

## **The role of AI as competitive advantage in the Caribbean tourism industry**

The perception of small businesses in the Caribbean regarding the use of AI technologies as competitive advantage

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**Master's Thesis**

*June 27th 2024*

**Word count:** 17120

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### ABSTRACT

*This thesis explores the topic of artificial intelligence (AI) as a competitive advantage in the Caribbean Tourism industry within the field of Media and Business. The main objective of this research was to identify how small businesses operating in the Caribbean tourism sector perceive the role of Artificial General Intelligence (AGI), read AI technologies in shaping their competitive landscape. The study investigated how the availability of AI in the region can be understood, where the opportunities lie as well as the potential obstacles regarding AI adoption. The main concepts that were identified to support the research question were the IT-capabilities theory, flexibility, the Organizational Information Processing Theory (OIPT), the Resource-based view (RBV) theory and AI technologies such as Artificial Neural Networks (ANN), Deep Learning (DL), robotics, virtual reality (VR)/augmented reality (AR) and emotional chatbots. This research employed a qualitative thematic analysis approach. Industry experts were interviewed to investigate how AI might enhance or disrupt their business and the tourism industry as a whole and what the operational competencies are to drive growth in the industry. The findings of this research suggest that small businesses operating in the Caribbean tourism sector perceive the role of AI technologies as a possibility and inspiration for their businesses as a competitive edge. The main capabilities these technologies bring include the ability to process vast amounts of data, marketing, effectiveness, speed, productivity and decreasing employment issues. However, there are certain obstacles they incur. These are regarding affordability of AI, the lack of knowledge among staff members, awareness, as well as cultural differences. Lastly, the operational competencies needed to inspire growth in the tourism industry must carry an entrepreneur-driven innovation approach while fostering authenticity and creating tools which are based on representative data sets. Knowledge, investment and expertise are the main competencies needed for small businesses to thrive. These findings contribute to our understanding of a deeper view into the experiences and obstacles entrepreneurs in the Caribbean region face when being confronted with implementation and adoption of AI technologies in their businesses. The research opens doors for further investigation into the cultural identity of these islands and how this can be better represented through AI. Additionally, further research could explore the use of VR and AR in its application to the tourism industry on the Caribbean islands as well as other AI methods such as ANN and DL. Privacy issues and legislation are also aspects that need to be addressed to realize growth. This could significantly improve the tourist experience and provide reliable insights into lesser known destinations such as the islands. Additionally, tackling these issues could help in reaching the United Nations sustainable development goals (UN SDGs).*

**Keywords:** *business, AI, entrepreneurs, small businesses, competitive advantage, capabilities, tourism industry, Caribbean*

## PREFACE & ACKNOWLEDGEMENTS

This thesis would not have been possible without the guidance and support from several individuals who generously contributed their time and assistance to the completion of this research. I want to express my deepest gratitude to all those involved.

I am grateful to my *supervisor*, Heath Brussard, whose guidance, support, and expertise have allowed me to complete my Master thesis within the university's official time frame. His encouragement helped me stay calm when I doubted my ability to finish on time and offered a clear perspective on my progress and work.

This thesis would not have been possible without the *industry experts* who participated in my research. I am deeply grateful to the accelerator for connecting me with these experts, Gert Papeburg for introducing me to key participants within his network in the Caribbean region. I also want to thank all the participants for their willingness and openness in sharing their insights and technologies within their businesses. Your contributions have provided valuable information for growth in both the industry and the region as a whole.

My gratitude goes out to my *friends* for their emotional support and for sustaining my motivation throughout the process in times of self-doubt. Thank you for being my wall to complain and offering a space to share my thoughts. Thank you to Sonali for being there to share my thoughts and for your time in giving me feedback. I am especially grateful for my *brother-in-law*, Cemre, for your time and effort in providing invaluable feedback. Your insights, thoughts, and expertise have greatly enhanced my understanding and the quality of my thesis.

I want to express my gratitude to my *partner*, Erden, for his unwavering support and kindness throughout this process. Your encouragement has been a crucial driving force in completing this project. Thank you for believing in me and standing by my side when I felt everything was going wrong. Your boundless motivation, wisdom, and dedication to my happiness have been invaluable to my success. I am forever thankful for you.

Lastly, I want to express my heartfelt gratitude to my *family* who have supported me and believed in me as I navigated life in a country far from home. Mama, your sacrifices have been essential to my success. Your encouraging words and belief in the woman I have become are deeply cherished. Thank you for being a strong female role model and for keeping me motivated. Dad, I appreciate you for instilling in me a sense of independence and strength, and for your ongoing support. Your wisdom and valuable discussions about my thesis subject have been immensely helpful. You will always be one of the smartest people I know. Sasha, my sister, your role in helping me finish this thesis has been invaluable. Thank you for your patience, for listening to my outbursts, and for supporting me in all I do. I am grateful for the ability to rely on you and for your presence in my life here in the Netherlands. Your love, laughter, and encouragement have been a driving force in my journey.

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## 1. Introduction

Regarding technology and the implementation of new technologies, the west has enjoyed a clear advantage over regions such as the Caribbean and Latin America due to its greater access to resources (Rubalcaba, 2015). Globally, small businesses play a crucial role in local economies and this is also the case in the Caribbean. The success of economic development in this region, relies heavily on the growth of these businesses (Alleyne et al., 2017). Research indicates that many small businesses in the region are struggling to prosper. Challenges such as limited knowledge, small local markets, and susceptibility to external shocks persistently hinder businesses in this area (Alleyne et al., 2017). In the study by Jurgens et al (2024), the World Tourism Organization (2018) reports that tourism accounts for over forty percent of the Caribbean's Gross Domestic Product (GDP). This rise began after the second World War (WWII), as many islands moved towards self-sufficiency and self-reliance by replacing the export of agricultural products with high-value export and services such as tourism. Moreover, the 1980s saw increased aviation access for middle-class North Americans and Europeans, which further expanded in the 1990s with the rise of sea cruises, which comprises a large part of Caribbean tourism (WTO, 2018). The use of digital tools is helping overcome some of the growth barriers, particularly by reducing the impact of factors like time and distance between Caribbean businesses and their customers. After the developments post-WWII, mass tourism became, and is still a significant contributor to economic growth in the Caribbean (Jurgens et al., 2024).

Continuing with high impact events, the COVID-19 pandemic resulted in the economy of these Small Island Developing States (SIDS) experiencing the largest hit compared to other countries in the world (Cepal, 2021). In a report by Mazzucato (2023), the author mentioned that regions such as the Caribbean have seen stubbornly low productivity growth in recent years, partly due to the pandemic. This is mainly because employee output has not kept pace with more developed economies like the United States (US) and Europe. In 2018, employees in this region produced only about 18% of what US employees did, compared to over 38% in 1990 in the US tourism industry (Cepal, 2021). This slow productivity rise limits how much and how well the region's economies can grow. The root of the problem lies in the economic structure of regions such as the Caribbean where high-tech industries play a minor role, and investment in innovation has not been sufficient to stimulate continuous development. For the past two decades, regions such as the Caribbean have consistently spent less than 0.7% of its GDP on research and

development (R&D) (Mazzucato, 2023). This undermines the potential competitive advantage that is expected with a growth rate of 6-8% for the Caribbean region (Cepal, 2021). Maximizing the potential and competitive advantage of countries in this region through artificial intelligence necessitates a supportive environment with strong digital infrastructure, accessible data, a skilled workforce that can innovate, and a thriving culture of digital entrepreneurship (Kılıçhan, & Yılmaz, 2020). Cepal (2021) argued that after the pandemic, significant growth was expected in various industries in the Caribbean. Consequently, this could be an opportunity for the region to accelerate growth through technological development such as the use of sophisticated technologies like Artificial Intelligence (AI). AI can be defined as including systems that demonstrate intelligent behavior by analyzing their environment and autonomously taking actions to accomplish specific objectives (Samoili et al., 2020). Capabilities such as innovation, digital entrepreneurship and accessible data will be among the subjects further explored in this research.

The research question this study aims to answer is as follows: ‘How do small businesses operating in the Caribbean tourism sector perceive the role of AGI technologies in shaping their competitive landscape?’. This region can benefit from AI technology in their booking processes and other data-based operations, since a significant number of customers expect to be able to make use of services through their phones and online environments. To be able to answer this research question, the following sub-questions will be explored:

- How can we understand the availability of AI in the Caribbean region?
- What are the perceived advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry?
- How do businesses believe AGI might enhance or disrupt their operations and the tourism experience within the region?
- What are the operational competencies needed to inspire growth in the industry?

A qualitative approach will be used to investigate this issue by approaching 7 industry experts within the Caribbean islands. This will ensure a topical and current representation of the issue and allow opportunities for the industry to add to possible solutions that have long lasting effects.

### *1.1 Artificial Intelligence*

Different types of AI can be categorized as Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI) (Kuusi & Heinonen, 2022). ANI often outperforms humans in mundane, specific and repetitive tasks such as truck driving, gaming, and medical diagnostics. AGI refers to the hypothetical capacity of an intelligent agent to comprehend or learn any intellectual task that a human can. ASI, on the other hand, has the ability to set its own goals independently of human awareness and understanding. It is important to notice here that ANI and AGI are the most dependent on human intervention and surveillance, while ASI could surpass human understanding. For the purposes of this research, AGI (read as AI in the coming chapters) will be used for further analysis. This is because this type of AI is the most frequently used by the travel industry to identify valuable insights about services and customer experiences, assisting in managing capabilities that provide advantages over competitors (Zsarnoczky, 2017).

An AI system collects and senses external information, processes it to understand, acts to achieve predefined goals, and learns from its own experiences and past knowledge. AI operates similarly to humans when it comes to processing, learning, making decisions, and drawing inferences from provided data using intelligent machines and data. The primary objective of AI is to enable machines to perform tasks autonomously, without human intervention. One of the types of AI used in the tourism industry are AI-powered chatbots (Popesku, 2019).

The study by Popesku mentions that AI-powered chatbots play a crucial role in the tourism industry. The term "chatbot" combines "chat" and "robot," clearly indicating their purpose. Chatbots are computer programs designed to simulate human conversation using natural language (Popesku, 2019). The first chatbot, ELIZA, was developed in 1966 to deceive users into believing they were conversing with a human. Since then, chatbots have significantly evolved, and their primary applications include retail, customer service, decision-making support, advanced payment systems and online community building. Some well-known examples of chatbots that are powered by AI are OpenAI's ChatGPT and Microsoft's Copilot.

Given their proven effectiveness and substantial market potential, the use of chatbots in the tourism industry has grown accordingly. As tourists increasingly seek reliable information sources, travel chatbots are designed to meet these needs. They enhance the travel experience by assisting tourists with all aspects of their journey: from booking to providing general travel advice.



Furthermore, despite the ongoing debate over the positive and negative impacts of AI and robotic technologies on service quality in the labor-intensive tourism and hospitality industry, these types of technologies are mostly used by businesses such as accommodation, travel, and transportation sectors (Kılıçhan, & Yılmaz, 2020). Additionally, their application in physical spaces such as airports, museums and tour guiding is noteworthy according to this study. Companies in the tourism and hospitality sector are increasingly adopting AI and investing in robotic technologies to enhance their operations and deliver higher quality services. While it can be argued that it is currently not financially feasible for these businesses to fully implement all their services using these technologies because of the high implementing costs, it is anticipated that the reliance on AI and robotic technologies will grow as both businesses and consumers become more accustomed to them (Samara, 2020).

