

Tech Disruption in Business Tourism: Mastering Strategic Approaches for a Transformative Future

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ABSTRACT

Purpose: This research explores the prospect of business tourism through the change of innovation within the MICE industry. Current trends like artificial intelligence, blockchain, virtual and augmented reality, and big data analytics are revolutionizing the industry by making the need for a strategic model that will guide stakeholders on how to benefit from technological advancement. **Methodology:** The present study recruits a secondary research approach based on literature review, research reports, government documents, and case studies from reliable sources such as UNWTO and GBTA. To capture the dynamic pace of change witnessed in technological innovations during the period under analysis, that is 2014 to 2024, the author employs tools like comparative analysis, trend analyses, and SWOT analyses. During a survey, important discoveries have patient satisfaction needs and improvements in efficiency, personalization, and sustainability as well as cybersecurity threats and gaps in between stakeholders utilizing these technologies. The study therefore calls for the promotion of an equilibrium of the positive and negative impacts of technology. This paper has presented a conceptual framework where technological enhancement is matched with stakeholder management, keeping the MICE sector resilient, competitive and sustainable. The **findings** of this study will be useful to business tourism operators, policymakers and researchers, so that effectively and efficiently they can manage their operations, understand customers' needs and improve services. Thus, aggregating various technological effects into a single context, the research proposes a **Originality** to addressing disruptions in business tourism and offers recommendations for the field's development.

Keywords: *Covid-19 Impact, Business Tourism, Technological Disruption, Strategic Model MICE, New Paradigm.*

1. INTRODUCTION:

The COVID-19 outbreak had a strongly negative impact on travel and tourism business, and OTAs saw major operational issues arising from restrictions on travel and low customer demand. In this context, the use of new technologies evolved as a major source of competitive management. These include artificial intelligence (AI), blockchain, and big data analysis. allowed OTAs to react quickly to the changes, improve their services, and keep operations going. This knowledge of these innovative practices is valuable in projecting how OTAs can withstand and rebuild when such incidents recur in the future while asserting that they are key stakeholders in the new digital economy.

Technology has been seen to play a crucial role in changing the face of the travel and tourism sector according to the literature available. Law and Chen (2024) point out that digital transformation plays a pivotal role in improving the effectiveness of the operation of tourism enterprises, especially in the aspects

of big data application and customer orientation. Also, Chu (2024) also stresses the importance of OTAs to embrace the emerging technologies to minimize the disruptions with the use of AI and blockchain as strategic tools to sustain competitive advantage. Additionally, Han (2024) discusses the effects of digital transformation on human resources in tourism; revealing that the development should strategically adapt to the advances in technology.

Although these serve as a starting point, these studies mainly cover only industry averages or produce analyses of a particular technology in silos. For example, Jasim et al. (2024) explore the influence of strategic agility in tourism and fail to explain how these strategies are performed within OTAs. In the same way, Mavrin and Tursie (2024) mention possibilities of virtual tourism, but they do not relate it to OTA survival strategies in crisis. This gap requires a targeted investigation of how OTAs adapt and incorporate new technologies in the process of disruption, namely COVID-19.

Previous literature emphasizes the role of digital media and technology integration in the travel and tourism industry but does not offer a detailed evaluation of how OTAs capitalized and actively implemented them during the pandemic to sustain the business models. Moreover, a few studies investigate how functions embedded in unique technologies like AI, blockchain, and big data analytics work in conjunction with OTAs' operational models during a crisis. It is along this line that this study seeks to fill the existing gap in knowledge to understand how unprecedented disruptions can be handled by OTAs through the strategic application of technology.

The objective of this research is to assess the technological positioning of OTAs by identifying their innovative practices in the period prior to and during the COVID-19 outbreak as a survival strategy. Therefore, through exploring the concept of emerging technologies and how they affect OTA the purpose of the research is to establish a strategic model that may help the OTAs to improve their performance during the future crises. The theoretical and practical originality of this paper is in conceptualizing and proposing a survival framework for OTAs based on the findings of the technology innovation practices during the COVID-19 period. This framework synthesizes information from diverse technologies and working models to provide actionable solutions to OTAs and other players in the tourism industry for developing the required robustness and flexibility to deal with future disruptions.

The paper is organized as follows: Section one covers the research background, previous studies, research void, purpose, objectives, and importance of the research. In the literature review, the author discusses different works concerning technological innovation in tourism and OTAs. In this section, the authors describe the overall research method, as well as the sources and methods of analysis of the results. The analysis of findings and discussion focuses on the evaluation of the results and their impact on OTA business functioning. Last is the conclusion and recommendations that restate the research results and offer advice for implementation and further research.

