Chapter 4
Technological Innovations in Asian Tourism

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Abstract Innovation is emerging as a perennial factor in driving the success of the tourism industry while technology is regarded as one of the fundamental determinants of innovation in the tourism sector. Hence, there exists a high correlation between the technological interventions of a tourism firm and the magnitude of innovation it induces. In this backdrop, the Asia continent has earned the repute of being the playground for innovation and an observatory for new travel trends. This chapter aims to find out the technological applications that drive innovation in the Asian tourism sector. The chapter also tries to understand the mechanism of technological-driven innovation in Asian tourism. Majority of the earlier works published have mostly dealt with the aspect of technology and innovations separately and very few of them have tried to explore the interlinkages which this chapter seeks to explore. This work is mainly descriptive and adopts a qualitative approach.

Keywords Technology · Asia · Tourism · Innovations

Introduction

Technology-based innovations have become great means to satisfy human needs and are highly applauded for their ability to drive social transformations and economic growth (Li & Piachaud, 2019). Similarly, in the tourism industry, innovation is emerging as a perennial factor in driving the success of various ventures (Hjalager, 2002) while technology is regarded as one of the fundamental determinants of innovation

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(Divisekera & Nguyen, 2018). Hence, there exists a high correlation between the technological interventions of a tourism firm and the magnitude of innovation it induces. Starting from booking the ticket to providing feedback for the tours, technology has drastically changed the structure and operations of the tourism industry through land marking innovations. In their study about future trends of the Asia Pacific region, Tolkach et al. (2016) predicted "technology and innovation" as the second most trending theme in the Asia-Pacific region.

Meanwhile, the Asian continent has earned the repute of being the playground for innovation and an observatory for new travel trends. Both tourism and technology are thriving in Asia and are showing spectacular signs of a bright future. While Asian tourism is maintaining its ace position in terms of growth in global tourist arrivals and spending in the year 2018 (UNWTO, 2019), the continent has also become the land for the technological boom. So, both technology and innovation are undergoing a synced-growth process in the context of the Asian tourism industry and therefore, are influencing each other like never before. However, this parallel growth process has hardly been discussed in the academic literature and needs a thorough investigation. The majority of the earlier works published have mostly dealt with the aspect of technology and innovations separately and very few of them have tried to explore the interlinkages. Against this backdrop, this chapter aims to find out the technological applications that are driving innovation in the Asian tourism sector.

The study is mainly descriptive and stems from the various literature in reputed newspapers, journals, Govt. documents, newsletters, and magazines etc. documenting the technology-based innovations in the Asian continent. One of the stark aspects of this chapter is that in the absence of adequate scientific literature, this work derives most of its records from the 'grey' literature that comprises of "unpublished studies and studies published outside widely available journals" (Conn et al.,

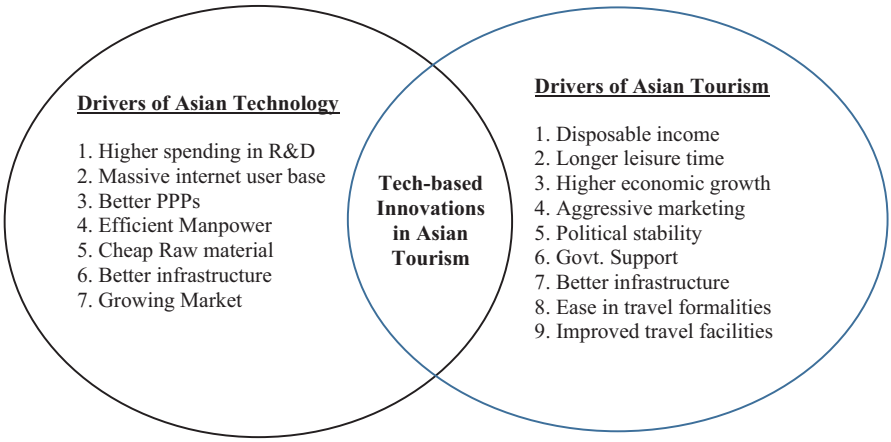

Fig. 4.1 Framework for drivers of tech-based innovations in Asian tourism. (Source: authors' own work)

2003: p. 256) and is considered as rich sources for data which are not adequately available in the scientific periodicals. Divided into three different parts, the paper begins by discussing the technological rise in the Asian region. While doing so, the authors also shed light on the reasons for such an upsurge. Secondly, various facets of the implication of technology-based innovations on the Asian tourism industry have been pondered upon. Last section deals with prospects and challenges that wait in future while adopting these innovations in the Asian tourism industry.

