

MODULE CODE: BMSW7003

Module Title: Leading Digital and Strategic Change.

Abstract

**Leading the reshaping of the strategic direction in the context
of digital change
Strategi analysis of British Airways (BA)**

Henry Chilaka (2209282)
Lecturer: Gwyneth Jones
7/05/2026

Contents

1. Introduction	2
2. Task1-Strategic Analysis of British Airways in the Digital Context	3
2.1. Strategy Position	3
2.1.1. PESTEL Analysis	3
2.1.2. SWOT Analysis	5
2.2. Corporate Culture and Leadership History	6
2.3. Mission and Strategic Choices (Ansoff matrix)	7
2.4. Policy Choice: AI-Driven Digital Operations and Customer Experience Platform	9
3. TASK 2 -Leadership Approaches for Implementing Digital Transformation at British Airways	10
3.1. Transformation Leadership and Digital Strategy Implementation	10
3.2. Adaptive Leadership and Organisational Resilience	11
3.3. Comparative Evaluations of Leadership Approaches	12
4. Task 3- Strategic Recommendations and Change Implementation.....	13
4.1. Reshaping British Airways' Strategic Direction through Digital Integration a	13
4.2. Gap Analysis: Current State vs Desired Digital Capability	13
4.3. Lewin Force Field Analysis	14
4.4. Risk Assessment and Implementation Capacity	15
4.5. Strengthening implementation success	16
5. Conclusion	18
Executive Summary.....	18
References	20

1. Introduction

Post-COVID19, the aviation sector globally is in the fast stage of digital transformation due to innovation like artificial intelligence (AI), data mining, automation, and platform-based customer interactions (Agarwal, Swami and Malhotra, 2024). In the case of legacy airlines like British Airways (hereafter BA) who are one of the founding companies of the international Airlines Group (IAG), digital innovation has ceased to be an optional feature but a core element of operational resiliency, the quality of the customer experience, and the capability to secure a competitive edge over competitors over time (IAG, 2023). This was accelerated during the COVID-19 crisis when airlines now must implement digital solutions in contactless travel, predictive maintenance, dynamic pricing, and automated customer support (Amankwah-Amoah, 2021). Meanwhile, the threat of digital nimble airlines and travel platforms has increased pressure on traditional airlines to revise their strategic direction. Historically, BA, established in 1974 in London, has followed the strategy of premium service differentiation, global connectivity and expansion of the network through alliances by investing in digital customer interfaces, including mobile booking platforms and biometric boarding solutions (British Airways, 2025). However, structural issues the airline still must resolve, such as legacy IT infrastructure, risk to disrupt operations, sustainability, and the development of customer demands to seamless digital travelling experiences (ePlane AI, 2025). All these are sources of risk and opportunities for strategic renewal.

Therefore, this report assists the senior management in thinking innovatively in digital transformation to change the strategic direction of BA with a view to enhancing organisational resilience and maintaining a competitive edge. It presents the strategic environment and digital positioning of BA, assessed based on PESTEL and SWOT. It also explores leadership theories needed to ensure successful digital transformation and concludes with recommendations, allowing a digitally enabled strategic path for BA aligned the future operating environment that the airline is bound to operate in.

2. Task1-Strategic Analysis of British Airways in the Digital Context

2.1. Strategy Position

BA, a part of the IAG, is involved in one of the most capital-intensive and digitally disrupted industries globally. Customer Experience websites Airline are now competing based on digital customer experience, operational data, and platform integration throughout the travel ecosystem (Wendel et al., 2024). The strategic position of BA should, therefore, be interpreted in the external forces of the macro-environment that have influenced the aviation industry and the internal strengths of the organisation. Aviation digital transformation is closely connected with cost efficiency, operational, and customer experience personalization. The report of BCG (Jhunhunwala et al., 2025) showed that airlines using predictive maintenance, AI-based operations, and digital customer platforms produce up to 15% increases in on-time performance and millions of cost reductions. Nevertheless, from the lens of (Ogunwale et al., 2023), the outdated IT architecture and complicated organisational process limit the structural capabilities of legacy carriers such as BA in the pace of change, fast than their low-cost competitors and digital-native counterparts.

2.1.1. PESTEL Analysis

PESTEL presents an analysis of external factors affecting BA's digital transformation.



Figure 1: PESTEL Framework

Source: Spring Works (2021)

Political

The aviation market is very regulated, a case where digitalisation collides with the security, data protection for passengers, and border control devices. Uk Civil Aviation Authority (CAA) and EU aviation standards present strict safety and cybersecurity requirements that the airlines must meet (Patton and Jahankhani, 2025). The UK aviation policy since Brexit has focused on the use of digital border technology and automation of airport, including biometric identity systems (European Commission, 2025). These advancements provide BA with space to the efficiency of passenger processing at a high cost in the form heavy digital investment.

Economic

The airline business is characterised by low profit margins and fixed costs. In 2023 IAG announced operating profit amounted to €3.5 billion, with BA accounting for a large portion of the recovery, following its losses during the pandemic (Topham, 2024). But because of increasing fuel prices, inflation and labour expenses are still straining profitability. AI-supported operation optimisation and digital automation are thus a strategically significant cost-management tool. According to a report by McKinsey, airlines with AI-based scheduling and predictive maintenance minimize the maintenance expenses (Langer *et al.*, 2024).

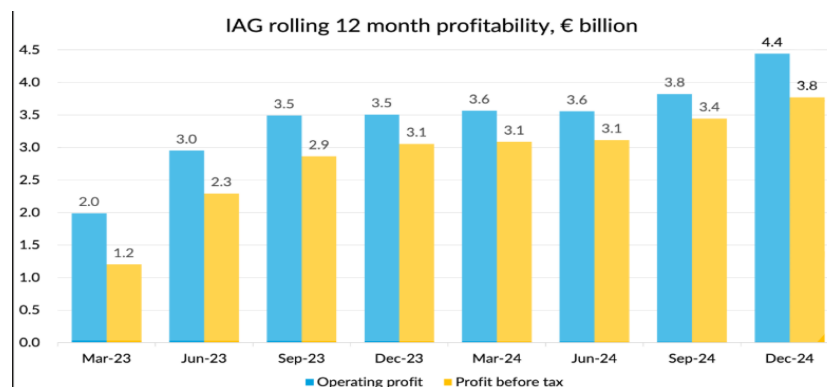


Figure 2: IAG's operating profit driven by BA's post-pandemic recovery

Source: Grandpoint Consulting (2025)

Social

Mobile-first is becoming a mandatory service requirement of post-pandemic travellers alongside the need to have real-time updates and integrated travel platforms (Rukumnuaykit et al., 2025). The Gen Z passengers tend to appreciate digital self-service and personalized offers, especially (Vancia et al., 2023).

