LAB University of Applied Sciences

Roles of AI in Digital Transformation of Tourism Business

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Abstract

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Abstract

The advent of the digital age has exponentially amplified the scope and impact of Artificial Intelligence (AI) in various sectors, including tourism. This thesis aims to comprehensively investigate and elaborate on the multifaceted roles of AI in accelerating the digital transformation of the tourism industry. The transformative potential of AI in fostering personalised marketing, offering tailored services, and driving business decision-making based on predictive analytics. The research further delves into the complexities and challenges of integrating AI, including privacy concerns, data quality issues, and the need for constant technology updates.

Despite its challenges, the thesis advocates that AI is an invaluable tool for the tourism industry in the digital era. Highlighting the comprehensive analysis of the current literature, case studies, and primary survey data, this thesis underscores the critical role of AI in shaping the future of the tourism industry in the digital world. It concludes that tourism businesses can unleash the full potential of digital transformation by harnessing AI's potential, ensuring a competitive edge in an increasingly digital and globalised marketplace.

Keywords

AI, Automation, NLP, OEE, Customer Experience, Strategies, Tools.

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1 Introduction

Artificial Intelligence is a product of computer science that thinks like a human being and leverages the problem-solving and decision-making capabilities of human beings. Tourism businesses can use 24/7 customer support by using AI technologies. As a result, businesses can predict data to anticipate the future and suggest the proper strategies and answers. The workflows and data traffic with the current technologies can be mitigated, and personalised interactions with the learning tech can improve business problems. Computer programming has changed the way of looking at the world, and the creations inside the digital world have changed with self-developing AI. Technology plays a massive role in developing the business. Recent developments and transformations of AI have become more responsive and advanced, with voice recognition and many other encountering experiences. The user database stores and analyses the user's perspective, suggesting recommendations and orders based on the user's liking is no surprise. (Calp 2020.)

Artificial intelligence has become an increasingly popular tool for tourism businesses looking to improve their operations and gain a competitive advantage. There are several key ways in which AI can help businesses, including increased efficiency and productivity, improved decision-making, enhanced customer experience, cost savings, and improved risk management and fraud detection. AI can increase efficiency and productivity by automating repetitive tasks and freeing employees to focus on more complex work. This can help businesses save time and money while improving their output quality. Additionally, AI can provide valuable insights and predictions based on data analysis, assisting businesses to make more informed decisions. (Koteshov 2023.)

Digital transformation and AI technology in tourism ordinate the leadership and management in tourism organisations. Digital transformation is conceptualised as a creative process activated by knowledge management and knowledge transfer, which aims to create new business possibilities and models, respectively. Digitalisation in experiences has changed a lot in the scenario of services. AI is a new form of business service experience and is amazingly helpful in finding the destination and getting the information for the next goal of the business. AI is not some magic potion that is discovered. AI is the compilation of human intelligence. A company, for instance, may have seven board directors and a management team. AI offers you the collective wisdom of all humans alive today and those who have set foot on earth in the past. It can filter out the best solutions to the most complex issues in a split second. Digital transformation and methods change, and AI companies are digitally connected with the circumstances. (Pesonen 2020.) The integration of Artificial In-

telligence (AI) has emerged as a transformative force driving the digital revolution in businesses across diverse industries. Within marketing, AI has revolutionised customer interaction, needs comprehension, and strategic optimisation. However, AI's impact extends beyond marketing, permeating multiple facets of business operations and reshaping organisational landscapes. Over the past few decades, AI has witnessed a historical trajectory in commercial applications, with recent advancements in computing power and data availability facilitating its widespread adoption. (Marwala 2020.) Initially confined to research labs and academic settings, AI's practical utility was limited. However, the convergence of big data, machine learning algorithms, and breakthroughs in natural language processing has propelled AI into the business arena, fostering innovation, efficiency, and competitive advantage. (Russel 2019.)

In marketing, AI has become an indispensable tool empowering businesses to analyse vast quantities of customer data and extract valuable insights into consumer behaviour, preferences, and trends. This knowledge lets marketers personalise campaigns, deliver targeted messages, and improve customer experiences. (Davenport 2018.) AI-powered recommendation systems, chatbots, and virtual assistants have become ubiquitous, providing personalised recommendations, addressing customer queries, and augmenting customer engagement. (Harrison 2023.) Furthermore, AI's automation capabilities have liberated businesses from repetitive and mundane tasks, effectively allocating valuable time and resources. Through automated data collection, analysis, and reporting processes, organisations streamline operations, enhance productivity, and expedite data-driven decision-making. AI-driven algorithms effortlessly navigate voluminous data sets, identify patterns, and extract actionable insights, empowering businesses to make informed strategic choices and improve overall performance. (Koteshov 2023.)

Beyond marketing, AI is pivotal in various facets of tourism business operations. AI algorithms detect fraud, evaluate risks, and facilitate algorithmic trading in finance. AI optimises inventory levels, predicts demand, and enhances logistical efficiency in supply chain management. Customer service departments rely on AI chatbots to offer instant support, address common issues, and elevate customer satisfaction. AI-driven predictive analytics and forecasting models assist businesses in making precise projections and improving resource allocation. (Lee 2018) AI has become an integral component of the digital transformation journey for businesses. Its impact on marketing has revolutionised customer engagement, enabling personalised experiences and targeted campaigns. (Harvard Business Review 2019.) However, the influence of AI extends beyond marketing, playing a pivotal role in automating tasks, optimising operations, and driving efficiency across diverse business

functions. As technology advances, AI's role in the tourism business will expand further, presenting new opportunities and challenges for organisations striving to maintain competitiveness in the digital age. (Daugherty & Wilson 2018.)

1.1 Research questions and expected results

In this thesis, the overarching research problem that connects all the research questions and aspects of the study is exploring how artificial intelligence (AI) can be effectively incorporated into the digital transformation processes within the tourism sector. This comprehensive problem involves understanding multiple dimensions of AI implementation, its benefits, challenges, and how it can revolutionise tourism industry procedures.

The first dimension deals with the current state of AI integration in the tourism sector. It includes understanding how far along the industry is in incorporating AI technologies, the strategies for digital transformation, and the extent to which these technologies are being utilised. The second dimension involves the evaluation of challenges that businesses encounter in the process of incorporating AI into their practices. These challenges could range from technical issues and resistance from staff to financial constraints. By identifying and understanding these challenges, strategies can be developed to help businesses overcome them effectively.

Another vital aspect of this research problem is the extraction of the potential benefits that AI could bring to these businesses. This includes understanding how AI can improve operational efficiency, positively impact customer satisfaction and engagement, and influence revenue generation and growth. This research problem also concerns the customer perspective—understanding how consumers view and interact with AI-based services within the tourism industry. This perspective is critical because customer acceptance and satisfaction ultimately decide the success of any deployed AI solution.

Through addressing these dimensions, this thesis seeks to provide a detailed roadmap for businesses in the tourism sector to harness the potential of AI for enhancing their digital transformation processes. The thesis culminates in developing a comprehensive and practical guide bolstered by real-life experiences and experts' insights from the tourism industry. The research objectives will be collected by selecting a qualitative research methods approach. The research data will be gathered from various sources such as tourism companies' websites, attending the AI online summit, the lecturer's guidance, etc. The research questions:

I. What are the roles of AI in the digital transformation of tourism businesses? How can AI facilitate or hinder the digital transformation process in the tourism industry, and what factors affect these processes?

II. How can AI help businesses in the tourism sector improve their operations and deliver better services? How can AI help to enhance customer personalisation in the tourism industry?

III. What are the ethical considerations in using AI for data handling and customer interaction in the tourism industry? How does adopting AI in the tourism sector affect employment, and how can AI aid in developing more sustainable tourism practices?

This thesis aims to elucidate the growing impact and significance of Artificial Intelligence (AI) in the digital transformation of tourism businesses. With modern innovations fundamentally reshaping the landscape of the global tourism industry, AI's contribution cannot be overlooked. Therefore, the research will primarily seek to understand, analyse, and demonstrate how AI improves the tourism sector's performance, competitiveness, efficiency, and prospective implications.

This study will explore multiple facets of AI integration in tourism, encompassing data analysis, personalising tourist experiences, enhancing customer service, fare forecasting, social media marketing, and risk management. It will unravel the concrete ways AI can boost business profitability while simultaneously improving user experiences. This research also anticipates contributing to academia by bridging a gap in the existing literature about AI's integration within the tourism industry. It would serve as a resource for businesses seeking to understand the benefits and challenges of AI implementation. By providing empirical data and validated results, the goal is to increase stakeholder comprehension of AI's crucial role in defining the future of the tourism industry in an increasingly digital world. Thus, this research seeks to provide insights that can fuel data-driven decisions and strategic plans for tourism businesses transitioning into the digital landscape with the aid of AI.

This research will contribute to understanding the study and show emerging trends in adopting AI in the tourism industry. For instance, increased use of AI chatbots for customer engagement or the application of AI in processing large amounts of data to enhance decision-making. Research could reveal best practices in integrating AI into tourism businesses, helping other businesses to facilitate their digital transformation more.

1.2 Key concepts

These key concepts will provide the backbone of the work, enriching the theoretical aspect and then applied in the empirical part of the study. Key concepts define the research problem and give the research topic's foundation knowledge. There are numerous intriguing research problems within the broad topic of the roles of AI in the digital transformation of the tourism business. (Barten 2023.) Here are a few potential areas:

Digital Transformation in Tourism: This concept refers to implementing digital technologies within tourism businesses to improve performance, competitiveness, and customer satisfaction. Digital transformation often involves a significant shift in business processes and organisational culture. (Barten 2023.)

Role of AI in Digital Transformation: This concept refers to the use of AI technologies to drive digital transformation, particularly its role in automation, data analysis, and enhancing customer interactions. It investigates how AI is being leveraged in the digital transition of businesses, specifically in the tourism sector. (Krysik 2023.)

AI for Personalization in Tourism: AI is increasingly used to provide personalised recommendations and experiences in the tourism industry based on customer data. This concept seeks to understand how algorithms can help meet individual customer needs and, thus, enhance satisfaction and engagement. (Krysik 2023.)

Challenges in AI Implementation: This concept outlines the potential bottlenecks businesses might face during the AI integration process, such as budget constraints, lack of expertise, or resistance from staff. It will examine these challenges and discuss possible solutions. (Barten 2023.)

Ethical Implications of AI in Tourism: AI applications often raise ethical questions, such as data privacy, discrimination, and the effect on employment. Leveraging AI without compromising ethical principles is a challenge that needs exploration. (Nechaeva 2023.)

Customer Experiences and Perceptions of AI: This concept explores how customers perceive and interact with AI technologies. Understanding consumer perspectives and responses to AI is critical to enhancing AI's integration and adoption in the tourism sector. (Srivastava 2023.)

Each of these concepts will be reviewed in greater depth in the theoretical section of the thesis, and their implications will be explored in the empirical section. Keeping the critical concepts aligned and centred on the research problem and research questions can ensure

a coherent and focused study. The questions are comprehensive as they are not only queries about the strategies and ways to enhance the usage of AI in tourism but also indirectly prompt research and anticipate potential challenges that could arise and how to mitigate them. Attention should be provided to both opportunities AI offers and potential issues it raises for the tourism industry. The readers will understand and not just focus on the application of AI in businesses but also explore fine-tuned strategies for the tourism industry and address possible challenges head-on. (Harrison 2023.)

The research highlights businesses' primary challenges when implementing AI and suggests practical solutions or strategies to address these issues. Investigation might reveal the impacts of AI on various aspects of the tourism sector - both positive (efficiency, personalisation) and negative (job displacement, privacy concerns). The study proves that AI plays a crucial role in reshaping the tourism industry post-COVID-19, assisting businesses to recover through contactless services, efficient operations, and reliable customer information. The research shows a projection about how AI will continue to shape the future of the tourism industry. Research may uncover ways AI contributes to sustainable tourism practices, such as resource optimisation or influencing traveller behaviour. (Abraham 2023.)

2 Journey of artificial intelligence and challenges

This topic potentially investigates AI technologies' evolution, tracing their rudimentary beginnings to their current complexities. It could examine the challenges encountered during this journey, exploring technical and ethical issues, such as bias in algorithms or data privacy concerns. Also, it could delve into how these problems were tackled and what lessons could be learned moving forward. As for relevance, understanding the journey of AI and its challenges is crucial to answering several research questions and solving the overall research problem. Exposing AI's past and present challenges could provide valuable insights into how to address future obstacles. Furthermore, recognising the evolution of AI can help clarify how AI can be leveraged to amplify the digital transformation in the tourism industry. (Dickert 2023.)

The journey of Artificial Intelligence (AI) has been a long one, dating back to the 17th century when mathematicians and natural philosophers began discussing automating the decision-making process. Since then, AI has evolved significantly, developing machine learning, deep learning, and other related technologies. However, AI still faces several challenges. One of the most significant challenges is the lack of interpretability and transparency in AI systems, making it difficult to understand how the system arrived at a particular decision. This lack of interpretability is particularly concerning in areas such as healthcare, where AI systems are increasingly used to make critical decisions about patient care. Additionally, AI systems require vast amounts of high-quality data to function correctly, hindering their effectiveness. (Heaven 2019.)

2.1 The efficiency of AI in different sectors

The thesis likely examines how AI aids in enhancing efficiency across diverse sectors. It's essential to the thesis because it provides a broad perspective on AI applications and helps identify best practices that could be adopted in the tourism industry. Comparisons across sectors can highlight AI's unique strengths and opportunities and how these can transform tourism businesses operationally and strategically. (Rodriguez 2023.)

Equipment effectiveness of AI refers to using Artificial Intelligence (AI) to improve the productivity and efficiency of manufacturing operations. AI can be used to optimise Overall Equipment Effectiveness (OEE), a metric used to measure the productivity of manufacturing operations. AI can help identify patterns in the production process that can lead to downtime or quality issues, allowing manufacturers to optimise their equipment and increase productivity. This is made possible by cloud or edge-based solutions like OEE Analytics, which enable manufacturers to record and analyse their equipment data and acquire production-

specific knowledge. Manufacturers can make more informed decisions about equipment maintenance and repairs using AI-powered OEE analytics. This is especially useful in cases where a machine may be experiencing problems that are difficult to diagnose by human engineers. (Bonada et al. 2020, 11-13.)

The benefits of using AI to improve equipment effectiveness include increased productivity, reduced downtime, and improved product quality. By using AI to identify patterns and potential issues, manufacturers can take corrective action before problems arise, reducing the likelihood of downtime and improving product quality. Additionally, AI can help manufacturers optimise their equipment, reducing waste and improving overall productivity Artificial Intelligence (AI) is a rapidly growing field that has the potential to revolutionise many aspects of our lives. AI technology has significant implications for tourism businesses across various industries. By leveraging AI, businesses can gain a competitive advantage by improving efficiency, reducing costs, and enhancing the customer experience. There are several areas where AI is expected to grow in the coming years, including healthcare, finance, transportation, and manufacturing. In healthcare, AI is expected to help improve patient outcomes by enabling more accurate diagnoses and personalised treatment plans. For example, AI can analyse medical images and identify patterns that may not be visible to the human eye, helping doctors make more accurate diagnoses. AI can also be used to develop personalised treatment plans based on a patient's unique genetic makeup and medical history, leading to more effective treatments and improved outcomes. (Baur & Wee 2015.)

AI is expected to help improve fraud detection and risk management in finance. AI can be used to analyse large amounts of financial data and identify patterns that may indicate fraudulent activity, helping financial institutions prevent fraud before it occurs. AI can also be used to develop more accurate risk models, enabling financial institutions to make better-informed decisions about investments and lending. (Cankett & Kelly 2022.)

In transportation, AI is expected to help improve safety and efficiency. Self-driving cars, for example, use AI to analyse sensor data and make decisions about how to navigate the road. The new idea of Taxi self-driving cars is happening in America, Korea, and China. Tourism businesses implementing AI technology can gain a significant edge over their competitors. However, it's important to note that implementing AI requires careful planning and execution. Businesses must ensure they have the necessary infrastructure and expertise to leverage AI technology effectively. Additionally, businesses must be mindful of potential ethical and privacy concerns associated with using AI. (Kolesnikova 2023.)