The hotel industry is likely the frontrunner in adopting AI technology in the Tourism industry (Chi et al., 2022). However, various tourism and hospitality services need different approaches to implementing this technology. According to the study done by Chi et al. (2022), tourists' overall willingness to accept AI service devices is notably lower for hospitality services compared to, for example, airline services. This may be because tourists perceive airlines as offering more utilitarian services, leading them to prioritize the practical value of these services over those provided by hospitality services, which usually require a more personal approach. Although this is a possible explanation, the adoption of AI can undoubtedly have benefits for the industry. This will be further proven during the course of this research.

The next section will delve into the focus on tourism businesses in the Caribbean and why this is particularly important for several important and interrelated reasons.

### *1.2 Social and scientific relevance*

The Caribbean is at a precarious stage in its development. Unemployment, poverty (up to 21% in some cases) and low growth, as well as lingering challenges to small business growth and development are issues which require urgent attention (Baisotti 2021). Furthermore, there is an acknowledgement that scientific research takes place only within particular contexts. Grant and Perren (2002) have for instance called for the broadening of perspectives in research on small business entrepreneurship in the Caribbean region. This suggests that there is a place for more research within the wider scholarship on the themes of this special issue generally and in a

developing and SIDS context. In these countries, it's crucial to seize the opportunity promptly. The market should be encouraged by governments and industry specialists through the implementation of various measures to create chances for new businesses to offer sustainable, affordable solutions that foster growth and incentivize technological adaptation. Additionally, due to recent technological developments in the field of AI, there have not been many studies within the context of AI in the tourism sector. Kırtıl and Aşkun (2020) did a meta-analysis where a significant amount of documents were analyzed to discover when AI in tourism became more interesting. The study shows that before 2017, three studies focused on this topic whereas after 2017 there was a 8.36% growth rate seen.

According to Table 1 in Appendix 1, there is a decrease in interest which can be explained by the diminishing AI popularity peak after 2018. It may be related to the fact that in 2017, Skift, the leading industry intelligence platform offering media, insights, and marketing to key sectors of travel, identified artificial intelligence as a major trend in the tourism industry (Popesku, 2019). Furthermore, the study shows that most of the research available was done to increase forecasting of tourist arrivals and tourist recommendations using AI (Kırtıl and Aşkun 2020). This validates the necessity to explore the implementation of AI for internal processes within the tourism sector, as a rise in customer numbers results in a corresponding increase in customer data processing requirements (Kırtıl and Aşkun 2020).

At the World Economic Forum (WEF) Annual Meeting 2018, CEOs of key sectoral companies highlighted three crucial priorities for transformation in the Caribbean region: attracting and enhancing skills to tap into an untapped digital market, fostering collaboration throughout the built environment value chain, and embracing advanced technology extensively (Parrado, September 13, 2023). The article also explains that to support entrepreneurship within the AI technology environment, businesses must be provided financial incentives, funding access, and mentorship programs. Collaboration among startups, established businesses, and research institutions must be promoted to boost AI-driven entrepreneurship. Additionally, Kuusi & Heinonen (2022) emphasize that nations should avoid isolating themselves in their adoption of AI. Instead, they suggest embracing global cooperation in AI development to avoid fragmented approaches. The differences in global rates of progress in tackling AI challenges present risks, including the absence of international agreements on AI use and insufficient sharing of AI research, as mentioned by Kırtıl and Aşkun (2020).

This thesis will therefore dive deeper on the points made at the WEF to utilize technology, specifically AI technology to enhance business operations in the Caribbean and how this can be implemented into small businesses within the Tourism sector because they are key in driving economic growth in this region (Spencer, & Spencer 2019).

### *1.3 Chapter introductions*

The second chapter will focus on the theories needed to support and explain the research topic. It is crucial to use theory to explain practical issues so utilization and recommendations are based on scientific proof. Additionally, the third chapter will discuss the process of data collection and the data analysis will be explained after to give the reader an overview of what steps were taken to conduct this research. After this, the fourth chapter will cover the results that were derived from the interview data and these will be discussed. This will give a deeper understanding of the issues at hand so recommendations can be well placed. The last and fifth chapter will present the conclusion and consist of an answer to the research question, the sub-questions and will discuss possible flaws in the research.

## 2. Theoretical Framework

### *2.1 Importance of technology in the Caribbean Tourism sector*

Since it is crucial for the global travel and tourism industry, Caribbean Small Island Developing States (SIDS) are increasingly realizing the significance of integrating technological tools into their tourism product development and policies. The tools utilized in travel have evolved to become faster, smaller, more intelligent, and seamlessly integrated into the user's surroundings. According to previous studies, an average traveler explores approximately 22 travel-related websites before finalizing a vacation booking. The impact of social media is also propelling the industry to unprecedented heights (Zhong et al., 2021).

Developing countries striving to uphold their tourism offerings must critically assess their readiness, willingness, and capability to embrace new technology in marketing, sales, and overall interaction with the ever-evolving tourism market. Information and Communication Technologies (ICTs) not only simplify the marketing and distribution efforts of developing countries, expanding their customer base, but also facilitate investors in accessing market and management data, sharing information, and establishing trading partnerships. Venturing into the e-business domain has created opportunities for tourism stakeholders to present fully developed web portals as comprehensive Destination Management Systems (DMS), encompassing booking and transaction facilities. This move promotes increased sales and generates additional revenue for the local economy (Spencer & Spencer, 2019).

Furthermore, technological innovation in the Caribbean region is increasingly aligned with several United Nations Sustainable Development Goals (UN SDGs), reflecting a growing emphasis on sustainable practices and economic growth (Russell et al., 2024). The digital transformation is also gaining momentum, with initiatives to expand broadband access and integrate digital solutions across different sectors, promoting innovation, entrepreneurship, and economic inclusion which relates to SDG 9: Industry, Innovation, and Infrastructure. Additionally, there is an effort to fill the gap in digital divide and improve digital literacy among youth, ensuring equal access to education and information. As research shows, few staff members in companies are adequately trained, especially those who possess a combination of theoretical, analytical, and technological skills relating to SDG 4: Quality Education. These technological innovations not only contribute to

economic resilience and innovation possibilities but also empower communities to achieve inclusive growth and meet their development goals in the Caribbean region (Russell et al., 2024).

### *2.1.1 Artificial intelligence in the Caribbean*

The implementation of artificial intelligence (AI) has a relatively recent history. This development is categorized into three phases: inception (infancy), industrialization, and explosion. One of the first significant advancements in AI was the creation of the Turing Test by Alan Turing. The Turing Test, also known as the Imitation Game, was designed to demonstrate whether a computer could deceive a human into believing that it, too, was human. If a computer passes the Turing Test, it is considered to have achieved artificial intelligence. Recently, several generative AI language models have succeeded in passing the Turing Test by understanding, reusing, and imitating human language (Foster & Rhoden, 2020). In his 1950 article in *Mind*, Turing posed the question, "Can machines think?" and formulated the Turing Test as part of his exploration. Alan Turing's research and the Turing Test are widely regarded by many scholars as the start of AI research. AI and automation are anticipated to drive the Fourth industrial revolution, also known as the Second Machine Age, which is characterized by a variety of emerging technologies that integrate the physical, digital, and biological elements. These innovations will influence all fields, economies, and industries, potentially reshaping our understanding of humanity. The developments in computers and information technology have enabled these systems to learn and execute intelligent tasks that were once exclusively performed by humans (Foster & Rhoden, 2020). These tasks include recognizing emotions in speech, translating languages, engaging in conversation, navigating, and aiding in decision-making through neural networks and other AI algorithms.

The greatest challenge for AI and automated robots is the ability to acquire, store, understand, and ultimately transform knowledge from the world into intelligent actions because the region still has to catch up on digitization of existing data. Furthermore, there is also the Caribbean AI Act, with the objective of regulating the development and use of AI in the Caribbean region. It aims to ensure that AI technologies are developed and implemented in a manner that promotes ethical standards, transparency, accountability, and inclusivity. The Act addresses key issues such as data privacy, bias in AI systems, and the socioeconomic impact of AI, while also encouraging innovation and the responsible use of AI for sustainable development in the Caribbean

(UNESCO Caribbean AI Policy Roadmap, 2021). This policy roadmap mentions the potential of security threats such as cyber-attacks if there is a rise in the use of AI. Recently, both cyber criminals and ethical hackers have managed to attack AI systems, influencing the functionality of machine learning and large language models. Their breaches have been so effective that cybersecurity experts in Western countries are struggling to keep up. This highlights the urgent need for better AI security and regulations (UNESCO Caribbean AI Policy Roadmap, 2021).

However, this can be seen as a problem for the future since integrating AI in the region in itself seems like a challenge. There are some challenges when it comes to the implementation of AI into the everyday lives of the local people, and within the business community. For example, in the study done by Foster & Rhoden (2020), attitude towards AI on the island of Jamaica reported a majority of the companies were curious to know more about the possibilities to apply the technology into their organization. Furthermore, since mass tourism is an important part of the economic landscape in the Caribbean (Jurgens et al., 2024), customer expectations could be a driving force for local small businesses to adopt AI into their operations for better processing of customer data and stay ahead with for example, large hotel chains who possess the means and manpower to attract customers (Jurgens et al., 2024).

## *2.2 Conceptual framework*

To understand the role of AI in business operations, we have to explore why this technology is important for further development and how we can explain the implications of accepting this into small businesses. Some concepts that can assist in making sense of this will be discussed in the following chapter.

### *2.2.1 IT-capabilities*

The first concept that will be explored in relation to the research question is the concept or theory of IT capabilities discussed by Wamba-Taguimdje et al. (2020). Since AI has already reshaped the fundamental framework of organizations and their interactions with the surrounding environment. The impact of AI extends to an interesting approach to information management, presenting organizations with both challenges and significant opportunities. However, capitalizing on these opportunities requires a shift in culture, mindset, and skill sets. The theory is defined by Wamba (2020) as the organization's capacity to integrate its organizational, human, and material

IT resources to generate value for the organization. In the case of small businesses in the Caribbean, some barriers to adopting IT capabilities include both economic and technical aspects. As mentioned in the introduction by (Mazzucato, (2023); Cepal, (2021) and Kılıçhan, & Yılmaz, (2020)), some of the challenges include the substantial costs associated with implementation and maintenance, the necessity for supportive infrastructure, the scarcity of usable data, and the restricted applicability to certain problem classes. Equally significant are the social barriers, such as an increased reliance on non-human entities, concerns about job security, a lack of knowledge and comprehension of potential benefits, safety issues, a lack of trust, and challenges in obtaining diverse stakeholder perspectives. Nevertheless, these social barriers are often framed as deficiencies in certain knowledge or trust, for example, that can be overcome with careful management. This acceptance is crucial for those who will either utilize the technology or be replaced by it (Cubric, 2020).

### *2.2.2 Flexibility*

Another concept that might not seem conventional but has been significantly impactful in this region is the notion of flexibility. According to Poon (1990), adopting a flexible specialization approach has become crucial for advancing development. However, this article warns against a potentially risky optimism in the developing world that stems from endorsing the notion of small-scale, flexible specialization proposed by Piore and Sable in 1984. The danger lies in mistakenly associating flexibility solely with a small scale. The argument contends that small size might not be necessary, and certainly, it is not a sufficient condition for achieving flexible specialization. The critical factors for flexible specialization are found in information technology applications, networks, synergies, system gains, scope economies, and production and organizational flexibility, rather than simply relying on small size. This perspective is illustrated by examining the Caribbean tourism industry.