Technologically

The areas of AI operations systems, biometric boarding, Internet-of-Things aircraft surveillance, and digital twins of maintenance simulation are rapidly innovating in the aviation sector (Jiang et al., 2023). Since 2019, Heathrow Airport has been conducting facial recognition boarding trials, and BA had biometric boarding on certain routes since 2022 (British Airways, 2022). Nevertheless, the industry reports indicate that the legacy airlines are still restrained by disjointed IT system, which restricts the holistic implementation of the digital operations (Jhunjunwala et al., 2025).

Legal

These consist of the aspects of GDPR compliance, aviation cybersecurity regulations, and laws on passenger compensation. In 2020, BA suffered a significant data breach with more than 400,000 customers being impacted, and the Information Commissioner Office (ICO) in the UK fined it £20 million (BBC, 2020). The cybersecurity investment in digital transformation is back by this incident as being strategic.

Environmental

Aviation alone contributes about 2.5% of the global CO₂ emissions, and regulators have been compelling the airlines to get towards dissimilar fuel-efficient optimization and adoption of sustainable aviation fuels (IEA, 2025). Sustainability has a strategic connection with digital innovation as state-of-the-art digital flight-path optimisation technology may decrease fuel waste by 5-10% (Miller et al., 2024).

2.1.2. SWOT Analysis

Strengths

Strengths of BA are as follows: the brand reputation worldwide, its dominance in Heathrow, alliances, and financial support of IAG (British Airways, 2025). The airline is also an advantage of the prevailing customer digital investment, such as mobile booking or customers as well as loyalty-programme analytics with the help of the Executive Club (British Airways, 2024). Another strength is that BA can access the shared digital

infrastructure and investment ability of IAG, which can result in economies of scale in terms of technological development. The IAG already invested heavily in cloud computing migrations and data analytics in its airline portfolio and improved operational coordination (Schmelzer, 2025).

Weaknesses

Nevertheless, there are major flaws in the previous IT systems and the business stability of BA. The 2017 incident has promoted criticism due to its devastating effect on the aviation sector because it resulted in more than 700 cancellations following a massive IT outage, which revealed the disruptions and as such, resilient digital architecture is necessary. Organisational complexity and unionized workforce structure limit BA in its digital transformation to slow the use of automation technologies than low-cost carriers (Dabrowska *et al.*, 2022).

Opportunities

Digital transformation sets valuable opportunities. To enhance operational efficiency and profitability airlines are turning to AI-based revenue management and predictive maintenance and digital customer engagement tools (Moghadasnian, 2024). BA can leverage its sophisticated analytics and integration of the platform to enhance the positioning of the premium services.

Threats

Competition with digitally efficient airline companies like Ryanair and easy jet, the use of digital platforms that dictate customer interactions is a threat (Gualini, Martini and Porta, 2024). There are cybersecurity threats, important since airlines process volumes of customer data IT infrastructure or cybersecurity failure might affect business operations across various business functions. As per Sukardi, Wahyuni and Rachmawati (2025), with airlines becoming increasingly digitally interconnected, resiliency is now determined by more than innovative resiliency, but a sound ability to manage digital risk.

2.2. Corporate Culture and Leadership History

Scholars like Venkataramani and Kothandaraman (2020) assert that corporate culture is a key driver in the success of digital transformation. The legacy of BA as flag carrier of the UK has historically been that of a high level of operational pyramid and service-excellence company culture (The Economist, 2019). Although this culture promotes safety and reliability, it slows down innovation and experiments of technologies. Since coming into

IAG in 2011, BA has undergone a leadership transition centred around cost-efficiency, recovery in operation, and enhancement of customer service (Olivares, 2023). BA has led efforts on digital allocation and operational resilience under the leadership of CEO Sean Doyle as part of their £7 billion plan (Hauser, 2024) in response to disruptions caused by the pandemic. The leadership has focused on the restoration of customer confidence and the enhancement of operational reliability. In this sense, according to Smuts and Smith (2021), collaborative and innovative-driven organisations have an easier time adapting to technological change. The culture of BA should thus be shifted to one that is based on data and cross-functional teamwork. Cases in the past, like the 2017 IT failure (Quetteville, 2019) and pandemic interruptions (1000 flights cancelled in 2022) (Clatworth, 2022), reinforce the significance of leader and organisational learning resistant to crises caused by technology.

The culture of BA has been influenced by privatisation since 1987, and a good level of professional specialization in terms of operation departments like engineering, cabin services and flight operations (Cozmuta, 2024). Although this facilitates compliance with safety and technical excellent, it may introduce silos in the organisation that prevent digital integration between functions. Digital transformation will make the cooperation between IT, operations and customer-experience teams closer, which can demand the cultural shift towards more agile ways of work. Forsythe and Rafoth (2022) stress the role of nurturing a digital mindset throughout the organisation instead of limited projects with the technology. The leadership of BA should thus strike the right balance between operations discipline and change management that is innovation focused. Recent adoption of digital training programmes and operational data systems (e.g., £ 100 million investment) depicts that airline is making early gains in ensuring the adoption of digital capability into the organisational culture (British Airways, 2025b)

2.3. Mission and Strategic Choices (Ansoff matrix)

The strategic path of BA is service differentiation and global connectedness, which is backed by digital innovation and sustainability (British Airways, 2025). In the Ansoff Matrix, the key aspect of BA transformation, which is digital, is the focus on product development and entering the market. The customers support, and personalized pricing, is one form of product development in the current market. Sear, Hunjet and Primorac (2021) reported that digital personalisation contributes greatly to customer satisfaction and loyalty when applied to service industries. BA the year 2050, the airline has committed to becoming a net -zero carbon emitter (British Airways, 2025b). meaning it will have to develop the

efficiency of its operations and fuel efficiency. BA follows penetration into the markets via digital loyalty programmes and platform integration, enhancing the relations with the current customer. The Executive Club loyalty programme of the airline is progressively leveraging the utilization of data analytics to make proposals and services customized (Arena, 2025). Further chances of transformation are in the areas of diversification in digital travel ecosystems, where airlines combine an accommodation service, insurance service, and mobility services into one platform. The aviation competition is turning to a platform-based strategy (Molchanova et al., 2020). Digital solutions, like AI-powered path-finding systems and real-time fuel consumption gadgets, are significant to meet these goals this is market development, as per Ansoff (1957), which fortifies current service offerings instead of a complete market entry. Digital innovation will hence become both a competitive approach and a sustainability facilitator, enabling BA to remain in premium positioning in response to environmental regulation and expectations of customers. WU and Yang (2021) support that such sustainability and digital strategy integration is vital in aviation competitiveness, which has grown to be increasingly appreciated.