Data is crucial for Artificial Intelligence (AI) because machine learning algorithms require large amounts of data to learn and make accurate predictions. AI systems use data to identify patterns, learn from past experiences, and make decisions based on that knowledge. The more data an AI system has access to, the more accurate and reliable its predictions will be. The more data an AI system can access, the more precise and reliable its predictions. In other words, if you want your AI system to make accurate predictions about how your business will perform in the future, it needs access to accurate data on past performance. (Tara 2022.)

However, the importance of data for AI also raises concerns about data security and privacy. AI data should be secured to prevent unauthorised access, theft, or misuse. This is especially important when dealing with sensitive data, such as personal health information or financial records. AI data security involves protecting data in transit and at rest, using encryption, access controls, and other security measures. (Rijmenam 2023.)

AI data should also be safe from bias and discrimination. AI systems are only as good as the data they are trained on, so if the data is biased, the AI system will produce limited results. This can have serious consequences, such as perpetuating discrimination or inequality. To ensure that AI data is unbiased, it is essential to use diverse and representative data sets and to audit and monitor AI systems regularly. A third area of AI data security is ensuring the data is safe from manipulation and misuse. One way to do this is by limiting access to only those with a legitimate business need. Another way would be through auditing and monitoring, which can ensure that an AI system does not violate your company's policies or ethical standards. Companies must provide education and training on responsible AI usage to ensure employees understand the ethical considerations and potential biases associated with AI. Workshops, seminars, and online courses are great ways to help employees understand the importance of responsible AI usage and how to avoid common pitfalls and security risks. AI is a powerful tool that can make our lives easier, but it is not always right and can be biased or misused if its limitations are not understood. Therefore, educating ourselves on AI's benefits and downsides is important so we can use it responsibly and effectively. (Calp 2020.)

When upgrading tools to AI technology, companies must carefully consider the tool's functionality, data requirements, and appropriate AI technology. Following best practices and leveraging AI development platforms can help companies successfully integrate AI capabilities into their tools and drive business value. As companies continue to adopt new AI technology, they must be careful to ensure that the benefits outweigh the risks. Companies should take steps to manage their data privacy and security while ensuring that humans are involved in every aspect of AI development. (Hao 2019.)

2.2 Advantages of machine learning

The advantages of machine learning presumably delve into the specific aspect of AI that focuses on the ability of systems to learn and improve from experiences. The discussion is essential as machine learning is a key component of AI that can shape personalised, dynamic, and responsive tourism services. The topic supports the thesis's argument on AI's pivotal role in the tourism industry's digital transformation by showing how machine learning can predict patterns, enhance customer engagement, and provide customised services. (Koteshov 2023.)

AI collects data in various ways, such as web scraping, data mining, and natural language processing (NLP). Web scraping involves extracting data from websites and web pages, while data mining analyses large data sets to identify patterns and insights. NLP enables AI to understand and analyse human language, which helps analyse social media posts, customer reviews, and other unstructured data sources. When AI collects data, storing it in a way that enables easy access and analysis is essential. Large-scale data storage systems, such as data lakes and data warehouses, are typical AI storage methods. Data lakes store raw, unstructured data, while data warehouses store structured data that has been processed and cleaned. AI storage systems often utilise cloud computing, which offers scalable and flexible storage solutions. (Marko 2019.)

It's worth noting that AI data collection and storage must be done responsibly and ethically. This means ensuring that the data collected is accurate and relevant, protecting the privacy and security of individuals whose data is collected, and avoiding bias in the data collection and analysis process. AI exploration and AI real-time operation are two distinct phases of AI development. AI exploration involves developing and testing AI models and algorithms to identify their strengths and weaknesses. During this phase, AI developers experiment with different approaches, collect data, and refine their models to improve accuracy and performance. AI exploration is often done offline, and the focus is on improving the accuracy of the models. (Henn 2021.)

On the other hand, AI real-time operation involves the deployment of AI models in a production environment. In this phase, AI models are integrated into the systems and applications that use them, and they operate in real-time to provide insights and predictions. This phase focuses on ensuring that the models are accurate, reliable, and scalable and meet the application's performance requirements. (Bridgwater 2023.)

2.3 AI utility trends and tools analysis

In the topic and subdivisions, the thesis likely tackles the challenges that have emerged from AI's application and how they've been addressed. This is critical as it provides a balanced perspective of AI, showing that while it has numerous advantages, it also comes with technical, ethical, or otherwise obstacles. By illustrating these challenges and how they have been managed, the thesis demonstrates the industry's resilience and commitment to harnessing AI's power despite difficulties. These topics help solve the research problem by providing evidence of AI's role in optimising industry efficiency and competitiveness in a digital landscape. They give decisive arguments answering research questions around AI's potential, understanding how AI can improve performance, competitiveness, and efficiency, and what implications this holds for tourism and other businesses. (Dickert 2023.)

Artificial Intelligence is becoming increasingly popular in the financial, health, and wellness sectors. Simultaneously, they will be utilised in e-mail and communication platforms. In the healthcare system, AI-optimised health check records and data help for clinical trials and smart solutions. Not only AI solutions for people who need emotional recognition care, such as autistic children, depressed patients, and those with different types of diseases, but these application trends will make more personalised healthcare businesses. In automobile companies, which is the current trend or talk of the communities, AI-powered safety resolution, autonomous driving mode, detecting the illness of the driver, AI-powered sensors, and AI communication for accident prevention, etc., are getting a lot of attention in different countries. Automobile companies are adopting AI solutions vehicles on the road. (Singh 2023.)

A quarter of travel and restaurant companies use AI technology. Typical use is making reservations or responding to inquiries. Large companies use chatbots more than small and medium-sized companies. The market can also be divided by application type into marketing, artificial intelligence, and human intelligence. Many companies have been digitalising their customer care and information channels. The main reason is the growing demand from consumers, global market trends, and demand to improve business efficiency permanently. (Singh 2023.)

Covid-19 has changed corporate minds and convincing findings that the pandemic and subsequent crisis associated with a change in consumer behaviour stimulated a change in the digitalisation trend of businesses. The logistics business also uses AI technology, cutting human effort by creating better warehouse shelving methods. In Europe, logistic businesses use the proper shelving of the products arriving and delivering with the help of AI. It has been a successful change in the businesses, an excellent example of digital transformation. The introduction of digitalisation projects accelerated the trend by seven years. Based on

these facts, the total digitalisation of mass market customer interaction channels is a sustainable trend, confirmed by the population's needs, the development of technologies, and business requirements. (Bridgwater 2023.)

The standard phone, a more cost-effective tool, would be a solution where you are requested to answer a robot in the innovation. The program supports many concurrent discussions and allows you to offer screenshots or attachments in its chat. There are ready-made professional knowledge banks or learned guidelines that help a chatbot tackle an issue created by a problem. Live chat and chatbot use side by side, with a chatbot handling the volume and Live chat the more difficult things. The AI can provide automatic data, minimising waste and improving the efficiency of the work process. (Kyivska & Tsiutsiura 2021.)

The construction business is one of the businesses that is transitioning so quickly with the help of AI technology. Traditional conduction is slowly taking the downtrend because of the evolved efficient technology. The AI can develop the 3D print model conduction in the physical world, pioneering the modern construction business. The cost-efficient and time-saving collaboration with AI technological companies started to be noticed by the public and media. Digitalisation and digital transformation are the same, whereas digitising involves creating analogue information, such as a checklist on modern computer devices and machines operating with human-controlled models. Digital transformation is fundamentally the process of changing the way we work; with the help of AI, the approximate future needs and changes can be evaluated precisely. (Kyivska & Tsiutsiura 2021.)

2.3.1 Pestel Analysis

The Pestel study of AI in Digital Transformation examines how AI influences digital transformation by examining the political, economic, sociocultural, technological, environmental, and legal elements affecting a company's operations. The PESTEL analysis (Appendix1) is a strategic evaluation of the political, economic, social, technological, environmental, and legal factors that can impact the integration and operation of AI technologies within the business landscape. This analysis provides a comprehensive understanding of the external influences that shape the adoption, implementation, and success of AI within various industry sectors. It serves as a crucial framework for businesses to assess the opportunities and challenges presented by the external environment in relation to AI adoption and utilisation. (Harrison 2023.)

Pestel analysis of AI in businesses in attachment (Appendix 1) makes clear that political dynamics such as governmental regulations or policies promoting digital transformation may encompass support for adopting AI. This provides a beneficial environment wherein

tourism companies are encouraged to implement AI tools. AI enables streamlining of operational processes, analysis of customer behaviour, and tailoring marketing strategies, which boost sales and decrease costs. AI adoption is influenced by geopolitical and societal trends and requires policies that promote responsible development. Governmental actions, national security concerns, and international competition are key variables affecting AI integration in businesses. (Murphy 2021.)

On the economic front, AI can facilitate financial growth by offering cost-cutting and revenue-enhancement avenues. Financial aspects, such as investment costs, maintenance, and workforce training, are crucial in adopting AI technologies. Economic stability impacts the willingness to invest in AI, and while there's significant potential for the transformation of commerce, there also exist risks associated with its adoption. (Harrison 2023.)

On the social front, the success of AI adoption hinges on public trust and societal acceptance. AI systems can reflect existing biases, so it's important they align with societal norms and values. The impact of AI on employment, by either creating new jobs or displacing existing ones, is also a critical consideration. Adopting AI capabilities also depends heavily on sociocultural attitudes. If customers are open to using AI for travel planning and booking, the company is more likely to succeed in its digital transformation efforts. (Harrison 2023.)

The creation and utilisation of AI technologies must be environmentally sustainable, considering energy usage and the management of electronic waste. Companies need to incorporate environmental considerations into their strategy to ensure a balanced approach to development. Regarding environmental considerations, AI can support eco-friendly practices in the tourism industry. For instance, it can help optimise routes to reduce fuel usage for transport services. AI can vastly change business operations and opportunities for growth. Seamless design and integration of AI are crucial, relying on advanced algorithms, computing power, and storage capabilities. Compatibility with existing tools and the workforce is also essential for successful technological adoption. Technologically, ongoing advancements in AI, machine learning, and data analytics drive the digital transformation process by making it more accessible and effective. (Murphy 2021.)

Navigating legal frameworks helps maximise the benefits of AI while complying with regulations like data privacy laws. A legal assessment is necessary for the sustainable and responsible use of AI in the digital transformation of businesses. Legal facets, including data privacy and AI usage regulations, can determine how extensively a tourism company can incorporate AI. While strict laws might delay the digital transformation process, they are crucial in maintaining consumer trust and safety. (Murphy 2021.)

In conclusion, how a tourism company leverages AI for digital transformation is influenced by a blend of political, economic, sociocultural, technological, environmental, and legal components. the PESTEL analysis of AI in businesses highlights the critical external factors that can significantly impact the integration, operation, and success of AI technologies within business environments. Understanding and addressing these factors is vital for strategic decision-making and long-term competitive advantage. (Harrison 2023.)

2.3.2 Swot analysis

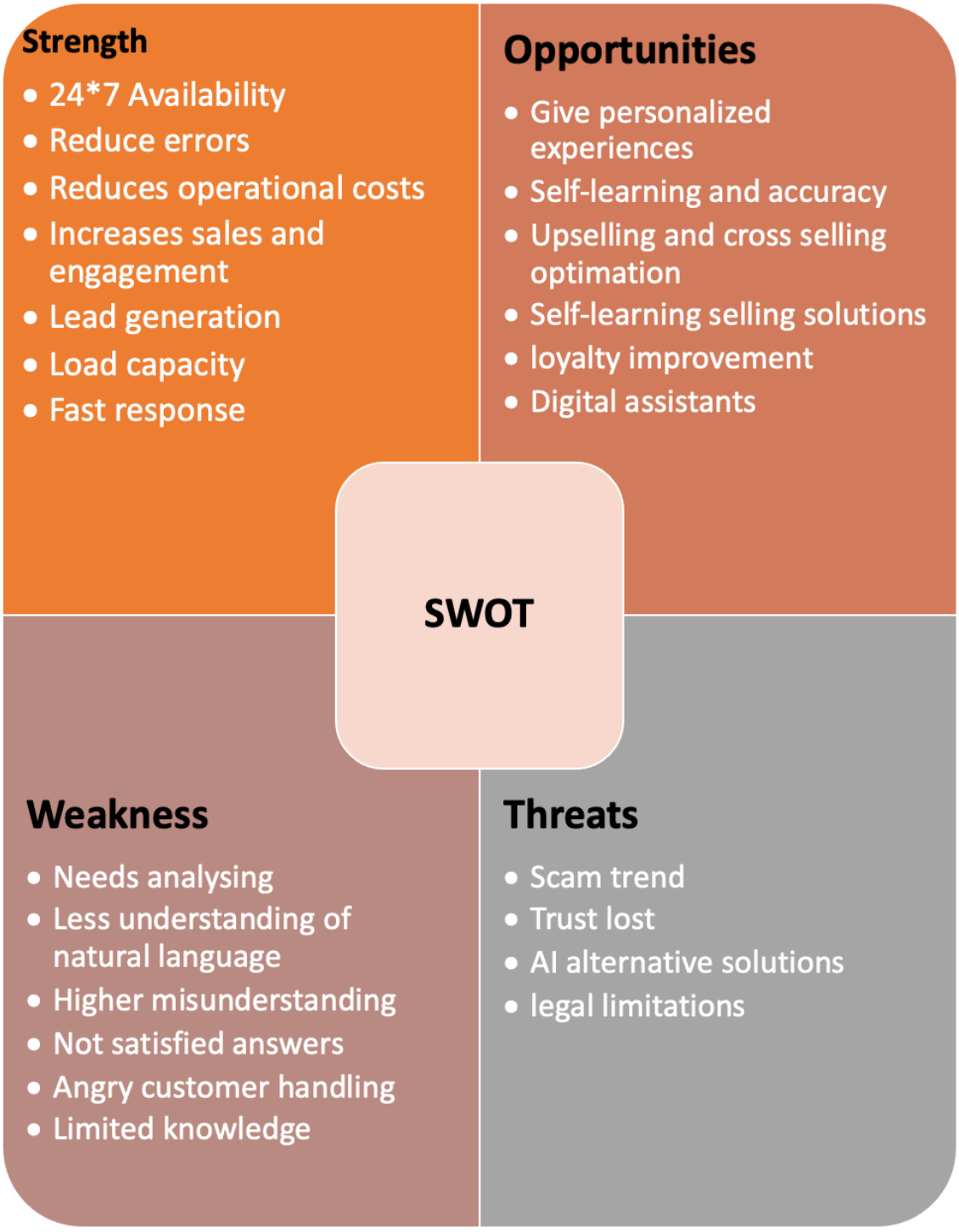

Figure 1. Swot analysis of AI in businesses (Murugesan 2023.)

Figure 1 describes SWOT analysis, which typically involves evaluating the strengths, weaknesses, opportunities, and threats related to the implementation of AI in business operations. The analysis provides insights into the advantages, limitations, potential growth areas, and potential challenges associated with integrating AI technologies within business strategies.

AI technology can automate repetitive tasks like booking management and customer support, allowing for more efficient operations and cost savings. AI algorithms can analyse customer data to provide personalised recommendations and tailored experiences, enhancing customer satisfaction and loyalty. AI can process vast amounts of data in real time, providing valuable insights into customer behaviour, market trends, and demand patterns, enabling businesses to optimise their strategies. AI-powered chatbots and virtual assistants can provide 24/7 customer support, answer queries, provide information, and even assist in bookings, improving customer service and reducing response times. Strengths (S) of AI include its ability to automate repetitive tasks, analyse customer data for personalised experiences, process large data volumes in real-time for key insights and provide continuous customer support via chatbots and virtual assistants. Moreover, operational cost reduction, lead generation, sales increase and engagement, quick responses etc. Businesses should lean into these strengths by integrating AI technologies into their operations wherever possible. For example, chatbots can enhance customer support, and personalised recommendations can be offered to customers using AI algorithms that analyse user behaviour and preferences. (Murugesan 2023.)

