Tourism Tech Roadmap

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Foreword

Under the wise leadership and long-term vision of *Samdech Akka Moha Sena Padei Techo* **HUN Sen, Prime Minister of the Kingdom of Cambodia**, and the Honorary Chair of the National Council of Science, Technology & Innovation (NCSTI), the Royal Government of Cambodia has demonstrated unwavering dedication and steadfast commitment to the achievement of national visions for 2030 as an upper-middle income country and 2050 as a higher income country. The government has made significant strides in fostering progress across all sectors, recognising Science, Technology and Innovation (STI) as a crucial core sector and as a fundamental tool for long-term growth and resilience in socioeconomic development.

To advance this transformative agenda, the Ministry of Industry, Science, Technology & Innovation (MISTI) and NCSTI have made significant contributions by providing strategic guidance for the implementation of the National Policy on STI 2020-2030 and Cambodia's STI Roadmap 2030. With existing natural and cultural resources available in Cambodia, it is undoubtedly true that promoting tourism is our strength. Thus, the TourismTech Roadmap was made and approved as a national directive document for relevant ministries, academia, development partners, and related local and international tourism industry operators. The TourismTech Roadmap was developed with the vision to accelerate Cambodia to be the top tourism destination in the region through harnessing innovative technologies with sustainability and inclusivity. By embracing the TourismTech Roadmap, Cambodia's tourism industries will be able to enhance products and services and create new opportunities for economic prosperity and social advancement.

As the Minister of Industry, Science, Technology & Innovation, and the Chair of the National Council of Science, Technology & Innovation, I would like to express my gratitude and commend the steering committee led by MISTI, the sub-committee led by the Ministry of Tourism, and relevant ministries and institutions for their unwavering dedication in developing this groundbreaking roadmap. Furthermore, I highly encourage all local and international stakeholders in the tourism industry to materialise this important report. I am strongly convinced that the technologies highlighted in this TourismTech Roadmap play a significant role in improving your respective

endeavours on an innovative mission. Last but not least, I would like to extend my profound gratitude to the esteemed leaders and officials of the General Department of STI, senior leaders of MISTI, and the Science and Technology Policy Institute (STEPI) of the Republic of Korea, whose invaluable contributions have played an essential role in the development of this TourismTech Roadmap.

Phnom Penh, 21 July 2023
Senior Minister
Minister of Industry, Science, Technology
& Innovation
and Chair of the National Council of Science, Technology
& Innovation

Kitti Settha Pandita **CHAM Prasidh**

Acknowlegements

Executive Summary

The Royal Government of Cambodia (RGC) has put the tourism sector as "Green Gold" considering its critical role in serving national identity, socioeconomic development, employment opportunities, natural environment and cultural heritage preservation and conservation, and greenhouse gas reduction mitigation. The tourism sector is seen as a fast-developing sector that adopts new technologies, contributing undoubtedly to the management and recovery of the tourism industry during and post Covid-19. Technologies have been more critical during crises; the Covid-19 pandemic is an evidence showing the need for technologies to overcome the challenges and be ubiquitous in dealing with future crises. Meanwhile, RGC has put much attention to cutting-edge technologies in her socioeconomic development. In addition, various policies and roadmaps concerning technologies toward the vision of 2030 as an upper-middle-income country and 2050 as a high-income country have been developed and implemented.

TourismTech Roadmap foresees supporting technologies in the tourism sector until 2030. Service and products needed till 2030 were assessed based on an innovation-driven approach through collaboration with STEPI. In fact, tourism activities patently covers accommodation, transportation, attraction, tour operator and travel agency, and entertainment. Technologies used in this sector are projected to be included in the roadmap. This roadmap has been developed by reviewing relevant literature, interviewing relevant stakeholders, and conducting consultation workshops with the subcommittee and relevant stakeholders from various ministries and the private sector.

The TourismTech Roadmap has been developed with the vision *"to accelerate Cambodia as the top tourism destination in the region through harnessing innovative technologies with sustainability and inclusivity by 2030"*. In addition, to reach the vision, four goals have been settled: (1) to improve technology literacy and skills for tourism operators and users, (2) to strengthen infrastructure and policy support, (3) to improve cyber security, and (4) to mobilise the utilisation of advanced technologies for tourism business operations.

Various drivers have been identified considering society, economy, politics, environment, and technology aspects. Based on the identified drivers, strategic tourism products and services and key technologies are acknowledged and charted. The roadmap prioritises eight strategic tourism products and services, such as smart experience, green tourism, integrated transportation, digital transaction and communication, tourism security and safety services, digital marketing, research and innovation in tourism, and destination management. Furthermore, fifteen key technologies have been identified to support the development of strategic tourism products and services, including OBP, Imagery Technology, the Internet, IoT, Cloud Computing, Smart Label Tech, AR/VR, Navigation Technology, GIS, AI, Big Data, Touch Screen technology, Social Media, Web/Mobile apps, and Portable Devices. These key technologies will serve their strategic importance to the strategic products and services within the short, medium, and long terms for supporting and reaching the goals and vision of the roadmap. The key recommendations have been addressed to the government, private sector, education and research institutions, and international collaboration agencies to secure the visual implementation of the roadmap for the short, medium, and long terms.

In order to ensure the implementation of this technology roadmap obtains the desired impacts, a monitoring and evaluation framework shall be in place. In addition to this, the roadmap shall be reviewed when necessary to ensure its relevance and effectiveness in providing direction for tourism technologies.

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Abbreviations

AI	:	Artificial Intelligence
AR	:	Augmented Reality
CRS	:	Computer Reservation Systems
GDP	:	Gross Domestic Product
GIS	:	Geographic Information System
GPS	:	Global Positioning System
GDS	:	Global Distribution Systems
ICT	:	Information Communication Technology
IoT	:	Internet of Thing
IRT	:	Image Recognition Technology
IMF	:	International Monetary Fun
MISTI	:	Ministry of Industry, Science, Technology & Innovation
MoT	:	Ministry of Tourism
MPTC	:	Ministry of Post and Telecommunications
NBC	:	National Bank of Cambodia
OBP	:	Online Booking Platform
PMS	:	Property Management System
RGC	:	Royal Government of Cambodia
STEPI	:	Science and Technology Policy Institute
STI	:	Science, Technology, and Innovation
VR	:	Virtual Reality
3D	:	Three dimensional
2G	:	2nd Mobile Generation
3G	:	3rd Mobile Generation
4G	:	4th Mobile Generation
5G	:	5th Mobile Generation

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1 Introduction

1.1 Background

Cambodia enjoys an annual Gross Domestic Product (GDP) growth rate of around 7% for the last two decades before the outbreak of the Covid-19 pandemic in early 2020 (IMF, 2021). The tourism industry has been one of the most important sectors contributing to economic development and poverty alleviation. In addition, the tourism sector has been recognised by the RGC as a priority as the "Green Gold", contributing to the national socio-economic development and also supporting Cambodia's vision of becoming "an upper-middle income country by 2030" and "a high-income country by 2050". This sector contributes to the development opportunities by creating jobs, raising the incomes of the people directly and indirectly, increasing national income, supporting economic growth, mitigating Green House Gas, and contributing to effective and responsible environmental and cultural preservation and protection (MoT, 2015). The RGC has endeavoured all recovery efforts ranging from amendment to the existing policies and legal instruments, providing incentives to tourism enterprises to establish social protection schemes for those vulnerable groups in major industries, including the tourism industry. Most importantly, the RGC has seen the opportunity to leverage advanced technologies for the development of Cambodia to ensure that the tourism industry will be developed in a more sustainable, smart, inclusive, and resilient manner during the post Covid-19 pandemic. The Covid-19 pandemic has been seen as a catalyst for the use of technology in Cambodia, including in the tourism sector. Digital transaction technology, such as smart label technology (e.g., QR code), is among other examples. According to the National Bank of Cambodia (NBC, 2021), digital payment transactions increased by 34.5 % in 2021 compared to 2020. In addition, more than 80% of the Cambodian population have e-wallet accounts.

Technology transformation continuously influences the operation of all major sectors in the tourism industry, such as accommodation, food and beverage, transportation, and destination attractions. Technology provides significant roles in the tourism industry ranging from facilitating transaction processes, marketing products or services, supporting decision-making, improving accessibility to consumption, and improving sustainability and governance of public administration for sustainable tourism development.

1.2 Approach and Scope

The TourismTech Roadmap has been developed with quantitative and qualitative approaches. First, the desk review aims to brainstorm key technologies being used in the tourism sector, understand technology trends, and review the existing data in the sector. Then, a scoping interview has been carried out with the most relevant stakeholders, including line ministries, research institutions, and universities. The relevant stakeholders, such as operators of restaurants, travel agencies, hotels, museums, airlines, and coffee shops, were then interviewed to identify the use of technologies in their business. Next, informaion has been analysed for the roadmap development, such as vision building, goals setting, potential technologies, and technology driver identifications. Finally, consultative workshops have been conducted to further brainstorm and obtain strategic information with high-level officials and experts from relevant line ministries, universities, and private sectors. Four consultative workshops were organised with the subcommittee of the TourismTech Roadmap, which is composed of multi-stakeholder

members, including relevant ministries, research institutions, universities, and private sectors to gather inputs on present and future technologies for the tourism sector (see annnex 1) .