Table 1: Ansoff matrix – strategic options for BA (made by the student)

Adapted from Ansoff 1957

Strategy	Existing Markets	New Markets
Existing product/services	Market Penetration . Expansion of Executive Club loyalty programme personalisation using data analytics . Mobile app improvements for booking and check-in . Dynamic pricing using AI revenue-management systems	Market Development . Expansion into emerging long-haul digital travel markets . Partnership platforms and mobility providers . Data -driven targeting of new customer segments
New products/services	Product Development . Ai-driven predictive maintenance systems . Automated disruption-management services . Personalised platforms . Biometric boarding/contactless airport services	Diversification . Integrated digital travel ecosystem (flights, hotel) . Subscription-based premium travel services . Data-driven ancillary services marketplaces

2.4. Policy Choice: AI-Driven Digital Operations and Customer Experience Platform

Policy Choice: AI-Driven Digital Operations and Customer Experience Platform

According to the strategic analysis, this report suggests that BA invests in an entirely integrated AI-based digital operations and customer-experience platform that incorporates three main elements:

- Predictive maintenance system
- AI-enabled customer personalisation
- Integrated operational data platform

Predictive maintenance applies machine learning and aircraft sensor data predict mechanical failure before the happen and minimise delays and the cost of maintenance. The airlines using predictive systems, like Prognos by AFI KLM, show that the time lost to maintenance decreases by up to 35% (Alomar and Nikita, 2025). AI-centred customer-experience solutions allow customers to receive offers tailored in real-time, employ chatbot-driven customer service, and recover services automatically when something goes wrong, which leads to a better customer experience and efficiency in processes (Nguyen *et al.*, 2026). The platform would integrate flight scheduling, maintenance, crew management, and customer systems to form a better resilience divide that would otherwise create weaknesses during disruptions-a major vulnerability in the strategic position of BA. It fits the strategy of the premium brand by being more reliable, personal, and efficient in its operation, and helps in sustainability due to the optimisation of fuel consumption and predictive analytics (British Airways, 2025a).

An additional advantage of the proposed digital platform investment is that it would enhance the data-driven decision-making through the organisation and, thus, BA will shift its focus on operations to a more predictive and adaptive one instead of operating reactively. According to Alomar and Nikita (2025), airlines, like Delta and United Airlines, which manage to execute integrated operational data platforms, have better disruption management and delay recovery. Notably, the investment would help to sustain the premium customer-value-proprietary of BA, in which reliability and personalized service are the main points of differentiation. According to the resource-based perspective by Barney (1991), such a platform may be valuable, rare, and hard-to-duplicate in the organisation, enhancing competitive strength in the long run.

3. TASK 2 -Leadership Approaches for Implementing Digital Transformation at British Airways

The digital transformation of large legacy organisations needs leadership style that would handle technological transformation, organizational culture and complexity of operations in one that is transformational. In this section, the success of the proposed investment is assessed based on the concept of Transformational leadership (TL) and adaptive leadership, which are the two modern leadership techniques that are applicable in the context of complex organisational change.

3.1. Transformation Leadership and Digital Strategy Implementation

TL is aimed at the creation of vision, motivation of employees, intellectual stimulation and alignment with organisational change (Gupa, 2025). Transformational leaders persuade the workers to look beyond the normal thought of operation in the organisation and take part in the company objectives. This leadership model is applicable to BA as the digital transformation involves transforming the outdated airline operations into an operation that is not based on data and into predictive systems. The adoption of predictive maintenance, AI-based customer personalisation, and integrated operational platforms would entail the participation of the employees in the engineering, customer service, and operations departments in the process of buy-in. regarding aviation sector, Dagar and Sisodia (2025) reported that in digital transformation initiatives, TL, can enhance the uptake of innovation and commitment of staff, both among cockpit and cabin crew . in aviation, the concerns of the staff are concern with safety and reliability more than with experimentation (Karanikas and Nederend, 2018), so leaders should thoroughly articulate the ways that digital innovation can be used to improve and not jeopardise their operational performance.

TL is especially significant as the organisational context of BA is favourable. Having strong professional identities, BA has cultural inertia hindering accelerated digital adoption (ePlane AI, 2025a). TL may help fix this through the association of digital investment with operational reliability, less disruption risk, and better customer experience, as the innovation is aligned with reliability, less disruption risk, and better customer experience, as the innovation is aligned with the set organisational value. For example, predictive maintenance technologies are based on engineering teams relying on the AI-produced insights, necessitating the leaders to advertise an intellectual and learning culture instead of ordering command-and-control implementation. Kabashkin, Misnevs and Zervina (2023) argue that aviation firms with AI technologies tend to spend a lot of funds on staff ability building and innovation culture, in addition to the adoption of technology.

Customer-experience innovation would also be improved TL. Airlines are lately competing based on personalisation via the digital platform and service restoration, in case of disruption, and relevant leaders should acknowledge the potential of attempting new service formulations. Fasnacht and Schlosser (2025) show that innovation in customer-experience in service sectors is enhanced significantly when the leaders encourage change, which is driven by the vision, and cross-functional collaboration. Nevertheless, TL might not be enough to neutralise the complexity of the transformation issue facing BA. The aviation organisations like BA work under strict safety rules, limits, and a unionized workforce structure (Li and Pilz, 2023), so the change cannot be based on inspirational leadership only. Continuous re-solving of problem and adjustment to arising technical and organisational issues is much closer to adaptive leadership than implementing AI-powered operational systems.