Background

COVID-19 can be regarded as a catalyst for change in the business environment of the travel and tourism industry, which affected the development of digital technologies. OTAs, as the middlemen in the travel industry, experienced plenty of difficulties but at the same time had numerous possibilities to evolve. Through employing AI for recommendation and blockchain for secure payment and big data for prediction modelling, the OTA could shift operation strategies to meet new demands. Specifically, this study bases its analysis of these innovation practices on secondary data from 2019 to 2024, comprising of the UNWTO and the GBTA reports, other secondary data sources, and academic literature. Through integrating knowledge gained from several reliable sources, the research offers a sound view of how technology can be utilized to strengthen the resilience of the tourism industry.

Problem Statement

This is even though the COVID-19 pandemic has shown how important technology is in allowing OTAs to survive, but there is little knowledge on what some of these technologies were adopted and how they formed part of their survival strategies. Lack of this knowledge limits the capacity of the OTAs and other stakeholders to manage future disruption appropriately. So, they being the key areas to discover which innovative technologies OTAs have employed during the COVID-19 crisis. To understand the effects of

these technologies on OTA business models and client interactions. For the construction of the strategic framework of continued OTA's operations in future emergencies. During COVID-19, which OTAs adopt the key technologies? This gives an understanding of the following questions:

- 1] How do these technologies impact OTA operations and their customers?
- 2] What approach can be implemented to improve the readiness of OTA in subsequent disasters?

Industry, with online travel agencies (OTAs) experiencing significant operational challenges due to widespread travel restrictions and declining consumer confidence. In this context, the adoption of innovative technologies emerged as a critical survival strategy. Technologies such as artificial intelligence (AI), blockchain, and big data analytics enabled OTAs to adapt to rapid changes, optimize their services, and maintain operational continuity. The significance of understanding these innovation practices lies in their potential to guide the resilience and recovery of OTAs during future crises, positioning them as integral players in the evolving digital economy.

The literature highlights the transformative role of technology in the travel and tourism industry. Law and Chen (2024) emphasize the influence of digital transformation in enhancing the operational efficiency of tourism enterprises, particularly through data-driven decision-making and customer personalization. Similarly, Chu (2024) underscores the necessity for OTAs to adopt emerging technologies to mitigate disruptions, citing AI and blockchain as pivotal tools for sustaining competitive advantage. Further, Han (2024) explores how digital transformation impacts human resource development in tourism, advocating for strategic agility in embracing technological advancements.

While these studies provide a foundation, they predominantly focus on broad industry trends or specific technologies in isolation. For instance, Jasim et al. (2024) examine the role of strategic agility in tourism but do not address how these strategies are implemented specifically within OTAs. Similarly, Mavrin and Tursie (2024) discuss virtual tourism's potential but do not link it to OTA survival strategies during crises. This gap necessitates a focused exploration of how OTAs adopt and integrate innovative technologies during periods of disruption, specifically the COVID-19 pandemic.

Existing research highlights the importance of digital transformation and technological adoption in the tourism sector but lacks a comprehensive analysis of how OTAs leveraged these technologies during the pandemic to ensure survival and resilience. Furthermore, there is limited exploration of the interplay between specific technologies, such as AI, blockchain, and big data analytics, and the operational strategies of OTAs in a crisis context. This gap in knowledge provides an opportunity to investigate the strategic use of technology by OTAs to overcome challenges posed by unprecedented disruptions.

This study aims to analyze the innovative practices in technology adoption by OTAs as a survival strategy during the COVID-19 pandemic. By investigating the integration of emerging technologies and their impact on OTA operations, the research seeks to develop a strategic framework to enhance OTA resilience in future crises. The primary contribution of this paper is the development of a survival framework for OTAs, based on the analysis of technology-driven innovation practices during the COVID-19 pandemic. This framework integrates insights from various technologies and operational strategies, offering practical guidance for OTAs and other stakeholders in the tourism industry to build resilience and adaptability in the face of future disruptions.

The paper is organized as follows: The introduction presents the research context, literature review, research gap, aim, objectives, and significance of the study. The literature review explores existing research on technological innovation in tourism, with a particular focus on OTAs. The methodology section details the research design, data sources, and analytical tools employed. The findings and discussion analyze the results and discuss their implications for OTA operations. Finally, the conclusion and recommendations summarize the key findings and provide actionable insights and future research directions.