Growth of Technology in Asia

In the last decade, the Asian region has emerged as one of the tech giants with stories of technological upsurge across its different nations making the headlines of many global periodicals. Asia is not anymore perceived as a third-world region with inadequate technological infrastructure and has been the blooming ground for many tech companies and startups. According to a McKinsey & company (2020) report, the Asian region acquired a global share of 52% of growth rate in tech-company revenues and accounted for 51% of spending on R&D (Research and Development), 43% of funding for startups, and 87% of patents filed for the year 2019. While China and Japan have occupied the second and third spots in the largest economies of the world, India at the fifth spot is exhibiting great signs of progress (Silver, 2020). Consequently, the technological growth in Asia has been most advanced by these three nations. China, for example, was home to 26% of the global unicorns (startup ventures with value more than equal to $1 billion), whereas India produced three fourth of the global STEM (science, technology, engineering, and mathematics) graduates during the period from 2016 to 2018 (Woetzel & Seong, 2020). With Asia's emergence as the adobe of the unicorns, six of the top fifteen global technology unicorns considering market capitalization are now from Asia including the biggest unicorn Bytedance, a Chinese technology venture worth US$147b; just ten years before, there was no representation from Asia in this category (CB Insights, 2020). Besides countries like South Korea and Japan are driving the innovation game to the next level backed by the companies like Samsung and Sony respectively. One of the bright indicators of Asia's commitment to innovation and knowledge is the number of patents filled. Over the last decade, the region seized 87% of worldwide growth in filings of patent with China alone accounting for 45% of the global patents.

Apart from the technological advancements, the Asian continent is also progressing a great deal in the telecom infrastructure and manufacturing of hardware and software. 90% of the total smartphones in the world are manufactured in Asia whereas the deployment of 5G internet services is in full flow across the Asian region. Across the world, five companies hold the patent for 5G services and four of these five belong to the Asian continent. World's biggest online retail market, Alibaba and online travel ventures like Trip.com and CTrip have their origins in China. Also, tech unicorn like Traveloka which is an Indonesian venture is changing

the shape of the travel industry with huge investments (approx. US$150 billion) in the travel experience market (Muskita, 2019). With Asian economies shifting to a diversified innovation- and knowledge-focused, its share in the world in terms of technology venture revenue has increased to a staggering 45% in 2016–18 from 41% in 2006–08, which is estimated to be 52% of growth worldwide.

Technology-Tourism Synergy in Asia

Travel industries need to keep up with the latest technology associated with travel and tourism for the alleviation of cost, providing the best experiences to customers, and improve the business performance. Technology adoption helps the travel industries to sustain in the globally competitive market as well as contribute to sustainability (Cheng & Cho, 2011). Technology adoption is contributing to sustainability in the tourism industry by replacing resources with technology (Choi et al., 2020). The technological evolution wave was noticed in the 1990s and influenced many airlines, travel agencies, and hospitality firms to develop websites along with online booking functions. Later, the online reservations of flights, hotels, and car rentals were offered by Expedia in 1996. In the continuation of the evolution of the online booking trend, many online platforms came into existence such as 'Priceline' online payment and website of trip advisor in 2000. In 2003, hotels started expanding around the world with the inclusion of Wi-Fi facilities. Many mobile-friendly websites and mobile application were launched after the introduction of smartphones. The touch screen information board replaced human contact, as a result, the first hotel in Japan Henn-na Hotel having robots staff was established in 2016 (Ira, 2020).

The technology application came into effect in the 1990s with the implementation of AI-based methods for tourism forecasting research and widely adapted since 2009 like the use of neural networks, genetic algorithms, and support vector regression. As of now, many new methods are used for tourism forecasting such as the use of big data analysis, machine learning, and search engine data research methods (Liu et al., 2019). Technological innovation in Asia has accelerated and brought digital transformation in the travel industry with the introduction of a various online platform like Travel and Expense management company 'Baoku', Online booking platforms like 12Go Asia, BorderPass, ConfirmTKT, Huangbaoche, Mafengwo, and online travel agency Flymya are specialized in facilitating the hassle-free travel-related services and smooth operation (Akeroyd, 2018).

