Digital Technology Adopted by Airlines during COVID-19 Pandemic

Subjects: Transportation Science & Technology

Contributor: Nirajan Shiwakoti , Qiming Hu , Ming Kin Pang , Tsz Mei Cheung , Zhengkai Xu , Hongwei Jiang

Airlines' major adoption of digital technology during the COVID-19 crisis may have changed how customers experience the services and may affect passengers' perceptions compared to the past. The pandemic has forced the airline industry to change and adopt new business strategies. Apart from ensuring business continuity, passengers also have higher expectations. Maintaining the same level of service standards as in the pre-pandemic era may be insufficient to retain passengers' satisfaction with the airlines. Passengers are now more stringent with health and hygiene. New digital technology can assist the airline industry in overcoming the challenges posed by the crisis. During the pandemic period, many airlines have strengthened their digital technology capability, significantly accelerating transformation and innovation to digitalization.

digital transformation passengers' satisfaction emerging technology

1. Technology Adoption before COVID-19

The COVID-19 pandemic has accelerated global digital transformation trends, indicated by the greater utilization of digital (new) technology in multiple industries and the creation and growth of digital infrastructures. Nonetheless, several digital transformation trends were evident before the emergence of the COVID-19 pandemic. The Internet of Things (IoT) trends were on the rise. Businesses have already started embracing IoT analytics to turn big data collected into revenue. For example, mining companies were using IoT analytics to monitor the efficiency of their production processes, while company fleets were fitted with IoT devices to track efficiency [1]. Edge computing technology was also widespread before the pandemic. By processing data close to the source rather than in the cloud, edge computing enhances how organizations acquire and analyze data. The technology delivers real-time data that enables businesses to make data-driven choices and more informed decisions.

5G deployment was successful, although mainstream adoption was still low before COVID-19. With many implementations across various sectors, Intel and Nokia had demonstrated significant promise. All these installations demonstrated that 5G technology was on the verge of becoming ubiquitous, with significant benefits for enterprises [2]. Major cloud companies were providing blockchain as a service for greater security. From finance to human resources, blockchain was set to disrupt sectors and departments. While blockchain technology has received much attention, many smaller businesses were yet to adopt it. Furthermore, Artificial Intelligence (AI) technology was mainstream. Companies started looking for methods to incorporate AI into their systems to simplify operations and procedures for their staff and customers. Most businesses, for example, had AI assistants built into their computer systems, platforms, and software [3]. Chatbots were already implemented by businesses to facilitate

customer support. While Augmented Reality (AR) was fast-rising, Virtual Reality (VR) was stagnating. Firms have already discovered that AR could improve their relationship with technology in various important ways [4]. The attention on VR was gradually decaying as businesses discovered that AR was less expensive and easier to utilize than VR, as they could better train, pitch, and envisage new ideas with 3-D virtualization at a lower cost than VR.

2. Technology Adoption in the Airline Industry Due to COVID-19

Under the global phenomenon of digitalization, the airline industry is inevitably trending towards increased digitalization. Digital technologies have been widely adopted in different areas within the airline industry over the past decades, for instance, air traffic management, airlines and airports, aircraft maintenance, and more [5]. Airline executives have also acknowledged and agreed on digital technology in the passenger service sector [6]. A better passenger experience may be achieved if airlines can conduct their business more mechanistically. Therefore, the airline industry was already undergoing digital or new technology evolution before the pandemic. Some studies have discussed the benefit and importance of digitalization for passengers in the airline industry. Digitalization can enhance aviation safety, efficiency, accessibility, collaboration, and cost reduction [5]. A study [5] has highlighted that the airline industry has benefited from numerous technologies to achieve these objectives, specifically the use of seven digital technologies in the airline industry: blockchain technology, artificial intelligence (AI), augmented reality and virtual reality, beacons technology, big data and analytics and biometrics. A framework for understanding the relationship between the use of artificial intelligence and the internet of things (IoT) with passenger satisfaction has been proposed in [7]. According to this framework, AI and IoT enabled sustainable practices enhance passenger confidence positively, which then further enhances positive word of mouth and passenger satisfaction. Likewise, it has been stated that the digital transformation process in airlines is not an easy task, and several interconnected organizationl factors and passengers' perspectives need to be considered [8]. As such, a Digital Transformation Maturity (DTM) self-assessment framework for the airline industry has been proposed in the literature that takes into account nine dimensions to measure digital transformation maturity along with feedback from experts on the relative importance of the selected dimensions, resulting in a self-assessment tool that can be used by practitioners [8].