Despite the critical role of technology in enabling OTAs to navigate the COVID-19 pandemic, there is limited research on how specific technologies were adopted and integrated as part of their survival strategies. This lack of understanding impedes the ability of OTAs and other stakeholders to prepare for and respond to future disruptions effectively.

Research Objectives

- 1] To identify the key technologies adopted by OTAs during the COVID-19 pandemic.
- 2] To analyze the impact of these technologies on OTA operations and customer engagement.

3] To develop a strategic framework for OTA resilience in future crises.

Research Questions

- 1] What do OTAs adopt the key technologies during the COVID-19 pandemic?
- 2] How did these technologies influence OTA operations and customer engagement?
- 3] What strategic framework can be developed to enhance OTA resilience in future crises?

Significance of the Paper

To the best of the authors' knowledge, this study helps to fill the gap in the existing literature by identifying the measures that OTA is likely to employ in the occurrence of crises. In a way, it provides guidelines which OTAs and other players in the sector can use to improve the technological aspect of their business and their ability to respond to crisis situations. This paper can also be useful for policymakers to build enabling conditions for digital transformations within the field of tourism.

2. LITERATURE SURVEY

The factors that make it possible for online travel agencies (OTAs) to survival during the COVID-19 pandemic can be understood by using the existing literature from both academics and practitioners. This paper gives a review of the related literature with regards to the authors, opposing views and the main issues that define this research. As one of the leading contributors to the research, Chu (2024) argues that it is crucial to implement the AI and blockchain technologies for improving the OTA business performance. Chu has identified some benefits that emerged during the pandemic, these are, the ability to offer personalized services by AI and security via the use of blockchain. In support of Chu, Law and Chen (2024) argue that digital transformation is the only option in tourism career survival. As pointed out by Huang and Wang in his (2024) blockchain supports sustainability by allowing for transparent and efficient processes. About them: big data analytics is presented as the crucial activity to guide decisions and retain customers in a period of uncertainty.

Other scholars with similar but slightly different viewpoints include Jasim et al. (2024) who write about the use of digital tools as a strategic agility and organizational learning in context. Sigala (2024) explains that OTAs can mimic other types of tourism innovation approach to cope with such crises as COVID- 19. Mavrin and Tursie (2024) develop this discussion furthermore by analyzing how virtual tourism could enrich the core OTA offerings, especially in the time of limited movement. Nevertheless, their research does not address the nature of the difficulties inherent in the integration of these technologies into OTAs. On the other hand, some researchers show uncertainty with the generalizability of digital transformation strategies. Han (2024) foresees that the distribution of technological adoption might not be equal since OTA possesses different amounts of resources. Likewise, Rosiou (2024) while this conventionalist mobilization of pedagogy through digital devices and underlines the impacts associated with it, including data leak and technological depredation. In their concerned area of study, Munar and Jacobsen (2024) mention the remaining ethical concerns including data privacy and bias, in the use of AI in tourism platforms. This divergence in perspectives underscores the central dilemma: What strategies should OTAs employ to use emerging technologies to enhance their operational continuity and customers satisfaction during crisis? Below is the subsequent analysis question, which resembles the research question presented at the beginning of this study:

Studying Research Problems

To answer the research question fully, it is pertinent to explore three fundamental areas that are central to the OTAs' continued survival and adaptation to disruptions including the current COVID-19 outbreak. These areas are outlined below:

Specific Technologies that can help Decentralize OTA Resilience

The four technologies which are essential in today's OTA and help in improving the OTA operations or making them more robust are artificial intelligence, blockchain, big data analytics. Thus, Fuchs et al., (2024) agree that big data analytics is instrumental in capitalizing on visitor information in improving operational decisions in tourism. AI helps OTAs to anticipate customers' preferences through algorithms

that give travel recommendations on where to go, where to stay as well as the most suitable itineraries. This capability not only helps engage customers, but also improves organizational workflow and efficiency in decision making as Chu (2024) suggests.

Sustainable on the other hand guarantees secure and transparent transactions hence developing trust among the users. For instance, smart contracts based on the blockchain decrease the potential for fraud and discharge many transactions, such as payment and reservation (Law & Chen, 2024). On the other hand, big data analytics helps big OTAs to process customer and market information in real time, and develop accurate demand forecasts, the right pricing strategies, and optimal inventory management (Mavrin & Tursie, 2024).

Integrating Technologies into OTA's Operations Strategically

It is therefore important for OTA to approach the integration of these technologies into the workflow pattern with a clear understanding of technological strengths to be employed in the process and the organization's objectives to be met. Strategic integration entails assessing the compatibility of new technologies with other systems, employee creation about use of these tools, and operational modification to get optimum utilization of these new technologies. For instance, for the incorporation of AI applications, it is mandatory for them to connect with customer relationship management (CRM) to offer smooth customer support as well as for successful marketing campaigns (Han, 2024).