The travel industry not only facilitates reaching a destination but also encourages travelers to explore it (Gupta et al., 2023). Numerous stakeholders, including healthcare (Nasseef et al., 2021), security (Chiu et al., 2009), and return travel services, play a role in supporting the industry by processing substantial amounts of information to enhance operational effectiveness. For example, travel agents, online travel agencies, tour operators, and regional tourism organizations indirectly assist the industry by helping tourists choose various combinations such as air travel,

accommodation, hotel transfers, and sightseeing (Gaur et al., 2021). This collaborative approach provides each party with the opportunity to adopt innovative technologies.

Summarizing, while the concept of small-scale flexibility may hold some appeal, achieving true flexible specialization requires a more nuanced approach. As exemplified by the Caribbean tourism industry, success lies in leveraging information technology such as AI, fostering networks, and embracing operational flexibility across various stakeholders. This collaborative ecosystem, supported by innovative technologies, empowers all parties to thrive within the dynamic tourism landscape.

### *2.2.3 Organizational information processing theory*

Organizational Information Processing Theory (OIPT) hypothesizes that an enterprise should efficiently organize and utilize information while operating interdependently and within a specific timeframe. The theory emphasizes three key aspects: (1) the information processing requirements; (2) the infrastructure's ability to process information within the ecosystem; and (3) the necessary capacity and capabilities to achieve optimal performance. OIPT provides a framework for understanding how enterprises can effectively manage and utilize information to enhance their performance.

The three key aspects are detailed as follows;

1. *Information Processing Requirements:* This aspect refers to the amount and type of information an organization needs to process in order to make effective decisions and operate efficiently. Different tasks and environments generate different levels of uncertainty and complexity, which in turn determine the information processing requirements. For example, a company operating in a highly dynamic market needs to process a large amount of diverse information quickly to respond to changes.
2. *Infrastructure's Capability to Process Information:* This focuses on the organization's ability to collect, process, and disseminate information. The infrastructure includes technological tools (such as information systems and databases), processes (like communication channels and workflows), and human resources (such as expertise and skills). Effective infrastructure ensures that information flows smoothly within the organization, enabling timely and accurate decision-making. For instance, advanced data



analytics systems can help a company process vast amounts of data to extract actionable insights.

3. *Capacity Requirements and Capabilities*: This aspect looks at the organization's capacity to handle the necessary volume of information and the capabilities required to achieve optimal performance. Capacity refers to the volume of information the organization can process, while capabilities include the skills, knowledge, and tools necessary to utilize this information effectively. Achieving the right balance between capacity and capability is crucial for optimal performance. For example, having a robust IT system without trained personnel to operate it would undermine the organization's ability to process information effectively.

In essence, OIPT suggests that for an organization to perform optimally, it must align its information processing needs with its processing capabilities and infrastructure. This alignment allows the organization to handle the complexity and uncertainty of its environment effectively, thereby improving decision-making and operational efficiency. One organization which advocates for the Caribbean tourism sector is the Caribbean Hotel and Tourism Association (CHTA). They represent hotels and tourism-related businesses in the Caribbean. The CHTA unites the private sector community and serves as a representative to governmental authorities, regional bodies, and international organizations. According to a guidebook written by the organization's technology task force, AI is essential for enhancing operational efficiency in the travel and tourism sector. It optimizes flight routes, manages inventory, automates customer service inquiries, and processes bookings, all of which help businesses cut costs and improve service quality. For example, predictive analytics can forecast travel demand, allowing airlines and hotels to adjust prices dynamically and manage resources more effectively. According to CHTA, AI will maintain its transformative impact on travel and tourism within the region (CHTA, 2023). One of their goals is to stimulate emerging technologies like augmented reality (AR) and virtual reality (VR), integrated with AI, to further enrich the traveler experience by providing immersive travel planning and exploration tools. Moreover, advancements in AI will continue to enhance operational efficiency, safety, and sustainability within the industry.

Similar to what the WEF proposed, this guidebook also contains some specific points to bring the region to that point of acceptance and willingness to adopt AI. The most important

expected points of action within a business are to establish clear objectives about the prospected use of AI, to develop a data strategy and cultivate a culture that is ready for AI. Firstly, prior to implementing AI, it is essential to establish clear, achievable goals. This point encourages to determine what the problems are that are needing to be solved or what the processes are that need improvement. This ensures that the solutions align with the business goals and provide measurable value (CHTA, 2023, p.7). It is also important to know that not all problems require AI to be solved. So, prioritizing use cases based on their potential impact, feasibility, and alignment with the overall business strategy is crucial. This helps focus resources on projects with the highest return on investment.

Secondly, data quality is an important aspect of growth within the industry: AI systems depend on data to learn and make decisions. Ensuring that data is high-quality, relevant, and diverse is fundamental to the success of AI projects and organizations. Companies need to invest in processes for data cleaning, preparation, and enrichment to enhance AI performance (CHTA, 2023, p.7). The last point has to do with preparing a culture that is ready for this type of technology. By building AI literacy and encouraging collaboration which has to do with the capabilities of a company, small companies in the Caribbean can be motivated to confidently use AI. Fostering an AI-ready culture involves educating and training employees on AI technologies and their potential impacts. This empowers teams to embrace AI tools and fosters a more innovative organizational culture. Additionally, the organization aims to leverage technology to improve industry efficiency, offering discounted registration to the Hospitality Industry Technology Exposition and Conference (HITEC), to educate members on innovative technological solutions in the hospitality sector. Establish strong data governance frameworks to manage data access, privacy, and security. Implement ethical guidelines to ensure that AI systems are fair, transparent, and free from biases. Furthermore, AI implementation often requires multidisciplinary teams, including data scientists, IT professionals, and domain experts. To ensure successful integration of AI, these groups must work together.

Taking all of this into account, it is illustrative to say that CHTA recognizes the transformative power of AI for the region's tourism industry. Their guidebook outlines a clear roadmap for successful AI adoption, emphasizing the importance of setting achievable goals, prioritizing the way data is used, and ensuring high-quality data. Building an AI-ready culture

through employee training and collaboration is equally crucial. By fostering innovation, ethical considerations, and strong data governance, the CHTA empowers businesses to leverage AI for enhanced operational efficiency, improved customer experiences, and overall industry sustainability. This proactive approach positions the Caribbean tourism sector to thrive in the dynamic landscape driven by artificial intelligence.

#### *2.2.4 Resource-based view (RBV)*

Another theory building on the OITP is one that focuses on using AI as a competitive advantage; the resource-based view (RBV) (Krakowski, et al., 2023). This theory explains the theoretical mechanisms linking resources to competitive advantage. It highlights the cognitive capabilities of humans as a key source of advantage because of their heterogeneous distribution, limited availability, and difficulty in imitation. According to Krakowski et al. (2023), these capabilities lead to performance differences when utilized by managers for strategic decision-making and problem-solving. However, the RBVs predictions about how AI adoption impacts competitive advantage in decision-making are not definitive or clear. If AI replaces human cognitive capabilities, the RBV predicts that the advantage provided by these capabilities will diminish. This is because AI, as a technological resource, can be reproduced at nearly zero marginal cost and is relatively easy to imitate, unlike human cognitive capabilities which are unique and harder to replicate. Companies with more resources than their competitors are likely to be more competitive, as long as they make good decisions (Spencer, & Spencer, 2019)

In the context of AI in the Caribbean tourism sector there are some potential considerations. Firstly, the current advantage detected is that Caribbean tourism businesses have unique human skills in various areas such as the understanding of the region's attractions, resorts and other hospitality based options as well as the customer service which is built on hyper-personalized interactions with tourists. AI could disrupt this advantage. This could be the case in the form of standardized services where AI-powered chatbots might handle basic inquiries, potentially reducing the value of human customer service expertise and connection. Additionally, data driven decision making based on AI algorithms could analyze trends and preferences, however this could mean a replacement of human-decision making in areas like marketing or tour planning. Ultimately, since speed and scale are becoming increasingly important Caribbean businesses could

develop unique AI capabilities that become a new source of competitive advantage (Spencer, & Spencer, 2019)

### *2.2.5 Types of AI in the Tourism industry*

Various scholars have investigated the use of several types of AI and their application to the Tourism industry. A profound analysis of work was done by Doborjeh et al. (2022), where different types of AI were evaluated on their effectiveness and application to the Caribbean tourism industry. Some of the main analytical AI methods which are applied in the tourism industry will be discussed in this chapter.

In the hospitality and tourism industry, Machine Learning (ML) algorithms are frequently applied to operational aspects such as hotel services, price forecasting, and customer demand prediction (Doborjeh et al., 2022). The two types of AI relevant for this research were the Artificial Neural Networks (ANN) system and Deep Learning networks (DL) (Doborjeh et al., 2022). An ANN is like a brain simulator built with layers of connected processing units. These units, called artificial neurons, receive information (inputs), process it using a special function (activation function), and then send a signal (output) if it meets a certain ceiling. Simple ANNs have three layers: the input layer which receives the initial information, the hidden layer(s) which processes the information and the output layer which provides the final result. More complex ANNs have more hidden layers and more processing capacity within each layer. This increased complexity allows them to tackle tougher and more complex problems. Since ANN are a component of DL, these elements play a crucial role in determining whether something qualifies as AI.

The Deep Learning (DL) techniques are excellent at analyzing complex, high-dimensional data (Zhong et al., 2020). Compared to traditional Machine Learning, DL offers better accuracy in both prediction and detection tasks. Furthermore, Zhong et al. (2020) mentioned in their work that an experiment done by Chang et al. (2020) successfully applied DL-based Natural Language Processing (NLP) to analyze hotel reviews. This allowed them to identify management responses and action points by combining various features within the reviews.

Driven by technological advancements in AI, robotics, and big data, the hospitality and tourism industry are evolving fast in the Caribbean (Doborjeh et al., 2022). An example given by these authors is that AI-enhanced hotel and tourism operations and management systems are

transforming it into a more intelligent hotel and tourism sector. Additionally, various kinds of AI are being explored to emphasize its usefulness such as robotics, virtual reality/augmented reality (VR/AR) and chatbots (Doborjeh et al., 2022; Choi et al., 2020; Zhong et al., 2021)

The International Federation of Robotics (IFR) defines a service robot as a robot that performs tasks for humans or equipment without the application of industrial automation. In hospitality and tourism, robotics are primarily utilized to enhance production management and customer engagement in hotels, restaurants, and airports (Tuomi et al., 2019; Borghi and Mariani, 2020; Choi et al., 2020). The advantages of incorporating robotics in these industries include improved service quality, reduced labor costs, and increased operational efficiency in hotels (Doborjeh et al., 2022). The study found that better experiences are being reported by hotel guests when robot services are provided. Hotel robots can mimic human cognition and behavior, enabling them to recognize and anticipate guests' needs and deliver effective service. Zhong (2021) found the same by studying the impact of robotics on consumers' purchase intentions in hotel services (Zhong et al., 2021). In the study it is mentioned that other literature confirms how advancements in robotics could improve quick-service restaurant operations in the Indonesian restaurant industry. Their system monitors customer arrivals, initiates cooking upon arrival, and provides employees with precise instructions to expedite cooking and service, thereby reducing waiting times. This data is then integrated with historical sales information to predict the demand for specific food items.

VR technology typically utilizes a VR headset to simulate a three-dimensional (3D) and digital experience (Doborjeh et al., 2022). In the tourism and hospitality sectors, VR technology is gaining popularity (Han et al., 2014; Loureiro et al., 2020). These industries use 3D videos to create virtual travel, hotel tours, and booking interface experiences for customers. Additionally a chatbot or Virtual Assistant (VA) is a software program that interacts with users in a natural language. By 2025, it is expected that 85% of customer interactions with companies will occur without human involvement globally (Doborjeh et al., 2022). One type of chatbot that has been gaining popularity is the emotion-related chatbot, which allows the virtual assistant to convey emotions. The goal with this emotion-related chatbot is that it can create a more genuine interaction with customers and function as audio tour guides, allowing travelers to navigate and learn about each location independently.