The use of AI requires collecting and analysing customer data, which raises concerns about privacy and data breaches. Companies need to implement robust security measures to protect customer information. While AI can enhance efficiency and personalisation, some customers may still prefer human interactions, especially in complex or emotional situations. Striking the right balance between AI and human customer service is crucial. AI poses challenges for individuals with limited access to technology or those who struggle with its usage. It is important to ensure that AI solutions are inclusive and accessible to all customer segments. Weaknesses (W) of AI relate to potential privacy and data breach concerns while collecting and analysing customer data and the necessary integration with current tools and workforce. In addition, less understanding of natural language, a chance of misunderstanding sometimes not satisfied answers and limited knowledge. Businesses should address these weaknesses by implementing robust data security measures, providing privacy assurance to customers, and ensuring seamless integration of AI technology with existing

systems. Training the workforce adequately to operate and manage AI technologies is also critical. (Frue 2019.)

AI can create immersive experiences through technologies like virtual reality (VR) or augmented reality (AR), enabling travellers to explore destinations remotely and make informed decisions. Integrating AI-powered chatbots into messaging platforms or voice assistants enables seamless and personalised communication, offering convenience and improving the overall customer experience. AI can optimise various processes in the tourism industry, such as inventory management, pricing strategies, and demand forecasting, leading to better resource allocation and improved profitability. AI can contribute to sustainable tourism practices by identifying energy-efficient solutions, optimising transportation routes and reducing carbon footprints. Opportunities (O) refer to external factors that businesses can exploit, which have not been explicitly mentioned in the given context. Typically, they include emerging trends, unique market needs, or a favourable regulatory environment, self-learning and accuracy, loyalty improvement, upselling and cross selling optimisation, and digital assistants. Capitalising on these opportunities, companies should stay informed about the latest AI technologies, closely monitor market needs and consumer behaviour, and understand government regulations on AI and data privacy. (Murugesan 2023.)

AI technology continually evolves, and its full potential for the tourism industry is still being explored. Rapid technological changes may require significant investments and a continuous business learning curve. The automation potential of AI may lead to job displacement in certain areas of the tourism industry. Anticipating these changes and providing retraining opportunities for affected employees is essential. Overreliance on AI technology may pose risks if technical failures or algorithmic biases could negatively impact customer experiences and tarnish a company's reputation. Threats (T) come from various fronts, such as competitive technologies, market or consumer preferences changes, regulatory restrictions, scams trends, trust loss, alternative solutions to AI, Legal limitations etc. but these are also not explicitly mentioned in the text. To tackle these threats, businesses must continuously innovate and improve their AI capabilities. They should also monitor the competitive landscape and adjust their strategies accordingly. (Murugesan 2023.)

3 Tourism business digitalisation

Understanding the journey of AI is vital to the thesis as it provides a historical context for the advancements in AI. This helps in understanding AI's evolution, progress, and potential future trajectory in different sectors, which is key to predicting its impact on the tourism industry. Furthermore, amplifying the challenges is crucial because it sheds light on the potential roadblocks the tourism industry could face while digitalising its services, providing valuable insights and precedents. The elaborate discussion on the journey and challenges of AI directly contributes to solving the research problem defined in the thesis. Understanding the spectrum of AI's evolution, potential, and pitfalls helps build a comprehensive foundation to approach the study's purpose of unravelling how AI can improve the tourism sector's performance, competitiveness, and efficiency. These expanded discussions enable the thesis to comprehensively answer research questions on AI's role and implications in the tourism industry's digital transformation. The topics reveal trends, insights, and lessons that can effectively guide and shape the approach to integrating AI within tourism businesses. (Tretyak et al. 2021.)

Business digitalisation integrates digital technology and strategies into business operations, processes, and models to increase efficiency, productivity, and customer experience. It involves using technologies such as cloud computing, big data analytics, artificial intelligence, mobile applications, social media, and automation to gather, examine, and use data to make data-driven decisions. It also requires changes to organisational structures and cultural norms. Digitalisation fundamentally changes how companies run and engage with their clients. It involves the integration of digital technologies into every facet of an organisation's activities to increase productivity and customer value. A comprehensive strategy, including investments in the appropriate technologies, personnel training, and a readiness to adjust to shifting market trends, is key to corporate digitalisation success. Understanding what constitutes effective solutions is increasingly important for success in the face of technological forces. (Buhalis & Law 2020.)

Tourism businesses need to stay up with technological innovations to maintain their competitive edge. Dynamic management skills significantly impact the company's digital maturity (Hendriarto 2021.) Companies can improve internal and external communication by adopting modern technology, encouraging a digital-first culture, and streamlining processes. To achieve these goals, firms should invest in dynamic management team members. Future research studies should look at how managerial traits impact digitalisation in businesses. The beginning of the digital age significantly altered how businesses run. It is not sufficient to merely digitise old operations to remain competitive in the market today.

Tourism companies must have a thorough digitalisation plan in place if they want to succeed. This must include spending money on the correct technologies and personnel training. A comprehensive approach that includes spending money on the correct technologies, providing people with training, and being open to adapting to shifting market trends is the key to corporate digitalisation success. Technology investments can result in resource waste without adequate personnel training and eventually impede business expansion. Furthermore, firms that want to last a long time must be able to adapt rapidly and efficiently to shifting market trends. (Tretyak et al. 2021.)

A business may make significant investments in modern technology but fail because of failing to foresee or adapt to changes in consumer behaviour. Therefore, an agile mindset and a long-term vision are essential when creating such initiatives. Embracing digital transformation may initially seem intimidating, but it presents excellent opportunities if done effectively by prudent investments in technology infrastructure, staff development, and flexibility towards evolving market dynamics. By doing this, businesses may ensure their relevance in the face of ongoing disruption and pave the way for long-term success. The digitalisation of the tourism business has become a hot issue in recent years as businesses search for ways to stay competitive and relevant in a world that is becoming more digital. To achieve successful digitalisation, companies must invest in the appropriate technologies, make sure personnel have the knowledge and training needed, be flexible in adjusting to shifting market trends, and collaborate with like-minded people for shared growth. The most crucial factor is gaining a thorough grasp of consumer demand patterns and keeping an eye on new industry trends while constantly enhancing the products and services provided. Businesses should embrace this shift as a chance for expansion, with substantial potential rewards. (Pesonen 2020.)

3.1 Artificial Intelligence and the digital transformation scenario

AI has been discussed for years but has recently gained more attention due to machine learning and data analysis developments. It has potential advantages, such as improved healthcare efficiency and automated customer service, but also worries about how it will affect the workforce. Considering the possible need for new training programs or education initiatives is essential. AI has potential advantages but still has difficulty being creative and using common sense reasoning. It lacks human flexibility and adaptability regarding more abstract concepts, so we must be aware of its limitations if we want to use it wisely (Boucher 2020.)

AI is projected to automate numerous jobs, potentially causing severe unemployment, and necessitating new training and educational programs. It is important to consider how automation may affect specific industries, such as repetitive labour in manufacturing or customer service roles. We must plan strategies to ensure no one is left behind during this transition (Holt 2018.) In another aspect, AI technology has become increasingly popular, leading to ethical issues such as who is accountable for its activities and how to stop it from being misused negatively. Creating AI systems with human values at their core is essential, giving equality, openness, privacy, responsibility, and safety a top priority. Responsible parties deploying modern technologies must prioritise transparency around the ethical principles governing their development. Failure to do so could have disastrous effects on people's lives. The future of artificial intelligence (AI) has both excitement and worry. It has the potential to transform various sectors, but there may be drawbacks, such as high unemployment rates and the need for additional training and educational initiatives. Despite these difficulties, society must embrace AI's potential and try to harness it while addressing any problems that may crop up. We have an opportunity to redefine our collective destiny through the responsible adoption of AI applications, and it is still possible for people and machines to navigate a secure future by cooperating. (Pesonen 2020.)

Digital transformation is transforming how businesses run, and companies are being compelled to adapt due to the growing integration of technology. It can improve customer interaction, optimise internal operations, and enable businesses to create new products/services more quickly than ever before. Failure to embrace digital transformations risks falling behind competitors. Digital transformation is key to business success, but many firms are still reluctant to shift. It involves re-evaluating organisational structures, customer interaction, and employee training tactics. Automation solutions powered by artificial intelligence or big data analytics can result in cost savings and efficiency. Companies must include digital changes in their operations strategy if they want to remain competitive in the rapidly changing technological environment. (Bozkurt & Sharma 2022.)

Digital tools like cloud computing, automation, and artificial intelligence have been widely adopted due to their affordability, sustainability, and capacity to streamline complicated procedures. Cloud computing and AI-driven automation can store large volumes of data and simplify repetitive operations. However, it is crucial to consider potential hazards such as cyber threats and data breaches. Additionally, sufficient safeguards must be made to ensure effective workflows do not compromise an organisation's privacy or safety standards. Digital transformation is essential for businesses to stay competitive in the digital environment. It requires substantial adjustments to corporate culture, procedures, infrastructure, and data-driven decision-making processes. Top management must exercise proactive

leadership and encourage innovation to ensure long-term sustainability. (Buhalis & Law 2020.)

Tourism businesses must prioritise digital transformation to keep up with the rapidly evolving digital landscape. This includes installing modern technologies, reinventing business models, optimising operations, equipping staff with the appropriate knowledge, and utilising data-driven insights. The benefits of digital transformation outweigh any difficulties, and organisations can open new doors for growth and generate value for their stakeholders and customers. There has never been a better time to start your digital transformation journey, regardless of whether you are a small start-up or a significant organisation. (Pesonen 2020.) The relationship between artificial intelligence (AI) and digital transformation is increasingly vital in today's technology-driven environment. AI is essential in opening new opportunities and fostering innovation, while digital transformation uses technology to alter how businesses run and connect with their clients radically. This essay will examine how AI and digital transformation change how businesses approach decision-making by enhancing customer interaction through personalised, customised experiences and understanding consumer behaviour through massive database storage capacities provided by Cloud Computing. (Calp 2020.)

AI technology is essential for businesses to upgrade and automate processes to increase their efficacy and correctness. However, tourism businesses must carefully examine which technology best supports their digital transformation objectives. To avoid compatibility and integration issues, businesses must adopt a comprehensive strategy when implementing AI technology. Digital transformation is essential for AI to thrive, as it enables the collection and analysis of vast volumes of data that can be used to train algorithms and improve decision-making. Tourism businesses can also give their customers more individualised experiences with AI-powered solutions. Still, they must adhere to privacy regulations to ensure fairness and protect people from identity theft (Holmström 2021.)

The symbiotic relationship between AI and digital transformation is fuelling unprecedented innovation and disruption across industries. It has enabled businesses to analyse large data sets quickly, make decisions more quickly, and improve customer experiences. These benefits come at the expense of lower operational costs. AI-powered fraud detection solutions in the financial sector can minimise fraudulent activities. Robots do routine activities while humans concentrate on more creative ones. Tourism businesses must adapt to technological development to compete with rivals. The relationship between artificial intelligence and digital transformation has established itself as a significant technical force, creating innovation and disruption in various sectors. However, there are still worries about job displacement and moral issues like privacy rights and security breaches. Successful integration of

these technologies requires careful planning to avoid ignoring ethical issues. Additional research is needed to understand the ramifications of this relationship. (Calp 2020.)

Digital transformation is a set of processes, methodologies, and tools modern companies use to optimise their operations. Digital transformation is a major movement from conventional business models to more customer-centric strategies. Companies must embrace digital transformation as a strategic priority, invest in innovative technologies, and adopt agile, customer-centric approaches to innovation and growth. Business leaders must understand how companies implement these changes to stay ahead of the competition. This essay will examine some of the crucial elements influencing the success of digital transformation initiatives and provide advice on how organisations can handle this essential process. It is a movement that attracts companies interested in reviewing processes, innovating, and gaining competitiveness with the help of technology. Data and Artificial Intelligence are critical factors in the strategy but must be aligned with the process and seen as the company's competitive advantage. (Buhalis & Law 2020.)

For organisations across the world, digital transformation has completely changed the scenario, bringing with it both new opportunities and problems. This paradigm shift has fundamentally changed how firms of all sizes operate, forcing them to adopt modern technology more quickly. As tourism businesses enthusiastically adopt digital technologies like cloud computing, AI, and big data analytics, they can develop novel business models that were previously unthinkable. This change is not without its challenges, though. Tourism organisations must deal with cybersecurity risks and data privacy worries while ensuring they comply with laws in various countries. Despite these difficulties, the advantages of digital transformation are obvious. They include increased productivity rates brought on by automated processes, quicker response times due to real-time monitoring capabilities, and improved customer experiences due to personalised services. Information technology-enabled transformative processes have already completely changed several significant sectors. As we look to the future of business operations, adaptation will be essential for businesses looking to survive over the long term in this fast-paced environment. (Schneider & Kokshagina 2021.)

The digital transition has been a major shift in recent years, with the development of mobile devices, cloud computing, and new digital platforms and ecosystems. Social media platforms like Facebook and Instagram link people worldwide and enable quick communication across borders. Technological development is still transforming our lives, leading to continued growth worldwide. Digital transformation is a fundamental change in how firms run. It requires investing in innovative technology and adopting agile, customer-oriented strategies. Companies must also embrace innovation as a strategic imperative and adopt agile,

customer-centered strategies. In today's fast-paced market, those who can adapt will succeed, while those who resist change risk becoming irrelevant. Businesses must proactively adjust their business models through creative solutions like AI-driven platforms to benefit from this wave of technological innovation. (Buhalis & Law 2020.)

3.2 AI in sustainable tourism practices and the implantation of AI tools

In the era of growing environmental consciousness, sustainability has transitioned from being a mere buzzword to a necessary endeavour in the tourism industry. In line with the UN's Sustainable Development Goals, tourism industry players persistently strive to implement practices that deepen their commitment to environmental, social, and economic sustainability. It has become increasingly important to embrace innovative technologies like AI to navigate this transformative journey successfully. (Singh 2023.)

With its data manipulation and predictive capabilities, AI can play a pivotal role in steering sustainable tourism. AI-powered tools can offer insightful predictive analysis to manage tourist footfall, leading to better crowd management and lesser strain on resources. It can also help create personalised eco-friendly itineraries, guiding tourists towards more responsible choices. Intelligent systems help businesses optimise resources, reduce waste, and manage energy practices, contributing to environmental sustainability. Another critical area is socio-cultural sustainability, where AI can aid in reviving and marketing underrepresented tourism locales, distributing the benefits of tourism more equitably. (Schneider & Kokshagina 2021.)

Although AI's potential in advancing sustainable tourism practices is vast, the reality might be far from the ideal. There exist obstacles, namely the digital divide, high setup costs, and data privacy concerns, all of which can hinder the adoption of sustainable AI tools. However, the bold step towards intertwining AI with sustainability is no longer an option but a compulsion for future-ready tourism. Finding ways to overcome these roadblocks and navigate toward a harmonious integration of AI and sustainable practices in the tourism sector is essential. AI has become crucial for companies trying to enhance their operations and maintain a competitive edge in their marketplaces. To fully benefit from AI implementation, significant thought, planning, and execution are required. AI tools can automate repetitive operations, free up staff to concentrate on more complicated and creative work and increase productivity, job satisfaction, and better business results. AI can also be used in decision-making by swiftly and appropriately processing massive amounts of data, leading to trustworthy and timely judgments. Implementing AI is not always simple, so appropriate training programs and effective change management strategies should be adopted. This essay will go through why it is vital for tourism businesses to strategically deploy AI tools inside their

operations and look at some examples of effective applications of these techniques. (Kitsios & Kamariotou 2021.)

AI tools in the tourism business have grown in popularity but require significant preparation and coordination across several company departments. Organisations must evaluate how modern technology will affect their overall objectives before using it and ensure that all pertinent departments are involved in the decision-making process. Communication channels across teams should remain open throughout the implementation process so everyone's opinions are considered at every stage. This collaborative method ensures that everyone's opinions are considered at every stage, leading to better AI implementation decisions and higher employee acceptance rates. Tourism businesses use AI tools to gain a competitive edge in today's fast-paced industry. This strategy involves automating procedures and forecasting consumer behaviour, which can help businesses run more efficiently and profitably. Companies must first determine the areas inside their business where AI technology could be successfully utilised and ensure they have the proper infrastructure to support them. Employee training on the best ways to use these modern technologies is another crucial component of successful integration. (Kitsios & Kamariotou 2021.)