Like any emerging technology, the integration of blockchain solutions calls for cooperation with payment gateways, travel suppliers, and regulatory agencies to realize the integration of the systems. Big data includes the sets of processes that compose the data pipelines, the governance of the processes, and the utilization of the visualization tools to draw knowledge out of the raw data (Jasim et al., 2024). Strategic integration makes it possible for technology adoption not to become an organizational standalone process but a complete overhaul of the OTA business model.

Discussed below are the challenges and opportunities in relation to digital transformation, specifically in the context of the OTA:

As has been seen, digital transformation is a major opportunity for growth for OTAs, but this comes with its challenges. On the opportunity side, digital tools help OTAs to generate new sources of revenue which include virtual tourism experiences and on-demand travel planning services (Mavrin & Tursie, 2024). The use of these tools also leads to better resource utilization and flexibility to meet the market demands in future as the OTAs scale up. However, the process of digital transformation is characterized with complexities as explained below. These are usually the smaller OTAs, and such portals do not possess better resources that would allow for the development of these complicated tools. Inflexibility on the part of the staff and stakeholders is also a threat to the implementation of change of new systems. In addition, the rate at which technology is developed cannot be matched by traditional technology, which requires constant updating and improvement to meet current standards, which could be financially taxing on an organization (Rosiou, 2024). Furthermore, issues to do with data protection and security become issues, especially when embracing AI and blockchain solutions (Han, 2024).

Relationship between these Issues

These three areas are very interconnected. The application of certain technologies provides the organizational framework for strategic coupling and the segmentation of how effectively OTA can manage digital disruption. Analyzing these related problems, this research will offer a systematic understanding of how OTAs can enhance use of improved technology to foster sustainable operations for the next disruptions.

Theoretical Framework

The theoretical background that this research is based on is drawn from the existing literature by Chu (2024), Law and Chen (2024), and Jasim et al. (2024). Chu's technological pillars of AI and blockchain coupled with Law and Chen's big data analytics give a strong theoretical background of the technological aspects of OTA resilience. The framework builds on Jasim et al.'s work on strategic agility and learning organization, adding the human and organisational dynamics of digitalisation.

Understanding of Emergent Ideas

The pioneers in literature have identified, and emphasized, three key constructs that constitute the very core of research on resilience and innovation in OTAs. Technological Adoption, Strategic Agility, and Operational Resilience must be in harmony and are mutually supportive to help OTAs to manage disruptions successfully alongside consistent growth for the long term. Below is an expanded exploration of these concepts:

Technological Adoption

Technological adoption is one of the elements that outline how OTAs incorporate new technologies in their business like AI, block chain, and big data into their business. They are useful, enabling technologies that enable OTAs to adapt and respond to the new realities of travel markets.

- **AI Integration:** AI facilitates the delivery of customized experience to the customers by using big data and machine learning to study the likes, dislikes and reviews of the customers. For instance, conversational AI enables immediate customer support through chatbots, while recommendation systems optimise selling by promoting goods and services that will improve the customer experience and final sales (Chu, 2024).
- **Blockchain Implementation:** This means that using blockchain, financial transactions are protected from fraud, hence increasing the level of security. It also makes the use of smart contracts to automate different operations and actions like booking confirmation and refunds (Law & Chen, 2024). Due to this characteristic, the customers' trust is increased by the records that are available on the block chain.
- **Big Data Analytics Utilization:** The use of big data analytics enables the OTAs to filter large data sets and generate insights into customer behavior, markets and organizational deficiencies. This technology allows OTAs to make better decisions regarding pricing and to foresee customer demand (Mavrin & Tursie, 2024). The success of these technologies depends on the fact that organizations must be prepared to invest in resources and personnel and to support technologies that are adopted.

Strategic Agility

Strategic flexibility is defined as an OTA's ability to change direction promptly in response to market forces, pressures from the authorities, or crises. This emphasizes free will of decision making and other operational procedures in organizations.