The hospitality and tourism industry is undergoing a rapid transformation fueled by advancements in AI, robotics, and big data. AI-powered systems are streamlining operations and management, while robotics are enhancing guest experiences and operational efficiency. Virtual Reality allows potential tourists to explore destinations virtually, and chatbots provide 24/7 customer support and personalized interactions. As these technologies continue to evolve and be integrated in the day-to-day operations of various organizations, the future of hospitality and tourism promises to be both innovative and centered around guests.

### 3. Research design and methodology

This research has been carried out using qualitative expert interviews, conducted by the researcher among industry experts and representatives of several small businesses in the Caribbean region. These in-depth expert interviews focused on the perception of the individuals when it comes to the utilization of artificial intelligence to improve business operations. This chapter provides detailed information regarding the general research design, operationalization and how the data was analyzed.

#### *3.1 General research design*

Considering the style of this question, qualitative research was chosen as the method to use for doing the research. Since this encompasses what qualitative research aims to achieve, namely meaning-making processes and understanding, this research method suits the research question best (Kitto et al., 2008). Additionally, the topic studies how technological advancements such as AI can help boost business operations for small enterprises in the Caribbean.

The research has been done by qualitative research which gives the participants the chance to speak out about their perception, how they experience the use of AI for business operations, as well as any challenges in implementing AI for internal business operations. Since the focus was on understanding individual expert views, experiences, and opinions, interviews will be conducted (Crabtree, 2006).

The research question explores how small businesses in the Caribbean tourism sector view the potential of Artificial General Intelligence (AGI) to shape their competitive landscape. This topic was chosen for several compelling reasons. First, there is an urgency for solutions within the region. As mentioned in the introduction, the Caribbean is facing significant development challenges with low productivity and rising unemployment. AI technologies could offer potential solutions to address these issues. Additionally, the policy and innovation landscape in the Caribbean is fostering innovation for growth, with initiatives like the Caribbean AI Act. Investigating the role of AI aligns with this forward-thinking approach. Furthermore, the tourism industry is rapidly evolving since the rise of social media because this has fueled tourism demand, leading to a growing need for high-quality services (Cubric, 2020). This research can provide

timely and valuable scientific insights to guide development efforts in the Caribbean tourism sector. This research approach ensures that the Caribbean island growth strategies are based on a solid scientific foundation.

### *3.2 Operationalization*

Table 2. *Interview operationalization*

To explore the availability and impact of Artificial Intelligence in the Caribbean region, this qualitative study will conduct expert interviews, focusing on several key sub-topics. These interviews will provide insights into the perception of industry experts regarding the implementation gaps, roles, advantages, obstacles, and potential influences of AGI on businesses, particularly in the tourism sector. Firstly, semi-structured interview questions were used to guide the interview. The questions were divided into four topics with subtopics. These will be briefly explained in the following paragraph.

The availability of AGI in the Caribbean region, the perceived advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry, how businesses believe AI might enhance or disrupt their operations and the tourism experience within the region and the operational competencies needed to inspire growth in the industry. Focusing on these topics, various sub-topics were identified such as; Implementation gap of AI in the Caribbean region and the role of AI in the region. An example of an interview question was; ‘What do you think is the biggest constraint in implementation of AGI in the Caribbean region’. For the second topic, the sub topics were: influence on small businesses and Advantages and obstacles with an example interview question; ‘In what way does the implementation of this technology influence your business in the short term and in the long run?’. The third subtopics consisted of questions about the ‘competitive edge’ and ‘operational enhancement’. An example of an interview question was; ‘In what way do you think AI can enhance the overall operations in your business?’. The last subtopic specified about the competencies needed to inspire growth in the industry. An example of a question was; ‘What are the core competencies that need the most attention to realize growth?’.



By addressing these sub-topics through targeted interview questions, this thesis aims to provide a comprehensive understanding of the current state, challenges, and potential of AI in the Caribbean region, with a specific focus on its impact on the tourism industry and small businesses. An overview of more interview questions can be found in Appendix 3.

The interviews started with an introduction of the researcher and a general question to get to know the expert and their background better. Here, the time was taken to make the expert feel comfortable and ensure them that the interview was confidential since they had the opportunity to demonstrate their use of AI within their business. During this stage, questions were also asked about their relation to the topic, following initial inquiries about the knowledge of the concepts that were going to be addressed and the associations between them.

After ensuring a confidential and open space for the experts, the first topic of availability of AI in the region was introduced and explored. Here, the company representatives could share in what way their company was willing to develop using AI, how they perceive the technology to be accessible and in what way the government played a role in their perceptions. Furthermore, the conversation included questions about the advantages, obstacles and implementation of AI within the tourism industry. The next topic included questions about the use of AI as a competitive edge and in what way the technology can enhance operational activities within the tourism business. Lastly, specific questions were included regarding the operational competencies needed to realize growth and which ones were lacking in the current landscape. The investigation also included questions about possible outside influences that could hinder the development of AI in the region.

### *3.3 Ethical considerations*

Before conducting the interviews, participants were sent an email containing a document with information about the study. This document included an explanation of what is meant by AI, why this study is being done and what the goal of the interviews were. Additionally, all interviewees were provided a consent form which they had the option to fill in or give face to face consent during the interview. This is why at the start of every interview, consent was verbally established and this can be detected in the transcripts provided. At the start of the interview, an introduction was provided about the background of this research, about the researcher and that an honest opinion and experiences are the only aspects needed to successfully conduct the

conversation. Additionally, all experts were provided with the possibility to share their expertise in any way they find fit. Participants were assured of complete confidentiality, with all interview data used solely for the researcher's graduation project. Lastly, all experts were informed that any information lacking could be clarified and they could end the conversation if the circumstances were such. All personal information would remain private and their names would not be used for the safety and privacy of their businesses.

### *3.4 Sampling*

Specifically, fifteen one-on-one interviews are chosen as the most suitable method for collecting data, providing an in-depth insight into the challenges faced by experts in the field when implementing or considering AI for their businesses. Purposive snowball sampling will be used for participant selection, requiring an information-rich population that meets certain criteria and may assist in reaching the same target group (Campbell et al., 2020). The selected population should hold a senior position in their company, possess knowledge about the topic, and be actively involved or interested in AI implementation in their work. Recruitment was facilitated through the researcher and supervisors' networks. The population was acquired by using the network of the researcher and through snowball sampling. Meaning that from initiation through personal networks, the first few experts were acquired. Following this, these experts referred to other industry experts that fit the required profile.

This includes the professional and personal network of the researcher. Additionally, company representatives were approached using various social platforms such as LinkedIn and Facebook. On LinkedIn, company representatives were approached on their profile with a personal message explaining the goal of the research and a call to respond if they were interested in participating in the research as an expert. Details like the topic of the research, the nature of the type of research and contact details were shared in the message so they could respond in their preferred way. Additionally, several groups were joined on LinkedIn such as the Caribbean Community of Capitalists, Business Executives & Entrepreneurs (CCCBEE) to find executives and experts in the region. The list of members was then scanned to filter companies within the tourism industry such as hotels, tourism agencies and spa & wellness centers. After this, the experts were approached with a personal message or an invite to connect so the researcher could send them a message to explain the research. After identification and interest, an email with a thorough

introduction to the research topic and sub questions was sent to the prospects so they could prepare for the interview before it was conducted. An example of this can be found in the Appendix 3 of this thesis. The experts were also given several dates to choose when they were available for the online interview and informed of what was expected of them. The experts were also approached through a telephone call if this was more convenient for them.

Once identified, the researcher approached the experts through e-mail messages containing information about the research topic and its relevance and what is expected from them and telephone calls to explore possible interest.

### *3.5 Data collection*

The interviews were recorded to collect the qualitative data. A transcript was made after every expert interview by using the automatic transcript from Microsoft Teams and listening back to the recordings to add or change any information that got lost in translation because some of the interviews were done in Dutch. The transcript was then investigated and cleaned up to remove any unnecessary information such as stop words to make analysis easier. The transcripts were enriched by notes that were made during the interview by the researcher. Every transcript was then uploaded individually in the coding program ATLAS.ti to start with the coding process. In this step, the documents were scanned to identify some general codes to start with.

Table 3 below provides an overview of the participants and the company they represented. The sessions were anonymized and pseudonyms were added to maintain the privacy of the people being interviewed. It was surprising to see that most of the participants were very open to sharing more information about their businesses and offered this voluntarily. The interviews revealed some very important and confidential information such as self-made systems, which were extremely helpful and supplemented the overall understanding of their services. The experts were incredibly open, not only discussing their internal systems but even showing them in action during the interviews. The interviews themselves varied in lengths due to the amount of detail being given by each person being interviewed and follow-up questions. This is beneficial as it indicates that the majority of experts consider this research to be highly important and relevant to current developments.

Table 3. *Information participants*

<b>Name</b>	<b>Role</b>
Ed	Owner
Alex	Owner/CEO
Danny	Managing Partner
Max	Owner
Lou	CEO
Mary	Director & Co-founder
Mo	Founder

### *3.6 Data analysis*

The outcome of the interviews provided a significant data set filled with valuable information. In order to gain clarity about the content of the different documents, it was important to strategically go through the information, therefore, thematic analysis was applied to analyze the collected data. This type of analysis is best explained by the founders of qualitative interviews, Braun and Clarke (2017). Since the research focuses on people in the industry and their views, experiences, and opinions, which can vary widely, thematic analysis helps organize and identify important codes and themes and therefore make the data understandable (Kitto et al., 2008). The method offers a comprehensive way to categorize codes into themes based on prior research. The study is grounded in a crucial theoretical foundation, providing a solid starting point for exploratory interviews with industry experts. While research has been done into this topic, competitive advantage in the Caribbean tourism sector has not been investigated extensively. Additionally, the qualitative nature offers a unique and in-depth analysis of the topic, which has been significantly scarce as mentioned in the introduction. Consequently, the contribution will significantly deepen the existing literature in a meaningful way as well as provide valuable knowledge to the business community in the Caribbean region.

In their work, Braun and Clarke (2017) explain the exact steps to take regarding the use of thematic analysis for a study. The steps are divided into six phases which will be explained below in connection to the chosen research topic. The first step in conducting thematic analysis after collecting data from the interview is the familiarization phase: in this phase the collected data was thoroughly read and it was important to be immersed in it to gain a general understanding of the content and identify initial impressions. The organization of the data was made workable by using separate documents for each company interview. This ensured a focused and manageable analysis for each individual document. Here, general remarks such as the positives and negatives that stood out and important recurring subjects can be identified. For example, during the familiarization phase it was clear that most of the data contained a significant amount of barriers mentioned by the experts although some of them mentioned that there are no obstacles regarding the use of AI in the Caribbean tourism sector. The second phase involves coding. The first time reading through the data provided a general view of topics and important subjects that were discussed and relevant for the research and allowed an in-depth understanding of the material. The coding process was both semantic and latent. This means that the codes captured the explicit, broader meaning of the data as well as latently, capturing the implicit meanings of the data and searching for the meanings and ideas behind what was mentioned by the experts (Braun and Clarke, 2017). First, some potential deductive codes were formed such as culture, challenges and opportunities for AI in the Caribbean. However, not all of these deductive codes were ultimately used. Thereafter, the coding process could start which involved labeling certain segments of the data with codes that described their content. The inductive coding process led to codes that were created such as awareness, lack of knowledge, magnifying workforce, interest, reviews etc. After this was done, the total of open codes amounted to 180 codes.