AI tools can revolutionise businesses by automating routine tasks and giving employees more time and resources to focus on more complex and creative work. This approach significantly benefits productivity and job satisfaction, increasing profitability and improving market competitiveness. AI technologies can give tourism businesses advantages such as greater productivity and efficiency. By automating repetitive operations, companies can take advantage of their employees' ingenuity and free them to focus on more innovative and value-adding work. AI tools should not be seen as a substitute for human intellect but rather as a facilitator that improves decision-making through data-driven insights. Collaboration between departments and stakeholders is necessary to integrate modern technologies successfully. (Pesonen 2020.)

4 Innovation acceptance and adaptation of AI

Innovation acceptance and adaptation of AI: the discussion revolves around understanding stakeholders' perspectives regarding accepting and adopting Artificial Intelligence (AI) in their professions, mainly in the tourism sector. It seeks to explore how different professionals, from travel agency owners to tech entrepreneurs, perceive the integration of AI into their operations and adapt to these changes. This discussion aids in solving the research problem by identifying possible barriers to AI adoption, uncovering its potential benefits, and revealing necessary conditions for successful integration. By gauging attitudes towards AI acceptance across various roles in the tourism industry, the research gets an extensive outlook on potential challenges and solutions from multiple perspectives. (Dickert 2023.) The findings from this discussion contribute significantly to answering the research questions. They offer insights into how AI can improve operational efficiency, its role in customer satisfaction and engagement, and potential impacts on business growth and revenue generation. This exploration of the interaction between AI and tourism business processes and the perceived risks and benefits aligns closely with the research goals, including identifying roles, challenges, and opportunities accompanied by AI integration in the tourism businesses' digital transformation processes.

Innovation acceptance and adaptation of AI are critical to understanding as AI technology advances and penetrates various industries, including tourism. Given that the thesis on the adoption and application of AI in the tourism industry aims to understand the perspectives and experiences of multiple stakeholders in this process, this topic is fundamental in guiding the focus of the research. Innovation acceptance and adaptation of AI have become major concerns in recent years due to perceived challenges, such as lack of understanding, concerns about job displacement, and ethical concerns. As such, this topic is connected to the thesis since it addresses the attitudes, perceptions, and behaviours related to adopting and integrating AI into the tourism industry. Therefore, understanding these factors is crucial to effectively designing and implementing AI applications that align with the stakeholders' needs and goals, leading to successful AI adoption and implementation. This has practical implications for businesses in the tourism sector and informs future research on the role of disruptive technologies in organisational transformation, digitalisation, and innovation. (Kitsios & Kamariotou 2021.)

Artificial Intelligence (AI) has become a pivotal innovation in various sectors, with tourism no exception. Despite its potential for enhancing business operations and customer experiences, acceptance and adaptation of AI are subject to numerous factors determining its successful implementation. Understanding these factors is crucial for stakeholders involved in AI's practical integration into the contemporary tourism landscape. Certain perspectives

suggest that those categorised as laggards tend to emulate or replicate ideas instead of creating new ones. This ability could be advantageous when designing motivational programs or establishing strategic objectives. Within the tourism sector, the "laggards" could be local inhabitants or business owners who either harbour doubts about or are unaware of emerging trends. The primary challenges they face revolve around the potential risks and an inadequate comprehension of the benefits linked to innovation. (Heinonen et al. 2023.)

Several models explore technology acceptance and adaptation. The Technology Acceptance Model (TAM) posits that perceived usefulness and ease of use primarily influence user acceptance. Meanwhile, the Unified Theory of Acceptance and Use of Technology (UTAUT) puts forth variables like effort expectancy and social influence as determinants of technology acceptance. These models provide valuable lenses to assess and understand AI's acceptance and adaptation within the tourism industry. The role of AI in Modern Tourism AI, with its multifaceted capabilities like data analysis, machine learning, and automated customer service, has considerable implications for modern tourism. From personalised recommendations to predictive analytics, AI has the potential to streamline operations and enhance the visitor experience, providing businesses with a competitive edge. However, their successful implementation hinges on numerous factors, including the technology's perceived usefulness, performance expectations, and the overall readiness of organisations and their customers to accept this advanced innovation. Real-World Adaptations and Challenges Across the globe, several tourism businesses have embraced AI to drive improved outcomes. For example, AI-powered chatbots are extensively used for customer service in hotels, airlines, and restaurants. Yet, challenges persist. Staff training and technology investment are significant barriers, and customers' concern over data privacy and lack of human touch in services can hinder AI adoption. (Chugh 2023.)

AI's role in the digital transformation of tourism is undeniable. Yet, a nuanced understanding of the factors influencing user acceptance and adaptation is mandatory to harness its potential fully. By incorporating constructs from technology acceptance theories into future research designs, stakeholders can gain insights into adoption barriers and the necessary facilitators. Fostering an environment conducive to AI innovation will give rise to trajectories needed for future development, with implications for business operations, customer relations, and the overall dynamics of the tourism industry.

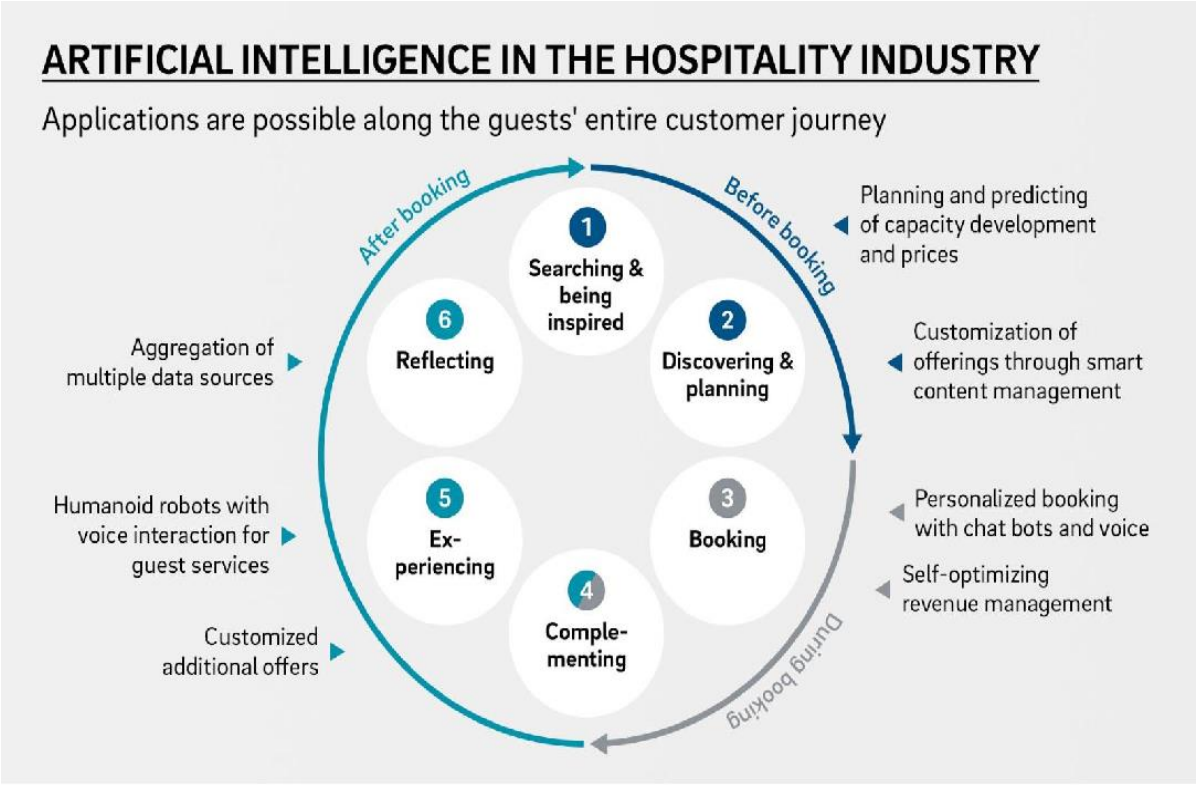

Figure 2. Artificial Intelligence in the hotel industry (Finnish Boutique and Lifestyle Hotels Perspective. (Ananeva 2019.)

Figure 2 describes that enhancing AI systems based on people's acceptance involves deeply understanding human behaviour and psychology. It requires drawing insights from data about how people respond to AI, their fears, misconceptions, and what they find helpful. This requires not just technical expertise in AI but also skills in psychology and human behaviour analysis, adding another challenge. Making operational changes to AI technology based on these insights can also be technically challenging. It requires a deep understanding of AI systems and the ability to modify them seamlessly without disrupting existing operations. This might involve reprogramming or retraining machine learning models, changing AI interfaces, or even building new systems from scratch. (Chugh 2023.)

Finally, Enhancing AI for acceptance can be time-consuming and costly. It involves comprehensive research, developing and testing new systems, ongoing monitoring and adjusting, and potentially re-educating users. These resources can add up, making it difficult for organisations with limited resources. There may also be external barriers to enhancing AI based on acceptance. These could include regulatory restrictions, competition, and potential backlash from users or the public, particularly in areas such as privacy and ethics. Despite these challenges, enhancing AI based on user acceptance is worthwhile. It can lead to greater user satisfaction, wider adoption of AI, and ultimately, the ability for AI to deliver more value to its users. (Chugh 2023.)

5 Roles of artificial intelligence in the tourism Industry

Roles of Artificial Intelligence in the Tourism Industry: the discussion is about AI's diverse roles in the tourism industry, and it will be a deep dive into how new and existing AI technologies are utilised. Topics might include how AI is used in data gathering and analysis, yielding insights on customer behaviour and preferences that enable further personalisation of tourism experiences. It also describes how AI has enhanced customer service within tourism, such as through AI chatbots that provide 24/7 customer support. (Finlay 2023.)

Further, this section explores AI's role in fare forecasting and social media marketing. It discusses how AI helps predict optimal pricing for travel and accommodations and provides strategic insights for tourism businesses' social media promotions. Risk management and ethical considerations, such as employment implications and sustainability concerns, will also be addressed in this section. The discussion within this heading is directly relevant to the thematic research questions. It's aimed at understanding the roles of AI in tourism businesses' digital transformations, scrutinising AI's potential benefits and challenges, and assessing how AI can lead to improved operations, better customer personalisation, and ethical data handling in tourism. Answers and insights from these analyses will be crucial in solving the research problem. The ultimate goal is to understand better AI's transformative impact in the tourism business sector. By comprehensively discussing the roles of AI in the sector, the research is well on its way to achieving its objective. (Krysik 2023.)

Digitalisation always begins with the adoption and work by the public; if some online shopping businesses start to pay on Bitcoin, or hotels or airlines start to pay by Bitcoin, governments are forced to create the environment for the activities. Most hotels and other travel industry companies are already making a big step towards AI to build their reputation because the technology can assist them in several ways. The AI guarantees are more trustworthy to improve the fast response even without employees. Various bots are among the most significant achievements of AI assisting online services. It can be learned over time with experiential work. Digital transformation sometimes creates conflicts; some countries allow AI tools, and others ban them. (Revfine 2020.)

Tourism business is the central topic of discussion; hence, tourism is always important in human history, and positively memorable visits are kept as a next visit goal. Rental car companies rely on experiential services, which they need to upgrade their next design based on customers' experiences. The Restaurant, parks, workshops, hotels, and retail stores made their services-based customer experience. A voice-based digital assistant is also pioneering digital transformation for various businesses, not only for tourism, but the

voice recognition technology also has the potential for highly secured museums, governments, and almost all types of businesses. (Krysik 2023.)

Artificial Intelligence (AI) plays an increasingly important role in the digital transformation of tourism businesses. In personalised Recommendations, AI can analyse large amounts of data to provide personalised travel recommendations. By considering past behaviour, preferences, and real-time context, AI can suggest destinations, accommodations, and activities tailored to each traveller's needs. AI can forecast travel trends and customer behaviour through machine learning, helping businesses plan marketing strategies, optimise pricing, and manage inventory. (Finlay 2023.) AI-powered chatbots and virtual assistants can handle customer inquiries 24/7, provide instant responses, and free up human staff for more complex tasks. AI can process and analyse customer reviews and social media data to evaluate customer satisfaction and perceptions. This information can be used to improve services and experiences. Tasks such as booking confirmation, check-in procedures, or issuing boarding passes can be automated by AI, improving efficiency, and reducing human error. AI can enhance AR and VR applications for virtual tours, enhancing the planning and travel experience. AI technologies like voice search and image recognition can improve accessibility for customers with different needs, creating a more inclusive tourism sector. (Krysik 2023.)

The voice assistant AI technology can help travellers 24/7 with precise answers, and self-learning technology will upgrade the requirements. These digital transformation types in tourism are always helpful during peak times in airports, hotels, booking taxis, etc. Flight forecasting could be boring for humans if there is no intellectual robot voice or human voice. AI can make many jobs more accessible and efficient, which is great for future generations. (Revfine 2020.)

AI technologies are machines with humanised behaviour; as a day-to-day customer service and the fastest personalised experience of the revolutionised technology, AI can provide the best service with many advantages. With no natural emotions, the AI acts can be measured perfectly for customer satisfaction because it has clear robotic responses with resolutions. For instance, if somebody wants an excellent customer service experience on call or in person, it saves that energy by typing messages with the most usual asking. AI technologies are great at memorising accurate information and as a receiver that acts as intelligence. Implementing AI at work is less expensive and easier for the tourism industry than human service. AI technologies are significant for all business industries, for example, business tourism, leisure tourism, cultural and religious tourism, research tourism, etc., so services should not be compromised. AI technologies are automated for customer service, which can quickly provide a personalised experience anytime. (Carvalho & Ivanov 2023.)

Artificial intelligence technologies are personalised virtual service providers that never feel real in the physical world. It is exceptional, and it is not always right about every query. It cannot do conversation as a human agent. It needs time-to-time optimisation, revisions, terms and conditions inputs, and constant maintenance based on how they communicate and work with customers. They always need meaningful actions to provide perfect customer satisfaction. More importantly, the creator should provide education to interact with customers in the most human way possible and to make it friendly; it constantly must be updated. (Carvalho & Ivanov 2023.)

5.1 Digital management, innovation, and experiences in tourism

An increasing number of digital services means getting easier for tourists. The desire for travel never ends, and new generations prefer new methods in the digital world. The consumer digital experience has an upward trend, and it is getting more and more attention because the new generation influences the old-generation consumer. Digital experience brings consumer safety and ensures the travel experience without any risks. For instance, consumers can tour Finland via virtual reality set (VR), which is easier for those who cannot travel due to physical problems, and they can experience the tour of the Himalayas, such as Mt. Everest, with the help of virtual reality. Tourism companies are adopting the demand for modern digitalisation. (Buhalis & Law 2020.)

The consumer feels more valued in personalised digital aspects. The AI-generated metaverse companies are thriving with the flooding digital art collection shows inside the metaverse. The metaverse platform represents the game competitions; the creators value the AI answers for the digital transformation of the creation. In various examples using the ChatGPT application, people can get a definite answer to their inquiry. Computer programming has been way more advanced than ever; the AI transformation has brought flooding opportunities for artists and art collectors. This means that AI is also for art companies. (Gupta 2023.)

The AI revolution has changed tourism; Booking.com, Airbnb, and TripAdvisor are examples of current innovations. Booking.com easily provides the cheapest flights to the destination, Airbnb has a tremendous solution for finding the best accommodation, and TripAdvisor tells details about the destination. There are a lot of innovations currently bubbling in the tourism industry. As tourism is the most significant source of commerce, the injection of AI makes it even better and bigger. The biometric data tracking system can easily handle the baggage and manage operations during the tour. (Finlay 2023.) The AI trends, such as IoT (Internet of Things) devices, are merging with the travel business so the consumer can

easily use travel planning just by communicating with AI. Due to the high demand of consumers in tourism, companies are searching for new technology such as Virtual and augmented reality (VR and AR). In the future, tourism will need blockchain technology for a better and safer payment system. There are already some decentralized-based companies connected with travel. Virtual experience in tourism is pioneering development; it expands the reality and amount of accessibility in new experiments. The widespread Metaverse adoption is an innovative example of a virtual experience. (Buhalis & Law 2020.)