The practice of searching information on online platforms is common among travellers for the collection of information about destinations and activities to participate but there is a lack of various other travel-related information such as choosing the best way to travel, time management, transportations. Artificial Intelligence (AI) is used to facilitate integrated information by adapting of Ant-Colony System for travelling and spreading travel awareness in Thailand. Ant Colony System is slow to perform but a popular tool for routing problems as well as suggests the shortage route to reach the destination and provide various travel-related

information such as opening and closing hours of attractions, type of vehicles to opt, suitable accommodations, recommend restaurants and activities to participate. Also, the Ant colony system is used for the Thailand Green Travelling problem by providing an information dataset taken from the Designated Areas for Sustainable Tourism Administration (DASTA) organization which supports reducing carbon emissions (Chawaratthanarungsri & Tongngam, 2020). Technology adoption is not limited to reservation only; the use of Robotics is also boomed in hotels of Asian regions (Dhoundiyal & Mohanty, in press) as in the case of MSocial Hotel of Singapore where chef robot prepares eggs for guests. Similarly, the facilitation of technology in Insadong and Cheonggyecheon Seoul forest acts as an attraction for travellers with the installation of media boards, free Wi-Fi, U- Health Park and self-driven information center 'U-help point' and permits visitors to connect the smartphone with official application to check the real-time state of tourist attraction. Since 2015, many projects are ongoing to facilitate smart ecosystem based on the Internet of Things (IoT) as the Bukchon city of Seoul is converted to living lab and these selected areas provide safety, transportation, and residential environment to tourists and residents by the installation of smart tour guide information center, free Wi-Fi and CCTV. 'U-city project' of Busan in Korea has also tremendously improved the city operation, ports, transportation. Busan announced the plans of global smart city development with the introduction of 26 the IoT-based services like smart parking, smart streetlights, and smart buildings in 2016. Thus, the smart city was established by Busan Tourism Corporation in 2017 and revealed the strategies like team formulation for smart tourism, public Wi-Fi, maps development, customized *Virtual reality* (VR), and Augmented *reality* (AR) for tourist sites (Um & Chung, 2021).

The use of technology is becoming crucial to get a hold on new ways to deal with the internal and external environment of a firm (Abelsen et al., 2014). Among Japanese society, robots have attained huge attention and are perceived positively as a result considered as companions despite machines. The previous studies found that Japan has the strongest emotional and social attachment to humanoid robots (Choi et al., 2020). Hence, Information and Communication Technology (ICT) plays an important role in describing, promoting, distributing, integrating, organizing, and delivering tourism products. Moreover, technology also brings innovation either sustaining innovation or disruptive innovation (Hjalager, 2014).

Tech-Based Innovations in Asian Tourism

Innovation is defined as the adoption of the perceived new idea, practice, objects by the individual or other units (Hung et al., 2011). Innovation is considered as a remedy to tackle the economic woes for the various industries of developed and developing nations. Hence, innovation adoption becomes necessary for growth and sustainability in the global competitive market. Also, the tourism industry is facing high competition due to the astonishing growth in the last few decades (Divisekera & Nguyen, 2018). In the competitive market, organizations are required to innovate

in the form of novelty, quality products, or cutting costs to fulfil the demands of customers. For successful innovation, an organization needs necessary tangible, financial, and intangible resources as well as requires people and technology to cope-up the rising global competition (Hjalager, 2014). According to Condor, 82% of global travel bookings were made via mobile app and website in 2018 and expected to rise to US$817 Billion in 2020 (Condor Ferries, 2021).

Travellers perceived the usefulness of mobile guide services provided by mobile app for tour planning, tour purpose, and peripheral information. The further purchase intension of travellers can be influenced by a mobile application that meets travellers expectation and fulfils the demands along with the feel of uniqueness and unforgettable experience (Chuang, 2020).

The innovation in the travel industry is parallel running with the evolution in technology and bringing novelty in the approaches of ICT and service delivery such as Computer Reservation System (CRS) and Global Distribution System (GDS). ICT services were used in the 1980s, e-service like Internet and Online travel agency (OTA) came into existence in the 1990s, the m-service prompted by the hike in the use of smartphones and social media in late or mid-2000s and 2020 introduced a-services which includes the use of IoT, *AI* and service robots, VR and AR and Biometric identifications. Similarly, service delivery approaches have evolved from Company-centric-standard-driven to Consumer-centric-data-driven (Leung, 2019).

The online innovations implemented for making the booking process flexible and convenient such as organizations like Expedia Group and Booking.com made it easy for clients to cancel the booking in case of circumstantial change or change of mind. Similarly, in the case of the COVID-19 outburst, Expedia Group launched 'Expedia Group Academy' to impart skills and provide training to workers as well as Philippines' Department of Tourism came in the front foot to support tourism stakeholders by providing online training to cope with the pandemic crises (Paine, 2020). Similarly, Mohanty et al. (2020) postulate how AR and VR technologies will make the tourists closer to the destination that they can't visit because of COVID-19 restrictions.