3.2. Adaptive Leadership and Organisational Resilience

Adaptive leadership by Heifetz, Grashow and Linsky (2009) is concerned with the mobilization of organisations in response to complex, uncertain and emerging challenges in which solutions are not obvious. In contrast to TL, where vision and motivation are more important, adaptive leadership focuses more on learning, experimentation, engagement of stakeholders and development of capabilities (Huang, Jiang and Chang, 2023). This strategy is quite applicable in the BA digital investment as the integration of an all-encompassing artificial intelligence-based operations platform entails technical risk, human workforce transformation, and corporate education. As Olaseni (2020) note, digital systems like predictive maintenance systems need constant data calibration and the coordination of the engineering teams, data scientists, and operational planners. Digital change resistance would be addressed by adaptive leadership, assisting BA in coping with the change. Lassebie and quintini (2022) assert that when the workers are professionally controlled sectors (e.g., aviation), they tend to view the automation as a threat to professional skills. In this sense, adaptive leaders simply consult employees in coming up with solutions to problems, rather than pushing technological solution down from the top (Azmi, 2025). This strategy enhances the level of tolerance to new systems. The nature of the aviation industry necessitates adaptive leadership as well, since the digital transformation should take place without signifying reduced security or trustworthiness (Kabashkin and Perekrestov, 2024). Thus, to integrate AI-based operational tools, it is vital to perform incremental testing, feedback loops, and organisational learning cycles, which are also in line with the adaptive leadership principles. Moreover, adaptive leadership can balance competing priorities in organisations, such as cost efficiency, safety compliance,

customer satisfaction, and sustainability (Nazeer, Saleem and Shafiq, 2024). The digital investment of BA needs to consider these priorities and retain efficacy in its operations. Adaptive leadership can be used to help organisations through trade-offs and adopt a strategy based on real-time feedback. Kiyiklik, Kusakci and Mbowe (2022) indicate that successful digital transformation maturity (DDM) in aviation can be achieved by the adoption of iterative implementation strategies by organisations, as opposed to large-scale implementation of technologies. This approach is supported by adaptive leadership, which promotes trial and error.

3.3. Comparative Evaluations of Leadership Approaches

The two leadership styles, transformational and adaptive, make significant, albeit distinct, contributions to the success of the digital investment of BA. TL plays a critical role in the development of strategic alignment and the inspiration of employees to adopt digital change (Qiao, Li and Hong, 2024), whereas adaptive leadership can be useful in dealing with uncertainty and ensuring organisational learning in the implementation process (Huang, Jiang and Chang, 2023). TL contributes to BA conveying a clear strategic story about how digital innovation relates to the reliability of operations and the experience of the organisation to take care of the complexity of implementation, develop new digital capabilities, and react to the new challenges. As per Wilfred, Prasad and Prakash (2025), aviation organisational learning. In the case of BA, the use of a single leadership approach would create a high implementation risk. TL that lacks adaptive capability will cause overambitious digital projects that cannot operate, whereas adaptive leadership that lacks a vision will produce small changes with no competitive edge.

Thus, the proposed AI-driven platform investment is most likely to succeed in case the TL offers strategic guidance, and the adaptive leadership help in learning and in engaging workers in the implementation. This leadership blend corresponds to the complexity of the strategic environment of BA and is more likely to lead to success in moving to digital transformation.

4. Task 3- Strategic Recommendations and Change Implementation

4.1. Reshaping British Airways’ Strategic Direction through Digital Integration a

According to the strategic analysis, BA needs to move away from a traditional premium strategy of its digital tools to a digitally integrated strategy in which operational data platform and AI- driven decision systems are strategically vital assets. This change can be traced to the industry point of evidence that the airlines that focus on data integration, predictive analytics, and automation are more resilient in operations and attain higher customer satisfaction levels (Jhunjhunwala *et al.*, 2025). The advisable capital to invest in an AI-based operations and customer-experience platform should thus be incorporated into the corporate-level strategy of BA, other than being an IT project. Troisi, Visvizi and Grimaldi (2024) indicate that data ecosystems are becoming the most important source of competitive advantages instead of separate service innovations. The strategic aim of BA would be to become a predictive airline, with operational disruptions expected, real-time automation of customer communication, and data modelling as biases of decision in maintaining an aircraft, instead of responding to an inspection cycle. Stanton *et al.* (2022) noted that companies where airlines use predictive maintenance technologies have fewer technical delays and major aircraft downtime. This digital adjournment enhances that premium positioning of BA, where reliability and personalized service are essential points of difference. Research shows that service reliability influences the airline customer loyalty more significantly than merely the price (Hamed *et al.*, 2024). Digital resilience to operations, therefore, contributes positively towards the competitive strategy of BA.

4.2. Gap Analysis: Current State vs Desired Digital Capability

BA has already introduced digital tools for customers (e.g., new and updated website and app) (British Airway, 2024). However, its operational digital maturity is not balanced. Manual-coordination process, as well as legacy IT systems and fragmented operational databases, still prevent the ability to make real-time decisions. The suggested AI-based platform necessitates the sealing of ability gaps in data combination, personnel digital skills, and operational analytics foundation. According to research, airlines using integrated operational data platforms recover much faster when it comes to disruptions, especially during peak travel durations (Lu *et al.*, 2024). Sealing such gaps is thus a strategic strength that BA needs to achieve.

Table 2: Gap analysis

Area	Current State (BA)	Desired State	Strategic Gap
------	--------------------	---------------	---------------

Operational IT systems	Fragmented legacy infrastructure	Integrated real-time operations platform	High
Maintenance strategy	Scheduled and reactive maintenance	Predictive AI -based maintenance	High medium
Customer disruption management	Manual coordination and compensation processes	Automated real-time service recovery	High
Workforce digital capability	Limited AI/data literacy outside IT teams	Organisation-wide digital capability	High
Data governance	Departmental data silos	Unified operational data ecosystem	High

4.3. Lewin Force Field Analysis

The force field analysis provided by Lewin (1951) can be used to determine the forces and obstacles that can impact the implementation of the AI-driven digital platform investment. Trieu et al. (2024) argue that digital transformation can achieve success in cases where organisations minimise restraining forces by building capabilities as opposed to strategic pressure alone. In the case of BA (Table 3), it involves a higher priority that goes to employee training, stage implementation, and IT modernization. The leadership should hence Centre its attention on minimising resistance and not just increasing the rate of technology adoption.