Metaverse is the virtual world where people use VR technology to use the experience. The motive is to fulfil the tour experience in a different level of reality, and it opens the minds of companies to invest in it. During the Covid pandemic, lots of virtual tour attractions increased, and it also built another industry to maximise the profit and boost the areas. Despite all the benefits, there are many insecurities inside AI technology, such as fear of losing privacy and data. However, it is still a solution to the continuity of consumer experience in tourism. (Buhalis & Law 2020.)

6 Ethical considerations and challenges in implementing artificial intelligence

AI has the potential to improve the tourism industry significantly, but it also poses significant ethical challenges. Issues related to data privacy, bias, and accountability have been identified. As such, exploring the ethical considerations and challenges associated with AI implementation and how they can be addressed is essential. This topic is critical for the thesis as it is intimately connected to the goal of understanding how AI can support the digital transformation of the tourism industry and the potential ethical concerns that arise from its implementation. Addressing these challenges is crucial in ensuring that the benefits of AI are realised while minimising any possible negative consequences. A thorough analysis of the ethical considerations in implementing AI in tourism is vital for developing effective policies, guidelines, and best practices supporting this technology's responsible and ethical use. (Nechaeva 2023.)

The discussion primarily concerns the intricacies of incorporating ethical considerations in developing and implementing AI technologies. The first discussed issue concerns the challenge of instilling contextual empathy and sensitivity into AI. This relates to gender identification, language usage, and overall fairness. The discussion highlights the difficulty in ensuring AI interactions are unbiased, rational, and positively oriented. A crucial part of this section is the examination of ethical considerations specific to AI, including concerns regarding data collection practices needed for machine learning and predictive analysis. It also scrutinises the issue of accountability for AI actions and the potential misuse of AI technologies. Emphasis is made on installing human values at the core of AI systems (prioritising equality, openness, privacy, responsibility, and safety) and ensuring transparency around such ethical guidelines. (Green 2017.)

It reflects on the societal implications of AI, covering both the excitement about potential transformations in various sectors and concerns about drawbacks, such as high unemployment rates and the need for new training and educational initiatives. This discourse plays a significant role in addressing the research problem and the research questions by focusing on the ethical implications of AI in the tourism industry. It examines potential challenges associated with AI applications and assists in mapping ethical frameworks for AI integration in this sector. As such, it is instrumental in answering research questions about the role, opportunities, challenges, and ethical implications of AI use in the tourism industry's digital transformation. (Haan 2023.)

Ethical considerations are essential concerns for the AI developer; it is challenging to put the level of empathy and sensitivity in the AI according to context. Gender identification to

language and fairness should be pre-programmed in a corporate and precise manner in the market competition. Since AI is the new frontier as a technology, the interactions can be biased and irrational, and sticking to the positive approach, especially during complicated situations, must be hard for machine algorithms. There are attacking language preferences in a manipulating order. For example, the Twitter bot cannot be biased in those matters. Developing such code ethics is a challenging term to consider; the implementation always gives the reviews, and with those reviews, the developer corrects the situation; hence, the AI technologies are not always accurate. They are self-developing tools, too. (Green 2017.)

Figure 3 shows the user communication analysis tools are attached to the AI algorithm as machine learning codes. AI requires large amounts of data for learning and prediction purposes. There can be serious concerns about how this data is collected and used and how privacy is maintained. AI systems are only as good as the data they are trained on. If the training data reflects societal biases, the AI system will also likely reproduce these biases, which can lead to unfair outcomes. AI often operates as a "black box" with decision-making processes that are difficult to interpret. The inability to understand how AI makes decisions raises issues about accountability and trust. The automation of tasks through AI could displace jobs. This has ethical implications and raises the question of ensuring a just transition for those whose jobs are affected. AI systems can be targeted by malicious actors, who could misuse the technology or manipulate it to cause harm. (Green 2017.)

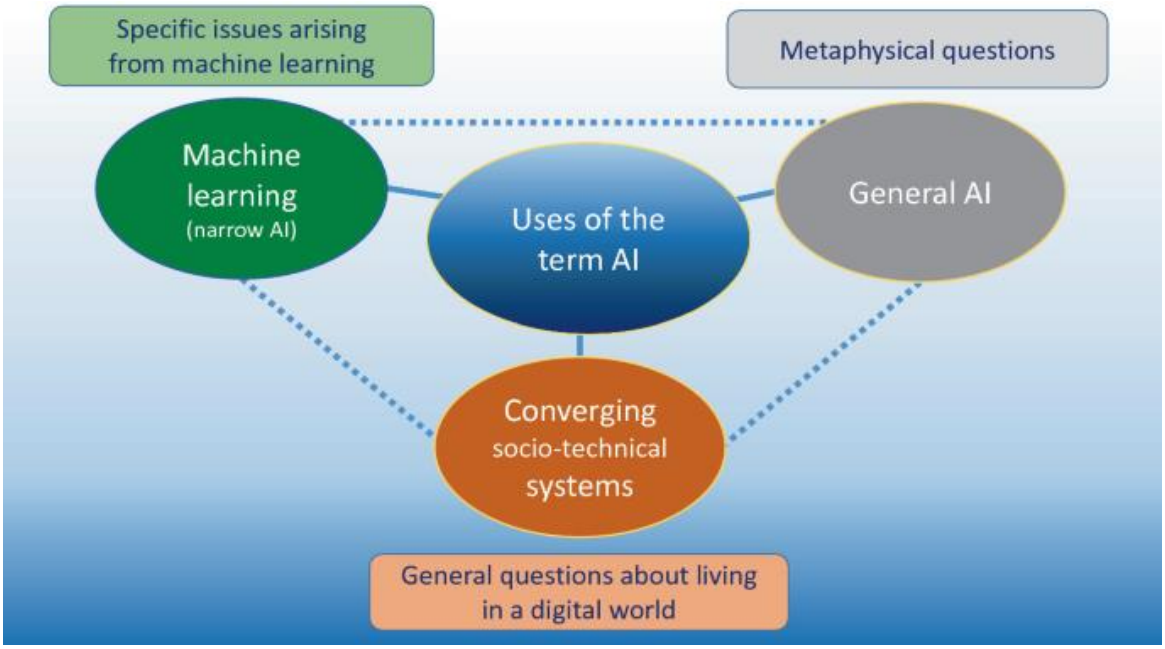

Figure 3. Ethical concept of AI. (Stahl 2021.)

Over-reliance on AI could lead to a loss of specific skill sets in the human workforce and dependency issues in case of technology failures. Ensuring AI is designed and implemented ethically, with a consideration of potential misuse or negative consequences, is a significant challenge. There are many cases of Google using personal data to sell third parties for personalised ads. Apple Siri is a prime example of a successful AI product like many others, male and female voice selection is a wonderfully ethical work example. Training AI about racism, offence language identification, or ethical education is actively tackled by many corporations, especially in tourism. Transparency is the key element when it comes to ethical considerations. Artificial intelligence must be included with awareness of the privacy regulations due to consent options. Personal data collecting system under complicated user privacy terms and conditions is not always transparent to the public, and harsh language is used in these cases, which could be unethical sometimes. The control over one's data should be allowed to make it more ethical and maximise trust in AI. (Haan 2023.)

Finally, AI digital technologies are now able to be part of the world. They have a sense of talking ability and guide humans in the best way possible while driving, travelling, or exploring something new. They are the memory house of the new world, which can provide unlimited access to knowledge with self-improving capability and is a great example of ethics. Nevertheless, AI is created to modernise human society toward the best future; they are taking the place of humans and, at the same time, giving a place for humans, which is an essential topic of consideration. (Kritikos 2020.)

7 Methodology

The research problems concern the roles, challenges, and opportunities for integrating AI in digital transformation within the tourism industry. These could include potential difficulties during the transformation process, gaps in successful AI implementation, or a lack of understanding of AI's potential to enhance tourism operations. The methodology helps delve into AI's history and associated challenges. This includes the evolution of AI algorithms, its integration across different sectors, and the struggles experienced during this journey. Through in-depth interviews and case study analyses, we can effectively identify critical transformational stages of AI, the barriers it faced, and how these were overcome. The qualitative method provides an enriched understanding of how the challenges of AI's incorporation have been managed and how they've shaped its current state in the tourism sector.

Tourism business digitalisation is interconnected with the methodology by focusing on how AI is woven into the digitalization efforts of tourism businesses. Interviews and surveys, as outlined in the methodology, provide an understanding of the level of AI integration into these processes. It offers insights into how AI-enabled technologies like machine learning, natural language processing, and predictive analytics enhance operational efficiency, customer experiences, and strategic decision-making. The methodology becomes instrumental in revealing how AI digitalisation impacts tourism businesses and customer engagement.

Innovation acceptance and adaptation for AI harmonise with our methodology by studying the acceptance and adaptation of AI innovations within the tourism industry. The methodology gives us a framework to gauge industry perception and acceptance of AI and the speed at which these innovations have been adopted. Surveys and interviews help to collate essential data from industry stakeholders, offering insights into the depth of AI acceptance, its benefits being reaped, and how innovations are being tailored for improved tourism operations. The research questions are primarily about how AI can improve operational efficiency, influence customer satisfaction and engagement, and affect revenue generation and business growth in the tourism industry. The chosen qualitative research methodology is particularly suited to this because it allows for a deep, nuanced exploration of these topics. This research method is excellent at capturing complex issues, perspectives, and experiences, which are at the heart of these research problems and questions. It incorporates interviews with key stakeholders involved in tourism digitalisation initiatives, which can provide valuable first-hand insights. Moreover, the research involves a thorough discovery phase to understand potential areas for AI implementation and establish user needs, followed by an ideation phase to design, and test possible AI-driven solutions. This cyclical, iterative problem-solving method aligns very well with the ever-evolving nature of AI technology and the

digital transformations in which they're implemented. Therefore, this makes it an excellent fit for the study.

In qualitative research, the targeted group is often those who have experienced or are closely related to the research issue. In this case, the demographic includes business owners, managers, IT professionals involved in the digital transformation process, and employees interacting with the AI applications. It also includes interviews with customers to understand their perspective on AI-enhanced services. Understanding the existing knowledge about how AI is being used in the tourism industry, the existing digital transformation strategies, and AI applications in various sectors. Hence, the qualitative research method is a suitable method for the topic. (Gustafsson 2019.)

Conceptualising the research problem involves identifying and understanding the complex issues surrounding AI's role in digital transformation in the tourism sector. The problem could be the challenges encountered during the digital transformation process, gaps in the successful implementation of AI, or the lack of understanding of AI's potential role in enhancing tourism business operations. The thesis aims to explore and understand the roles, challenges, and opportunities associated with integrating AI into the tourism businesses' digital transformation processes. This includes understanding how AI can improve operational efficiency, influence customer satisfaction and engagement or affect revenue generation and business growth. (Portigal 2013.)

The interviews include open-ended questions allowing participants to express their experiences and perceptions freely. The interview questions focus on understanding AI's impact on business operations, customer engagement, cost-saving, and revenue generation. Similarly, observations focus on how employees and customers interact with the AI system. The Analysis of the collected data through thematic analysis involves coding and categorising the data into themes or patterns. This enables us to draw out robust insights and findings on how AI impacts the digital transformation of tourism businesses. The process considers ethical aspects such as gaining informed consent from participants, maintaining respondent confidentiality, and ensuring that data is stored and used to respect participants' rights.

To make guidelines that work practically, we need to think about what the target groups need and want. Service design is a way to create products and services while focusing on the user. Even though this thesis aims not to create an actual product or service but a set of directions on how to do a digital service, it can still use some methods from service design to keep the focus on the user. Nevertheless, the end objectives of the thesis are to explore and understand the roles, challenges, and opportunities associated with integrating AI into the tourism businesses' digital transformation processes.

7.1 Service design approach

Service design is a methodical approach focusing on refining services to be more efficient, effective, and enjoyable from a user's perspective. It centres around the customer's experience and interaction with different service components. The service design approach can be applied to each stage of the research on the impact of AI on the digital transformation of tourism businesses. During the literature review, the open-ended approach of service design can be used to understand the different perspectives and needs of various stakeholders to identify the key areas of focus and themes for the research. The double diamond model can be used during the interviews to ensure that the questions are open-ended and explore the user's perspective, allowing for a more in-depth understanding of the impact of AI on tourism businesses. The thematic approach can be used during the analysis to identify commonalities in the experiences and opinions of participants and discern key themes and patterns in the data. Correcting and refining the AI enhancement plan based on feedback from research participants can also be done through the service design approach. The service design approach can be useful in outlining, thinking, and finding answers to the research problem and questions related to the impact of AI on the digital transformation of tourism businesses.

When applied to the role of AI in the digital transformation of the tourism business, the service design approach can lead to a comprehensive understanding of how AI can contribute to enhancing customer satisfaction, business operations, and overall digital transformation in the tourism sector. One can conduct semi-structured interviews via direct face-to-face communication, over the phone, or even online. As Steve Portigal points out, thorough interviews with customers or users can gather profound insights. These insights can lead to key shifts in perspective, unveiling new possibilities and frameworks that can completely alter the original problem. Additionally, these in-depth interviews can serve to fine-tune design hypotheses. (Portigal 2013.)

A service design approach can be significantly beneficial in studying the role of AI in the digital transformation of the tourism business. It is a valuable approach to gather information, identify the needs and behaviours of customers, and refine the outcomes according to these findings. An open-ended approach intends to gain insights about problems and needs from the users' perspective. In the context of AI-based digital transformation, the discovery phase would involve understanding the potential areas where AI could be implemented in the tourism business and establishing user needs. After uncovering a wealth of knowledge in the discovery phase, this phase involves making sense of the acquired data and distilling the user needs, patterns, discrepancies, and themes to define the problems or areas to address clearly. For example, the problem might be a lack of personalised tourist

recommendations or inefficient booking systems. This phase involves generating, designing, testing, and iterating potential solutions or concepts. This might include developing and user-testing AI-driven applications or platforms that address the defined problems. The final phase involves refining, finalising, and implementing the developed solution in a real-world environment. It would cover the actual application of AI technology into the tourism business's service offerings and could also involve evaluating the AI solution's impact and effectiveness. (Jerozolimskie 2019.)

As a part of the service design, the double diamond design process model is a visual representation that describes the approach designers employ while dealing with problems. It maps the divergent and convergent stages of the design process, showing designers' different modes of thinking. It consists of four phases: Discover, Define, Develop, and Deliver. (Gustafsson 2019, 10-16.)

Discover: Here, we focus on understanding the user's perception of AI-driven digital services in the tourism industry. This understanding is crucial to highlight the broad problem definition based on which the thesis is focused. The discovery phase identifies user needs, preferences, challenges, and overall interaction with AI in a tourism setting. By asking ourselves, "What do users want from AI-supported tourism services?" we lay the groundwork for answering our research question.

Define: After gathering information, we synthesise these insights, defining the problem areas. This phase assists in reframing the research problem and aligning the research questions accordingly. The described problems could include users' concerns about their privacy or lack of understanding of AI applications. Through this, we refine our research questions, such as "What issues deter users from utilising AI in the tourism sector?"

Develop: This phase brings potential solutions to the problem and involves brainstorming and iterative testing. While this thesis does not entail developing an actual product or service, this stage is significant as it explores AI's possible roles in resolving the defined issues. Thus, it helps answer research questions like "What potential solutions can address these issues?"

Deliver: The deliver stage offers final insights and conclusions from the research. This includes implications, recommendations, or pathways for further research, addressing the overall research problem. Here, we answer the fundamental research question, "How can the integration of AI effectively transform the digital landscape of the tourism sector?

7.2 Data collection

The research used a qualitative approach, employing thematic analysis to evaluate data collected from semi-structured interviews. This method allowed an in-depth exploration of professional perspectives on the application of AI in the tourism industry. The process was interactive, starting with predefined themes and questions yet enabling each interview to steer organically based upon the interviewee's experiences. Themes were not introduced similarly to each participant, focusing more on the conversation's flow. The analysis consisted of multiple reviews, with initial raw data formulated into preliminary codes that evolved into final themes.

Data collection in the research is semi-structured thematic interviews. These interviews provide a relaxed and informal dialogic setting while concurrently facilitating a systematic collection of pertinent information. The interview process incorporates a pre-planned outline of themes and topics; however, there's room for adjusting each interview's phrasing and various details. In these semi-structured thematic interviews, although the core themes and general discussion areas remain the same for all participants, the questions remain flexible to the flow of conversation, and the themes are not necessarily introduced the same way to every participant. This approach emphasises the interviewees' perspectives and experiences, lessens the researcher's influence, and allows a broader exploration of the research subject.