1.3 Overview of Tourism in Cambodia

Tourism in Cambodia has been remarkably developed. Tourism development has been focused on four main destinations. Phnom Penh and surrounding areas are the capital for shopping and cultural tourism areas. The Coastal zone, including Kep, Kampot, Preah Sihanouk Ville, and Koh Kong provinces, has been developed for coastal tourism. Cambodian coasts have been listed as the world's best bays. Siem Reap and Tonle Sap areas are the cultural heritage tourism and ecotourism. The northeastern area, including Mondulkiri, Ratanakiri, Kratie, and Stung Treng, is known as the ecotourism area. Cambodia's tourism focuses on nature and culture based on its potential resources. Cambodia has enjoyed full peace and becomes a popular tourist destination in Southeast Asia by increasingly attracting millions of tourists every year. This increase of inbound tourism has steadily attributed to Cambodia's integration efforts, a well-connected nationwide infrastructure, a stable electricity supply, an improved security environment for tourists as well as a diversification of tourist markets and products (RGC, 2018). In 2019, the tourism sector contributed 12.1 % to Cambodia's GDP and provided 630,000 direct jobs (RGC, 2021).   However, this sector got a severe impact from the Covid-19 pandemic. It was predicted that the revenue contribution of the national GDP would decline to under 10%. Meanwhile, 2,838 tourism establishments were closed, and around 510,000 tourism employees were predicted to be at risk (MoT, 2021).

The statistics of tourist arrivals in the country increased yearly before the Covid-19 pandemic. The international tourists increased from 2,508,289 in 2010 to 6,610,592 in 2019 with an average growth rate of 12%, while domestic tourist arrivals went up from 7,562,699 to 11,319,523 with an average growth rate of 4.62 % in the same period (MoT, 2019, 2021). The average length of stay of international tourists was 6.2 days, with an average expenditure of 95.50 USD per day and a receipt of 4,919 million USD in 2019 (MoT, 2019). The statistics of tourists visiting ecotourism sites got the lowest record compared to other areas. Meanwhile, infrastructure and facilities responding to such demand have been developed accordingly. According to MoT (2017), there were 731 hotels with 39,328 rooms, 2,437 restaurants, 682 tour operators and travel agents, 5,377 guides, and 43 airlines.
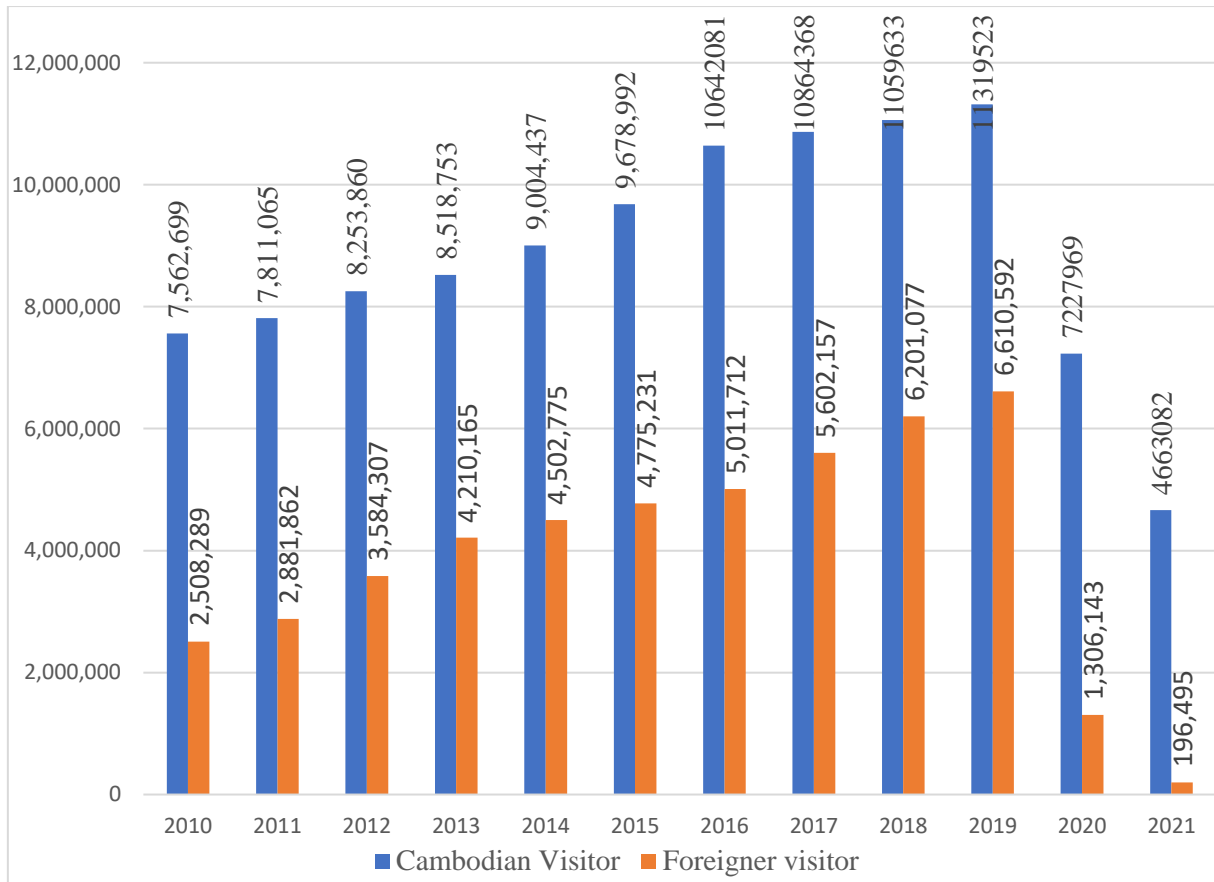
Figure 1. Statistics of tourists visiting Cambodia 2010-2021
Source: MoT, 2021)

The Covid-19 pandemic in early 2020 has seriously affected tourism in Cambodia. In 2020, the statistics for international and domestic tourists dropped by around 80% and 20% respectively, compared to 2019. The statistics continued to fall in 2021 due to the restriction and lockdown regulations again Covid-19. However, the Covid-19 pandemic is more manageable with the vaccine discovery in 2020 and the effective intervention policy measures, the number of international tourists would increase to 2,276,626 in 2022 and the number of international tourists has been projected to increase to 10,267,025 in 2027 (MoT, 2021).

1.4 Technology Trends in Tourism Industry

Smart devices such as smartphones, iPads/tablets are the most popular devices for information searching (e.g., tourist destinations, accommodation, food and beverages, and transportation). Navigation technology (e.g., Google Maps) is widely used to search for tourism sites and locations of facilities. During and after the trip, people post photos on social media, use digital devices to review their trips and photos, and give feedback on the tourism establishments' services. This trend is more popular among the young generation, particularly generation Z, who is named tech-savvy.

An increase in the number of tourists has resulted in a corresponding rise in the utilisation of tourism technology. In the last decade, there has been a significant surge in the usage of digital

technology in the tourism industry. Mobile phone usage statistics increased from 4,242,000 in 2010 to 2,1675,523 in 2019, while internet subscribers rose from 193,585 to 16,126,356 for the same period (MoP, 2021). In addition, the internet service went up from 193,585 in 2010 to 16,126,356 in 2019. Internet mobile has been popular among Cambodians. There were 17,349,261 mobile internet subscribers, 98.30% of the market share in Cambodia, compared to 1.70 % of fixed internet users. The mobile phone services provided in Cambodia include 2G (92.30% of the population), 3G (85.2% of the population), and 4G (82.5% of the population), covering 79.5%, 66.2%, and 60.4% of the country's area respectively (MPTC, 2022).

Over one-third of young Cambodians are quickly catching up with digital technology use (MPTC, 2022). Cambodian student are more familiar with social media and smart devices (phone, tablet), for instance, university students in Phnom Penh have accounts on Facebook (35.40 %), Instagram (25.30%), YouTube (22.30%), Twitter (7.3%), LinkedIn (4.4%), Blog (1.8%) and others (3.5%) (Leav, 2019). Furthermore, Cambodians aged from 21 to 41 use Credit cards (17%), Visa cards (36.9%), Master card (40%), and Debit cards (3%) to purchase the product online (Vireak, 2021). The concept of digital tourism has become more interesting in the last two decades. Interestingly, digital tourism uses technology to enhance the tourists' visiting experience while experience can be enhanced through the presence of the products through technology (Benyon et al., 2014). In addition, Benyon et al. (2014) claimed that the more the technology could present the products in response to the tourists' intention, transform the touristic experience into the active one, and make sense to tourists, the more experience tourists gained.