The hotel industry can be transformed with the innovative use of technology as it reduces the workload and provides the solution to avail quality products to the guests. Tech implementation enables the service to operate in an effective way such as Japan-based Tradfit's technology helping the hotel staff and guests both. Tradfit is a speaker that allows guests to make calls and sending housekeeping room requests as well as it has a chatbot that acts as a smart concierge for the hotel that translates up to 17 languages. The use of Tradfit in hotels is useful for handling the guest check-in and check-out process as it reduces the requirement of manpower. Tradfit uses AI, IoT, and voice recognition to handle guest query and facilitate the hotel operation efficiently (Yeo, 2019).

The new era is using Stimulus-Organisation-Response theory (SOR) for brand building of hotel as well as increasing Customer brand loyalty by the innovation of services and technological competence. Innovative services can be increased by the adoption of competence technology in a hotel and the guest psychological process can be changed after stay experience by innovative service and technology

competence. The feel of trust and brand equity can be raised among customers by using High-level service innovation and technological competence. Hence, brand loyalty will increase by creating a high level of perceived value among customers (Ruan et al., 2020).

The development of blockchain is also bringing a revolution in the travel industry as the innovators in Asia have been foster to adopt Blockchain technology in travel technology. The world's first digital wallet-based Blockchain is introduced by KrisFlyer airline of Singapore and allows the members to participate in point-of-sale transactions at retail merchants by using digital Kris Flyer miles. Blockchain is also applied by *Go Globe Chain* of China for building up a decentralized B&B booking system to eradicate false trading and credit risks (Akeroyd, 2018).

Drivers of Tech-Based Tourism Innovation in Asia

Several reasons are attributed to the rise of tech-based companies in Asian tourism. Undoubtedly, the biggest reason for it is the rise in middle-income groups with higher dispensable income and leisure time. As the most populous region of the world housing 47% of the global population, the Asian region is the home to 42% of the global middle-class, a number that is expected to grow to 54% by the year 2035. Also, with almost half of the global city-dwellers (2 billion Asian against 4.1 billion global) living in the Asian cities, the region accounts for 43% of the world's GDP considering purchasing power parity (Oxford Economics, 2020). These numbers narrate the behind the curtain stories of the rise in Asian tourism as well as higher investment in technology. Among the other reasons higher spending in R&D on technology (only by some countries like China and Singapore), massive internet user base, and better PPPs (Public-Private Partnerships) are considered to be the biggest contributors to Asia's rise as a tech-giant (McKinsey & Company, 2020).

On the other hand, Singh (1997) lists disposable income, longer leisure time, higher economic growth, aggressive tourism campaigns, and political stability as the factors for the growth of tourism in the Asia Pacific region. UNWTO (2019) commends additional factors like the support of Govt. for tourism, better tourism infrastructure, ease in travel formalities, and improved travel facilities for the growth of tourism in Asia. No matter whatsoever tourism industry in Asia is on a rising path and that is evident by more than one indicators. For example, China is the biggest outbound tourism market for the whole world while countries like India are the ones to show the biggest growth trends in tourist arrivals all over the world. As stated before, the parallel growth in both technology and tourism drives the innovation in tech-based tourism in Asia. A framework for the same is depicted below:

Prospects and Challenges of Tech-Based Innovation in Asian Tourism

The ongoing technological innovation is shaping the future of tourism service delivery system with the introduction of cutting edge technology or will be used to improve the experiences among tourists which includes the use of AI, IoT, service robots, VR and AR, and biometric identification features and predicted the evolution of service automation stage (i.e. a-service) (Leung, 2019). The delivery process in rural tourism projects can be innovated with the use of ICT for services which will help in the smooth flow of operations (Hjalager, 2014). Ant colony system needs to increase its searching speed and develop with the addition of more options to facilitate complete planning such as changing vehicles at a tourist site, the inclusion of more halts at the petrol station, and restaurants. The integration between the Public transport system and ant colony system will increase capacity to find out the best route, decrease the cost and reduce the CO^2 emission in the atmosphere. The other methods can also be introduced such as the Particle Swarm Optimization algorithm and shuffle Frog Leaping algorithm or may use hybrid methods (Chawaratthanarungsri & Tongngam, 2020). There is a need for empirical knowledge and study about innovations in tourism sectors for the formulation of strategies and policies to promote innovation (Divisekera & Nguyen, 2018). The government of Nepal is required to integrate with ICT to improvise the tourism delivery method to resolve the issue of networking connectivity in remote and high altitude areas. The use of technology increased in the Nepal travel industry and needs an integrated system design to meet the demands, take care of existing technology and implement plans and policies for availing the advantages of ICT (Shrestha et al., 2021). Economic growth can be foster with the promotion of technology advancement, ICT distribution, and tourism development (Castro et al., 2021). The earlier study highlighted the key areas to utilize AR in a way to avail functional, social and perceived values of National Park visitors (i.e. tour and service information to be provided on the application during the visit) (Jiang et al., 2019). Hotels can introduce the use of Bicentennial Man with the inclusion of smart sound, light, and vision to bring the innovations in hotels which in return creates a technical rapport of the hotel. The inclusions of virtual dynamics will facilitate a unique experience for guests as well as customer evaluation can be improved with the installation of multidimensional sensory technology. The evolution is possible with the efficiency of hotel staff and motivation among staff therefore it's important to have freedom for employees to have flexible thinking and use ideas at work. Hence, customer's trust can be improved with the change in services and provides opportunity for innovation in hotel and escalate long-term relationship between employees and guests. The addition of ancillary services helps in enhancement of core product attractiveness (Ruan et al., 2020).