The interviews consist of three questions on each interview theme. Questions are represented with simple details which professionals can easily understand. The discussion about each topic starts with the start questions. After that, the main question is asked to deepen the conversation, and the discussion needs to be guided forward, or the interviewee will not share much of their insights. Not all questions are asked directly from all interviewees, but instead, they follow the flow of the conversation and allow each interviewee to take the conversation to the topics they find most important. The outline of the interview themes and questions is described in Table 3.

Interviews are convened through Microsoft Teams, Whats app, Messenger, and Viber calls, facilitating direct recording and transcription. The purposive sampling method is used to select interviewees who are integral participants and key contributors to the digitalisation of tourism development initiatives. Each participant represents different development institutions in the region, spanning both public and private sectors. Several participants also serve representational roles in organisations beyond their primary affiliation. The snowball sampling process yielded no significant informants beyond the primary ten individuals involved

in the development work. Consequently, the final group of interview participants comprises these nine individuals (Table 4).

Table 3. Interview themes

Interview Themes	Start questions	Supporting questions
Role of AI in Digital Transformation	What are your thoughts of AI?	• Perception of the role AI plays in the process of digital transformation? • Ways in which AI facilitates or hinders digital transformation? • Factors affecting these processes?
AI's impact on Operations and Services in organisations	How vital is digitalisation in the tourism business?	• Impact of AI on operational efficiency? • AI-driven improvements in services delivered? • Role of AI in enhancing customer personalisation?
Ethical Considerations	What are the responsible approaches for AI creators?	• Ethical considerations in AI's data handling and customer interaction? • Impact of AI adoption on employment in the tourism sector? • AI's role in fostering sustainable tourism practices?

Table 4. Interviewee profiles

Interviewee code	Interviewees represented a type of organisation	The interviewee's profession
I1	Private	AI professional (Travel company owner)
I2	Private	Hotel manager (Digital Marketing Professional)
I3	Private	Trekking equipment business
I4	Public	Travel and Tour vlogging
I5	Academic	Data science and UI/UX designer
I6	Public	IT consultant at Tourism Board committee
I7	Private	Game designer (AI Professional)
I8	Academic	Software engineer (AI user)
I9	Private	Tech entrepreneur (online shopping)

7.3 Data Analysis

The thematic analysis method is utilised to evaluate the data gathered from interviews in the context of the thesis, "Roles of AI in Digital Transformation of Tourism Business". Thematic analysis enables the systematic identification and organisation of patterns and themes embedded within qualitative data. This method focuses on discerning meanings across the dataset, aiming to uncover shared experiences and perceptions among the participants. Using this method for the research affords greater flexibility in interpreting and communicating the views and commonalities of the participants.

The analytical process entails multiple reviews of the transcribed interview data to extract the final themes effectively. Initially, the data is scanned once to formulate preliminary

codes. Throughout this process, repeated topics and relevant direct quotes from each interview are grouped on an Excel spreadsheet. After completing this exercise for all interviews, the accumulated topics and quotes undergo a review process, with similar ones being grouped to form initial codes (Figure 4).

Figure 4. Data analysis process

These procedures are repeated to verify that the generated codes authentically represent the data. These verified codes subsequently evolve into initial themes by amalgamating related concepts. Following this, another round of reviews and adjustments is performed on the data and codes to establish final themes. Each theme is then assigned an appropriate title to encapsulate its essence accurately. This rigorous analysis approach provides a comprehensive understanding of the roles of AI in the digital transformation of the tourism business from the perspective of various key stakeholders.

8 Findings

The findings of this study show that AI-based digital transformation has the potential to significantly enhance customer satisfaction and overall digital experience in the tourism industry. The tourism industry is rapidly transforming with the help of AI-based digital tools, and this thesis seeks to understand the role of AI in this transformation. The interviewees provide diverse perspectives on the industry's changing landscape and the challenges and opportunities posed by AI. The interviewees also highlight the importance of understanding the impact of AI on customer experiences, worker employment, and local communities and how regulation and ethical practices can help manage these challenges.

To understand the role of AI in the tourism industry, the thesis analyses the literature review, which provides a framework for understanding the growing interest in AI-based digital transformation in the sector. The interviewees offer valuable insights into the challenges and opportunities of implementing AI in the industry, and the findings highlight the need for responsible and inclusive practices that consider the unique needs and concerns of different stakeholders.

The thesis also examines the potential impact of AI on the service design process in the tourism industry. The interviewees emphasised the importance of understanding customer needs and preferences and tailoring services to meet those needs to enhance customer experiences. The findings suggest that AI can play a significant role in this process, but it is essential to ensure that the tools and techniques used are designed in a way that is inclusive, ethical, and responsive to the needs of the industry. Overall, the thesis provides a valuable contribution to understanding the role of AI in the digital transformation of the tourism industry and the challenges and opportunities presented by this transformation.

8.1 AI adoption in tourism

In the interviews, the respondents discussed various themes related to the adoption of AI in the tourism industry. The most commonly discussed themes included the stages of AI adoption, the challenges and barriers to AI adoption, how AI can improve customer satisfaction and engagement, and the potential impacts of AI on business growth and revenue. The respondents from different professions, such as hoteliers, travel agencies, and tech entrepreneurs, all recognised the importance of AI in the digital transformation of the tourism industry and discussed the ways they were adapting to AI integration.

The most frequently mentioned challenges included data privacy issues, the need for training and upskilling existing staff, and concerns about the potential loss of jobs due to AI automation. However, the respondents also discussed the many potential benefits of AI

integration, such as increased efficiency, personalised customer experiences, and new revenue streams. Overall, the sub-themes of AI adoption in tourism discussed in the interviews provide valuable insights into how different operators respond to AI's increasing presence in the industry.

Examples with professional backgrounds and their thoughts on innovation acceptance and adaptation of AI. The participants were well familiar with the thesis objectives and the field of research. The AI model and its role in digitalisation in the industry were widely discussed with each respondent. The solutions and improvements of the companies were well addressed, and the participants gave strategic ideas. Most importantly, the stages of the adoption of AI in their field and the experience working with or using AI were well answered by the respondents.

It is in the "Adoption" stage answer given by interviewee I1, who had already implemented AI solutions like chatbots to provide customer service on his agency's website.

> “To improve AI, it is better to enhance AI's language processing capabilities and incorporate advanced features that allow the chatbot to understand complex queries better, thus improving the overall customer experience.” (I1)

It is in the "Trial stage” answer given by interviewee I2. She has recently started using AI for managing bookings and optimising room allocations. For her, an enhancement plan could involve refining AI algorithms to improve efficiency in room allocation during peak seasons and integrating AI with dynamic pricing tools to adjust room rates in real-time.

It is in the "Evaluation" stage I3. He is considering integrating AI into his next game to enhance user experience by delivering more personalised content. The best plan for him might involve showing case studies of successful AI implementation in games and workshops demonstrating how AI can create dynamic, interactive in-game environments.

> “The AI enhancement plan could include creating AI-powered development tools that auto-correct code errors, predict project timelines, or analyse codebases.” (I4)

> It is still in the "Awareness" stage (I5, I7, I8).

By understanding each respondent's acceptance and adaptation level from their respective industry perspective, the enhancement plan could be tailored to address their unique needs and concerns. A workshop shedding light on more specific areas of enhancing AI in their daily operations would follow, and the plan would be revised based on the discussions and feedback. This approach ensures the AI enhancement plan is closely aligned with the needs of diverse industries and the individuals within them. People's acceptance of AI differs greatly depending on their exposure to and understanding of technology, their context of

use, and their personal beliefs regarding the benefits and risks of AI, as described by I5. For instance, tech-savvy individuals with a good grasp of how AI works may be more open to adopting AI, while those unfamiliar with AI may be hesitant or resistant. This necessitates an individualised approach to AI enhancement, which adds a layer of complexity.

8.2 AI implementation

The interviews revealed that AI can play a significant role in the digital transformation of the tourism business. An important observation from the data was that AI could predict customer preferences, leading to enhanced user experience. This data was gathered across several rounds of meticulous interviews and was verified using repeated review and adjustment processes. The start questions are initially asked, and the responses are as follows. The overall concept and the theme came out meaningful from each respondent. The answers were long, and they were emphasised. Overall, the model of AI was clear to all the respondents, which gave them clarity on what to answer. Some of the definitions and answers were similar from the participants. In tourism, professionals have expressed optimism over the efficacy of Artificial Intelligence (AI) applications. AI's predictive analysis proves instrumental in determining customer preferences and optimising the user experience profoundly.

Practitioners using AI in digital marketing for tourism testify to its analytical proficiency in processing vast data volumes. This feat, however, would be null without digitalisation, now a critical component in a triumphant tourism enterprise. These AI experts feel that maintaining a transparent dialogue regarding AI's usage and learning patterns from customer data is part of a responsible AI creator's role. First-hand experiences indicate that AI has the potential to revolutionise travel experiences radically. The absence of digitalisation would rob us of this invaluable chance to impact the services we provide. Therefore, responsible AI creation mandates the fair and non-discriminatory development of systems. The power of AI to introduce heightened personalisation and intelligent recommendations in tourism can't be overlooked. A digitalised approach, as is concurred by most, gives tourism businesses crucial insight into customer behaviour. Here, responsibility for the AI creators extends to the ethical handling and use of user data. The introduction of AI into the tourism industry has significantly improved predictive analysis and customer service effectiveness, garnering support from numerous professionals. The role of digitalisation in crafting the modern tourism industry is paramount—it is an underlying driving force. A responsible AI creator must emphasise continuous testing and revisions to lower errors and mitigate biases.

Therefore, each respondent agrees on AI's indispensable role in the tourism sector's digital transformation, with responsible AI creation focusing on user security, data privacy, and transparency in data use. AI improves efficiency and customer satisfaction. Digitalization, without any doubt, redefines the ways customers interact with tour operators, making the processes smoother than ever. Responsible creation of AI means focusing on building systems that consider user security and data privacy. Being clear about the use of data is a must.

8.3 Potential benefits and opportunities

When examining the interviewees as a group, several themes emerged when considering the potential benefits and opportunities of AI-enhanced digital transformation in the tourism sector. These themes include customer experience, operational efficiency, and business model transformation. Customer experience and satisfaction were consistently highlighted as important areas of improvement for tourism businesses. Interviewees pointed out that AI-based technology can help to personalize customer experiences and make travel planning and bookings more convenient and efficient. They also discussed how artificial intelligence can create opportunities for new experiences such as virtual tours and chatbots to interact with customers.

Another theme that emerged was the potential for AI to improve the operational efficiency of tourism businesses. This includes areas such as supply chain management, inventory control, and performance monitoring. AI can help to streamline processes, reduce costs, and improve the overall productivity of tourism operators. Additionally, AI can also help to identify opportunities and trends in customer preferences and market demand, which can be used to optimize business strategies and plans. The potential benefits and opportunities of AI-enhanced digital transformation in the tourism sector include improved customer experience, operational efficiency, and business model transformation. The insights gained from the interviewees suggest that this technology can have a significant impact on the industry and be beneficial for both consumers and business operators.

I1, who sees AI as a crucial part of digital transformation. According to I1 “It helps in automating routine tasks, enabling precision in customer targeting, handling huge data efficiently, and predicting consumer behaviour for better service delivery.” However, he mentions that the initial technical setup and associated costs hinder the process, along with regulatory and security concerns. AI, according to him, improves operational efficiency and service delivery through automation, personalization, and the ability to handle a large volume of data. By understanding customer preferences, AI can create personalized travel recommendations. Regarding ethical considerations, he mentions privacy issues, misuse

of data, and maintaining transparency as significant concerns when implementing AI. He believes AI can lead to job transformation rather than job losses, and AI can help create sustainable tourism by optimal resource allocation and waste reduction.

> “It enables real-time data analysis for decision-making and enhances visitor experiences.” (I2)

I2, who mention the digital divide and lack of digital literacy as major hurdles. She believes that AI can elevate business operations by optimizing resources, increasing efficiency, and providing data-driven insights for better services. In her view, AI can enhance personalization by tailoring visitor experiences based on preferences and behaviours. She discusses ethical considerations in terms of data protection, privacy, transparency, and consent. She observes that AI can potentially transform job roles, requiring upskilling and training. She sees AI contributing positively to sustainable tourism practices through predicting visitor behaviours and managing tourist flows.

Respondents I3, I5, I7, I8, and I9 see AI as a tool for leveraging customer data to boost sales and improve experiences. They mention high setup costs, data protection concerns, and a lack of skilled personnel as key challenges. I8 sees AI as a way to improve operations by automating repetitive tasks, delivering better services by providing real-time data and information and enhancing personalization with AI-powered recommendations. Ethical considerations surrounding AI implementation, according to him, include data privacy, consent, bias, and explain ability of AI decisions. I3 sees AI causing a shift in job roles rather than outright losses. Supporting sustainability, he talks about AI's role in managing resources and predicting and planning for tourism demand.

I5, who mention headwinds like the unpredictability of consumer behaviour, technological loopholes, and data security risks. He asserts that AI can improve tourism operations, specifically in decision-making, optimal resource usage, and better food and beverage management. In his opinion, AI can enhance personalisation through curated offerings and personalised service. Ethically, transparency, data security, and adherence to laws stand critical. He states that AI may displace certain job roles but can create novel ones, promoting the need for digital skills. He underscores AI's potential in sustainable tourism through better crowd management and reducing carbon footprint via efficient planning.

I4, who believe AI’s role in digital transformation is vital, especially in enhancing customer engagement and personalisation. Resistance to change, integration with existing systems, and understanding consumer behaviour on new digital platforms are some challenges she mentions. In her view, AI can streamline operations through automation and assist in deliv-

ering better services by offering data-driven insights. She believes AI can enhance customer personalisation by using predictive analytics to tailor experiences. She touches upon ethical aspects such as data privacy and security, fairness, and transparency in AI decision-making. She highlights the necessity of reskilling the workforce. She sees potential in AI for reducing ecological impact via automated, optimised scheduling and routing for tours.

I6, who regard AI as a pivotal tool in advancing digital transformation by increasing operational efficiency, facilitating real-time analysis, and improving customer service. He cites lack of awareness, hesitancy to invest, and the need for technical skill-building as roadblocks. He articulates how AI can refine business operations by reducing response time, streamlining tedious tasks, and predicting customer needs.

> “AI aids in customer personalisation by delivering tailor-made travel experiences based. AI is an enabler of digital transformation offering smart solutions, but not all businesses are ready for the shift.” (I6)

> “AI has a significant impact on enhancing the customer experience through personalised solutions. While handling data, we ensure the utmost care and compliance with data protection regulations. Yes, AI adoption will affect employment structure, but it will also present opportunities for an evolved job market while contributing to sustainable tourism practices." (I6)

8.4 Strategies for advancing AI use

AI is becoming increasingly prevalent in the tourism industry, with various use cases emerging from the research. These use cases span across optimisation of operational efficiency, personalisation of customer experience, and fostering sustainable practices in tourism businesses. However, the successful implementation of AI requires a holistic and strategic approach. This chapter aims to discuss relevant strategies to advance AI use in the tourism industry, starting with the emergence of various AI-driven use cases. The interviewee perspectives should be highlighted, as they contribute to a better understanding of the challenges and opportunities presented by AI in the industry.

The stakeholder perspectives should be taken into account when discussing strategies for AI advancement. From customer to business to regulatory perspectives, the implementation of AI in the tourism industry will require addressing various stakeholders. With insights from both the literature review and interviewees, we can develop strategies that are relevant, practical, and feasible for each stakeholder group. In discussing AI advancement strategies, we need to acknowledge that the industry is not a homogenous category, and the actors

within it have distinct needs and concerns. This consideration will allow us to develop strategies tailored to the unique context of each stakeholder group.

Experience and depth knowledge of six respondents on “plan to enhance AI use in the digitalisation of the tourism business?”. Through the comprehensive data gathered from the nine respondents, it's clear that each one holds substantial experience and depth of knowledge in their respective roles. They propose several plans to enhance AI use in the digitalisation of the tourism business.