Digital technology has been applied in tourism operations while ICT plays an essential role in digital tourism. In the context of cultural heritage, digitalisation can help to attract new audiences, preserve cultural heritage in the digital world, offer massive interconnectivity and involvement, create opportunities for creative industries, and redirect tourists to new destinations (Tourism 4.0, 2022). On the other hand, tourism businesses apply digital technology for marketing (Alford & Jones, 2020). Some technologies applied in digital tourism include 3D printing, virtual assistants, big data, the internet of things (IoT), blockchain, artificial intelligence (AI), chatbots, 5G technology, robots, autonomous security robot, recognition technology, augmented reality (AR), virtual reality (VR), and voice technology (Cambodia 4.0 Center, 2021).

Over the last decade, it has been remarkably observed that tourism development has significantly benefited from the development of innovative technologies added to the market (Gössling, 2021). These technologies have significantly improved the efficiency and effectiveness of business operations by sharing information between different departments in the hotel industry (Koo et al., 2015). In fact, the transformation of technology in tourism can be seen in different periods of time from 1970s to present, and the tourism industry has been transformed accordingly.

In the first stage, 1970s to 1980s when the development of Computer Reservation Systems (CRSs) and Global Distribution Systems (GDSs) was in place, there were changes in the ways in the tourism industry operates, particularly in the hospitality and tourism industry, and air transportation such as rooms, food, and beverage reservation, and flight ticket booking (Buhalis & Law, 2008).

From the late 1990s to 2000, internet technology and the first World Wide Web development have transformed all dimensions of the tourism business and visitor experiences (Buhalis & Inversini, 2014). This development has modernised and revolutionised communication in the tourism industry, which lead to significantly change the marketing and management strategies and approaches of tourism business operators and destinations (Buhalis, 2000; Drosos et al., 2017).

From 2000 to the present, smart technologies have substantially and rapidly transformed tourism business transactions, marketing and promotion strategies, and tourist experiences. The emergence of smart technologies has transformed the tourism industry to another stage and brought changes to both the supply and demand sides. According to Xiang and Fesenmaier (2017), the use of key technologies that has been adopted in the tourism industry since 2000 includes the use of the internet and websites for tourism marketing and promotion, despite the limitation of static websites containing information about businesses and destinations. In addition, the availability of eCash and internet banking has facilitated business transactions, so that tourists can purchase products and services anytime and anywhere they like. E-mail and mobile devices (i.e., smart phones and tablets) have effectively and efficiently replaced traditional ways of people's communication, including in the tourism business ecosystem. On the demand side, travellers can access information about destination or attraction products and services necessary for their decision-making. Destination marketing organisations also benefit from adopting new technologies by applying smart tourism destination governance to exploit the benefits of technology diffusion and embed novel technologies in the main elements of destination management (Gretzel, 2022).

Table 1. Development of technologies applied to tourism

Time	Key technology
1970-1980	CRS, GDS
1980-1990	Personal computer and Emails
1990-2000	Internet, Website, Software (e.g., financial and office software), Email, Mobile phones, eCash, Email, Intranet, Internet Banking World Wide Web and Video Conferences
2000-2010	Smartphones, Social Media, Web 2.0, Text Messages, Database and Computer Software, Online Booking Systems, CRS, Web/Mobile Apps, and Online Video Streaming Instant Messaging
From 2010 to present	AR/VR, Web/Mobile Apps, Cloud Computing and Online Data Storage, Virtual Assistants, Wearable Technologies, Social Media, Google Analytics, Blogs and Review Websites, Collaborative Online Environments, Web 2.0, Chatbots and Instant Support, Digital Platforms

(Adapted from Gössling, 2021; Xiang & Fesenmaier, 2017)

1.4.1 Internet of Things

The Internet of Things (IoT) refers to the network of physical objects or "things" embedded with sensors, software, and connectivity that enables them to collect and exchange data over the internet (Wise & Heidari, 2019). It can enable new possibilities such as smart homes, smart cities, and smart wearable devices and clothes. It is one of the vital forces of big data expansion (Mauro et al., 2015). In tourism, IoT provides opportunities for tourism information access, social media interaction, content marketing, big data, and wearables (Wise & Heidari, 2019). With this, tourists can access various tourism information on destination products and services, including accommodation, food and beverage, communication, and transportation. Thus, it is essential for current and future tourism with the rapid growth of advanced technologies and the internet.

1.4.2 Big Data

Big data concerns the high volume, variety, velocity, and veracity of information (Alaei et al., 2017; Mauro et al., 2015). Mauro et al. (2015) clarified the conceptualization concerning information, technology, methods, and impact, i.e., big data consists of the abundance and

variety of information, which requires specific technologies to transform such information into economic value. The more the information is stored with the better-processing technologies, the bigger and better the data is. With this conceptualization, big data is vital for the tourism industry since tourism is an information-intensive service sector (Song, 2012), in which information about products and services is always required to be updated and available online for tourists. Beyond this, big data is applicable to research in the tourism sector (Alaei et al., 2017). In addition, researchers have used data from big data for research projects; thus, big data is essential for tourism development.

1.4.3 Blockchain

Blockchain considerably transforms the tourism industry (Balasubramanian et al., 2022). The blockchain can be applied to tourism management through digitalisation, automation, disintermediation, and an intelligent environment. These blockchain applications allow tourists to utilise them for their pre-trip (e.g., planning and booking), during the trip (e.g., tourists' baggage tracking, tourists' identifications, and payments), and post-trip (e.g., reviewing their last trip and planning for the next one). Blockchain technologies can change the physical ecosystem into a digital ecosystem; automate the tourism process globally to increase industry efficiency, accuracy, and productivity; enhance the disintermediation level, e.g., push tourists to inform their travel decisions; and make the tourism industry more intelligent (Balasubramanian et al., 2022). Thus, blockchain is one of the essential technologies for future tourism development with the advancement of technologyies.

1.4.4 Artificial Intelligence (AI) and Robotic Technologies

Artificial Intelligence (AI) and robotic technologies are employed in tourism and hospitality enterprises (Ivanov & Webster, 2021; Samala et al., 2022). Customers favour robots in service delivery in tourism and hospitality, and they are willing to reduce their payment for services fully offered by robots (Ivanov & Webster, 2021). Robotic technologies can be applied in such sectors as hotels in the means of carrying customer luggage, and restaurants by serving food and

beverage to customers. Similarly, AI has been utilised in the tourism industry regarding personalisation enhancement, customer recommendation provision, and response speed accuracy (Samala et al., 2022). AI has been seen as a booster in tourism business marketing to be more competitive by automating the business activity process. These technologies can also be applied in airports, museums, or tourist attractions for service delivery (Samala et al., 20220). Hence, AI and robots can be potential technologies for future tourism, especially for tourists who prefer modern service-providing technologies with less payment.

1.4.5 Other Technologies

Numerous digital technologies have been applied to restaurants. Their applications have been seen in automation systems, QR menus, human robots, robotic chiefs, the internet of objects, and 3D food printers (Altaş, 2020). Furthermore, sensor-based technologies are essential for the hospitality and hotel business (Thakur, 2022). Renewable energies such as solar panels, wind turbines, and batteries contribute to tourism, especially green and sustainable tourism (Prinsloo, 2015). These technologies also have the potential to support future tourism development.

2 Government Policies Related to Technology

Side 2 of the Rectangular Strategy (Phase IV) has set out the key priorities for RGC during its sixth mandate. One of them is the tourism sector，which requires a master plan preparation with a focus on diversification of tourist products and destinations, attracting high-spending tourists, and encouraging tourism-supporting industries by ensuring a balance between development and preservation (RGC, 2018). In addition, the RGC has focused more on technology and digital development through establishing and developing authorities, laws, and policies for over two decades. These include the National Authority for Information and Communication Technology Development initiated in 2000; the Communication Technology Master Plan of Cambodia 2020, developed in 2014; the National Institute of Posts, Telecommunications, Information, and Communication Technology established in 2014, known as Cambodia Academy of Digital Technology in 2021; the Law on Telecommunications enacted in 2015; the Development Policy for Telecommunications, Information and Communication Technology 2020 established in 2016; the E-Commerce Law in 2019; Draft law on Information Technology Crimes in 2019; Draft Law on Cybersecurity 2019; and Draft law on Access to Information 2019 (Ministry of Post and Telecommunications, 2022). In addition, in 2020, RGC planned to establish digital infrastructure and digital information systems.

Cambodia's Digital Economy and Society Policy Framework 2021-2035 was developed in 2021. It is a comprehensive framework that focuses on five goals, including developing infrastructure, building reliability and confidence in digital systems, building digital citizens, building digital government, and enabling digital businesses. It is developed to build digital skills for the public, private, and citizens. Its principles include building foundations and digital adoption from 2021 to 2025, digital adoption and digital transformation from 2026 to 2030, and digital transformation from 2031 to 2035.

Further, in 2022, Cambodia's Digital Government Policy 2022-2035 was initiated. It aims to build an intelligent government that utilises digital infrastructure and technology as an ecosystem for governance system modernisation and reform in a transparent and creditable way to enhance a comprehensive digital economy and society. It has four strategic goals: digital governance infrastructure development promotion; digital governance and digital public service development; digital capacity, and innovation improvement; and public-private relationship and cooperation promotion.