Challenges to Technological Innovations in Asian Tourism

Albeit the technological advancements that have occurred in Asia, the region has to overcome several issues before it could make it to the top of the global table. Woetzel and Seong (2020) in their article in the Japan Times note "Asia's rapid development as a global technological leader over the last decade is a testament to the power of collaboration. And yet, in much of the world, the tide is turning toward isolationism and protectionism. Indeed, after years of relative openness, rising trade barriers threaten to disrupt global flows of technology and intellectual property".

For quite some time, the continent of Asia has been wrongly perceived as a 'monolith' i.e. a region slows to change and comprising of little diversity. But the reality is far from it. This brings us to the challenge of technological gaps. While Asia has made tremendous growth in tech-based innovations, the majority of this stimulus has come from China alone. Other Asian countries are yet to harness their potential, if not their best. For example, a country like India with more than three fourth of STEM graduates don't have an adequate number of tech-giants which is creating a huge wave of unemployment and subsequently, its people are falling into the colloquial unrest of 'what happens when machines take up your job?'. Similar situation is reflected in the tech-based tourism innovations segment. While countries like China, Taiwan, and Singapore are facing the online travel market, the majority of other Asian countries are yet to make a mark on the digital platforms.

Most of this pocket development of technology in Asia can be attributed to the lack of collaboration among the Asian economies due to end number of geopolitical reasons. With constant unrest between China and India, for example, more than 115 Chinese apps (like TikTok and PUBG mobile) and websites were banned in India (ET Spotlight Team, 2021). Also, as tourism is a highly vulnerable industry, disruptions like these interrupt the harmony among different countries, which is one of the most basic elements for tourism growth.

Thirdly, not all Governments and private organizations across the Asian region find the technology-based travel sector lucrative to invest in and so, at the local level new tech ventures are not allocated sufficient funds to grow. South Asian countries specifically showcase a very minor portion of their budget allocated for tourism and technological developments. This consequently results in a lack of tech infrastructure growth in the tourism industry of these countries in the absence of favourable policies.

Another perennial challenge lying ahead of technology development in Asian tourism is the size, lack of experience and recent origins of its companies in the market. With the global tourism-technology market dominated by the big American and European companies, Asian tourism companies find it difficult to survive in the global online space. In recent years, companies like CTrip and Makemytrip are making their presence felt in the digital space, yet examples like these remain rare in the global market. Also, small tourism ventures even find it hard to access and make their presence on online platforms (let alone creating innovative products) due to lack of budget and scarcity of other resources (Styvén & Wallström, 2019).

Conclusion

Asia's story in terms of growth in tourism and technology is one to be remembered. This parallel growth in both sectors has provided a conducive breeding ground for innovations to happen. These innovations are not just important for providing strategic advances to the Asian organizations rather taking Asian tourism to a competitive position. On a long term basis, these new technological innovations can contribute to the cause of tourism sustainability based on environment, culture, and business as well (Mohanty, 2020). The chapter highlights some of the critical aspects of tech-based innovations in tourism while providing numerous examples from the Asian region. There is no doubt that innovations will drive a significant portion of Asian tourism growth. However, numerous challenges need to be addressed while implementing these innovations. The chapter also briefly highlights how these innovations will eventually take the center stage in tourism following the development of new paradigms post-COVID-19. In the absence of scientific literature on tech-based innovations in tourism, this article opens up many new avenues to be discussed and researched in the future.

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