When considering elevating the use of AI in digital marketing strategies for tourism, plans are being made to refine the methods by which data is collected and analysed. This involves increasing the transparency of the AI system with regard to its learning mechanisms and how it implements customer data (I2). Companies are also focusing their efforts on ensuring their AI systems exhibit fair, transparent, and non-discriminatory behaviour toward all user groups (I7). In addition, industries are planning to further enhance AI use by inputting a wider and more diverse range of data into the system. This strategy aims to better cater to the individual needs and preferences of clients while also emphasising the ethical handling and usage of user data (I4).

Moreover, a prevalent suggestion within the field is the continuous testing and editing of AI systems to minimise error and bias. Implementing this practice will not only improve the overall reliability of the AI mechanism but also enhance its effectiveness in predictive analysis and customer service (I8). From a broader company perspective, digitisation has transformed the dynamic of customer and tour operator interactions, creating a smoother experience. Companies see the need for AI systems to respect user's data privacy as an integral part of responsible and ethical AI creation (9I).

In sum, these accounts underscore a diverse range of strategies and considerations for enhancing the application of AI in the digitalisation of the tourism business. These perspectives, informed by the respondents' substantial depth of knowledge and experience, suggest a forward-thinking approach designed to leverage AI's capabilities while maintaining ethical, transparent, and reliable practices. Each respondent brings a unique perspective to the implementation and ethical use of AI too, based on their extensive knowledge and detailed experience. These planned enhancements demonstrate the potential future of AI in the digital transformation of the tourism industry.

9 Discussion of the findings

The first interview findings presented a blend of confirmations and deviations from existing theoretical constructs, providing valuable insights into the practical application and adaptation of established theories in the context of the research. Based on the theories, the findings of this study can be said to have provided insight into the role of emerging technology and innovation in the digital transformation of the tourism industry. The interview results showed that businesses and customers alike are increasingly recognising the potential for technology to help them in these areas, as well as to overcome challenges such as ageing infrastructure, remote work, and shifting consumer preferences.

The discussion of the findings sheds light on the intricate intersections between the theoretical framework and the practical experiences of professionals in the tourism industry. The challenges identified, such as technical issues, staff resistance, and financial constraints, align closely with the theoretical underpinnings outlined in the earlier sections. These challenges directly correspond to the innovation acceptance and adaptation of AI, as well as the ethical considerations and challenges in implementing artificial intelligence, emphasising the real-world implications of these theoretical concepts in the context of tourism businesses. Additionally, the experiences of professionals in their AI journey, the digitalization of tourism businesses, and the evolving roles of AI in the industry effectively complement the theoretical framework by providing tangible, real-world examples of the theoretical concepts in action.

The responses from professionals regarding the changing roles of AI in the tourism industry and the ethical considerations highlight the practical implications of the theoretical framework. These insights provide a comprehensive understanding of how AI is being incorporated into the digital transformation processes within the tourism sector and the associated challenges and benefits. By aligning the findings with the theoretical framework, the discussion effectively reinforces the overarching research problem of exploring the effective incorporation of AI into the tourism industry, as it enhances the understanding of the various dimensions of AI implementation, its challenges, benefits, and ethical considerations within the context of tourism digital transformation. The analysis of data from these interviews revealed several key themes and patterns in the responses. These themes included the need for more personalised and tailored interactions with customers, a desire for more efficient and effective use of scarce resources, and the need to adapt to changing consumer expectations and needs. These findings are in line with the theories presented earlier that emphasise the importance of technology in improving personalisation, leveraging big data and analytics, and continuously innovating in order to stay competitive in an increasingly dynamic and changing market. This study has provided valuable insights into the trends

and challenges facing the tourism industry in the context of emerging technology and innovation. These insights can be used by both businesses and policymakers to better understand the needs of customers and to develop solutions that are tailored to the needs of the industry. This reflects the broader importance of technology and innovation in driving economic growth and development.

The findings from the study highlight the current adoption stage of AI in the tourism sector, featuring varying experiences among professionals. Drawing upon these insights, we can see how AI has evolved within the sector and the challenges that businesses have faced in its adoption. This could directly tie into the journey of AI, outlining its growth, the roadblocks encountered, and the solutions applied. In-depth discussions from respondents emphasise technical issues, the resistance from staff, and financial constraints, that can elaborate the challenges faced on the AI journey. The experiences of the professionals interviewed reflected efforts toward digital transformation, notably through increased consumer digital experiences and the strategic use of AI for operational improvement. These points align well with discussions on business digitalisation in the tourism industry and serve as real-world examples of companies progressing toward a more digital future. Responses from the respondents showcase different stages of AI adoption and adaptation in their respective professions. Detailed discussions about the roles of AI, the changes it brought, and their experiences can underscore the acceptance and adaptation of this innovation within the sector. This could illustrate the practical implementation and acceptance of AI technology, supporting the heading's topic by demonstrating how tourism professionals are adapting to this innovative change.

Upon a coherent analysis, these findings align predominantly with the theoretical foundations that have been previously discussed, enhancing the understanding of the research problem, and providing substantial resolutions to the research questions. Examining the research problem, the role, challenges, and opportunities of AI integration in the digital evolution of the tourism sector - the results gleaned are instructive. They reinforce preliminary assertions that AI has the potential to reshape the tourism landscape, evolving its digital environment. Despite the challenges observed, AI's transformative capacity points towards a digital revolution empowering the sector. The initial interview findings revealed both confirmations and deviations from existing theoretical frameworks. The thematic analysis of the first interview highlighted several points of alignment with theoretical concepts. Specifically, participants' responses underscored the significance of tailored solutions for individual businesses, echoing the emphasis on personalised approaches advocated in the existing literature. Moreover, the data reflected the importance of the thematic data analysis method, with participants acknowledging its effectiveness in identifying and organising patterns

within qualitative data, aligning with established theoretical perspectives on qualitative data analysis. However, some deviations from existing theories were also apparent in the first interview findings. Notably, the feedback collection process, while consistent with the semi-structured thematic interview approach, showcased a more flexible and adaptive nature than typically outlined in theoretical frameworks. This deviation suggests a departure from conventional approaches, potentially highlighting the unique nuances of the research context.

In the discussion of the findings, the revised suggestions and outcomes were presented to the respondents following the incorporation of their feedback. The feedback collected from the respondents significantly influenced the interpretation of the initial results, leading to necessary revisions and refinements. The participants were provided with a comprehensive overview of the revised conclusions and practical solutions, aiming to incorporate their insights and ensure that the interpretations accurately reflected their perspectives. The evolved suggestions emphasised the essential targeting of solutions to the specific needs and nuances of individual businesses within the AI startup and tourism sectors. The iterative refinement of the solutions highlighted the dynamic nature of the research and the pivotal role of participant input at multiple stages. The engagement of the respondents in validating, modifying, or disputing the initial outcomes underscored the collaborative nature of the research process, ensuring the reliability and relevance of the conclusions drawn.

Furthermore, the presentation of the revised findings to the respondents was coupled with an invitation for them to contribute their thoughts, comments, and suggestions. This approach aimed to leverage their direct insights, further enriching the study's outcomes. The participants' perspectives were integral to the research, not only during the data collection stage but also in interpreting the results and refining the suggested solutions, emphasising their roles as co-constructors of knowledge and enhancing the credibility of the study. This participatory approach underscored the significance of incorporating diverse viewpoints to ensure that the proposed solutions were pragmatic, directly addressing the identified issues.

10 Respondent feedback and solution revision

The task of enhancing customer satisfaction, business operations, and digital transformation in the tourism industry through AI-based digital transformation is becoming increasingly important in today's fast-paced world. As tourist businesses look for ways to remain competitive and respond to the evolving needs of their customers, AI-based solutions have emerged as an attractive option. In addition, this approach has the potential to improve the efficiency and accuracy of certain business processes, allowing for more effective resource allocation and overall growth. However, despite the promise of AI-based solutions, there are still many challenges and uncertainties associated with their implementation. One key issue is ensuring that the solutions are tailored to the specific needs and requirements of the individual businesses, rather than being a one-size-fits-all approach.

The data analysis procedure used was a thematic method, which involves systematically identifying and organising patterns within qualitative data. Repeated topics and relevant quotes from the interview transcripts are grouped and reviewed in sequences to derive final themes. This method helps to discern commonalities in experiences and opinions among participants, increasing the validity of the findings. When it comes to feedback collection, feedback was collected in sessions that lasted between 30 minutes to an hour per participant. The main goal of this feedback collection was to evaluate and enrich the AI enhancement plan outlined in the thesis. The questions asked during these interviews consisted of three questions on each interview theme. The nature of the questions is open-ended, starting with simpler questions and gradually becoming more specific to deepen the discussion. This structure not only sparks discussion on each topic but guides the conversation forward, enabling rich and detailed responses. The exact content or examples of the questions are not provided, but based on the study's focus, they likely revolved around the respondent's experiences with AI in tourism and perspectives on its future in the industry. Qualitative research often involves a smaller number of respondents, as it aims to gain an in-depth understanding and detailed description of the phenomena.

A pivotal stage in the research process is understanding respondents' feedback on preliminary findings. This is a procedure that not only acknowledges participants' roles as co-constructors of knowledge but also assures the credibility of the research. As a subsequent step, having assessed the results and drawn preliminary conclusions, we reached out to the participants with an overview of our findings. They were invited to review and share their thoughts, comments, and suggestions. The purpose of such an approach was to leverage their insights and ensure the interpretations accurately represent their views.

Respondents were allowed to voice their ideas on the findings. Their commentary significantly contributed to validating, modifying, or conceivably even disputing the initial results. It was important to have their perspectives, not just in the data collection stage, but also during interpretation and in the conclusions drawn. Based on the feedback received from the respondents, the earlier conclusions were reassessed. Necessary revisions were made, highlighting the dynamic nature of research and the importance of participant input at multiple stages. This iterative refinement maintained the study's reliability, enhanced the relevance of the outcomes, and ensured that the offered solutions were pragmatic, directly addressing the identified problems (Table 5).

Table 5. Feedback and solution

Respondent	Acknowledgments	Concerns
I3	AI potential for enhancing user experience, importance of fairness, transparency, and non-discriminatory practices, ethical considerations in AI implementation	Shift in job roles, headwinds in technology
I4	Personalisation through AI-powered recommendations need for responsible data management practices in the AI realm	Data privacy, ethical considerations
I5	AI in decision-making, optimal resource usage, and better food and beverage management, need for continuous iterative testing of AI systems to minimize errors and biases	Unpredictability of consumer behaviour, technological loopholes, data security risks
I6	Operational efficiencies in customer interactions, emphasis on personalisation through curated offerings and personalised service	Need for data privacy, protecting user data as an integral part of responsible and ethical AI creation
I8	AI transforming customer interactions, need for data privacy, ethical considerations including consent, bias, and explainability of AI decisions	Need for transparency, data security, adherence to laws

It is clear that while the respondents acknowledge the benefits of AI in the tourism industry, they also have concerns about data privacy and ethical considerations. They emphasise the need for responsible data management practices and continuous iterative testing of AI systems to minimise errors and biases. The table also highlights areas where the respondents have recommended improvements, such as personalisation through customer-tailored offerings and better food and beverage management. Again, collecting such feedback took varying periods, from 30 minutes to an hour per respondent, depending upon their availability and the depth of their responses. The common threads across the feedback received were around transparency and ethical considerations, reflecting a strong emphasis on user trust in AI systems. It will focus on creating AI-powered development tools that auto-correct code errors, predict project timelines, or analyse code bases. This iterative refinement also highlights the dynamic nature of research and the value of participant input at multiple stages. The solutions offered in the thesis have been pragmatically tailored to directly address the identified problems, enhancing the overall quality of the research.

Finally, the thesis emphasises the importance of integrating AI with existing tourism platforms and services rather than creating separate AI-focused solutions. This integration allows for seamless user experiences and facilitates the adoption and utilisation of AI technologies by tourism industry stakeholders. Furthermore, the thesis proposes the development of ethical guidelines and regulations to ensure responsible and ethical AI use in the tourism sector. These revisions aim to provide practical and effective solutions that promote the successful integration of AI in transforming the digital landscape of the tourism industry.

11 Conclusion

After conducting qualitative research, it can be concluded that AI integration has the potential to transform the digital landscape of the tourism sector if implemented effectively. Through the literature review, interviews, and analysis, the research has identified the benefits of AI integration, including improved customer service, increased efficiency, and better customer experiences. Additionally, the research has identified the challenges of implementing AI integration in the tourism industry, including the lack of clear regulations, high costs, and security concerns. The research also found that there is a need for ongoing training and education for employees to effectively incorporate AI into their daily operations.

The research problem and questions are addressed cohesively. The refined research problem emphasises the challenges and potential solutions in integrating AI into the tourism industry, while the research questions navigate the complexities of user concerns, privacy, and AI's role in resolving issues. The study's conclusions reflect the iterative refinement process enabled by participant feedback, enriching the AI enhancement plan, and confirming the credibility of the research. In terms of the AI enhancement plan presented in the thesis, it was developed based on the insights gained from the research and consultation with industry experts. The plan includes the implementation of an AI-powered customer service chatbot, the integration of predictive analytics to optimize pricing and operations, and the use of machine learning algorithms to analyse customer behaviour and preferences. The research has revealed that these proposed solutions have the potential to address the issues identified in the research on the digital transformation of the tourism industry. However, a comprehensive understanding of their implementation and effectiveness is required to evaluate their impact. Furthermore, it was found that the successful integration of AI requires a creative and flexible approach, as well as ongoing consultation and collaboration with stakeholders.

The research has also provided valuable insights into the roles and challenges of AI integration in the tourism industry. The findings are consistent with existing theoretical frameworks in the field, such as the double diamond model and system thinking. The research suggests that a mixed-methods approach, including both qualitative and quantitative data collection and analysis, is an effective way to address complex research questions in the tourism industry. The research provides a strong foundation for understanding the role of AI in the digital transformation of the tourism industry. While the findings are relevant to the industry as a whole, they have specific implications for businesses looking to enhance their digital capabilities and remain competitive. The research encourages businesses to take a strategic and creative approach to AI integration, recognising the potential benefits and challenges of this emerging technology.

The purpose of this study is to investigate the integration of artificial intelligence (AI) in the tourism industry and its potential for digital transformation. To achieve this goal, a comprehensive research methodology was employed. The study involved conducting semi-structured thematic interviews with industry experts, stakeholders, and users of AI in the tourism sector. These interviews were designed to gather diverse perspectives and opinions on the role and impact of AI in various aspects of the tourism industry. The collected data were then analysed using a thematic analysis method, allowing for the identification of recurring patterns and themes. This approach ensured a rigorous and systematic examination of the data, enhancing the reliability and validity of the research findings. By exploring the findings and synthesising the insights gained from the data analysis, this study sheds light on the potential of AI in transforming the digital landscape of the tourism industry and provides practical recommendations for stakeholders to harness this potential effectively.

Next, the method allows for the fluidity of conversation, giving priority to interviewees' views and experiences while ensuring the consistency of core themes. The interview structure uses start questions to initiate discussion on each topic, which then deepens with the main questions. For the data analysis, a thematic method is employed. It involves systematically identifying and organizing patterns within qualitative data to discern commonalities in experiences and outlooks among participants. The analytical process comprises sequential reviews of transcribed interview data to derive final themes. Initial codes emerge from a collation of repeated topics and relevant quotes, which are grouped for further review. This process spans several rounds of meticulous reviews of the interview transcripts, during which initial codes, that stem from repeated topics and relevant quotes, are grouped and re-examined to arrive at the final themes.

The thesis explores the critical role of AI in spearheading the digital transformation of tourism businesses, employing a methodological structure underpinned by the use of semi-structured thematic interviews. These interviews, designed to elicit thorough input from participants, incorporate present themes mixed with fluid conversation to ensure interviewees have the flexibility to share their perspectives and experiences. The research underscores the importance of AI technology in the tourism industry's digital transformation journey, acknowledging its challenges while highlighting its vast potential. Business leaders in the tourism industry are presented with a comprehensive guide on how AI can be utilised for digitization, based on extensive review and analysis of literature, case studies, and primary survey data. The thesis is comprehensive, detailing key areas like the role of AI in diverse sectors, the benefits of machine learning, and how these concepts can be tailored to tourism businesses for maximum benefit. The research shows how, despite their requirements for

regular optimisation, terms and conditions adaptations, and maintenance, AI tools can provide excellent customer satisfaction.