Table 3: Force field analysis for BA

Made by the student based on the company analysis

Driving Forces for Change	Strength (1-5)	Restraining Forces Against Change	Strength (1-5)
Need to improve operational reliability and reduce disruptions	5	Legacy IT infrastructure complexity	4
Competitive pressure from	4	Workforce resistance to	4

digitally efficient airlines		automation and AI adoption	
Customer demand for a seamless digital travel experience	4	Cybersecurity and data-protection concerns	3
Sustainability and fuel-efficiency optimisation goals	3	High upfront digital investment cost	3
IAG's financial and technological support	4	Regulatory and compliance requirements	2
Ai-based predictive maintenance efficiency gains	5	Organisational inertia and siloed departments	3

4.4. Risk Assessment and Implementation Capacity

The aviation investment in digital transformation is subject to operational, technological, financial and organisational risk. One risk area is cybersecurity risk due to the 2018 data breach experienced by BA, resulting in a £ 183m fine (BBC, 2019), which revealed the weakness of digital systems. Ukwandu *et al.* (2022) agree that given large amounts of passenger data and interconnected systems that operate airline, there is a growing number of cyberattacks targeted at these companies, nevertheless, BA has significant implementation capacities as well. The airline can access financial resources, common digital infrastructure projects and analytics expertise through IAG. These strengths alleviate the risks of investments as opposed to smaller airlines. Another capacity advantages are the capability that BA has in its engineering experience, as well as its operational data available (British Airways, 2024b); it is important to its predictive maintenance systems. It is not about the availability of the data but the necessity to integrate it and develop the data analytics skills. Risk assessment is summarized in Table 4.

Table 4: Risk assessment

Risk	likelihood	Impact	Risk level	Mitigation strategy

Legacy IT integration failure	Medium	High	High	Phased cloud migration and system testing
Workforce resistance to AI tools	High	Medium	High	Digital training programmes and participation
Cybersecurity breach	Medium	High	High	Advanced cybersecurity architecture and monitoring
Budget overrun	Medium		Medium	Incremental investment approach
Operational disruption during rollout	Low	High	Medium	Parallel system operation during transition

4.5. Strengthening implementation success

BA needs to implement a gradual strategy of change to digital transformation to enhance the chances of its successful implementation. The proposed order of plan implementation is: First, there is a need to incorporate the operational data infrastructure of BA into a single digital system. Existing systems of operation, maintenance, and customer-service are running on bases that are partially disconnected and thus restrict real-time decision-making. The flight operations, customer -service team, and engineering teams should be able to access consistent real- time information by migrating core operations systems to data architecture hosted in the cloud. Geske, Herold and Kummer (2024) support that airlines that use integrated functioning data systems improve coordination in case of disruption and minimise the amount of time it takes to make decisions. The second phase will be pilot testing on the predictive maintenance systems on the selected aircraft and routes. Instead of putting predictive analytics on the whole network at time, BA will start with the high utilization of the aircraft, like long-haul fleets taking off and landing at Heathrow. The pilot programmes enable the teams of engineers to develop confidence in the AI- based predictions in maintenance without causing disruption to the operational process. Suebsuwong (2024) underpins that the incremental predictive maintenance implementation is more helpful in enhancing the reliability outcomes and reducing risks in technical integration. The third phase should concern the implementation of AI-powered

customer-experience software and, especially, the integration of the service disruption tools. This can involve the rebooking system that is automated, the real-time communication tools with the passengers, and the mechanisms of compensation that are personalised. Bakir et al. (2025) indicated that proactive digital communication during delays can substantially increase customer satisfaction and lower the number of complaints in airline activities. The strategy of implementing these tools once the operational data is integrated will guarantee that the customer systems are supported by the correct operational information.

The final phase will include organisationa-wide implementation with workforce ability construction and rules. Training programmes on digital training will be implemented in engineering, operations and customer-service departments to create trust in AI-based decision systems. Having a central unit of digital transformation leadership at BA would have ensured that there is coordination amongst different departments and ensured there is strategic alignment with the overall IAG digital strategy (AbdEl-Fatah, 2023). This gradual implementation process will aid in minimising the risk of operations and enable the organisation to build long-term digital capability.

5. Conclusion

Overall, the aviation sector is experiencing a structural change caused by digital technologies, evolving customer demands and demands for sustainability. In the case of BA, to retain a competitive advantage in the long-term, the company should cease a series of small-scale digital upgrades and transition to a comprehensive physical approach to digital operations and customer-experience policy. This report underpinned that the digital transformation is not merely a technological upgrade but an organisational change of strategy which involves leadership, building adequate capacity, and updating infrastructure. The strategic analysis revealed that Bahas some valuable strengths, like brand relationship, operational experience and the assistance of the IAG, but has major challenges in the form of outdated IT systems, bureaucratism and mounting competition from digitally modernised airlines. These are important reasons that justify how digital investment is vital and strategic. The recommended AI-based operational and customer-experience platform is an avenue of enhancing reliability, future decision-making and customer service provisioning. Nevertheless, the effectiveness of this investment will be determined by sealing the digital skills of the workforce, data integration, and organisational synergy gaps. The gap analysis, along with the force-field analysis, depicted that to implement the idea of resistance and implementation risk reduction, workforce engagement, the implementation pivot, and good digital implementation governance are prerequisites. Importantly, IT, in combination with adaptive implementation ability, can help BA to transform the strategic direction successfully. Succinctly, integrating digital innovation into its core business will enable BA to become more resilient, increase customer confidence, and maintain a competitive edge in the ever-changing global aviation industry.

Executive Summary

This report examined the way British Airways (BA) can rebrand its strategic focus on the digital revolution within the airline sector. Digital technologies, including artificial intelligence (AI), predictive maintenance systems, integrated operational data platforms, automated customer-experience tools, were becoming the core of airline competitiveness, operational resilience, and customer satisfaction. The analysis using PESTEL and SWOT models revealed the main issue of BA, though some of them are outside IT infrastructure, the risk of operational interruption, the increase in the demands of digital services, and sustainability factors. Meanwhile, high brand positioning, the ability to leverage the digital investment capacity of IAG, and its vast operational data can help the airline to transform. The report suggested making an investment in the AI-based digital operations and customer-experience platform to enhance reliability, efficiency, and

service personalisation. The analysis of leadership based on transformational and adaptive leadership theories showed that strategic vision, as well as organisational learning ability, should be used to ensure the implementation is key to success. Comprehensively, digital integration is a strategic potential in BA that will make it more resilient, provide better customer experiences, and keep its comitatives position in a more data-driven aviation industry.