Additionally, RGC has developed numerous roadmaps. First, Cambodia's STI Roadmap 2030 has five pillars, including (1) Governance: to enhance the governance of the STI system, (2) Education: to build human capital in STI, (3) Research: to strengthen research capacity and quality of research, (4) Collaboration: to increase collaboration and networking between STI stakeholders, and (5) Ecosystem: to foster an enabling ecosystem for building absorption capacities in firms and attracting investments in STI. Second, the EduTech roadmap aims to promote overall learning outcomes, digital literacy, entrepreneurship skills, and technological readiness of the Cambodian population, as well as to provide a detailed outline for technology adoption and support strategic and long-term growth of the education sector. Third, the AgriTech roadmap aims to harness the power of STI in the agricultural sector by increasing agricultural productivity and quality infrastructure, food security and exports; leveraging high value-added production/service to agricultural commodities; and integrating agricultural commodities into the global supply chain to expand Cambodia's agricultural businesses and reputation into international markets and networks. Fourth, the HealthTech roadmap has a vision to increase the health and well-being of Cambodians through research and development, innovation and technologies that will focus on multidisciplinary policy and governance for health technology, strengthening research and knowledge sharing capacity, and integrating one health approach. These technology roadmaps will enhance each sector's technology, digital knowledge, and skills by 2030. The policies and roadmaps demonstrate that RGC vigorously enforces knowledge and skills in technology and digital.

On the other hand, the tourism sector grows with technology and digital. Like other sectors, tourism has been under the attention of the RGC with technology and digital application. The Ministry of Tourism (MoT) has focused on industry 4.0 in tourism by providing digital training for tourism-related businesses and the public interested in digital skills. The Roadmap for Recovery of Cambodia Tourism During and Post Covid-19 also highlights the enhancement of the digital tourism industry and digital skills. Digital marketing has been emphasised in the tourism development master plan 2021-2035 for Siem Reap and Mondulkiri provinces. The effect of Covid-19 on tourism leads the RGC to pay more attention to the role of technology in tourism.

3 Technology Roadmap Development Process

The development of this roadmap consists of five steps. Figure 2 shows the process of technology roadmap development. The first step is to build the vision of the TourismTech Roadmap. Goals are then initiated in accordance with the vision in this step. The second step is to analyse the environment, which includes the social, technological, environmental, economic, and political environments. The third step is to select the strategic products and services to fulfil the goals and vision. The strategic products and services are determined in this step. The fourth

step is to define the technologies for product and service development. The last step is to create a roadmap charting to link the strategic products and services and technologies to the target market.
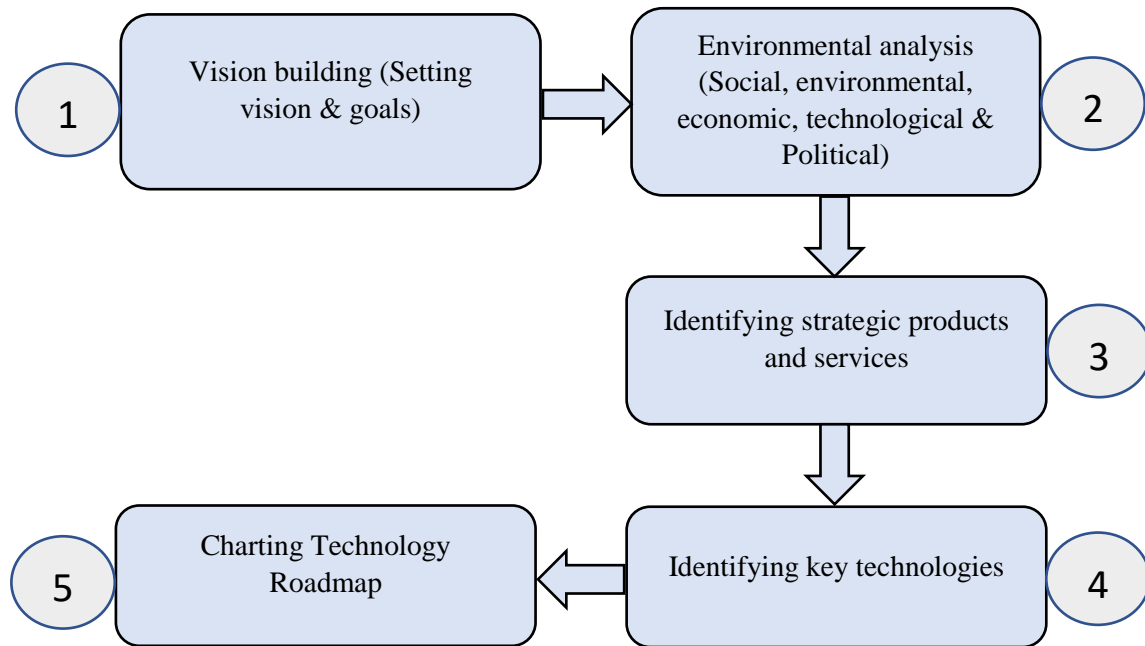
Figure 2**.** Technology Roadmap Development Processes

4 TourismTech Roadmap Development

4.1 Vision and Goals

To accelerate Cambodia as the top tourism destination in the region through harnessing innovative technologies with sustainability and inclusivity by 2030.

(1) ***To improve technology literacy and skills for tourism operators and users***
The stakeholders in tourism, including the private sector, public sector, and development partners, shall improve their literacy and skills in technologies through formal, non-formal, and informal education.
(2) ***To strengthen infrastructure and policy support***
The supporting infrastructure and policy shall be more developed and monitored to adopt and transform technology in the tourism sector.
(3) ***To improve cyber security***
Improving the security for technology uses, for instance, data security and safety, could build trust among technology users, making them adopt innovative technologies without concerns.
(4) ***To mobilise the utilization of advanced technologies for tourism business operation***
Mobilising and encouraging the use of advanced technologies among tourism business operators shall speed up the adoption and transformation of technologies.

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4.2 STEEP Analysis

The Social, Technological, Economic, Environmental, and Political (STEEP) analysis, the contextualised analysis to have a holistic view of the whole landscape, is applied to identify the drivers that could push the adoption of the relevant technologies by 2030, as shown in Figure 3. All drivers of change are identified and assessed by using three key criteria, including strategic importance, economic impact and potential to success. As a result, based on the key drivers identified, opportunities and threats to tourism development were determined.

Technological
New Technology, Research & Development, Paten & intellectual property, Copyright, Innovation & Creativity, Smart city, Media &Branding, Technology Transfer Digitalization & Digitization E-marketing, Platforms, Smart Destination, Cyber security.

Social
Young population, Population growth, Covid-19 pandemic, Migration/urbanization, Better education/ higher education literacy rate, Human capital, Globalization, Religion, National standardization, Quality of life

Economic
Global/Regional Integration, High Return on Investment in Tech business, High Labor Cost, Public & Private Partnership, Privatization, Competition, Access to funding, Value-added Products/Services

Political
Government Policy & Legal Framework, Tourism Tax Incentive, Economic Slowdown, Political Agenda & Political stability, Human Right, Collaboration

Environmental
Climate Change, Disaster, Natural Resource Depletion, Strategic Geographical location, Community-Based Tourism/Ecotourism Waste Management

Figure 3. Drivers affecting the development of the tourism industry

The key social drivers that influence the future of tourism development in Cambodia include a sizable proportion of the young population, a higher literacy rate, a higher quality of human capital, the effects of globalisation, urbanisation, and migration, and the pandemic. The

population growth, particularly the growth of tech-savvy young people such as Generation Z and Alpha, will increase demand for adopting technologies in the travel and tourism industries, responding to their consumption behaviours. Additionally, this also means that human capital can be improved accordingly. As a result, the literacy rate can be also improved to ensure sufficient human resources for the tourism industry.

Undeniably, technologies play significant roles in the tourism industry. Therefore, paying close attention to the key technological drivers that could significantly affect tourism development is necessary. The tourism industry is thus required to adopt appropriate technologies, including emerging technologies, to accommodate the changing demand of visitors. Technology adoption also improves visitors' experiences and enhances tourism businesses' and destinations' competitive advantages and sustainability. The key technological drivers required special attention, including new technologies available in the markets, technologies used for marketing such as brand promotion and advertising, and social media platforms, technologies supporting smart destinations and ensuring cyber security, digitalisation and digitisation, and research and development in the technology.

Key economic drivers that could bring changes to the tourism industry include having access to funding for technology adoption and transformation, increasing value-added products and services, increasing competition among high demand for technology sectors, and promoting public-private partnerships. Additionally, regional and international integration is another key driver for the economic development of Cambodia. Consequently, these key drivers could have impacts on tourism development and the adoption of technologies.

Several environmental drivers will also affect tourism development. Some remarkable key drivers include climate change, waste management problems, and community-based tourism development aligned with global, regional, and national environmental priority issues. Although Cambodia is located in a strategic location and blessed with an abundance of natural resources and warm weather that have the potential for tourism development, natural disasters and natural resource depletion also need to be considered due to their negative effects to tourism development in the medium and long term.