The next phase was generating themes, here the open codes were grouped into 7 code groups (barriers/challenges, AI possibilities, usage, culture, business community, operational competencies and government). These represented the most significant aspects of the data, however, they could be merged and modified. This is the next phase where the themes are reviewed and critically evaluated so they capture the nuances of the data and are well supported by the coded groups. In this step, usage was merged with AI possibilities, and government was merged with barriers/challenges which resulted into 4 main themes with sub-themes. For example, as a main theme, “AI possibilities” was accompanied by the sub-themes of custom coding, distribution

channels, marketing, effectiveness, speed, access, productivity, research, VR/AR, and fight unemployment. In order to have results that represented the data well, continual examination was needed to develop a clearly structured relationship between these categories. This makes the coding process an iterative process (Braun & Clarke, 2017). The next and fifth phase includes defining and naming themes to represent the collected data. Additionally, each theme is defined and receives a descriptive name, reflecting its essence properly. The last phase of thematic analysis includes writing and presenting the findings in a report.

During the analysis, other forms of analytical strategies were used. For example, it was important to let the interviewee speak their mind even when it was silent for some moments, this allowed them the space to think and gave them the freedom to speak without the feeling of pressure or other kinds of expectations. Additionally, comparisons were made between the West, specifically the Netherlands during an interview with a company based in Curacao because the island is part of the Kingdom of the Netherlands. This way, comparing the attitudes and cultural aspects of both countries enabled the participant to think about the reason behind these cultural and technological differences. This resulted in a broad perspective during the analysis comparing the two countries which are both on different continents.

To analyze the data, the coding software ATLAS.ti was used. Firstly, all documents that were not conducted in the English language were translated into English to enable the ease of analysis. These documents were then read and inspected to find out any wrong translations and context issues. Additionally, excess words such as significant amounts of 'yes' and personal stories that did not relate to the research question were removed. The documents were named after the person who conducted the interview, their company name and the language (English translation). Then, all the documents were uploaded into the software in their English format.

After this, coding was started by manually coding sentences and words in every document. By adding new codes and applying existing codes while coding the documents after the first, the initial coding phase was concluded. Hereafter, group codes were made through the group code button by reading the code list which is available in the Appendix 4. After the codes were grouped and formed into themes, the coding data was exported to an Excel file so the data was coherent.

The different categories, themes and sub-themes were strategically categorized by taking into account several aspects. These aspects included the context, reiteration and relevance. To

make this clear, all themes and subthemes were provided with a short explanation in relation to the research question. These explanations can be found in Table 4 below.

Table 4. *Explanation of Themes*

<b>Theme</b>	<b>Explanation</b>
<b>AI possibilities</b>	By investing in research and development around custom coding, distribution channels, and integration with VR-AR, AI can become a powerful tool for businesses to improve productivity, access, and marketing effectiveness. However, careful planning and training initiatives are crucial to manage potential job displacement and ensure a smooth transition as AI becomes more integrated into the workforce.
<b>Barriers and challenges</b>	By addressing barriers such as access and affordability, data set bias, lack of awareness: analytical thinking gap, adaptation challenges, generational differences, local vs. tourist balance, high-risk countries, limited financial support: through targeted education, promoting responsible data collection practices, and fostering a culture of innovation, the Caribbean region can pave the way for a future where AI empowers businesses and improves lives.
<b>Regional culture</b>	Striking a balance between embracing innovation and preserving cultural identity is key to ensuring AI empowers the Caribbean without compromising its unique soul. We must learn from abroad but adapt that knowledge to fit the regional cultural landscape.
<b>Business community</b>	The Caribbean business community can leverage AI to not only magnify its existing strengths but also unlock new avenues for growth and success. Investing in local talent, fostering innovation, and prioritizing customer needs are key to bridging the gap and realizing the transformative potential of AI in the region.

## 4. Results and discussion

### 4.1 Introduction

This chapter will discuss and analyze the interview results regarding the use of AI as a competitive advantage in the Caribbean region. The main themes and subthemes identified from the interviews are listed in the table below for a clear overview and will be examined in detail. Additionally, the researcher will provide a detailed analysis of the topic using the collected data.

Table 5. *Themes and sub-themes*

<b>Theme</b>	<b>Sub-themes</b>
<b>AI possibilities</b>	Custom coding, distribution channels, marketing, effectiveness, speed, access, productivity, research, VR-AR, fight unemployment
<b>Barriers and challenges</b>	Access, adaptation, affordability, data set bias, analytical thinking, awareness, local-tourist balance, differences of islands, education, generational, high-risk countries, financial support, usage
<b>Regional culture</b>	Anxiety, cultural differences, authenticity, mentality, history, necessity, thinking capacity, foreign knowledge
<b>Business community</b>	representation, entrepreneur-driven, open space, inspiration for growth, customer-centric, magnify workforce, skilled broadly, gap

### 4.1 Availability of AI in the region

To dive into this topic as a whole, it was important to gain insights into the overall view and experiences of companies regarding the availability of AI in the Caribbean region. Due to the unavailability of AI, it is used less. However, availability was not considered an issue that companies struggled with. Majority of the participants reported that availability was an issue, so AI is not widely available for companies to use. However, when discussing the nature of what we call AI, most of the companies considered ChatGPT as an AI tool that they know. Since operational AI is not represented well enough according to the participants, the main issues with AI were



awareness and financial capacity. The following was stated in an interview by Danny: “There isn't very much. In my opinion, there is not a lot of awareness about what AI can do for an organization, what the Opportunities are..” (Danny). Another remark by one of the participants was as follows: “But why don't many companies implement it? And that is "It is a pure lack of finances...” (Mary). As mentioned in the concept of OITP by Krakowski, et al. (2023) where necessary capabilities are needed to achieve optimal performance such as the tools, this capability needs to be addressed to achieve the desired positive results that come with implementing AI into the company (Spencer, & Spencer, 2019). The financial barrier is seen as an artificial barrier by the majority (four out of seven) participants. However, a small group (three executives) who have had extensive experience and held significant roles within the industry, focusing on legislation, government-related communication, and developing their own tools rather than using pre-made solutions for their companies reported that this is in fact a real barrier. Often simple AI tools like ChatGPT are free and user-friendly, allowing significant progress with the free version alone. However, more complex AI technologies, such as robots, VR/AR, and advanced chatbots, require financial investment from the company and the support of skilled professionals, such as engineers, to maintain and operate them effectively (Krakowski et al., 2022). Additionally, to safeguard their business-critical data from being accessed by third parties, companies should opt for the paid business or enterprise versions of generative AI tools.

As has been made clear so far, AI has been increasingly gaining popularity in the Caribbean region, specifically when it comes to the analysis of customer data for marketing purposes. However, this is mostly the case for larger companies such as hotel chains and companies who are related to large corporations. According to the majority of interviewees, smaller companies are either not aware of AI as an option for their business or the funding is not adequate for them to invest in this type of technology. Additionally, since small-scale operations are believed to be more flexible, this is not quite true when it comes to the Caribbean small and medium enterprises because of a hierarchy issue. It is expected that with fewer employees, shorter lines, and smaller volumes, these companies could be able to drive innovation faster. One of the company representatives mentioned the following: “The culture is, someone does something because his boss has said that he still does that and if someone wants to do something new, he will ask his boss, can I do something new and that whole layering...” (Max). This quote is a catalyst to the underlying issue of lack of knowledge and cultural differences within companies. If employees

ideate something, it is usually not being considered because top-down is the only way to bring change into the environment. Consequently, the urge for innovation has to come from the top-down to be able to bring about company-wide change. The responsibility to source fitting AI tools and make them available for the companies thus lie with executives such as owners, CEOs and founders of these businesses.

#### *4.1.1 AI possibilities*

The possibilities regarding AI are significantly present in the Caribbean. The first possibility that was mentioned by one of the participants was the creation of custom coding of AI programs. Here, the custom codes and data sets have to include local specifications such as languages and cultural nuances. Majority of the participants do see possibilities in the use of AI in smaller companies, but they all stress the importance of a proper representation in the data sets that AI works with. One example can be found below:

“...who speak many different languages and can express themselves 70 to 80% well in almost all languages, but not 100% in any language...That's a lot of data to take in and then you also have the different islands that all have different dialects...That is also a point, so actually the languages culture” (Mo)

This corresponds with the need for IT-capabilities to be in place. The scarcity of data sets is a continuing problem that can only be overcome by extensive change management. A representable data set is then set in place because local data will be the basis of this type of AI system. A perfect example of this kind of system is the system by Lou, where the AI system generates content for all departments within a company such as HR-reports, management reports and marketing output based on a piece of text written in the tone of voice of the person who wrote it. For example; The researcher attempted to compose an 'About Us' section for a fictional company, drawing from a self-written blog that included stop words and personal style elements in various languages such as Sranang Tongo (a local Surinamese language) and Hindi. An AI system was utilized to refine these elements, making a professional 'About Us' paragraph for the company website. This serves as a small example of how information processing can be done using AI as a foundation for small businesses.

Another possibility which could benefit small companies in the Caribbean region is the possibility of processing data and creating data from various distribution channels such as comparison websites where deals are made with different companies regarding accommodation, tours, restaurants and other important aspects of a tourist' time on the destination. Mo mentioned that these distribution websites work on a commission basis, where part of the profit goes to the corresponding website. However, for example prices on these websites have to be manually monitored in order to stay up to date on prices in the different seasons such as summer, when a significant number of tourists visit from Europe. One of the participants, Mo, mentioned the following:

“Hotels make a lot of use of distribution channels...The prices are not properly optimized on all these channels. For example, a hotel pays 20% commission to Booking.com or to expedia for obtaining a booking. But then they also have their best price on Booking.com instead of on their own channel's own website, so we ensure that they are firstly aware of this and that they also optimize it.”

This is in line with what the authors Romero & Tejada (2020) mention where hotels have less control over pricing when relying on intermediaries such as distribution websites because they can not oversee larger numbers of these partners. According to Romeo and Tajeda (2023), small hotels often pay much higher fees (20-30%) to online travel agencies (OTAs) to get bookings, whereas larger hotel chains which typically negotiate a lower, flat rate pay around 15%. These payments are fairly unnecessary, since the development in using sophisticated AI systems can provide in-house analysis of various tourist websites and target these same tourists to gain more profits.

This can be done through artificial neural networks (ANN) AI-systems or deep learning networks (DL) AI-systems (Doborjeh et al., 2022). An ANN is like a brain simulator built with layers of connected processing units. These units, called artificial neurons, receive information (inputs), process it using a special function (activation function), and then send a signal (output) if it meets a certain ceiling. Simple ANNs have three layers: the input layer which receives the initial information, the hidden layer(s) which processes the information and the output layer which provides the final result. More complex ANNs have more hidden layers and more processing capacity within each layer. This increased complexity allows them to tackle tougher and more complex problems. The Deep Learning (DL) techniques are excellent at analyzing complex, high-

dimensional data (Zhong et al., 2020). Compared to traditional Machine Learning, DL offers better accuracy in both prediction and detection tasks. Furthermore, Zhong et al. (2020) mentioned in their work that an experiment done by Chang et al. (2020) successfully applied DL-based Natural Language Processing (NLP) to analyze hotel reviews. This allowed them to identify management responses and action points by combining various features within the reviews. This is something that Alex demonstrated during one of the interviews. While his company is only 2 years old, he mentioned that his clientele is becoming larger because this feature is significantly in demand, especially among hotels.