References

- AbdEl-Fatah, A.A.-F. (2023) 'The role of digital transformation in improving the competitiveness and operational processes of airlines', *Journal of Tourism, Hotels and Heritage*, 6(1), pp. 117-132
- Agarwal, P., Swami, S. and Malhotra, S.K. (2024) 'Artificial intelligence adoption in the post COVID-19 new-normal and role of smart technologies in transforming business: a review', *Journal of Science and Technology Policy Management*, 15(3), pp. 506-529.
- Alomar, I. and Nikita, D. (2025) 'Managing operational efficiency and reducing aircraft downtime by optimization of aircraft on-ground (AOG) processes for air operator', *Applied Sciences*, 15(9), pp. 5129-5129.
- Amankwah-Amoah, J. (2021) 'COVID-19 pandemic and innovation activities in the global airline industry: a review', *Environment International*, 156, p. 106719.
- Ansoff, H.I. (1957) 'Strategies for diversification', *Harvard Business Review*, 35(5), pp. 113–124.
- Arena, L. (2025) 'British Airways to introduce new spend based loyalty', *Business Travel News Europe*, Available at: <https://www.businesstravelnewseurope.com/Air-Travel/British-Airways-to-introduce-new-spend-based-loyalty> (Accessed:18 February 2026).
- Azmi, S.D. (2025) 'The role of adaptive leadership in responding to disruptive technological change', *Sistem, Informasi, Manajemen, dan Bisnis Adaptif (SIMBA)*, 1(1), pp. 1-10
- BBC (2019) 'British Airways faces record £183m fine for data breach', *BBC News*, 7 February. Available at: <https://www.bbc.com/news/business-48905907> (Accessed: 7 February 2026).
- BBC (2020) 'British Airways fined £20m over data breach', *BBC News*, 16 October. Available at: <https://www.bbc.com/news/technology-54568784> (Accessed: 18 February 2026).
- British Airways (2022) 'British Airways launches new smart technology trial, allowing customers to travel abroad without showing their passport at their departure airport', *Media Centre British Airways*. Available at: <https://mediacentre.britishairways.com/pressrelease/details/14300> (Accessed 19 February 2026).
- British Airways (2024a) 'British Airways unveils new website and app as part of its £7bn transformation plan', *Media Centre British Airways*. Available at:

<https://mediacentre.britishairways.com/pressrelease/details/19166> (Accessed 19 February 2026).

British Airways (2024b) 'Engineering greater efficiency: British Airways moves to predictive automated maintenance reporting system', *Media Centre British Airways*. Available at: <https://mediacentre.britishairways.com/pressrelease/details/18932> (Accessed 19 February 2026).

British Airways (2025a) 'About BA | Information | British Airways', *British Airways*. Available at: <https://www.britishairways.com/content/information/about> (Accessed 19 February 2026).

British Airways (2025b) 'British Airways improves on-time performance as world-leading technology boosts flight punctuality', *Media Centre British Airways*. Available at: <https://mediacentre.britishairways.com/news/14052025/british-airways-improves-on-time-performance-as-world-leading-technology-boosts-flight-punctuality> (accessed 19 February 2026).

British Airways (2025c) 'Planet | BA sustainability, carbon reduction & net zero', *British Airways*. Available at: <https://www.britishairways.com/content/information/about-ba/ba-better-world/planet> (Accessed 19 February 2026).

Bakir, N., El Nemar, S., Gehchan, F.B., Samrout, K. and Vrontis, D. (2025) Barney, J. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, 17(1), pp. 99–120.

Cozmata, A. (2024) 'Selling "The World's Favourite Airline": British Airways' privatisation and the motives behind it', *Business History*, 66(1), pp. 181–200.

Clatworthy, B. (2022) '10,000 British Airways flights cancelled this winter', *The Times*. Available at: <https://www.thetimes.com/world/asia/article/10-000-british-airways-flights-cancelled-next-winter-03bl9567q> (Accessed 7 February 2026).

Dąbrowska, J., Almpantopoulou, A., Brem, A., Chesbrough, H., Cucino, V., Di Minin, A., Dagar, R. and Sisodia, S. (2025) 'From cockpit to crew: the role of transformational leadership and culture in aviation employee engagement', *Advances in Consumer Research*, 2(1).

Fasnacht, D. and Schlosser, J. (2025) 'The role of foresight in bridging the gap between trends and customer experiences', *European Journal of Futures Research*, 13(1), p. 11.

Forsythe, J. and Rafoth, J. (2022) 'Being digital: why addressing culture and creating a digital mindset are critical to successful transformation', *Insight*, 25(1), pp. 25–28.

Geske, A.M., Herold, D.M. and Kummer, S. (2024) 'Integrating AI support into a framework for collaborative decision-making (CDM) for airline disruption management', *Journal of the Air Transport Research Society*, 3, p. 100026.

Gupta, P. (2025) 'Transformational leadership: inspiring change and innovation', *International Journal of Science and Research (IJSR)*, 14(2), pp. 504–509.

Giones, F., Hakala, H., Marullo, C., Mention, A., Mortara, L., Nørskov, S., Nylund, P.A., Oddo, C.M., Radziwon, A. and Ritala, P. (2022) 'Digital transformation, for better or worse: a critical multi-level research agenda', *R&D Management*, 52(5), pp. 930–954.

ePlane AI (2025a) 'BA chief warns AI agents may diminish brand visibility', ePlane AI. Available at: <https://www.eplaneai.com/news/ba-chief-warns-ai-agents-may-diminish-brand-visibility> (Accessed: 7 February 2026). 9(2), pp. 487–510.

Barney, J. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, 17(1), pp. 99–120.

Cozmuta, A. (2024) 'Selling "The World's Favourite Airline": British Airways' privatisation and the motives behind it', *Business History*, 66(1), pp. 181–200.

Clatworthy, B. (2022) '10,000 British Airways flights cancelled this winter', *The Times*. Available at: <https://www.thetimes.com/world/asia/article/10-000-british-airways-flights-cancelled-next-winter-03bl9567q> (Accessed: 20 April 2026)

Dąbrowska, J., Almpantopoulou, A., Brem, A., Chesbrough, H., Cucino, V., Di Minin, A., Dagar, R. and Sisodia, S. (2025) 'From cockpit to crew: the role of transformational leadership and culture in aviation employee engagement', *Advances in Consumer Research*, 2(1).

Fasnacht, D. and Schlosser, J. (2025) 'The role of foresight in bridging the gap between trends and customer experiences', *European Journal of Futures Research*, 13(1), p. 11.

Forsythe, J. and Rafoth, J. (2022) 'Being digital: why addressing culture and creating a digital mindset are critical to successful transformation', *Insight*, 25(1), pp. 25–28.

Geske, A.M., Herold, D.M. and Kummer, S. (2024) 'Integrating AI support into a framework for collaborative decision-making (CDM) for airline disruption management', *Journal of the Air Transport Research Society*, 3, p. 100026.

Gupta, P. (2025) 'Transformational leadership: inspiring change and innovation', *International Journal of Science and Research (IJSR)*, 14(2), pp. 504–509.