In order to design the products and services and adopt the necessary technologies for supporting the tourism industry, the political drivers need to be thoroughly understood because the tourism industry is susceptible to political changes at all levels, including the national, regional, and international levels. The government policies and legal instruments are necessary for effectively and efficiently supporting the adoption of technologies for the tourism industry, both directly and indirectly. Retaining peace and stability is one of the most important drivers because the tourism sector is very susceptible to political instability and global crises such as Covid-19. The government's political agenda could also significantly affect tourism development in the medium and long term. Finally, collaboration and networking at national, regional, and international levels are vitally important. The collaboration could include collaboration between government institutions at different levels and between the government institutions and the private and third sectors.

4.3 Opportunity and Threat

All key drivers of change could affect the future development of the tourism industry. However, it is equally necessary to identify the opportunities and threats for these key drivers to be effectively unleash its potential. Table 2 shows opportunities and threats identified and evaluated based on score ratings by experts participated in the workshops.

Table 2. Opportunities and Threats

Opportunities	Threats
• Young population • High demand for technologies adoption • Adaptability to use different technologies • Increasing technology literacy • Availability of technologies for good management and analysis skills • Availability of technologies for the tourism industry • Policies in place for supporting tourism • Wide range of digital marketing and digital platforms • Government's commitment to supporting cyber security and data privacy • Change consumer/visitor behaviour to tourism • Community-based tourism and ecotourism • Increasing FDI and local investment in the tourism sector • Political and economic stability • Government's commitment to a clean and green environment • The good trend of Public and Private Partnership • Global/regional integration	• High human capital competitiveness • Climate change vulnerability • Competition • Access to funding • Pandemics • Geopolitics • Limited capacity to manage cybersecurity • Limited supply capacity for mass tourism

5 Strategic Products and Services for TourismTech Roadmap

The products and services, shown in Figure 4, discussed in this section are the byproducts of synergizing data from different sources, including existing literature, interviews with key stakeholders in the tourism industry, panel discussions, and expert consultation in the workshops,

which also include evaluation of opportunities and threats identified in the previous section. Eight products and services were then identified and evaluated as the prioritised tourism products and services, as below:

Smart experience

The smart experience is a strategic product that effectively responds to changing consumer behaviour, especially the potential market of the Millennials and Generation Z. These target market groups comprised 23% of the world's population (Neufeld, 2021). Millennials, particularly Generation Z, born during advanced technology development and sometimes called digital natives, are tech-savvy and have a high demand for personalised experiences (Buhalis & Karatay, 2022). These large prospective tourism markets are increasingly likely to influence the development of tourism globally in the following decades.

Ecotourism

Climate change has multi-dimensional and multi-sectorial impacts, including on the tourism sector. Global environmental issues and changing visitor behaviour towards a more sociocultural and environmentally responsible consumption require the tourism industry to change its development and management to meet the needs for the sustainability of this vital industry. Ecotourism development is necessary to cope with the threats posed by this global issue and changing customer green and sustainable consumption trends. According to Lendvai et al., 2022, consumers are now more environmentally and health conscious than ever before. Sustainable tourism development also reduces conflict of interest among stakeholders through a participatory approach and equity in cost and benefit sharing. Although the tourism sector is not a silver bullet, sustainable tourism development will improve the inclusiveness of development. Therefore, marginalised groups, who lack resources, knowledge, and skills, could also benefit from the development of tourism in their local areas.

Integrated transportation service

Accessibility is one of the most important factors in tourism development because visitors cannot travel to destination areas without proper transportation modes and means. Accessibility to global, regional, and national tourism destinations depends on how well the terminals of different transportation systems are linked (Dileep & Pagliara, 2023). Integrated transportation provides a seamless experience through an integrated transportation network and transportation choices from one tourism destination to another. Moreover, a practical integrated transport network could improve the destination image by providing a more convenient and effective connection between transportation modes and destinations (Zhang et al., 2021). Finally, integrated transportation also facilitates intra- and inter-regional travel and improves the flow of visitors between destinations, particularly to remote destinations such as community-based tourism destinations.

Digital transaction and communication

With digital transactions and communication, tourism business operators can access to the global market and, at the same time, raise the quality of consumer experiences to another level. It can also enhance customer/visitor engagement, provide services speedily, and maintain good communication (Inversini & Rega, 2020). According to WTTC (2019), 83% of travellers travel with their mobile devices and use web/mobile apps to plan their trips, buy tickets, board flights, check in hotels and unlock their rooms, read digital menus in restaurants, and pay fees. According to the data from WTTC, in 2016, mobile tourism transactions were around 15.5% and mobile booking was 45% of global payment and booking transactions.

Tourism safety and security service

Safety and security are critical issues in the tourism industry as it is susceptible to internal and external risks such as pandemics, terrorism, natural disasters, and cyberattacks. According to

Agarwal et al. (2021), the tourism industry's safety and security shall fully account for tourist health, transportation-related accidents, other harmful incidents happening during travel, and personal data security. Tourist safety and security have gained significant attention, particularly during the Covid-19 and post-pandemic (Rahman et al., 2021). Business operators in the tourism and hospitality industries have adopted management measurements, including using ICTs, robots, drones, and autonomous machines and vehicles (Zeng et al., 2020). Therefore, the technologies improving safety and security services shall necessarily be paid attention to, as they could build the trust and confidence of consumers/visitors.

Digital marketing

Traditional marketing is losing its popularity to digital marketing due to a primarily change in consumer behaviour, particularly among the young generation, such as Generation Z and Millennials (Anjum et al., 2020). On the other hand, digital marketing is an alternative to the traditional promotion of tourism destinations (Devasia & Kumar, 2022). This new marketing strategy aims to provide the right communication contents to the right customers through the proper distribution channels, improving sales and increasing customer loyalty (Maurer, 2022). More importantly, effective digital marketing strategy implementation provides opportunities for firms to achieve cost-effectiveness in product and service promotion to target customers (Olson et al., 2021). Also, digital marketing could contribute to improving a destination's competitive advantage through improving stakeholder collaboration, reducing operational costs, and promoting a tourism destination to a global market.

Research and development

Research and development contribute to providing solutions to emerging issues in the tourism industry. It could also include improving safety and security (including cyber security) and developing new technologies and innovative tourism products to meet the needs of consumers/visitors. Also, research and development are crucial in reducing risks caused by natural disasters through analytical approaches such as multi-hazard analysis methods (Zuccaro et al., 2020). More importantly, research can provide evidence-based policy advice to address the negative socio-cultural, economic, and environmental impacts resulting from tourism development, for example, damage to tourism resources, unemployment issues, and destination image recovery (Dwyer et al., 2012).

Destination management

Managing tourism destinations significantly contributes to their success and sustainability. Therefore, a destination is more likely to enhance its competitive advantages and improve the service quality and experience of consumers/visitors via smart experiences (Liberato et al., 2018). Based on the new trend of consumer demand, destination management could necessarily integrate innovative technologies to move from traditional to smart destination management (Fyall & Garrod, 2019).
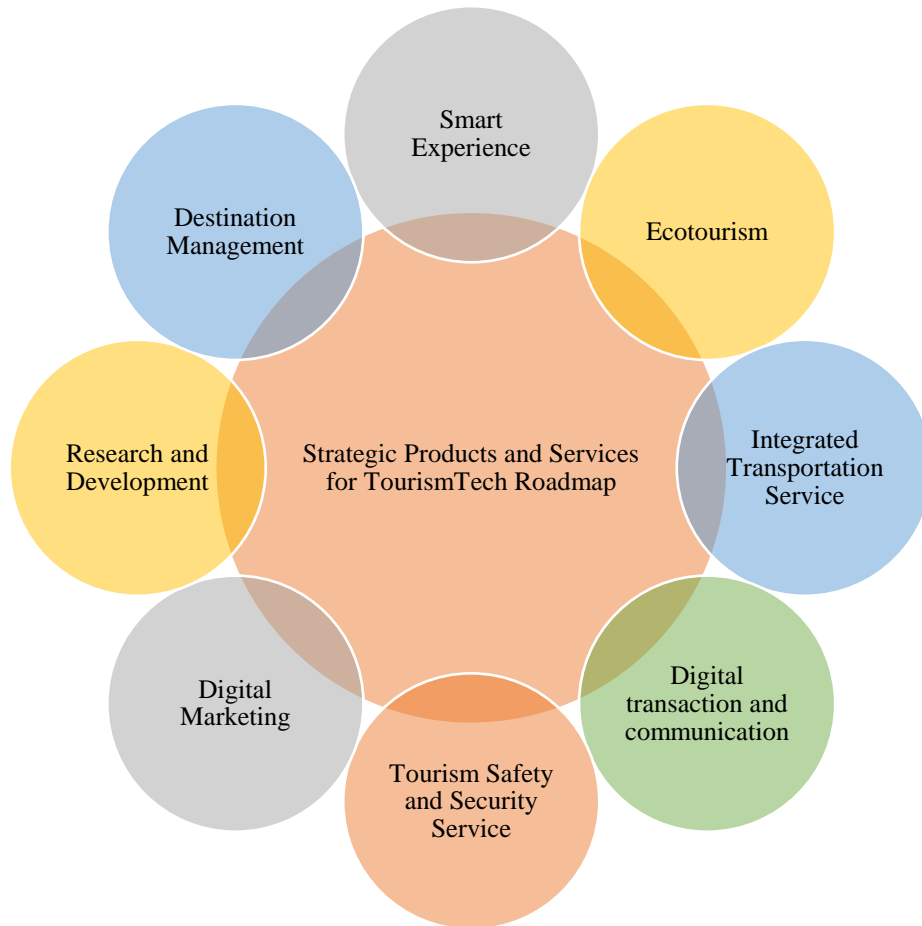
Figure 4. Strategic products and services for TourismTech Roadmap