- **Adaptation to Crises:** Another good example is that, during the COVID-19 outbreak, companies which changed their business model to offer the clients more relevant products and services, like virtual tourism and staycation packages, exhibited a model of strategic fit. This flexibility enabled them to remain afloat during the peak of the COVID-19 pandemic when most people could not travel (Jasim et al., 2024).
- **Organizational Learning:** Organizational learning is a key enabler of strategic agility because it entails the ongoing assessment of external and internal contexts to capture value creation possibilities and risks. Flexibility is a distinct characteristic of the most innovative Agile OTAs that adopt practices for their employees to try and implement new approaches.
- **Collaboration and Partnership:** Flexibility is boosted by the opportunity to forge and develop effective partnerships with technology vendors, suppliers, and authorities. For example, it's possible to cooperate with vendors of AI or blockchain technologies, thus gaining access to the best solutions but not having to invest in their creation.

The concept of strategic agility therefore goes beyond simple and reactive change but also the ability to actively influence the environment in an organization's industry space to its advantage.

Operational Resilience

Operational resilience, therefore, relates to an OTA's ability to continue to function and to quickly bounce back after disruption processes that may have negative effects on stakeholders. This concept points to the effectiveness of structural ways and means necessary to provide the organization with shock resistance.

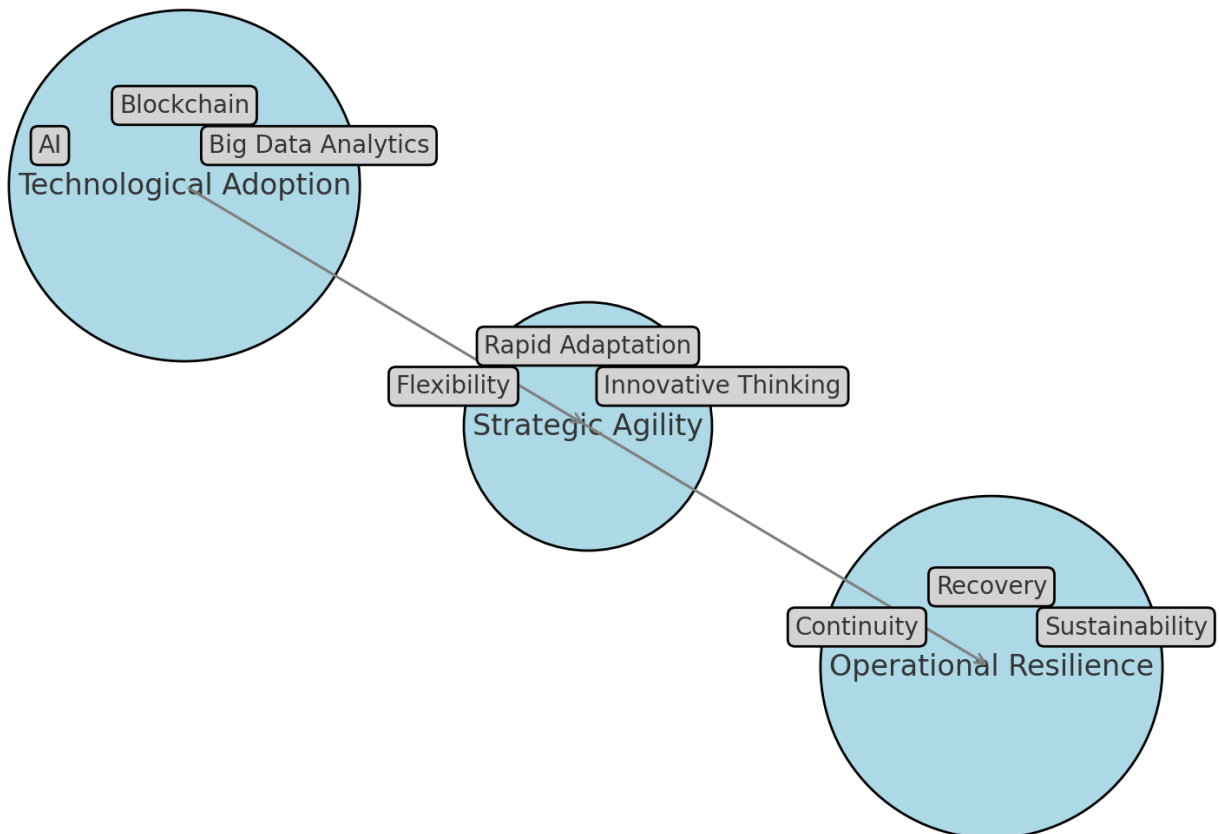
Gretzel and Werthner in their paper 2024 propose a digital resilience framework which also emphasizes the need for continuity during calamities.