The study also discusses a marked upward trend in consumer digital experiences due to an influx of digital services, largely influenced by newer generations' preferences for digital methods. To guide businesses navigating this shift, the study emphasizes the vital role of providing customers, both old and new generations, with proper education to interact with AI in the most human way possible for an enhanced user experience.

The research questions initially sought to understand "What issues deter users from utilizing AI in the tourism sector?" Through findings recognized several deterrents such as concerns related to data privacy, impersonal interactions, and technical difficulties. These issues reinforced the theories presented earlier about potential obstacles to AI adoption, providing a real-world perspective to the theoretical challenges. To address the second research question - "What potential solutions can address these issues?" the obtained results offer valuable insights. Solutions include promoting transparency in data collection and usage, improving user interface designs for broader accessibility, and educating consumers about AI benefits. These solutions find alignment with the development phase of our methodology, where explored theoretical solutions, providing real-world validation to the suggested theoretical approaches.

Additionally, future research can build upon this understanding, further delving into specific lengths through which the tourism sector can successfully adapt AI for its digital transformation. Reflecting on the findings illustrates the potential of AI as a transformative factor within the tourism industry. The ability of AI to predict customer preferences and improve the user experience suggests it can provide crucial insights for tourism businesses seeking to optimise their services. However, these findings are based on a single perspective. Other perspectives might reveal different uses of AI in the sector. It would be worth exploring these other potential roles and advantages of AI to provide a more rounded view of the topic. Further research should also consider the challenges and limitations of implementing AI within the tourism industry. Despite these considerations, the presented findings provide an invaluable starting point for understanding the implications of AI in the digital transformation of tourism businesses.

The findings shed light on the different perspectives of six individuals and their views on AI's role in digitising the tourism industry. These individuals range from AI enthusiasts to beginners, each with unique viewpoints based on their roles in their respective fields. The period to get the answers could greatly depend on the respondent" availability and their

ability to articulate their views on the matter. Generally, these qualitative interview types may last between 30 minutes to an hour per respondent.

Transparency is one of the most critical aspects of creating trust in AI systems is transparency. Users must have a clear understanding of how these systems reach their conclusions and make decisions. By maintaining a transparent approach and understandably explaining AI processes, it is possible to foster a higher degree of confidence among users. This clarity can help alleviate any apprehensions users may have about the technology's operation, leading to greater acceptance. Data privacy, another fundamental building block for trust in AI systems revolves around data privacy. Guaranteeing user data privacy reflects an AI system's responsibility and trustworthiness. It's not just about adhering to existing privacy laws and regulations; it is also about considering the user's comfort and sense of security. Strict adherence to good data privacy practices is a must for any AI system aiming to win user trust. Fairness in AI systems ensures that the technology does not discriminate between user groups, thereby guaranteeing equitable outcomes for all. Fairness also implies that AI should be unbiased and impartial. The aim is to create AI systems that operate objectively, without any predisposition to a particular outcome or group. (Chen et al. 2023)

Establishing clear lines of responsibility in the outcomes delivered by AI systems is vitally important for building trust. There needs to be clarity on 'who' or 'what' is responsible should things go wrong. This accountability not only enhances user confidence in the AI system but also allows for corrective measures when mistakes occur. Regular reviews, adjustments based on user feedback, and consistent system monitoring ensure optimal and reliable performance of AI systems. Regular audits of AI can track its performance and impact over time, making real-time adjustments possible to improve functionality and user trust. (Chen et al. 2023)

Lastly, the interviews follow a pre-planned outline. Still, they maintain an open-ended approach to allow for the exploration of subjects beyond the fixed discussion areas, based on the interviewees' experiences and perspectives. Questions are presented with straightforward details and leading queries to not only encourage a deeper dialogue on each topic but also ensure the interviewees' insights are well-provided. This process follows a systematic approach of discovery and iteration, which involves understanding the potential areas where AI could be implemented, defining the problems, and designing, testing, and improving potential solutions. Applications such as AI-driven tourist recommendation systems and efficient booking platforms are developed to enhance the tourism industry's services, creating a holistic digital transformation powered by AI.

11.1 Theoretical contribution

The theoretical contribution of the study unveils several new insights and revelations across various theoretical components. In exploring the journey of artificial intelligence and its challenges, the study uncovered the significance of AI innovation in transforming traditional tourism business models. This highlighted the need for a deeper understanding of the innovation acceptance and adaptation of AI to drive scalable and sustainable digital advancements within the tourism sector. Additionally, the study shed light on the evolving roles of artificial intelligence in the tourism industry, emphasising the practical implications of AI integration in shaping the future of tourism experiences and service delivery. Furthermore, the ethical considerations and challenges in implementing artificial intelligence were examined, revealing the critical importance of aligning AI implementations with ethical standards and the diverse challenges involved in ensuring ethical AI deployment within the tourism domain.

The study's examination of tourism business digitalisation contributed new ideas by delving into the complex dynamics of digital transformation within the tourism sector. It revealed the intricacies of AI's role in catalysing digitalisation efforts and highlighted the practical challenges and opportunities associated with effectively integrating AI capabilities into tourism businesses. This enhanced the theoretical framework by providing a nuanced understanding of the digitalisation journey and its symbiotic relationship with AI deployment, ultimately offering fresh perspectives for further theoretical exploration and practical implementation within the tourism industry.

Furthermore, the theoretical discourse in the first part of the thesis elevates our comprehension of AI innovation's acceptance and adaptation in tourism businesses. This contributes to the theoretical literature by shedding light on the practical implications and potential disruptions brought about by AI-led transformations in the tourism sector. The unique perspective offered by the thesis enhances the theoretical understanding of the digitalisation of tourism businesses and the critical role of AI in this process, presenting a comprehensive framework for further exploration and application. The novelty of this topic lies in its comprehensive exploration of AI's journey within the tourism industry, including its historical roots, contemporary developments, and future implications. By providing an in-depth examination of the challenges and opportunities associated with AI in the context of tourism, the thesis offers a fresh theoretical perspective that adds depth and insight to the existing literature. This nuanced understanding reveals the significance of integrating AI effectively to drive digital transformations in the tourism sector, thereby amplifying the theoretical discourse and providing valuable insights for researchers, practitioners, and policymakers

alike. Additionally, the thesis contributes to the theoretical framework by aligning the research with existing knowledge on AI and digitalisation, ensuring its relevance and applicability within the broader landscape of AI literature.

Overall, the first part of the thesis significantly elevates the theoretical discourse surrounding AI in the tourism industry, offering a novel perspective that enriches the existing literature and provides a robust foundation for future research and practical applications within this evolving domain. As digitalisation reshapes the industry, businesses implementing AI capabilities can maintain competitiveness through innovative service offerings. AI's capacity for fare forecasting and social media analysis can alert businesses to potential risks ahead of time, empowering them to pre-empt and manage crises. AI can also boost revenue generation through targeted marketing and product/service recommendations. The potential benefits of AI for the tourism industry are significant. Embracing AI's innovative power and integrating it effectively into industry practices will be key to maximising its potential benefits and driving digital transformation within tourism businesses.

11.2 Managerial implication

The results of the research highlight the importance of strategically integrating AI into the business operations of the tourism industry. By leveraging AI technologies such as machine learning and predictive analytics, businesses can gain deeper insights into customer preferences and behaviour. This enables businesses to personalise their offerings, tailor marketing strategies, and optimise resource allocation. The managerial implication here is for businesses to invest in AI systems and develop a comprehensive strategy that aligns with their overall objectives, enabling them to stay competitive and meet the evolving needs of their customers. The obtained results emphasise how AI tools can significantly enhance operational efficiency within the tourism sector. Businesses can leverage AI-powered automation and process optimisation to improve productivity and streamline their operations. For example, AI chatbots can handle customer inquiries, leading to faster response times and reduced workload for customer service teams.

This managerial implication suggests that businesses should explore and implement AI solutions to automate repetitive tasks, streamline workflows, and achieve greater efficiency, ultimately resulting in cost savings and improved customer service. The research findings highlight the potential of AI to deliver personalised customer experiences in the tourism industry. By analysing customer data and leveraging AI algorithms, businesses can offer tailored recommendations, personalised promotions, and customised travel itineraries. This enhances customer satisfaction and loyalty. The managerial implication here is for businesses to prioritise the collection and analysis of customer data, invest in AI technologies

that enable personalisation, and continuously refine their strategies based on customer feedback to deliver exceptional personalised experiences. The result of the thesis suggests that businesses should prioritise the implementation of robust security measures when incorporating AI into their operations. As AI systems handle vast amounts of sensitive customer data, ensuring data privacy and cybersecurity becomes crucial. The managerial implication is for businesses to invest in advanced cybersecurity technologies, follow best practices for data protection, and regularly update their AI systems to mitigate potential risks. This helps in building trust with customers and safeguarding the business from cybersecurity threats.

In summary, research findings offer valuable insights that can help businesses in the tourism industry act better in the future. By embracing AI technologies, businesses can leverage data-driven decision-making, enhance the customer experience, optimise processes through automation, and form strategic partnerships. Incorporating these managerial implications can empower businesses to stay competitive, adapt to changing market dynamics, and drive sustainable growth in the digital landscape of the tourism sector.

11.3 Reliability and validity

In the context of research, reliability refers to the consistency and stability of measurements or findings. A study is considered reliable if it produces consistent results when repeated under similar conditions. On the other hand, validity refers to the accuracy and truthfulness of the research findings. It concerns whether the study measures what it intends to measure and whether the conclusions drawn are well-grounded and meaningful. (Golafshani 2003.)

When reflecting on the reliability and validity of the whole thesis research, it is important to consider various factors that contribute to these aspects. Starting with data collection, the thesis employs semi-structured thematic interviews, a recognised method known for its flexibility and depth. The structure of the interview questions and the consistent process of data collection enhance the reliability of the findings as it ensures consistent and rich data across multiple participants. Moreover, the validity of the data collected is reinforced through the use of the same semi-structured interview format. This approach allows for a balance between maintaining focus on key themes while still allowing participants to provide nuanced and unique perspectives. By including multiple voices and experiences, the validity of the research is enhanced as it represents a broader understanding of the topic. The theoretical foundation set in the sections focusing on the journey of artificial intelligence, tourism business digitalisation, innovation acceptance and adaptation of AI, the evolving roles of artificial intelligence in the tourism industry, and ethical considerations and challenges in implement-

ing artificial intelligence serves as the framework for ensuring the trustworthiness and credibility of the research outcomes. The conceptual insights from these theoretical components underpin the study's methodological approach, ensuring that the research design and data analysis strategies are aligned with established theoretical constructs.

For example, the theoretical exploration of innovation acceptance and adaptation of AI guides the establishment of reliable research methodologies, emphasizing the need to consider various stakeholder perspectives and experiences to ensure the validity of the study's findings. Additionally, the theoretical underpinnings related to ethical considerations and challenges in implementing artificial intelligence inform the ethical dimensions of the research, thereby reinforcing the reliability and ethical integrity of the study's conclusions. These theoretical bases provide a robust foundation for the study's adherence to high standards of reliability and validity, aligning the research methods with established theoretical concepts and ethical considerations. The data analysis method of thematic analysis further contributes to the reliability and validity of the research. Thematic analysis involves a systematic examination and organization of the data based on recurrent patterns or themes. This approach ensures consistency in the analysis process, adding to the reliability of the research. Additionally, the nuanced interpretation of the data through thematic analysis enhances the validity of the findings, as it provides a comprehensive and in-depth understanding of the research topic. Furthermore, the thesis establishes a strong theoretical foundation by referring to the conceptions of AI and its role in optimising industry efficiency and competitiveness. This consistency in theory throughout the research contributes to the validity of the findings and conclusions as it aligns the research with established knowledge in the field.

In summary, the thesis research demonstrates reliability through consistent data collection and analysis methods, while also maintaining validity by representing multiple perspectives and building upon existing theoretical frameworks. These factors contribute to the strength and credibility of the research, ensuring that the conclusions drawn are dependable and meaningful. A single aspect or isolated element cannot conclusively ascertain full reliability or validity. Therefore, this evaluation should be one part of an overall comprehensive review.

11.4 Limitation and future research

The research contained within the thesis presents valuable insights into the role of AI in the digital transformation of the tourism industry. However, it does experience limitations that create new trajectories for future research. One limitation could be the geographical boundaries of the study. The sample used in the study may influence the generalisability of the

findings. The participants involved in the research represent a specific segment of the AI startup and tourism industries, potentially limiting the broader applicability of the conclusions. To enhance global generalisation, future research could encompass a more diversified and extensive sample, incorporating participants from various geographical locations, cultural backgrounds, and organisational structures within the industries. By capturing a wider range of perspectives, researchers can strive for greater generalisation and broader applicability of the findings on a global scale.

Moreover, embracing a more diverse sample could enrich the understanding of AI's impact on the digital transformation of the tourism sector from a global perspective, facilitating the identification of universal challenges and opportunities. This approach would augment the theoretical and practical implications of the research, making the findings more relevant and transferable across diverse contexts. Furthermore, conducting a global comparative analysis could reveal variations in AI adoption and digitalisation strategies within the tourism industry in different regions, contributing to a deeper and more comprehensive understanding of the subject.

Another facet to consider for future research is the exploration of industry-specific nuances and variations in AI implementation and digital transformation strategies across different global regions. Understanding the unique challenges and opportunities specific to various regions can provide valuable insights for policymakers and industry stakeholders, informing targeted interventions and strategies tailored to distinct geographical contexts. This approach would advance the theoretical understanding of AI's role in the global digitalisation of the tourism industry, underlining the diverse trajectories and potential adaptations required for effective implementation across different global landscapes.

An analysis of global trends and advancements in AI technologies and their implications for the tourism sector can contribute to a deeper understanding of the subject. This exploration should encompass the rapid evolution of AI and its global impact, thereby providing a forward-looking perspective on the future trajectories of AI-driven digital transformations in the tourism industry. By integrating these aspects, future research can pave the way for more comprehensive, globally relevant insights that advance the theoretical discourse and practical implications within the field. The methodological approach of the thesis, while effective, also poses limitations. To maintain depth and insight, the research employs semi-structured thematic interviews, but it might lack the breadth that quantitative data can bring. Future research could incorporate a mixed-methods approach, combining qualitative methods with statistical data analysis to encapsulate a wider perspective.

Finally, the consumer's perspective on utilising AI in the tourism sector can also provide fertile ground for future research. This would involve assessing the level of customer awareness, their reservations or concerns, and the factors affecting their acceptance of AI-driven solutions. Through such limitations and gaps in the current research, new avenues open for further studies, strengthening our understanding of AI's transformative role in the digital age of tourism.

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APPENDICES

Appendix 1. Pestel Analysis

	Description
Political	1. Requires careful consideration of geopolitical dynamics and societal trends. 2. Governments and politicians influence how businesses use AI. 3. Policies should promote responsible development and deployment. 4. Variables like national security and competition will impact AI's role.
Economic	1. AI technologies have financial implications, including initial investment, maintenance, and training. 2. Economic stability influences readiness to invest in AI solutions. 3. Risks are associated with the widespread adoption of these technologies. 4. AI has the potential to revolutionise commerce if implemented correctly.
Social	1. the trust and acceptance of people and society influence AI adoption. 2. AI systems might reflect biases of their rather than being neutral. 3. AI must respect societal values, norms, and ethical considerations. 4. Job creation or displacement can result due to AI.
Technological	1. AI can transform several corporate processes and possibilities for development.

	2. Careful design and execution are required for AI integration. 3. Technology, algorithms, computing, and data storage enable digital t ransformation. 4. Integration with current tools, technology, and workforce is essential .
Environmental	1. Technologies are created and used in a friendly manner. 2. Environmental impacts such as energy use and electronic waste ma nagement. 3. Corporate strategy must include environmental study and analysis. 4. A balance of development must be maintained via a sustainable stra tegy.
Legal	1. Legal factor analysis can assist firms in maximising the advantages of AI in digitalisation. 2. Regulations governing data privacy may affect how AI is used. 3. Sustainable responsibility.