6 Key Technology for Strategic Products and Services

In the initial stage of identifying key technologies for strategic products and services, 30 tourism-related technologies have been gathered and identified as candidate technologies through interviews with relevant stakeholders, literature review, and consultative workshops. These candidate technologies were evaluated and rated based on their importance and feasibility for the eight strategic products and services (see annex 2 & 3). 15 key technologies were then selected based on their high rating scores for these strategic products and services. Thus, these selected key technologies are strongly recommended to be focused on to support strategic products and services, which in turn will lead to achieving the goals and vision of this TourismTech Roadmap (see annex 4). It is worth noting that each strategic product and service may require more than one key technology, and vice versa, one key technology may also serve more than one strategic product and service. Figure 5 demonstrates the links between vision, goals, strategic products and services, and key technologies.
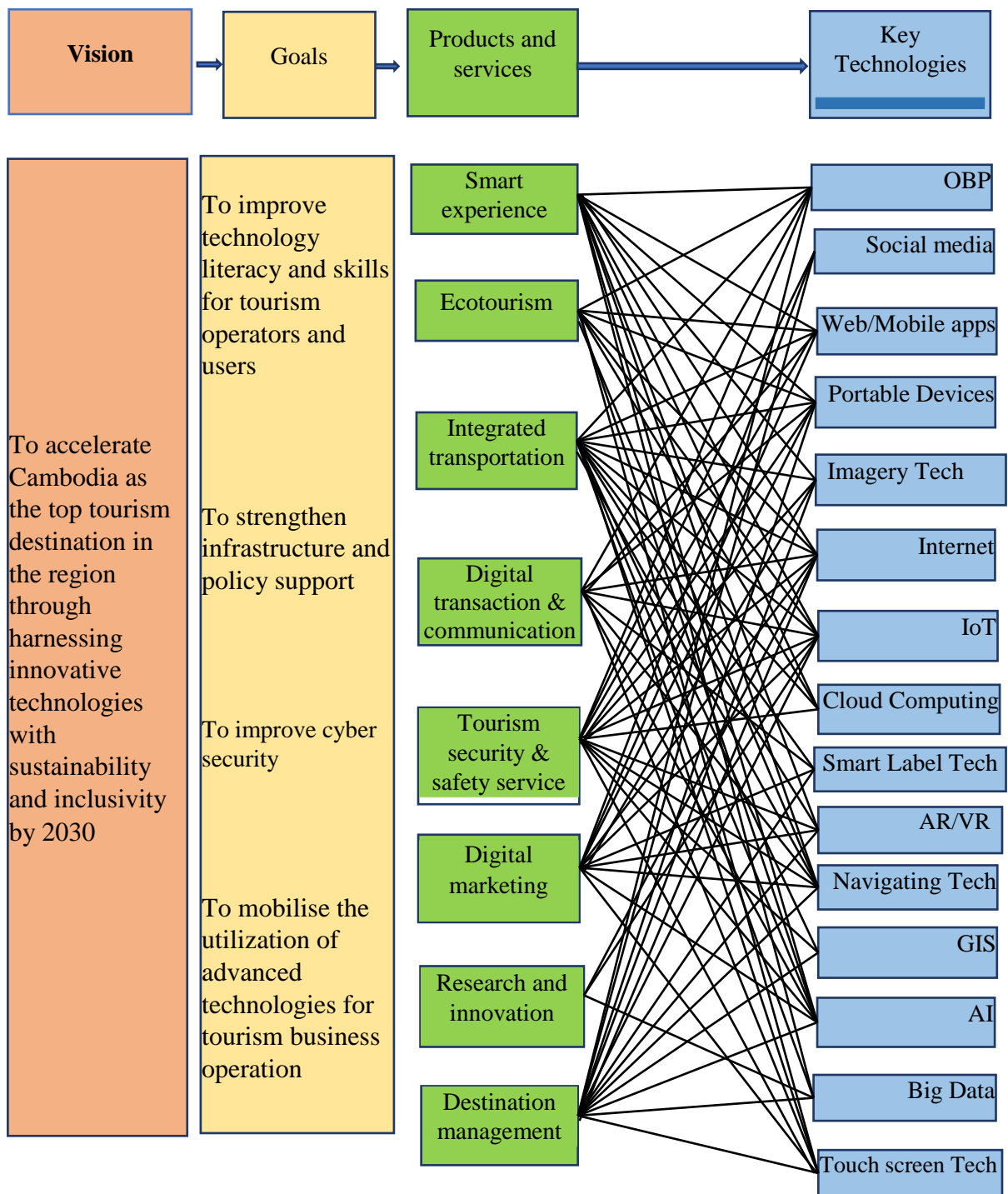
Figure 5. Diagram linking vision, goal, product & service, and key technologies

7 TourismTech Roadmap Charting

The charting tourism roadmap, shown in Figure 6, has been developed to respond to the goals of the roadmap. Key technologies, products and services, and goals, which also showcase in this charting, must be continuously integrated and implemented to realise the vision of the roadmap as "to accelerate Cambodia as the top tourism destination in the region through harnessing innovative technologies with sustainability and inclusivity by 2030".

This charting roadmap outlines the technologies used in strategic products and services for the short term (present-2024), medium term (2025-2027), and long term (2028-2030). Moreover, each technology has an identified importance and a technology acquisition strategy for the relevant products. The key technologies will serve their strategic importance to the designated products and services within the short, medium and long term for reaching the goals and vision of the roadmap. Furthermore, this charting also indicates a technology acquisition strategy that is initiated and led by government (G), private (P), international collaboration (IC), and research & development (R&D). The precedent initiative and leading technology acquisition strategy are the most significant. For instance, the OBP will serve the smart experience, green tourism, integrated transportation, digital transactions and communication, tourism security and safety, and destination management. Moreover, this OBP will be enhanced by the private sector, followed by international collaboration.

In the short term, from now until 2024, the use of an Online Booking Platform (OBP) is prioritised as being of critical strategic importance because consumers/visitors are now starting to expect tour and activity businesses to accept an online booking platform. Over 50% of travellers worldwide would prefer to place a booking online rather than through another channel. Potential consumers/visitors could book hotels, airlines, restaurants, and other tourism-related services anywhere and at any time through this 24/7 OBP. This OBP will become more crucial for attracting younger demographics and high-value-added visitors to Cambodia. However, OBP could become less strategic importance in the medium and long term as it becomes available for consumers/visitors or it may be replaced with a booking & reservation app in the future. Similarly, touchscreen technology has been used widely in tourism and hospitality.

Touchscreen technology is not limited to smart mobile phones or tablets, but it has been increasingly used as a source of information for customers or visitors in the tourism industry, such as hotels, airports, transportation, and tourist attractions. Self-service Kiosks are one example. Visitors can visit an attraction, such as a museum, and experience an artefact production process virtually through the touchscreen. For example, SOSORO Museum in Phnom Penh provides table touchscreen games for visitors to understand the currencies more interactively and information about the currency and history of the Cambodian economy. The touchscreen kiosk provides information about the tourist facilities and attractions around the destination; for instance, at the airport, it provides information to travellers about the density of passengers at the gates (waiting time and flight gates). In the hotel industry, touchscreen technology can enhance the visitor experience through integrated in-room facilities management systems on digital touchscreen tablets. Therefore, in urgent need, this touchscreen technology plays crucial roles in Cambodia's tourism industry development, in which the adoption and adaptation of touchscreen technology from the private sector are required to support and accommodate the needs of inbound and outbound visitors.

Social media, navigation technology, and the Internet are fundamental components to support tourism industry development in Cambodia in the short and medium term. In Cambodia, social media has gained more and more popularity and played decisive roles in providing and sharing information about tourism products and services, and become one of the key drivers for purchasing decision-making and marketing strategies. The use of social media, including Facebook, TikTok, Instagram, Telegram, and other platforms has steadily increased for online activities such as marketing, viewing tourism destinations and places, providing comments or complaints, doing campaigns, and other related business operations. These social media platforms play very sensitive and important roles in the effectiveness of tourism marketing and promotion as they have the ability to provide consumers/visitors with accurate and confident information about their destinations, make decisions about their destinations and tourism sites for their visits, and share and post their experiences and perspectives regarding the sites they visited. Moreover, social media has been recognised as a major communication vehicle that swiftly spreads across the borders in the region and around the globe. Social media are mostly driven by the private sector and will continue to be a strategic importance until 2026 for Cambodia's tourism industry development.