Giones, F., Hakala, H., Marullo, C., Mention, A., Mortara, L., Nørskov, S., Nylund, P.A., Oddo, C.M., Radziwon, A. and Ritala, P. (2022) 'Digital transformation, for better or worse: a critical multi-level research agenda', *R&D Management*, 52(5), pp. 930–954.

ePlane AI (2025a) 'BA chief warns AI agents may diminish brand visibility', *ePlan AI*. Available at: <https://www.eplaneai.com/news/ba-chief-warns-ai-agents-may-diminish-brand-visibility> (Accessed: 20 April 20226).

ePlane AI (2025b) 'Challenges facing the airline industry: AI, pilot strain, technical issues, and regulatory changes', *ePlane AI*. Available at: <https://www.eplaneai.com/news/challenges-facing-the-airline-industry-ai-pilot-strain-technical-issues-and-regulatory-changes> (Accessed: 20 April 2026).

European Commission (2025) 'How the new digital borders system works', *European Commission*. Available at: https://commission.europa.eu/news-and-media/news/how-new-digital-borders-system-works-2025-10-13_en (Accessed: 22 April 2026).

Glean (2025) 'How AI agents are enhancing predictive maintenance strategies', *Glean*. Available at: <https://www.glean.com/perspectives/how-ai-agents-are-enhancing-predictive-maintenance-strategies> (Accessed: 22 April 2026).

Gridpoint Consulting (2025) 'Stonking full year results from IAG', *Gridpoint Consulting*. Available at: <https://www.gridpoint.consulting/blog/stonking-full-year-results-from-iag> (Accessed: 22 April 2026).

Gualini, A., Martini, G. and Porta, F. (2024) 'Are low cost carriers airfares still lower? A comparison with full service carriers in Europe', *Journal of the Air Transport Research Society*, 2, pp. 100012–100012.

Hameed, I., Chatterjee, R.S., Zainab, B., Tzhe, A.X., Yee, L.S. and Khan, K. (2024) 'Navigating loyalty and trust in the skies: The mediating role of customer satisfaction and image for sustainable airlines', *Sustainable Futures*, 8, pp. 100299–100299.

Hauser, S. (2024) 'CEO and chairman Sean Doyle on British Airways' transformation', *McKinsey & Company*. Available at: <https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/ceo-and-chairman-sean-doyle-on-british-airways-transformation> (Accessed: 24 April 2026)

Heifetz, R.A., Grashow, A. and Linsky, M. (2009) *The practice of adaptive leadership: Tools and tactics for changing your organization and the world*. Boston, MA: Harvard Business Press.

Huang, J.Y., Jiang, R. and Chang, J.Y. (2023) 'The effects of transformational and adaptive leadership on dynamic capabilities: Digital transformation projects', *Project Management Journal*, 54(4), pp. 428–446.

IAG (2023) *British Airways Plc annual report and accounts 2023*. Available at: <https://www.iagroup.com/media/2h0hgqddq/british-airways-annual-report-and-accounts-2023.pdf> (Accessed: 24 April 2026).

IEA (2025) *Aviation*, International Energy Agency. Available at: <https://www.iea.org/energy-system/transport/aviation> (Accessed: 24 April 2026).

Jhunjhunwala, P., Diepeveen, B., Lewis, R., Agarwal, R. and Madambakkam, B. (2025) *From turbulence to transformation: How airlines can win with digital*. BCG Global. Available at: <https://www.bcg.com/publications/2025/turbulence-to-transformation-airlines-embrace-digital> (Accessed: 24 April 2026).

Jiang, Y., Tran, T.H. and Williams, L. (2023) 'Machine learning and mixed reality for smart aviation: Applications and challenges', *Journal of Air Transport Management*, 111, p. 102437.

Kabashkin, I., Misnevs, B. and Zervina, O. (2023) 'Artificial intelligence in aviation: New professionals for new technologies', *Applied Sciences*, 13(21), p. 11660.

Kabashkin, I. and Perekrestov, V. (2024) 'Ecosystem of aviation maintenance: Transition from aircraft health monitoring to health management based on IoT and AI synergy', *Applied Sciences*, 14(11), p. 4394.

Karanikas, N. and Nederend, J. (2018) 'The controllability classification of safety events and its application to aviation investigation reports', *Safety Science*, 108, pp. 89–103.

Kıyıklık, A., Kuşakcı, A.O. and Mbowe, B. (2022) 'A digital transformation maturity model for the airline industry with a self-assessment tool', *Decision Analytics Journal*, 3, p. 100055.

Lassébie, J. and Quintini, G. (2022) 'What skills and abilities can automation technologies replicate and what does it mean for workers? New evidence', *OECD Social, Employment and Migration Working Papers*, No. 282, pp. 1-66.

Lewin, K. (1951) *Field theory in social science*. New York: Harper.

Li, J. and Pilz, M. (2023) 'In-company training in a safety-critical industry: Lessons from the aircraft industry', *Journal of Workplace Learning*, 35(2), pp. 210–227.

Langer, C., Leblanc, D., Marcontell, D., Nutter, J., Porter, E. and Thibert, J. (2024) 'The generative AI opportunity in maintenance', *McKinsey & Company*. Available at:

<https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/the-generative-ai-opportunity-in-airline-maintenance> (Accessed: 24 April 2026)

Lu, L., Xu, Y., Fan, W., Pan, H., Ip, W. and Yung, K.L. (2024) 'Research on the recovery method of disrupted flights considering passenger transfer and cancellation costs', *Operations Management Research*, 18, pp. 691–717.

Miller, T., Durlík, I., Kostecka, E., Łobodzińska, A. and Matuszak, M. (2024) 'The emerging role of artificial intelligence in enhancing energy efficiency and reducing GHG emissions in transport systems', *Energies*, 17(24), p. 6271.

Moghadasnian, S. (2024) 'Artificial intelligence in airline business management: A paradigm shift in the industry', *Journal of Business Data Science Research*, 3(1), pp. 36–47.

Molchanova, K., Trushkina, N. and Katerna, O. (2020) 'Digital platforms and their application in the aviation industry', *Electronic Scientific Journal: Intellectualization of Logistics and Supply Chain Management*, 1(3), pp. 83–98.

Nazeer, S., Saleem, H.M.N. and Shafiq, M. (2024) 'Examining the influence of adoptability, alignment, and agility approaches on the sustainable performance of aviation industry: An empirical investigation from a supply chain perspective', *International Journal of Aviation, Aeronautics, and Aerospace*, 11(1), p. 8.