Internet of Things (IoT) is integrated into E-luggage tags, E-menu, and Self-check-in kiosks, enabling airline passengers' data to be collected and connected seamlessly with stakeholders in real-time. This can lead to better customer understanding to enhance customer experience [7]. Artificial Intelligence (AI) played an important role during the pandemic. Airlines have adopted AI for customer service through numerous channels, including the official airline website and social media platforms. Combined with IoT, AI can quickly respond to passengers' queries with airline information in a timely manner [7].

A survey found that personal entertainment systems and online ticket booking are essential for Indian passengers [9]. Similarly, an online survey found that focusing on online services and inflight services, including the in-flight entertainment system and in-flight Wi-Fi, can improve the overall satisfaction level and passenger loyalty toward the airline [10].

In addition, blockchain technology has been utilised in the airline industry to transform passenger processing from physical ID checks to digital ID checks, through a decentralised database that can be accessed by relevant personnel. Thus, it helps build a robust security system to manage customer data and allows for the achievement of biometrics recognition [11]. Spirit Airlines, JetBlue and Delta Airways have utilised this technology to allow passengers to perform facial recognition for baggage drop, security, boarding and more [12]. Such transformation helps minimize the time for identifying passengers [5]. Apart from that, AirAsia also integrates AI into the mobile application–Scan2Fly, where AI is used instead of staff for the verification of the Polymerase Chain Reaction (PCR) test certificate, as well as other COVID-19 related documents [13]. Similarly, Singapore Airlines begun the trial of the International Air Transport Association's Travel Pass Framework based digital health verification process, which allows passengers to digitally store and present their COVID-19 tests and vaccine status [14]. The services utilised big data analysis, allowing stakeholders, including other airlines, ground services, airports, etc., to share the information. This not only improves passengers' experience but also strengthens the collaboration of the airline industry [14].

The pandemic has also raised attention to the need for the adoption of improved hygiene procedures due to travellers' health and safety concerns. In 2020, Honeywell introduced Ultraviolet Cabin, which has been applied by multiple airlines as the technology to reduce certain viruses and bacteria on targeted surfaces, including SAR-CoV-2 (COVID) [15]. Nevertheless, airlines have also developed similar products to sanitise the airport and cabin, such as automatic cleaning robots introduced by United Airlines. These cleaning robots spray antimicrobial agents on the cabin surface and form a durable protective barrier to provide hygiene for both travellers and crew members [16].

3. Passengers' Perceptions

In the highly competitive market, airlines' advantage lies in the quality of service perceived by passengers, as only passengers can define the quality of services [17]. Therefore, the digital technology uptake in the airline industry needs to be accomplished with quality to influence passengers' satisfaction positively. During the COVID-19 era, studying airlines' digital transformations, passenger satisfaction, or the relationship between the two is becoming an emergent field [18].

Passengers are now demanding higher levels of hygiene and require airlines to provide adequate preventive measures [18]. Digital technology is one of the most effective methods to provide contactless services and is a part of an airlines' business strategy in response to the pandemic, which has been discussed in several studies. A study [19] has summarised touchless technology used by airlines, including electronic bag tags (EBTs), high-efficiency particulate air (HEPA) filters, etc. Additionally, another study [20] created a concept called 'CoviNovation', which illustrated COVID-19-induced innovation activities such as ultraviolet light (UV) to disinfect the cabin, touchless processes at airports, and biometric check-in and boarding. However, these studies are theoretically based on research papers and organization reports. The lack of data support, especially passengers' perceptions of those technologies, hindered the study of deeper insights. Additionally, existing studies on digital technology adoption in the airline industry often focus on the airlines' business perspective. For example, [7] discussed the utilization of AI

and the IoT to enhance service quality and rebuild passengers' confidence and satisfaction while travelling during the pandemic. Passengers who have a positive experience with airlines will spread positive word of mouth to their friends, relatives, etc., which will also benefit the airlines [7]. The study uses conceptual analytics to analyze and present how technological advancements would benefit the industry and customer satisfaction. However, the study lacked verification from the empirical data.

In terms of passenger satisfaction, some researchers have studied the changes in the drivers of passenger satisfaction during the pandemic based on the analysis of passengers' comments on airline websites, social media platforms and questionnaires [18][21][22]. Machine learning approach was applied to data collected from local surveys to evaluate service attributes [17]. The study determined that online boarding, inflight Wi-Fi, and inflight entertainment systems are crucial services to increase passenger satisfaction and emphasized that airlines should prioritize services that are digitally relevant. The result is supported by [23], which also adopted a survey and discovered that digital services positively affect passenger satisfaction throughout the journey with airlines, especially during the pre-arrival, pre-boarding, and arrival stages.