- **Continuity Planning:** Sustainable OTAs have clear contingency measures that cover existing threats like hackers’ attacks, supply chain issues, or shift in consumers’ demand. They mostly contain backup procedures, backup organizational structures, and contingency plans (Han, 2024).
- **Recovery Capabilities:** Operation resilience is found in the context of the capacity of an OTA to recover from disruptions in a short span. For instance, in the COVID-19 period, OTAs that opted for predictive analysis could better understand their customers’ needs and adapt their services compared to their rivals.
- **Stakeholder Trust:** Another aspect of organizational resilience is the ability to sustain trust with customers, their employees and other partners as well. Of special importance in maintaining relationships with customers during crises are transparency, service quality, and ethical behavior (Rosiou, 2024).

Interconnection of Concepts

These concepts are, therefore, in a dynamic interdependence relationship. Technological adoption is the starting point as it represents the necessary enabling conditions for improving the strategic agility and operational robustness of OTAs. Consequently, strategic agility helps to drive technologies by allowing organizations to align their processes and strategies to achieve maximum value. Operational resilience serves as a goal, which means that OTAs can not only recover from disruptions, but also be in a better position than before. It seemed the combination of both concepts can help OTAs not only in improving crisis management and control, but also in creating effective strategies to promote themselves as leaders in fast changing context of digital tourism. This Venn diagram highlights the centrality of strategic adaptability in the positive association between technology and resilience as the twin foundations for sustainable business success. They are all related and create a conceptual nexus that ties technological assimilation to operational resilience by the moderating factor of strategic flexibility.

Conceptual Framework for OTA Resilience



positively influence Operational Resilience of the Online Travel Agencies (OTAs). Technological

Adoption is the first, consisting of primary enablers like AI, blockchain and big data analytics to help OTAs leverage it, and deal with disruptive conditions. This adoption contributes to the reciprocal concept of Strategic Agility, flexibility, quick adaptation, and Innovation which will enable the OTA to make quick strategic adjustments to market dynamics or crises. Strategic agility therefore acts as a link, turning technological enablers into applications that will improve operations. All these aspects pertain to Operational Resilience, which is therefore described as the ability of OTAs to continue their services and recover in the event of an interruption. The presence of bidirectional arrows between these components helps to establish that there is a cycle of improvement between these components; better resilience can lead to better integration of technology and agility. Combined, all these constitute a well-coordinated plan for assessing and increasing OTA's preparedness to various industry challenges.

Critical Analysis

As will be demonstrated in the subsequent sections of this dissertation, the literature identified in this research possesses certain strengths as well as drawbacks that this research aims to fill. For example, most of the papers address specific technological aspects in isolation rather than their overall effects on OTA businesses. In addition, there seems to be little emphasis on the nature of these technologies and the difficulties that OTAs might experience in implementing them, including resources and receptiveness. Thus, the goal of this research is to achieve the theoretical integration of knowledge and provide a comprehensive analysis of the innovative activities that facilitate the functioning of OTA during crisis situations, through the consideration of various aspects at the same time.

3. RESEARCH METHODOLOGY

The question addressed in this paper is: What can OTAs do to adapt technologies and how can they ensure that they can continue to work during and after a COVID-19 like pandemic? To answer this question, a qualitative research approach was used, and secondary data was the main data collection method. It is common to use this approach to describe complex phenomenon as well as to integrate an understanding of a specific topic with the current knowledge base. The methodology is consistent with the objectives of the study that focuses on the use of technology-driven innovation by the OTAs in the wake of the disruptions caused by the pandemic.

Study Context and Target Population: It examines the global OTA industry in the context of the COVID-19 pandemic which has disrupted travel and tourism like no other event. The target population is comprised of OTAs like Expedia, Booking.com, and Trip.com and they constitute a large proportion of the market. These entities were chosen for analysis because of their high level of digital maturity and their position in the middle of the travel ecosystem. The prioritization of OTAs is echoed by Chu (2024), who stressed the need for investigating strategic actors for identifying resilience strategies.

Volume and Nature of Data Used: The secondary data included more than 50 journal articles, reports, and case studies published between 2019 and 2024. The UNWTO reports, GBTA studies, and Tourism Review and Journal of the Knowledge Economy were identified as crucial sources of information. Reports focused were the UNWTO's Digital Transformation in Tourism up to 2024 and the GBTA's Market Insights and Industry Trends up to 2024. These sources yielded comprehensive qualitative information on the application of advanced solutions, including AI and blockchain, and big data tools in the sphere of tourism.