Likewise, the tourism industry is one of the sectors that has benefited the most from the Internet improvement that has become an integral part of tourism industry planning and development. The use of the Internet and other information and communication technologies leads to a new era of the tourism economy, particularly for the new generation. In Cambodia, the number of Internet subscribers and Internet service has been reported of its steady increase since the 2010s. In addition, high speed Internet and Internet service coverage are mainly led by private companies. With this trend, the government will vitally position in terms of policies and other legal instruments to ensure the availability of the Internet both in urban and rural areas with inclusive Internet services, reasonable prices, and market competition that can allow people to access related information and data for their tourism sector.

Google Map, one of the navigation technologies, is a computer system used for the collection, storage, management, analysis, and mapping of spatial data. With navigating technology, the tourism industry can develop modern and digital maps that facilitate consumers/visitors' navigation to and within the destination areas. Navigating technologies have not been being used only in the choice of location, including selection of hotels and information on shopping centres, and tourist attractions, but they are also being used in distribution, marketing, tourism, and traffic analysis. From present to 2027, navigation technology will be most widely used in tourism planning, tourism destination control, and tourism resource management. Therefore, the private sector and government should work together to modernise and promote the use of navigation technology to serve the purposes of the tourism industry in Cambodia. In addition, international collaboration will be another option to enhance the use of updated navigation technology among tourism visitors and operators.

In the long term, key technologies that should be addressed for the TourismTech Roadmap include web/mobile apps, AI, big data, and AR/VR. Web/mobile apps as a web application is a programme stored on a remote server and delivered to the user via a browser, while a mobile application is a software application designed to deliver services run on mobile devices. Web/mobile apps have provided substantial opportunities for tourism operators and enterprises to promote, interact with, and sell their products and services. At the same time, web/mobile apps will empower tourists and visitors to create their trip planning and destination mapping through instant access to necessary information at any time and in any places. Web/mobile apps are seen as having strategic

importance in the current situation, and they will continue to be more important in the medium and long term. To ensure the long-run availability of inclusive web/mobile apps, it requires investment and efforts from the private sector, government, education and research centre (R&D), and international collaboration to sustain the availability of web/mobile apps for all people.

Since its recent emergence, the travel and tourism industry has used artificial intelligence (AI) for customer service purposes. With chatbots, AI has the ability to deliver rapid responses to problems or queries. AI is improving all the time, making it more reliable and attractive as a business solution in the travel industry. Besides, hotels and other companies operating in the tourism industry have applied the use of AI to accurately and continuously sort through data and draw conclusions about business performance or trends associated with customer satisfaction. In recent years, AI has been debated among Cambodian experts, academia, the government, civil society, the private sector, and youth on the opportunities of AI to advance the right to access information. Consequently, it is required to well prepare for the emergence of the use of AI in the development of tourism industry in Cambodia in the medium and long term starting in 2025. This readiness will require a variety of research and development activities in AI performance among academia and the private sector. In addition, the government will play a vital role in ensuring the use of AI in the right way by developing supporting policies and other legal instruments.

In modern tourism management, big data and cloud computing have played significant roles in the tourism industry, such as improving the effectiveness of the governance of tourism destinations through providing sources of data for research, innovation, and management of tourism destinations and enterprises. Another valuable use of big data for business performance is the analysis of data for revenue management purposes, using historic occupancy rates and other past trends to better anticipate levels of demand. Big data and cloud computing have not become of strategic importance in short term due to the lack of infrastructure and institutional support, which require huge investments from the government and private sector. On the other hand, big data and cloud computing are a must not only for tourism industry, but for other sectors in the long term (2027-2030). The positive trend of data is now being considered in some ministries of Cambodia; for instance, MISTI and MPTC have their own data centre that will be the foundation of big data and cloud computing in the long term. Therefore, the government and private sector will play critical roles in leading the initiatives and investment to build the data centre to collect, store, and analyse big data and cloud computing. In addition, the government will also need to create policies and other legal instruments to secure the use of big data and cloud computing to maintain the national interest, peace and security, and socioeconomic development.

Last but not least, AR/VR has been used in the tourism industry to provide alternative travel to a real destination or tourism business location in the form of a virtual tour, enhance the visitor experience through virtually interacting with tourism products/services, facilitate tourism destination navigation as a marketing tool to increase visitors' intention to visit, and revisit the destination areas through environmental stimulation and a high-quality virtual experience. Currently, private companies (tech companies and tech start-ups) have adopted and adapted these technologies in the industry sector and other sectors such as real estate, education, and research (labs). AR/VR technologies are expected to play more important roles in the next couple of years.

Vision: To accelerate Cambodia as the top tourism destination in the region through harnessing innovative technologies with sustainability and inclusivity by 2030.

Products and Services	Short Term (~2024)	Medium Term (~2027)	Long Term (~2030)
(1) Smart Experience	(1,2,3,4,5,8) Online Booking Platforms P,IC		
	(5,6,8) Social Media P		
(2) Ecotourism	(1,2,3,4,5,6) Web/Mobile Apps P,G,R&D,IC		
	(1,2,3,4,5,6,8) Portable Devices P		
(3) Integrated transportation		(1,3,5,7,8) Imagery Technology P,G,R&D,IC	
	(1,2,3,4,5,6,7,8) Internet P,G		
(4) Digital transaction & Communication		(1,2,3,4,5,6,7,8) IoT R&D,P,IC	
		(1,2,3,5) Cloud Computing P,G	
(5) Tourism security and safety	(3,4,6,8) Smart Label Technology P		
	(1,2,3,4,5,6,8) Navigation Technology P,G,IC		
(6) Digital Marketing	(3,5,8) GIS P,IC		
(7) Research and innovation		(1,2,3,4,5,6,8) AI R&D,P,G	
		(2,3,7,8) Big Data G,P,R&D,IC	
(8) Destination Management	(2,3,4,5,6,8) Touchscreen P		
		(1,3,5,6,8) AR/VR P	

Tech Acquisition Strategy: Government Lead (G)   Private (P)   International Collaboration (IC)   Research & Development (R&D)

Strategic importance

Figure 6. Charting TourismTech Roadmap

8 Conclusion and Recommendation

Conclusion

Tourism has played a crucial role in and significantly contributed to the economic development of Cambodia in the last few decades, when Cambodia obtained peace and stability. It has also contributed to reducing the poverty of Cambodian citizens, especially those who live in the provinces, where tourism hotspots are located, as Cambodia is, fortunately, blessed with tourism destinations. Cambodia has an abundance of cultural tourism destinations; most of them are considered world heritage sites. Angkor Wat complex, for instance, is a worldwide renowned heritage site, attracting millions of national and international tourists. In addition, Cambodia is also endowed with natural resources that are popular tourist attractions, including white and finest sand beaches, rainforests, waterfalls, mountains, and many more. These factors not only greatly impact to the economy, but also contribute directly to local people through job creation and profit making. Moreover, tourism has also made Cambodia known to the world as the Kingdom of Wonder. As a result, the RGC has considered the tourism sector as "Green Gold" for Cambodia, as this sector has played a critical role in serving national identity, economic development, employment opportunities, natural environment and cultural heritage conservation, and green house gas mitigation. However, tourism in Cambodia has faced many challenges due to the high competition from neighbouring countries like Thailand and Vietnam, and countries in the region such as Singapore and Malaysia, and especially the impacts of the Covid-19 pandemic, which has had significant impacts on tourism in countries around the world. Understanding these challenges, the RGC fully realises that scientific and technological advancement, and innovative solutions could help tackle the challenges and boost the tourism sector of Cambodia, unlock the full potential of its blessed endowment, be more competitive, and attract more tourists from all over the world. Hence, this TourismTech Roadmap is established to harness the power of Science, Technology and Innovation for sustainable tourism development.