While local businesses are scared of unemployment as a result of AI, wider use of the technology could actually help fight unemployment in the region. However, since 50% of the population is not online yet, the infrastructure of digital use should be tackled first. In the future, tools like ChatGPT and internal data analysis processing tools could be harnessed to educate local residents and boost the overall knowledge base on these islands (Russell, & Heath, 2023).

While AI holds great promise for the Caribbean, particularly in customer data analysis for larger companies, its widespread adoption faces hurdles. Limited awareness, funding constraints, and a lack of culturally-representative data sets hinder smaller businesses. Hierarchical company structures further impede innovation. However, AI offers significant potential for these businesses through optimized pricing using AI systems based on ANN and DL, data analysis, and content generation. To fully embrace this potential, the region needs to invest in workforce education, infrastructure expansion, and educational tools like ChatGPT alongside internal data analysis tools. Addressing these challenges and focusing on responsible AI development can position the Caribbean to leverage this technology for economic growth, cultural preservation, and a more empowered future for its citizens.

## *4.2 Advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry*

### *4.2.1 Barriers and challenges*

According to theory, many of the barriers and challenges when it comes to adopting technologies such as AI into a company include internal barriers such as knowledge gaps and

affordability. In this section we will dive into the practical challenges that participants mentioned and their relationship to the research question and connect them to the theory.

The first significant finding was that the majority (six out of seven) participants thought that obstacles that hinder the use of AI were multi-dimensional. This means that there are several reasons why small companies in the Caribbean are unable to make use of this technology. One of these reasons which had a heavy weight during the analysis of data was education and analytical thinking. An example mentioned by Danny: “Analytical thinking, It is perhaps a competency that you say, you know, if you were to improve it... It would benefit from thinking about how I can use it further?”. On the other hand, some participants (two out of six) did not see or want to see so-called barriers at all. They thought that there are endless opportunities, if only people know what to do with it. This in itself can count as a barrier, since people are not aware enough. As illustrated in the quote below:

“Barrier. I see, I don't really see a barrier, I rather see opportunities. For example, I see hotels can do much more to provide inspiration. They don't do that enough now, for example, say someone has someone who wants to be in Curaçao for 7 days. Moreover, they have no idea what they can do. If you have some kind of database of activities and you use AI, for example, to build a very nice personalized itinerary that is highly specific to the wishes of the guest. Then people are also more likely to buy a third party product, for example a tour or a car rental or whatever, or a massage from you through you, so that you can then earn commission on the third party instead of you being the one.”

This example shows us that while entrepreneurs are willing to seize opportunities, there are still ‘artificial barriers’ which hinder the growth of the industry. As mentioned by the OIPT theory, internal capabilities such as the skills and tools needed to adopt AI as a competitive advantage, and artificial barriers have to be considered to accelerate growth within the industry. As Foster and Rhoden (2020) mentioned during their study in Jamaica, people simply do not know about it. Therefore, this has to be tackled first, before companies are willing to go a step further.

Additionally, another interesting finding mentioned by Mary who was chair of the CHTA foundation representing the tourism industry was that the executives or senior representatives must strive for a locals-tourist balance. This is to avoid the islands becoming too crowded and tourists being a nuisance to locals who live and work on the islands. Here is an example:

“The biggest problems are, of course, you really have a strategy for the future of tourism for the island, right? You can't go crazy, but keep growing without knowing where you want to go, because then you fill up the island and you only have tourists and...Are the beaches full and hey, the people themselves can barely survive on them, so that is not the intention, so it is very important that this is considered.”

Furthermore, education is another aspect that had a high amount of individual codes during the analysis. Specifically regarding employees, and the younger generation who are on the verge of choosing a study major. Education is a crucial aspect according to the theories originally by Belhadi et al., 2024 and Krakowski, et al., 2023. Five out of 7 participants believe that education has to play a major role in raising awareness and driving change within the tourism industry and its use of AI. Both theories stress the application and importance of a solid knowledge base. The OIPT mentions the training and knowledge skills of employees and the RBV by Krakowski (2023) highlights the importance of resources such as knowledge and education. An example shows the following: Lou mentioned that he trained everyone in his company, which was not a massive company and consisted of about 20 people. According to Mo, the lack of local entrepreneurs on the island might be due to limited access to knowledge and opportunities. He noted, "You don't see many new starting entrepreneurs coming from the island. These are usually individuals who go to study in the Netherlands or America, and it often takes a long time for them to return, if they do at all." Alex added, "Yes, so it's also about the framework and knowledge that are insufficient.”

In these examples it is profound that training, knowledge and education play a vital role in the adoption of AI in the Caribbean region. Those who already know about the technology and its applications should educate the people who do not understand it. Additionally, higher education should include and promote the importance of technology, mainly AI, in the future and bring awareness to the younger generation of the role it is going to play. Since the region can catalyze its development, AI could assist in contributing to its development using the training of employees as well as starting to offer AI-related higher education.

An outstanding finding was one that was mentioned by Mary who held a board position in various Tourism and finance related roles. These roles allowed her to engage and communicate with the government such as the Ministry of Economic Development and gain valuable insights into their plans and goals for the region. This finding implies that people appreciate the authenticity

of the island and its people over the comfort of technology. She mentioned the following: "... it is only a small destination and people mainly want to like the authenticity, right? From the island to see that and It's about the People who make the difference."

This is the case for tourists but also a significant driver of the choice of companies to implement AI technology to serve their customers. For too long, the Caribbean has focused solely on increasing tourist numbers and economic gains, neglecting the impact on the region itself. The term "overtourism" refers to these situations. This obsession with growth hasn't considered the downsides (Peterson, 2023) where an excessive number of tourists in a destination negatively affects the perceived quality of life for residents and/or reduces the value of the desired visitor experience in certain areas. Additionally, in the study done by Chi et al. (2022) it is mentioned that tourists accept AI services less in hospitality services since this requires a more personal approach. However, AI can be of value to tourists' overall willingness to accept AI service devices and it is notably lower for hospitality services compared to, for example, airline services. This may be because tourists perceive airlines as offering more utilitarian services, leading them to prioritize the practical value of these services over those provided by hospitality services which usually require a more personal approach. An example is provided by Doborjeh, et al. (2022) who mention that AI applications, such as robotics are transforming the tourism and hospitality industries. The study reports that because hotel robots can imitate human behavior and cognition, they can recognize and anticipate guests' needs and deliver a corresponding service (Choi et al., 2022).

Furthermore, in the restaurant business, operational excellence can be achieved by using these kinds of robots as competitive edge because the AI system monitors customer arrivals, initiates cooking upon arrival, and provides employees with precise instructions to expedite cooking and service, thereby reducing waiting times, which can be a reason for customers to not attend a restaurant (Doborjeh, et al. (2022). This data is then integrated with historical sales information to predict the demand for specific food items. What is worth mentioning is the 'first come first eat' phenomenon where the first in the business will always have an advantage. Lou mentioned the following: "... First movers will, they will consume 90% of the market. So it's not only about sizes it's about when you start, so if you start early...if you start late, you will get crushed." As AI begins to gain traction in the Caribbean, it is crucial for companies to recognize

that they have the advantage of being pioneers in the region with a technology that has already been proven in the tourism industry (Choi et al., 2020).

This theme revealed that while some participants see endless opportunities with AI, the majority identified multi-dimensional obstacles which hinder its adoption. Education and analytical thinking were highlighted as key internal barriers. Interestingly, some participants felt a lack of awareness itself creates a barrier. This aligns with the OIPT theory, emphasizing the importance of internal capabilities for competitive advantage. Furthermore, balancing tourism growth with resident well-being emerged as a concern. While AI can enhance efficiency, some participants expressed a desire to preserve the island's authenticity, emphasizing tourist preference for human interaction. The study also emphasizes the need for educational initiatives to cultivate a knowledge base on AI and its applications. Overall, the findings suggest that Caribbean companies have a unique opportunity to leverage AI as pioneers in the region, capitalizing on its proven success in tourism while maintaining a balance with the islands' unique character.

#### *4.3 Enhance or disrupt operations and the tourism experience within the region*

##### *4.3.1 Regional culture*

In these countries which are mostly islands, people have a lower necessity regarding the use of technologies making things faster and which are time-efficient. Majority of the participants thought that life on the islands is more laid back and the communities are small which means that the volumes of data are not that big. Additionally, the majority also mentioned that people are wary of change and anxious about what they do not know. Ed said the following: “Yes and you have to, you have to be open to that as a company. And a lot of business entrepreneurs and people are afraid of change.”

As mentioned in the CHTA guidebook for AI in the Caribbean by building AI literacy and encouraging collaboration which has to do with the capabilities of a company, small companies in the Caribbean can be motivated to confidently use AI. According to the majority of the participants, this mainly has to be encouraged by fellow entrepreneurs. Mary said: “Awareness, you know that you have to give explanations like this, so that you can get a little less pushback and show that, right? Yes, it is also good for the island and for ourselves if we just go along with all the developments that are happening.”



Additionally, the cultural differences of life in the West as well as between the islands themselves play a significant role in the adaptation of AI. Majority of the participants mentioned that the West has a culture that is performance driven, whereas cultures on the islands are people-driven, and rooted in face to face interactions which are seen to hold more value (Samara et al., 2020). The vibrant history, diverse cuisine (blending over 90 nationalities), and diverse artistic scene offer a wealth of cultural and creative opportunities for local entrepreneurs and the community to explore (Peterson, 2023). Furthermore, Mary mentioned that there is a difference between the Anglo-Saxon islands and the Dutch islands because they have completely different histories and therefore very different development paths. We see that islands such as Jamaica attract larger groups because of the English language and islands such as Curacao attract the majority of Dutch-speaking tourists. Since language is an important part of the identity of these Caribbean islands, English speaking islands have a larger target group compared to islands speaking smaller scale languages such as Dutch or Papiamentu, according to Mary. This is confirmed by several authors such as Peterson (2023) and Jurgens et al., (2024).

The mentality of small business entrepreneurs on an island is also different in the way that they are more dependent on larger developed countries. This can be seen in the following statement: "...development in the Netherlands, which has made me think differently, But we do grow up here a bit with the mentality that we are dependent on others." (Mo). This implies that having another point of view by studying abroad and acquiring knowledge from a developed country has the ability to bring about that mindset change. However, it is important to notice that growing up on the islands themselves does lead to a more dependent mentality and leads to a smaller urgency to innovate. Local entrepreneurs should be trained and acquire knowledge from international sources until they can independently generate this knowledge and pass it on to future generations.

In conclusion, the Caribbean's laid-back culture and emphasis on human connection may slow AI adoption. Cultural differences and a dependence on developed nations further highlight the need for educational initiatives. By working together and building AI literacy, Caribbean entrepreneurs can embrace this technology while preserving their unique culture. This knowledge-sharing will empower future generations to innovate independently, ensuring a bright future for Caribbean businesses.

#### *4.4 Operational competencies needed to inspire growth in the industry:*

##### *4.4.1 Business community*

This sub-chapter will discuss the operational competencies that the business community has to foster to inspire growth in the number of entrepreneurs using AI as a competitive advantage. First, the majority of the participants in this research agreed that it begins with the entrepreneurs, not the government. Regarding innovation, adaptation, and implementation of AI into the tourism industry, they must lead by example instead of expecting guidance from the government. Some of the interviewees mentioned the following: “The entrepreneurs themselves must play a leading role in this. They have to look for themselves..” (Ed) and Mo said; “I think it has to come from the owners of the organization itself.” Another example given by Danny; “... If you want something yourself, then you really have to go after it yourself. Consult the people in your immediate area and do your own research before you find out. I don't think I would really feel supported or guided by the government in this.”