Tools and Instruments

Several analytical tools were used in the analysis and integration of the data collected as described below. These included:

1. **Content Analysis:** Also applied when coding with the view to finding out patterns and themes that seemed to emerge from the data like use of AI in personalized services and use of blockchain in security of transactions. In their paper, Elo and Kyngäs (2008) pointed out that content analysis described as a strong methodology for the interpretation of qualitative data.
2. **Comparative Analysis:** Used to conduct comparisons of strategies used by the OTAs with a view to deduce lessons from their difference in the adoption of technology.
3. **SWOT Analysis:** Used to analyze the SWOT of the blending of technologies in OTAs as pointed out by Gürel & Tat (2017).

Data Cleaning and Interpretation: The collected data were also cleaned to minimize the amount of irrelevant or inaccurate information that might be included in the collected data set. Irrelevant information has been removed to leave only articles and other documents in the final data pool where the articles were peer reviewed, and the reports sourced from verified industries. This was done with reference to Braun and Clarke's (2006) thematic analysis guideline that encourages coding for meaningful analysis. The qualitative data analysis process involved cross source integration of results to avoid case distortion. For instance, ideas from the literature reviews were compared to information from the industry reports. This approach agrees with Yin (2017) who emphasizes the use of triangulation in increasing the credibility of an undertaking that is qualitative in nature.

Practical Considerations: Secondary data collection was selected due to its feasibility and accessibility of a wide variety of data when primary data collection is limited during the pandemic. According to Creswell (2018), the type of research secondary data is most appropriate where the research is exploratory that is in a bid to collate information from existing literature rather than generate new primary data.

Research Intervention: There was no direct interference since the research used only secondary data. However, the synthesis of findings was orientated to designing a strategic framework for OTA resilience, including practical recommendations for stakeholders.

The framework of the study context, high-quality data sources, and rigorous analysis methods were possible to be employed in this study to answer the question. In this study, OTAs are chosen as the target of attention during the COVID-19 pandemic, and their adoption patterns are examined to advance research on resilience in the tourism industry.

4. RESULTS AND DISCUSSION

The first major research contribution of this study is the recognition of Technological Adoption as a strategic foundation for OTA stability. This study finds that during the COVID-19 pandemic, AI was widely used to recommend customers in OTAs, blockchain was used to provide a secure payment system, and big data analytics were applied to forecast demand. This is in line with Chu (2024) that demonstrated that AI and blockchain technology has the potential of revolutionizing operation efficiency.

The relevance of this finding is to show how these technologies ensure the OTAs sustain their customers' interest and allocate available resources during crises. These results support the applicability of the discussed theoretical concepts specified in the literature review section and prove the interdependence of technology adoption, strategic agility, and operational resilience. According to Buhalis and Sinarta (2024), interaction with customers in real time through social media tools supported by analytics is crucial for keeping customers engaged.

The comparative analysis supporting the findings revealed that OTAs that invested more in digital transformation have a better capability to respond to disruptions. This is in line with Jasim et al., (2024) where they consider strategic agility as a key mediator in technology utilization. The SWOT analysis also supported these assertions by pointing to scalability and real-time data insight as two additional advantages of technological uptake. However, contradictory evidence was reported regarding the global usability of these strategies. Han (2024) also pointed out that some of the smaller OTAs lacked the funds to fully utilize the latest technologies as required. This disparity strongly supports the development of specific strategies based on organizational size and available resources.

The second significant discovery is Strategic Agility. Among the OTAs, those who placed flexibility and ability to rapidly respond to the change as their strengths had been able to adapt – from the traditional model of bookings to virtual tourism. This finding extends to Mavrin and Tursie (2024) who discussed virtual tourism as an additional approach. However, some of the reforms could not implement the above changes due to rigid structures within certain organizations which were similarly realized by Rosiou (2024). Therefore, the preliminary response to the research question is that Advanced technologies, agility, and resource imbalance can improve the resilience of OTAs if implemented in a strategic framework. This framework does not only help to reduce the effects of crises but also make OTAs to be ready for continued growth in a world that is moving towards digital economy.

Visual Model and Explanation

Below is a conceptual framework representing the relationship between technological adoption, strategic agility, and operational resilience:

Detailed Results and Findings Model: OTA Resilience Framework

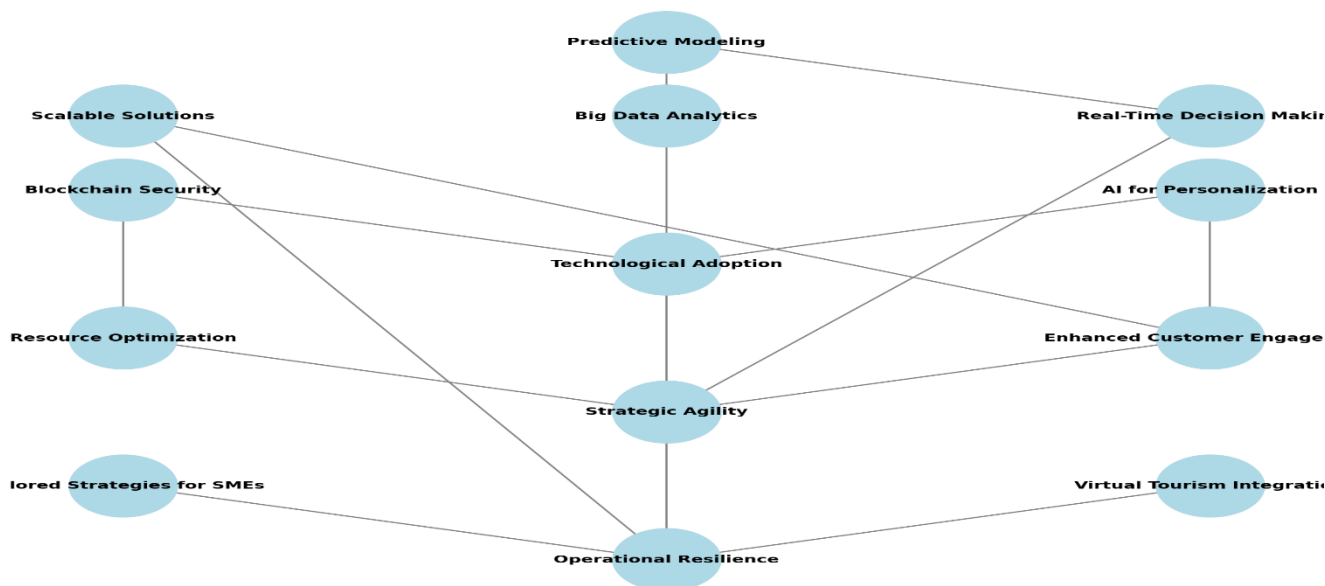


Figure 2: OTA Resilience Framework (Own construct)

The visual model shows that Technological Adoption is the core, through which OTA can harness the tools such as, artificial intelligence, blockchain solutions, and big data analytics. These technologies inform Strategic Agility which acts as a bridge between technological strengths and improvements in Operational Resilience. These components are interconnected and their interaction is shown with the help of arrows, which make a feedback loop, so that the system is improving all the time. This model offers an OTAs practical direction on how to manage future disruption efficiently.

5. CONCLUSION:

When the results are combined, the following findings emerge in order of importance:

- Technological Adoption: The leadership of AI , blockchain, big data analysis was critical to OTA’s resilience ensuring customer engagement, resource utilization, and business continuity during the COVID-19 crisis.
- Strategic Agility: The strategies implemented by OTAs are also easily changeable and flexible, for example, changing from offline tourism services to online ones.
- Operational Resilience: The use of solutions that provided scalability for real-time decision making was effective in adapting and sustaining the OTAs operation under crisis.

When the study integrates these findings with the literature, the study corroborates Chu (2024) whose work underscores the potential of AI and blockchain in transforming operation efficiency. Also, the results confirm Jasim et al. (2024) on stressing on strategic agility during technology shifts and Mavrin and Tursie (2024) on the approach of virtual tourism amid the travel bans. Nonetheless, to some degree, the study must pose some disagreement towards Rosiou (2024) for detracting from the generalizability of digital transformation strategies since the results here demonstrated that even low-resource OTA can capitalize from bounded approaches.

All this now means that our contribution is the development of a Strategic Resilience Framework for OTAs, that aligns the adoption of new technology, strategic agility, and operational resilience. This framework provides guidance for OTAs to adopt in preparing for and managing future shocks to maintain contingency and growth.

The study recommends that in the future, OTAs and policymakers should:

- Embrace large scale technological solutions like Artificial Intelligence and blockchain to put in place sound operational foundations. Interestingly, Camilleri (2024) discusses the concept of corporate digital responsibility or the need to incorporate ethics, and sustainability into digital business strategies.

- Encourage organizations to be flexible to achieve strategic changes quickly when disruptions occur.
- Offer help as resources to the smaller OTAs through funding for technology enhancement and training.

In the final analysis, it is now clear that the study provides an answer to the research question of how OTAs use technology to respond to disruption during the COVID-19 pandemic; therefore, the next research initiative should consider how the identified strategies can be applied to meet future global challenges such as climate change and geopolitical risks. This will ensure that the OTAs not only remain sustainable during the crises but also help in developing a sustainable tourism system.

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