of the investigation. Researchers may have to prioritise certain parts of tourist sustainability reporting utilising Blockchain over others, ignoring nuances or underexplored areas in the process. There may not be enough time to get into the precise ramifications of employing Blockchain technology and the context considerations around tourist sustainability reporting. Researchers may have to depend on prior understanding or guesswork, increasing the risk that they would miss crucial contextual complexity in their investigation. Because of this limitation, the researcher had to speed through data analysis and interpretation if they were pressed for time. This can lead to more mistakes, missed opportunities, and incomplete or incorrect conclusions. Due to time limits, it is difficult to do member verification or triangulate results with other data sources, as well as to follow up with participants (Yu et al., 2014). The quality and validity of the findings may suffer as a result of this. Though this research ensured to make the findings were valid through the secondary data by following the ethical considerations and presenting authenticity, time constraints were a major limitation.

In light of the issues raised in this paper, it may be worthwhile to examine how stakeholders like customers, suppliers, and workers react to the introduction of this technology to determine whether or not it aids in the improvement of the sustainability of the processes along the tourism value chain. Future studies should concentrate on resolving the issues raised by Blockchain technology in the context of tourism concerning security, transparency, and traceability. Prior studies have defined security levels at the process, data, and infrastructure levels; this should be done in light of those findings (Leng et al., 2022). The research can help us better understand how Blockchain technology can deliver secure solutions for the tourism industry by taking into

consideration these different layers of protection. Both improving the method and setting the framework for future research into the extent to which the tourist industry, intermediaries, and consumers will use this technology are crucial.

Sustainability reporting in the tourist sector is an area with several potential avenues for further study. For instance, utilising Blockchain to undertake primary qualitative research on tourist sustainability reporting practises obtaining new and more context-specific data. This would help us better comprehend the stakeholders' viewpoints, obstacles, and possibilities regarding the adoption and use of Blockchain technology for sustainability reporting. In the future, academics can use Blockchain to undertake longitudinal studies that chart the development of sustainability reporting in the tourist industry (Baralla et al., 2019). This would aid in documenting the travel industry's adoption and deployment of Blockchain technology, as well as any resulting trends, changes, or repercussions. The use of Blockchain technology in the tourist industry also allows for the possibility of a cross-regional or cross-national comparative review of sustainability reporting procedures. This would help us understand the wider environment that affects the success of sustainability reporting projects built on Blockchain.

Future academics may also find it worthwhile to dig into the results and effects of using Blockchain technology for sustainability reporting in the tourist industry. This line of inquiry might examine the impact of Blockchain-based reporting systems on promoting environmentally responsible practices and vacation experiences. Examining the potential ethical hazards and difficulties of implementing Blockchain technology for sustainability reporting in the tourist industry (Leng et al., 2019). Data privacy, security, governance, and the role of stakeholders in assuring responsible and ethical usage of Blockchain in sustainability reporting are all topics that might be explored in this line of inquiry.

In addition, the tourist sector has yet to establish the regulatory framework and the sort of infrastructure that must be built to fully realise the potential of the suggested technology. The ability of blockchain applications to improve and learn is crucial for the tourism sector. Possible future lines of inquiry might focus on integrating it with AI and optimisation techniques to further advance the industry. Blockchain technology's potential in the travel industry is particularly exciting. Therefore, academics may contribute to the growth of knowledge in this developing subject by addressing these constraints and researching these future research directions to better understand and utilise Blockchain technology for tourist sustainability reporting.

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