These statements reveal that the government is not doing significantly enough to foster innovation and development in this area. When the question was asked about the Caribbean AI act that the UN has created, none of the participants were aware of this Act. While the west would think of the UN as a credible source to drive action with such an act, it was discovered that it did not reach the local entrepreneurs at all. However, all of the participants aimed at being an inspiration for the people around them, to increase awareness and hopefully inspire other entrepreneurs to use AI in their operations.

Another advantage the business community should embrace is to have the ability to magnify their workforce and attract more customers through online platforms. By applying AI tools into the company such as ANN and DL, company representatives can focus on their customers instead of time-consuming tasks. One of the participants mentioned: “And when we have tools like AI, automation and other things that we do and processes in particular, so that all those back office things take less time, so that you can give more time to the customer who wants that attention from you” (Lou). Additionally, by offering operational AI-technologies on their

online platforms like VR, customers can enjoy pre-enthusiasm and enjoy the convenience of experiencing their destination, managing expectations and more precise choices.

In conclusion, fostering AI adoption in Caribbean tourism depends on entrepreneurial leadership. Participants emphasized that business owners, not governments, must take the initiative. This was evident in their statements about needing to be proactive and their lack of awareness about the UN's Caribbean AI Act (UNESCO Caribbean AI Policy Roadmap, 2021). Entrepreneurs see themselves as role models, aiming to inspire colleagues and increase AI awareness. Furthermore, leveraging AI to streamline back-office tasks allows businesses to focus on customer service. Additionally, AI-powered online platforms like VR can enhance customer experience by building excitement and facilitating informed decision-making. By embracing these strategies, the Caribbean business community can play a pivotal role in driving AI adoption within the tourism industry.

## 5. Conclusion

This study focused on how the utilization of artificial intelligence technologies in the Caribbean region could be used as a competitive advantage within small businesses on these islands. The study investigated how the availability of AI in the region can be understood, where the opportunities lie as well as the potential obstacles regarding AI adoption. A qualitative thematic analysis was used to uncover recurring themes within the data, allowing for a deep dive into participants' experiences, thoughts, and perspectives on the chosen topic (Braun & Clarke, 2017). To explore the potential impact of AI, interviews were conducted with 7 industry leaders to investigate the tourism industry as a whole and what the operational competencies are to drive growth using this technology. The main concepts that supported the analysis were the IT-capabilities theory, flexibility, the Organizational Information Processing Theory (OIPT) theory, the Resource-based view (RBV) theory, AI technologies such as robotics, VR/AR and emotional chatbots. The following paragraphs will answer the sub-questions and research questions, providing a detailed analysis and insights into each aspect explored in this study.

### *5.1 Answer to the sub-research questions*

In the upcoming paragraphs, a detailed answer will be given to the sub-questions this study has been investigating.

#### *5.1.1 How can we understand the availability of AGI in the Caribbean region?*

According to this study, the availability of AI in the region depends on the population that is being asked. However, low-cost AI is easily available and there are no barriers mentioned regarding this from the participants, majority of the participants even mentioned that AI is widely available for everyone to use. However, tools such as ChatGPT are mainly used as a 'glorified typewriter'. On the other hand, more complex AI systems are usually more expensive to acquire and require additional expertise such as engineers and financial incentive. According to the theory OITP mentioned by Krakowski, et al. (2023), their necessary capabilities are to achieve optimal performance such as the tools and knowledge to keep the company running.

The most important aspects of this theory regarding the availability of AI are the capacity requirements and capabilities. Since this aspect has to do with the organization's capacity to handle volume and have the skills, knowledge and tools to effectively carry out the task, majority of the

participants also mentioned the importance of training their personnel to acquire these skills and knowledge. As a company owner or CEO, many participants acknowledge that the inspiration to innovate should come from them so they can inspire the intrinsic motivation throughout the organization. This confirms the OITP theory, where this kind of capability allows the organization to process information effectively and therefore pass on the knowledge and create a larger availability from the inside of an organization out to the local community. This is also confirmed when we look at flexibility, since companies are mostly hierarchical in nature, according to the majority of participants. This understanding explains why smaller companies dealing with financial problems are usually more successful if the owner has a background from work or studies abroad because they experience the development in other countries and therefore are motivated to bring those technological developments back to their islands.

For example; Alex from was inspired by an AI system that was already being used in Europe to build his own AI system to optimize business strategies within the Hotel-sector on Curacao. He mentioned that he would not know about this type of technological option, had he not left the islands for his studies. From this, we can state that the availability of AI is dependent on operational resources and capabilities an organization is willing to develop within the industry.

Additionally, although the availability has its challenges, the possibilities of AI options in the Caribbean are widely present according to the majority (six out of seven) of the participants. These possibilities include custom coding, distribution channels, marketing, effectiveness, speed, access, productivity, research, VR/AR and fighting unemployment. Firstly, even the availability of low-cost AI such as ChatGPT is not being utilized enough by the local entrepreneurs. By creating custom data sets and thus bringing the use of AI closer to the Caribbean business environment, companies can gain significantly more from using it. This also means that distribution channels for Tourism companies can be easily identified and internal development will be based on data that is accurate. Furthermore, this will create an effective environment where entrepreneurs can connect with the output of such AI systems. Creating more traffic to the islands will result in an increase in employment according to the majority of the participants, meaning as an internal capability, marketing can take a lead role in the attraction of customers who are sourced by an AI system. One popular possibility mentioned by a participant and which was also mentioned in the guidebook by the CHTA included the use of VR/AR and AI technology to further enrich

the traveler experience by providing immersive travel planning and exploration tools (CHTA, 2023).

Taking all of this into account, availability in the Caribbean region is accessible, however more complex types of AI do require an investment that is sometimes larger than the budgetary options of smaller businesses. Additionally, knowledge should be promoted about the technology through a top-down approach because of the hierarchical nature of business. Although the availability has its challenges, the possibilities of AI in the Caribbean are present according to the majority (six out of seven) of the participants. These possibilities include custom coding, distribution channels, marketing, effectiveness, speed, access, productivity, research, VR/AR and fighting unemployment

### *5.1.2 What are the perceived advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry?*

Various studies have mentioned the advantages of using AI within their business in the Caribbean region. From marketing to distribution efforts and facilitating investors to access market and management data, adopting these types of technology can assist in sharing information across the islands and establish trading partnerships among like-minded executives (Jurgens et al., 2024; Alleyne et al., 2022; Choi et al., 2020). The most significant advantages were those of speed, productivity and access to information. Firstly, as some experts mentioned, life on the islands is a more laid-back and relaxed than life in for example Europe and the United States, therefore within companies, innovation and adoption of new technologies also transpires on a slower pace. According to Qureshi et al. (2021) the business dynamics in the Caribbean are far less concerned with innovation than Asian and European countries. Adopting AI could therefore foster innovation and lead to faster analysis of data. Additionally, one of the participants mentioned that the Caribbean is dealing with productivity issues. Since productivity is a component of entrepreneurship, the region can benefit from using AI to focus on the 'boring' tasks and allow employees or themselves to focus on the customers' needs and wants (Cubric, 2020). Qureshi mentions that entrepreneurship is the cornerstone of competitiveness (Qureshi et al., 2021), this can thus promote entrepreneurship by getting rid of back office time and allow tourism companies to enhance their offerings.

Regarding the obstacles, the main findings include access to education and knowledge which leads to lower analytical thinking, awareness, affordability and the local-tourist balance. The first significant finding regarding this topic was that the knowledge and education about AI in the region is fairly minimal according to all participants. This means that local businesses do not contain the knowledge about the possibilities AI can offer to operate more successfully (Russell, & Heath, 2023), as well as human resources (such as knowledge and abilities). Decision-making that is precise is made possible by an efficient infrastructure that guarantees transmission of data throughout the company. The OITP mentions the companies capability to Process Information which also includes human resources (such as expertise and skills) to keep companies ahead of their competitors (Bulchand- Gidumal, 2022). Additionally these skills and expertise can remove the barrier of analytical thinking among employees since they are well prepared and receive the tools to develop their knowledge. Another significant issue was the fact that more than 50% of the population is not aware of the existence and operational competencies of AI according to the experts. This means that the local populations need to be informed and educated regarding the various applications of AI.

Five out of seven participants believe that education and awareness has to play a major role to raise awareness and drive change within the tourism industry and its use of AI. One other meaningful finding discusses the financial capacity of small businesses within the region. Part of the experts say that since these companies usually have smaller budget options, financial input and investment can be full of risks. Additionally, complex AI such as robots, VR/AR and chatbots require financial input from the company and involve having skilled professionals such as engineers to sustain its use (Krakowski et al., 2022). However, a majority of these experts think that finances are an ‘artificial barrier’ stating that there are no barriers regarding the use of AI. The last surprising, but quite logical finding in this study was the phenomenon of a local-tourist balance. According to one of the executives who participated in several government-level associations as board member and consultant, the islands have the probability of being overcrowded with tourists. Governments and other policy-related organizations such as CHTA have the responsibility to balance between economic prosperity which could be a result of innovation and AI, and the freedom of the local population on their homeland.

Ultimately, implementing AI can have various advantages such as faster processes and more access to information, however there are still obstacles such as awareness and affordability and balance between locals and tourists that hinder the ability of small businesses to tap into the potential of AI in the Caribbean tourism sector.

### *5.1.3 How do businesses believe AGI might enhance or disrupt their operations and the tourism experience within the region?*

The study also investigated in what way experts in the field thought that AI could enhance or disrupt their operations. Some of the results of these experiences include an anxious approach, cultural difference, necessity and authenticity. First, the majority of the experts mentioned that when it comes to the use of AI, many entrepreneurs on the island are afraid of the changes that come with it. This can be explained by the flexibility component where small scale is not the only requirement to implement change (Poon, 1990). The author mentions that there are several other requirements to foster a flexible organization that is willing to change for the better regarding the applications of information technology such as AI. These factors include the awareness of the advantages that come with AI, networking with other innovative entrepreneurs and understanding scope economies (Poon, 1990). By making people aware of the benefits from AI, organizational change can occur more easily. Furthermore, production can become lower cost when small businesses, such as SPAs and wellness resorts, attract a larger volume of customers, resulting in a larger profit and minimal production costs.

Additional to this, nurturing the authentic Caribbean culture is another important aspect that was mentioned by the participants. This finding implies that people appreciate the authenticity of the island and its people over the comfort of technology. This is the case for tourists but also a significant driver of the choice of companies to implement AI technology to serve their customers. The study by Chi et al. (2022) shows that tourists' overall willingness to accept AI service devices is notably lower for hospitality services. However, studies have found that AI applications, such as robotics who can imitate human behavior and cognition, are able to recognize and anticipate guests' needs and deliver a corresponding service so tourists will have their required service while the operation is run more efficiently (Choi et al., 2022). In this case, implementing AI therefore does not have negative implications to the overall customer experience, instead it reduces waiting times and makes the organization run smoothly (Chi et al. (2022)). Furthermore, the tourism



industry can benefit from AI from a sustainability point of view by making use of AI tools for habitat mapping (Da Silveira et al., 2021). This allows the islands to preserve one of the most important drivers behind tourism to the region, which is their nature's biodiversity.

The necessity of using AI in the Caribbean can be a counterargument for businesses. In the RBV theory, Krakowski et al (2023) stress human capabilities as a key competitive advantage because of the difficulty in imitation. By replacing human capital with AI on the islands, an important advantage could be taken for granted. AI is relatively easy to imitate, unlike human cognitive capabilities which are unique and harder to replicate, especially in the tourism sector. Even if AI is used in operations to create a competitive edge, the human touch will always be a valuable addition to the output generated by AI (Chi et al. (2022).