References

1. Manyika, J.; Chui, M.; Bisson, P.; Woetzel, J.; Dobbs, R.; Bughin, J.; Aharon, D. Unlocking the Potential of the Internet of Things. McKinsey Global Institute. 2015. Available online: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world (accessed on 1 April 2022).
2. Haas, H. LiFi is a paradigm-shifting 5G technology. Rev. Phys. 2018, 3, 26–31.
3. Deepika, K.; Tilekya, V.; Mamatha, J.; Subetha, T. Jollity Chatbot-a contextual AI assistant. In Proceedings of the Third International Conference on Smart Systems and Inventive Technology (ICSSIT), Tirunelveli, India, 20–22 August 2020; pp. 1196–1200.
4. Rotsidis, A.; Theodorou, A.; Bryson, J.J.; Wortham, R.H. Improving robot transparency: An investigation with mobile augmented reality. In Proceedings of the 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), New Delhi, India, 14–18 October 2019; pp. 1–8.
5. Molchanova, K. A Review of Digital Technologies in Aviation Industry. Logist. Transp. 2020, 47–48, 69–77.
6. Serrano, F.; Kazda, A. The future of airports post COVID-19. J. Air Transp. Manag. 2020, 89, 101900.
7. Chakraborty, S.; Chakravorty, T.; Bhatt, V. IoT and AI driven sustainable practices in airlines as enabler of passenger confidence, satisfaction and positive WOM: AI and IoT driven sustainable

practice in airline. In Proceedings of the International Conference on Artificial Intelligence and Smart Systems (ICAIS), Coimbatore, India, 25–27 March 2021; pp. 1421–1425.

8. Kıyıklık, A.; Kuşakcı, A.O.; Mbowe, B. A digital transformation maturity model for the airline industry with a self-assessment tool. Decis. Anal. J. 2022, 3, 100055.
9. Singaravelu, K.; Amuthanayaki, V. A study on service quality and passenger satisfaction on Indian airlines. J. Commer. Trade 2017, 12, 106–115.
10. Park, E. The role of satisfaction on customer reuse to airline services: An application of Big Data approaches. J. Retail. Consum. Serv. 2019, 47, 370–374.
11. Delgado-Mohatar, O.; Fierrez, J.; Tolosana, R.; Vera-Rodriguez, R. Blockchain meets biometrics: Concepts, application to template protection, and trends. arXiv 2020, arXiv:2003.09262.
12. Delta. Delta Reveals First-Ever Dedicated TSA Precheck Lobby, Bag Drop. 26 October 2021. Available online: https://news.delta.com/delta-reveals-first-ever-dedicated-tsa-precheckr-lobby-bag-drop (accessed on 6 March 2022).
13. Airasia. 2022. Available online: https://www.airasia.com/aa/about-us/en/gb/scan2fly.html (accessed on 6 May 2022).
14. Olaganathan, R. Impact of COVID-19 on airline industry and strategic plan for its recovery with special reference to data analytics technology. Glob. J. Eng. Technol. Adv. 2021, 7, 33.
15. Honeywell. Effect of UV-C on Aircraft Interior Materials, Company Report, Honeywell. 2020. Available online: https://aerospace.honeywell.com/content/dam/aerobt/en/documents/learn/products/cabin-management-and-entertainment/brochures/Effects_of_UV-C_on_Aircraft_Interior_Materials.pdf (accessed on 2 May 2022).
16. United Airlines. What to Expect When You Fly, United Airlines. 2022. Available online: https://www.united.com/ual/en/us/fly/travel/what-to-expect.html (accessed on 6 May 2022).
17. Noviantoro, T.; Huang, J.-P. Investigating airline passenger satisfaction: Data mining method. Res. Transp. Bus. Manag. 2021, 43, 100726.
18. Afaq, A.; Gaur, L.; Singh, G.; Dhir, A. COVID-19: Transforming air passengers' behaviour and reshaping their expectations towards the airline industry. Tour. Recreat. Res. 2021, 1–9.
19. Suk, M.; Kim, W. COVID-19 and the airline industry: Crisis management and resilience. Tour. Rev. 2021, 76, 984–998.
20. Amankwah-Amoah, J. COVID-19 pandemic and innovation activities in the global airline industry: A review. Environ. Int. 2021, 156, 106719.

21. Pereira, F.C. The Impact of the COVID 19 Pandemic on European Airlines' Passenger Satisfaction. Master's Thesis, University Institute of Lisbon, Lisbon, Portugal, 2021. Available online: https://repositorio.iscte-iul.pt/handle/10071/23516 (accessed on 1 April 2022).
22. Thepchalerm, T.; Ho, P.; Kongtaveesawas, N. Factors Affecting Airline's Passenger Choice During COVID-19 Pandemic. J. Humanit. Soc. Sci. Thonburi Univ. 2021, 15, 13–24.
23. Heiets, I.; La, J.; Zhou, W.; Xu, S.; Wang, X.; Xu, Y. Digital transformation of airline industry. Res. Transp. Econ. 2022, 92, 101186.