Nguyen, T.T., Hoang, C.C., Kaushik, K. and Nguyen, N.D.K. (2026) 'Enhancing customer experience with generative AI chatbots: Strategies, applications and future trends', in *Artificial Intelligence (AI) for IT Energy Efficiency and Green AI for Environment Sustainability*. Cham: Springer, pp. 433–449.

Ogunwale, O., Onukwulu, E.C., Joel, M.O., Adaga, E.M. and Ibeh, A.I. (2023) 'Modernizing legacy systems: A scalable approach to next-generation data architectures and seamless integration', *International Journal of Multidisciplinary Research and Growth Evaluation*, 4(1), pp. 901–909.

Olaseni, I.O. (2020) 'Digital twin and BIM synergy for predictive maintenance in smart building engineering systems development', *World Journal of Advanced Research and Reviews*, 8(2), pp. 406–421.

Olivares, J.V. (2023) 'Alliances as a coopetitive strategy of the airlines: The case of Iberia (1980–2020)', in *Collective Entrepreneurship in the Contemporary European Services Industries: A Long Term Approach*. Bingley: Emerald Publishing Limited, pp. 77–93.

Patton, R. and Jahankhani, H. (2025) 'How can existing cyber frameworks be better implemented to ensure operational resilience within the UK aviation industry in the event

of a cyber-attack against its mission critical, satellite-based services?', in *Autonomous Revolution: Strategies, Threats and Challenges*. Cham: Springer, pp. 199–239.

Qiao, G., Li, Y. and Hong, A. (2024) 'The strategic role of digital transformation: Leveraging digital leadership to enhance employee performance and organizational commitment in the digital era', *Systems*, 12(11), p. 457.

Quetteville, H. de (2019) 'In-house or outsourced, why BA's creaking IT systems are a laughing stock', *The Telegraph*. Available at: <https://www.telegraph.co.uk/technology/2019/08/07/in-house-outsourced-bas-creaking-systems-laughing-stock/> (Accessed: 24 April 2026).

Rukumnuaykit, P., Pholphirul, P. and Phaphimolwat, W. (2025) 'Post-COVID-19 adoption of service robots in Thai tourism enterprises: Assessing impacts on job displacement and job creation', *Social Sciences & Humanities Open*, 12, p. 101784.

Schmelzer, R. (2025) 'How IAG's home-grown AI could save airlines millions', *Forbes*, 27 June. Available at: <https://www.forbes.com/sites/ronschmelzer/2025/06/27/how-iags-home-grown-ai-could-save-airlines-millions/> (Accessed 22 February 2026)

Sesar, V., Hunjet, A. and Primorac, D. (2021) 'The impact of digitalization on customer satisfaction and customer loyalty: literature review', *Economic and Social Development: Book of Proceedings*, pp. 297–306.

Smuts, H. and Smith, A. (2021) 'Collaboration of human and machine for knowledge work: an organisational transformation framework for data-driven decision-making', in *Information technology in organisations and societies: Multidisciplinary perspectives from AI to technostress*. Bingley: Emerald Publishing Limited, pp. 25–59.

SpringWorks (2021) *How to conduct an effective PESTEL analysis?* Available at: <https://springworks.ch/en/pestel-analysis/> (Accessed 22 February 2026).

Stanton, I., Munir, K., Ikram, A. and El-Bakry, M. (2022) 'Predictive maintenance analytics and implementation for aircraft: Challenges and opportunities', *Systems Engineering*, 26(2), pp. 216–237.

Suebsuwong, P. (2024) 'Integrating horizons: A holistic view of predictive maintenance in aviation maintenance practices', *Journal of Science and Technology Kasetsart University*, 13(3), pp. 38–60.

Sukardi, S., Wahyuni, S. and Rachmawati, R. (2025) 'Entrepreneurship capability by triple series innovations in building competitive resilience within the airline industry', *Aptisi Transactions on Technopreneurship (ATT)*, 7(3), pp. 957–972.

The Economist (2019) 'British Airways' profits may not fly high much longer', *The Economist*, 19 October. Available at: <https://www.economist.com/business/2019/10/19/british-airways-profits-may-not-fly-high-much-longer> (Accessed: 24 April 2026).

Topham, G. (2024) 'British Airways owner's annual profits soar to £2.3bn on leisure boom', *The Guardian*, 29 February. Available at: <https://www.theguardian.com/business/2024/feb/29/british-airways-owner-iag-annual-profits-soar-leisure> (Accessed: 25 April 2026).

Trieu, H.D., Nguyen, P.V., Tran, K.T., Vrontis, D. and Ahmed, Z. (2024) 'Organisational resilience, ambidexterity and performance: The roles of information technology competencies, digital transformation policies and paradoxical leadership', *International Journal of Organizational Analysis*, 32(7), pp. 1302–1321.

Troisi, O., Visvizi, A. and Grimaldi, M. (2024) 'The different shades of innovation emergence in smart service systems: The case of Italian cluster for aerospace technology', *Journal of Business & Industrial Marketing*, 39(6), pp. 1105–1129.

Ukwandu, E., Ben-Farah, M.A., Hindy, H., Bures, M., Atkinson, R., Tachtatzis, C., Andonovic, I. and Bellekens, X. (2022) 'Cyber-security challenges in aviation industry: A review of current and future trends', *Information*, 13(3), p. 146.

Vancia, A.P.P., Băltescu, C.A., Brătucu, G., Tecău, A.S., Chițu, I.B. and Duguleană, L. (2023) 'Examining the disruptive potential of Generation Z tourists on the travel industry in the digital age', *Sustainability*, 15(11), p. 8756.

Venkataramani, S. and Kothandaraman, K. (2020) 'Driving transformational change through organisational culture', *NHRD Network Journal*, 13(2), pp. 116–128.

Wendel, L.-M., Albers, S. and Dewulf, W. (2024) 'Creating architectural advantage in the airline industry: Strategic options for airlines to migrate values', *Journal of the Air Transport Research Society*, 2, p. 100002.

Wilfred, V., Prasad, M.R. and Prakash, S.K.J. (2025) 'From runway to success: Unravelling business transformation approaches in India's aviation industry', *Case Studies on Transport Policy*, 19, p. 101370.

Wu, P.J. and Yang, C.K. (2021) 'Sustainable development in aviation logistics: Successful drivers and business strategies', *Business Strategy and the Environment*, 30(8), pp. 3763–3771.