At last, Caribbean entrepreneurs are willing to explore the use of AI, however they are still anxious because they are a minority in the region. Additionally, cultural differences and authenticity require careful consideration by entrepreneurs, government and other stakeholders to manage change on the islands because the human factor plays a major role in attracting tourists to the region.

#### *5.1.4 What are the operational competencies needed to inspire growth in the industry?*

The statements from experts during the interviews reveal that the government is not doing significantly enough to foster innovation and development in this area. This explains why the majority of the participants thought that regarding innovation, adaptation and implementation of AI into the tourism industry, entrepreneurs have to lead by example. They expect the coming years to be an open space for companies to inspire each other to innovate and use AI, exchanging ideas and following in the footsteps of developed countries such as Europe.

By using AI, companies can magnify their workforce by offering operational AI-technologies on their online platforms like ANN and DL (Doborjeh et al., 2022; Choi et al., 2020; Zhong et al., 2021). By applying AI tools into the company, company representatives can focus on their customers instead of time-consuming tasks like scanning distribution websites and analyzing tourists reviews to optimize internal processes. Additionally, VR allows customers to have first-hand experience of the chosen destination. This way, customers can enjoy pre-enthusiasm and

enjoy the convenience of experiencing their destination, managing expectations and more precise choices (Doborjeh et al., 2022).

In essence, the operational competencies needed to inspire growth in the tourism industry include an entrepreneur-driven innovation approach, implementing AI tools to boost internal capabilities and the promotion and training of knowledgeable staff.

### *5.2 Answer to the research question*

The answer to the research question is multidimensional. Taking all of the above into account, a clear answer remains difficult, however, an attempt will be made to answer the question of how small businesses operating in the Caribbean tourism sector perceive the role of AGI technologies in shaping their competitive landscape.

Small businesses in Caribbean tourism see Artificial General Intelligence (AGI) as a potential game-changer and inspiration for their businesses as a competitive edge. By offering benefits like optimized pricing and data-driven insights. However, widespread adoption faces some obstacles. Limited awareness, funding constraints, and a lack of culturally relevant data pose challenges. Additionally, traditional company structures can hinder innovation and the local mentality resulting in lack of innovation needs to be addressed. The biggest obstacles therefore include cultural barriers and financial investment. Despite these obstacles, AI offers significant opportunities. AI systems can optimize pricing for better competitiveness, analyze data to understand customer behavior, and even generate content for marketing. Additionally, to preserve and advance Tourism within the region, AI tools can be used for ecological sustainability. To unlock this potential, the Caribbean region needs to invest in workforce education, infrastructure and digitization to support AI development. Educational tools like ChatGPT can further enhance AI literacy, however it is important for companies to make use of more sophisticated forms of AI to ensure privacy of valuable company data. Furthermore, responsible AI development that respects cultural values is crucial. By addressing these challenges and taking a proactive approach, the Caribbean can leverage AI to achieve economic growth, cultural preservation, and empower its citizens for a brighter future.

### *5.3 Reflections on the implications*

This study has significant scientific value due to the lack of research done on the particular topic of AI as a competitive advantage for small businesses in the Caribbean region. As mentioned in the introduction, scientific research on this topic has been scarce, however, more researchers are diving into the importance of AI in this region. Additionally, few studies have conducted in depth expert interviews on this topic. This type of research can assist in creating valuable insights for the region itself. By delving into the professional minds of entrepreneurs and other industry experts, stakeholders can gain specific information about the tools, challenges and important aspects of operational competencies needed to grow. It is crucial to consider the ethical implications of the utilization of this type of technology into the Caribbean space. Issues of importance include the balance between local-and tourist life, the need to foster authenticity on the islands and preserving their cultural freedom.

Experts-interviews were the perfect method for this type of research question since the perception of businesses and what they need can only be given by industry-based experts. Additionally, an in depth conversation between researcher and expert allowed for an insider view of what is playing in the heads of entrepreneurs and prominents regarding the use of AI in the tourism industry. Additionally, all of the participants mentioned that this topic needs more attention because the potential of small businesses in the Caribbean are high. This is the case for local business as well as the option for collaborations with external partners.

While the Caribbean region is diverse, there are a significant amount of stakeholders involved in the development and social issues on the islands. Since international organizations like the UN are involved with the development of AI in various ways such as the Sustainable development goals, this research adds on to the understanding of what is needed to accelerate technological change in the region. Additionally, the Caribbean region is fairly similar to other continents such as Latin America, where development is comparable because of the colonial histories and similar population backgrounds. The expectation therefore is mostly to follow in the footsteps of developed countries regarding adoption of technologies and legislation, which independent islands under a kingdom have to adhere to and islands who chose to be municipalities are subjected to direct supervision of the country they are part of.

#### *5.4 Limitations and future research*

To understand the nature of this research and its results, it is important to consider possible limitations as well. One of the limitations includes the scope of the research that has been done. This study includes seven industry experts from different countries of the Caribbean, however the Caribbean region contains 21 countries and islands which are unique in themselves. Therefore, the study does not capture the scope of experiences, thoughts and perspectives on the topic. Generalizability can therefore be restricted. Furthermore, the companies that were interviewed did not all use more complex forms of AI yet. This means that the operational experience of those who did not yet use these types of AI are limited. However, the study revealed some interesting insights that could be utilized for further research. Some of these could be a deep dive into the cultural identity of these islands and how this can be better represented through AI. Additionally, further research could explore the use of VR and AR in its application to the tourism industry. This could significantly improve the tourist experience and provide reliable insight into long distance destinations and give a taste of their vacations.

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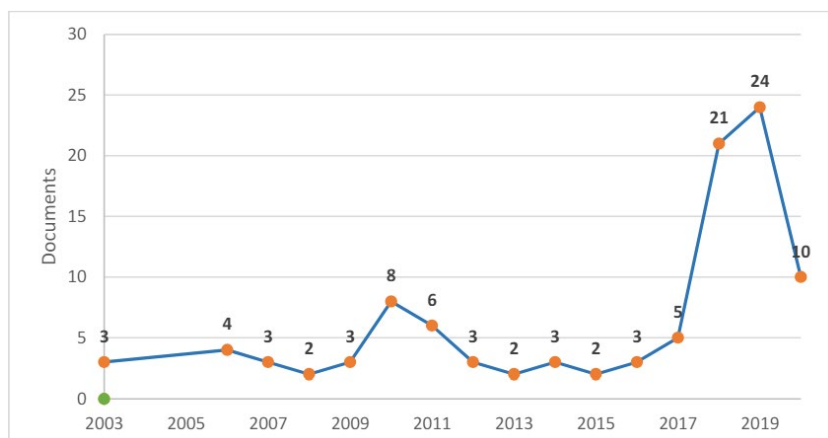
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## APPENDIX 1

Table 1. *Growth rate analyzed documents about Artificial Intelligence research in the tourism sector*



## APPENDIX 2. Interview operationalization

Research sub question	sub-topic	Example of interview questions
How can we understand the availability of AI in the Caribbean region?	Implementation gap of AI in the Caribbean region	- What do you think is the biggest constraint in implementation of AI in the Caribbean region
	Role of AI in the region	- What role does AI currently play in the Caribbean, specifically the Tourism industry?

<p>What are the perceived advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry?</p>	<p>Influence on small businesses</p>	<ul style="list-style-type: none"> <li>- In what way does the implementation of it influence your business in the short term and on the long run?</li> </ul>
	<p>Advantages and obstacles</p>	<ul style="list-style-type: none"> <li>- What are the advantages of AGI according to you for your company?</li> <li>- What are the obstacles that hinder the use of AGI?</li> </ul>
<p>How do businesses believe AGI might enhance or disrupt their operations and the tourism experience within the region?</p>	<p>Competitive edge</p>	<ul style="list-style-type: none"> <li>- How does this increase the competitive edge?</li> <li>- In what way do you think AGI can enhance your overall operations in tourism? <ul style="list-style-type: none"> <li>● Can you name some ways in which AGI can</li> </ul> </li> </ul>

	Operational enhancement	be useful for you? Ex. operational, internal, external, employees, departments, consumer etc.
What are the operational competencies needed to inspire growth in the industry?	Competencies	<ul style="list-style-type: none"> <li>- What competencies are lacking when it comes to growth for AGI in the industry?</li> <li>- What are the core competencies that need the most attention to realize growth?</li> </ul>

### **APPENDIX 3. Example content email information**

#### **Preparation interview**

#### **Using AI as competitive advantage for small businesses in the Caribbean**

Dear participant, I am a master student at the Erasmus University Rotterdam and for my Masters thesis I'm investigating how small businesses operating in the Caribbean region perceive the role of AGI technologies in shaping their competitive landscape There is nothing pre-expected of you other than to just give your honest opinion about your experiences and perspective on the matter

#### **Background information**

When it comes to technology and the implementation of new technologies, the west has had a clear advantage over other parts of the world such as the Caribbean and Latin America because of its access to resources (Rubalcaba, 2015). Globally, small businesses play a crucial role in local economies and in the Caribbean, the success of economic development relies heavily on the growth of these businesses (Alleyne et al., 2017). Research indicates that many small businesses in the region are struggling to prosper. Challenges such as limited knowledge, small local markets, and susceptibility to external shocks persistently hinder businesses in this area (Alleyne et al., 2017). The use of digital tools is helping overcome some of these growth barriers, particularly by reducing the impact of factors like time and distance between Caribbean businesses and their customers.

Different types of AI can be classified as Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI), and Artificial Superintelligence (ASI) (Zsarnoczky, 2017). For the purposes of this research, AGI will be used as this type of AI is the most frequently used by the travel industry to identify valuable insights about services and customer experiences, assisting in managing capabilities that provide advantages over competitors (Izchak, 2021).

### *Social and scientific relevance*

The Caribbean is at a precarious point in its development. Unemployment, poverty (up to 21% in some cases) and low growth, as well as lingering challenges to small business growth and development are issues which require urgent attention. Furthermore, there is an acknowledgement that research takes place within particular contexts (. Grant and Perren (2002), have for instance called for the broadening of perspectives in research on small business entrepreneurship. This suggests that there is a place for more research within the wider scholarship on the themes of this special issue generally and in a developing and SIDS (small islands developing states) context. In these countries, it's crucial to seize the opportunity promptly. The market should be encouraged by implementing various measures to create chances for new businesses to offer sustainable, affordable solutions that foster growth and incentivize technological adaptation. At the World Economic Forum Annual Meeting 2018, CEOs of key sectoral companies highlighted three crucial priorities for transformation: attracting and enhancing skills to tap into an untapped digital market, fostering collaboration throughout the built environment value chain, and embracing advanced technology extensively (Parrado, September 13, 2023). The article also explains that to support entrepreneurship within the AI technology environment, businesses must be provided financial incentives, funding access, and mentorship programs. Collaboration among startups, established businesses, and research institutions must be promoted to boost AI-driven entrepreneurship. This thesis will therefore dive deeper on the points made at the WEF to utilize technology, specifically AI technology to enhance business operations in the Caribbean and how this can be implemented into small businesses within the Tourism sector because they are key in driving economic growth in this region (Spencer, & Spencer 2019).

*Research question:* How do small businesses operating in the Caribbean region perceive the role of AGI technologies in shaping their competitive landscape?

*Subjects for the interview:*

- Availability of AGI in the region
- Perceived advantages, obstacles, and potential implications of adopting these technologies on individual businesses and the tourism industry
- How AGI might enhance or disrupt their operations and the tourism experience within the region
- Operational competencies needed to inspire growth in the industry

#### **APPENDIX 4**