The vision of the TourismTech Roadmap is "to accelerate Cambodia as the top tourism destination in the region through harnessing innovativ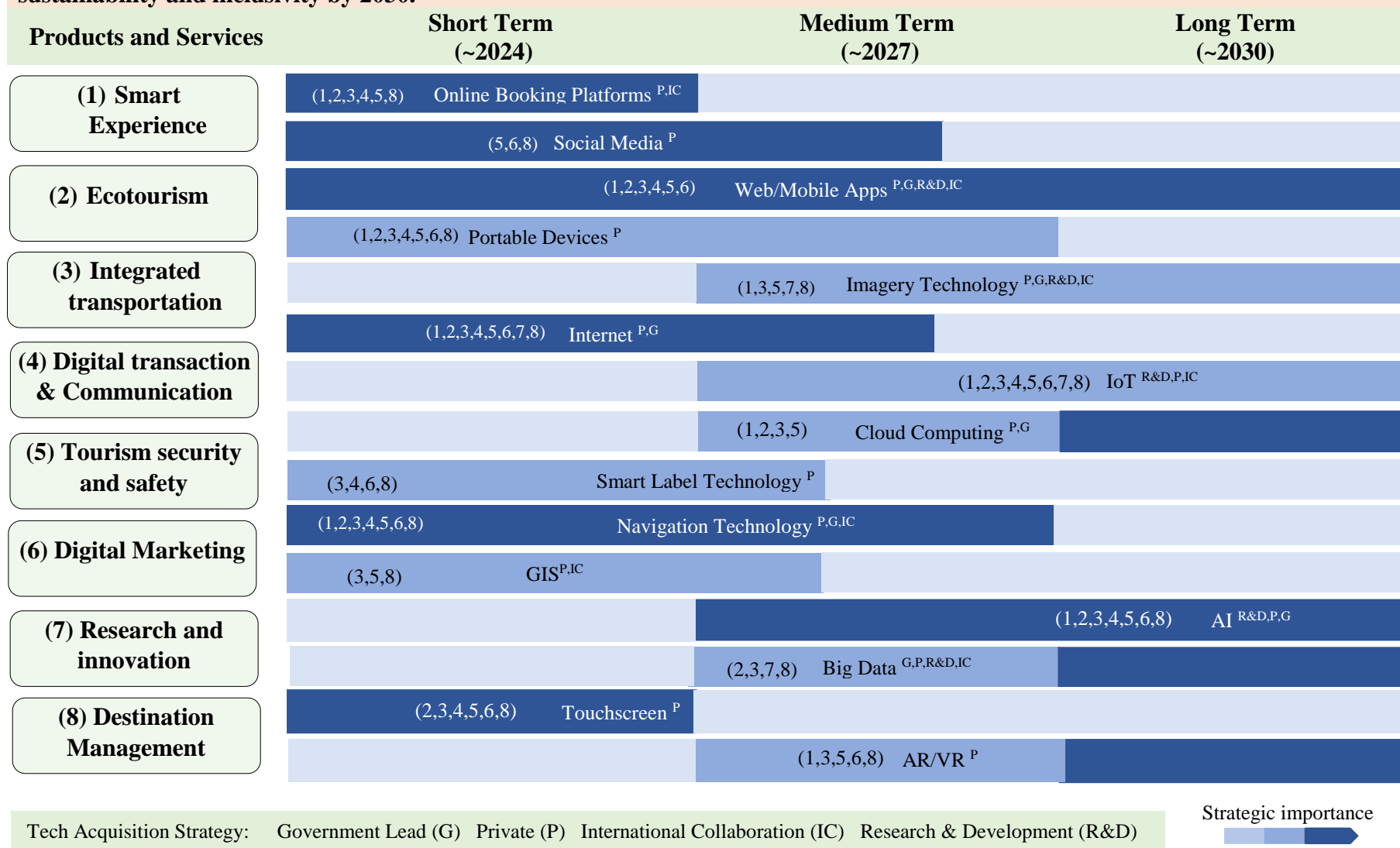e technologies with sustainability and inclusivity by 2030." Along with the vision, four goals are put in place: improving technology literacy and skills for tourism operators and users, strengthening infrastructure and policy support, improving cyber security, and mobilizing the utilization of advanced technologies for tourism business operations. To realise the goals and vision, 15 key technologies are selected to support these 8 strategic products and services, such as smart experience, ecotourism, integrated transportation, digital transaction and communication, tourism security and safety services, digital marketing, research and innovation in tourism, and destination management. In fact, each strategic product and service may require more than one technology. Likewise, one key technology is also possible to serve more than one strategic product and service. Based on feasibility and strategic importance, these 15 key technologies have been prioritised for the short term (present-2024), medium term (2025-2027), and long term (2028-2030) to sever the roadmap's strategic products and services. These key technologies can be sourced from government, the private sector (licences and outsourcing), education and research institutions (research and development), and international cooperation. As a result, these key technologies, products and services, and goals must be continuously integrated and implemented to realise the vision of the roadmap.

To this end, this TourismTech Roadmap also provides policy recommendations for effective implementation and informs stakeholders to take the right course of action.

Recommendations

In order to support the tourism industry to adopt and transform the supported technologies into its ecosystem, specific recommendations are provided as follows:

1. Develop timely relevant policies and legal instruments and enhance the enforcement
Policies and legal instruments play an integral role in supporting the use of technology in the tourism industry in Cambodia. Policies and legal instruments should ensure to provide clarity and transparency about the rules and regulations surrounding the use of technology in the tourism industry, encourage innovation and competition among tourism operators, enhance technology integration in tourism services to remove any hurdles or barriers when using technology, motivate tourism operators to adopt certain standards that can enhance the quality of their services, provide assurance to potential investors, and encourage them to invest in related tourism businesses in Cambodia. Policies shall be developed timely and agilely, as technology changes quite fast.

2. Invest in advanced technologies and supporting infrastructure

Encourage investment in advanced technology adoption and supporting infrastructure, especially for research and development, and innovation activities, particularly AI, AR/VR, cloud computing, and big data, which should be fully supported by the government and the private sector. Investment in advanced technologies can drive innovation and create job opportunities. In addition, the use of advanced technologies can also provide tourism operators and government agencies with a better understanding of trends and visitor behaviours by analysing vast amounts of data that are essential for better decision-making related to the tourism industry in Cambodia. Advanced technologies can also be enhanced through collaboration and partnerships with international organisations related to these key technologies.

3. Foster partnerships between the private sector and higher educational institutions

The private sector and higher educational institutions, particularly universities, can work together to design curricula and training programmes that align with the latest industry trends and meet each other's needs. This collaboration can be done through internships, apprenticeships, or university-industry linkages that will mutually benefit both parties. Hence, fostering partnerships, especially between academia and the private sector, shall be constantly promoted for industries to tap into scientific knowledge to integrate into their production lines to increase productivity and tackle challenges and academia to access finance to conduct research and transition from traditional teaching and learning, and conducting research to entrepreneurial universities.

4. Encouraging and building capacity of Cambodian tourism operators to adapting and adopting technologies

Cambodian tourism operators require technology adaptation and adoption in response to future global tourism trends and tourism technology transformation since these technologies will play a crucial role in their successful tourism market in Cambodia. Adapting and adopting technologies

in their tourism business can significantly enhance customer's experiences, improve business operations, foster innovation, and support sustainable tourism development. However, in order to effectively adopt technologies, absorptive capacity building among operators and firms shall be in place. Therefore, it is essential for tourism operators to invest in technology and build their capacity to gain competitiveness in Cambodia's tourism market.

5. Enhance the access to the internet and quality Wi-Fi services

Many travellers depend on the internet and Wi-Fi to stay connected and access essential information while travelling. Having access to the internet and quality Wi-Fi services in tourist areas and facilities, such as hotels, restaurants, and cafes, can help tourists stay connected and modernise Cambodia's tourism industry, making it easier to manage and promote services, attract more tourists, and improve the overall experience of visitors. Therefore, the internet speed, reliability, and network coverage, including 5G mobile internet, particularly in rural areas of Cambodia, should be increased to meet the needs of visitors, tourism business operators, and local tourism communities.

6. Awareness-raising for tourists or visitors for the use of related tourism technologies

Awareness-raising for technology use in Cambodia is vital to helping visitors or tourists have an improved overall experience, and to develop smart and sustainable tourism practises while ensuring their safety and security. Though the young generation (including Millennials and Generation Z, or tech-savvy) is getting familiar with using technologies for their visits, some are still limited in using them. These people will have difficulties in accessing information about a destination or attraction, reserving accommodation online, or accessing tour guides during their trip. Awareness-raising for tourists or visitors also plays an important role to ensure their safe usage of technology which can minimise the risks associated with technology use and provide them with complete protection over their sensitive personal and financial information.

Last but importantly, for this TourismTech Roadmap to deliver its promising result, monitoring and evaluation mechanisms for technology adoption shall be established, and this roadmap shall be constantly reviewed and revised if necessary.

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Annex

Annex 1: The establishment of the committee and sub-committee for the Development of Technology Roadmap for energy technology, tourism technology and digital technology

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
Ministry of Industry, Science, Technology & Innovation
លេខៈ ០១៣ MISTI / ២០២២

សេចក្តីសម្រេច
ស្តីពី
ការបង្កើតគណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោង
អភិវឌ្ឍផែនទីបច្ចាញ់ផ្លូវសម្រាប់បច្ចេកវិទ្យាថាមពល
បច្ចេកវិទ្យាទេសចរណ៍ និងបច្ចេកវិទ្យាឌីជីថល

ទេសរដ្ឋមន្ត្រី រដ្ឋមន្ត្រីក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍

- បានឃើញរដ្ឋធម្មនុញ្ញនៃព្រះរាជាណាចក្រកម្ពុជា
- បានឃើញព្រះរាជក្រឹត្យលេខ នស/រកត/០៩១៨/៩២៥ ចុះថ្ងៃទី០៦ ខែកញ្ញា ឆ្នាំ២០១៨ ស្តីពីការតែងតាំង រាជរដ្ឋាភិបាលនៃព្រះរាជាណាចក្រកម្ពុជា
- បានឃើញព្រះរាជក្រឹត្យលេខ នស/រកត/០៣២០/៤២១ ចុះថ្ងៃទី៣០ ខែមីនា ឆ្នាំ២០២០ ស្តីពីការតែងតាំង និង កែសម្រួលសមាសភាពរាជរដ្ឋាភិបាល
- បានឃើញព្រះរាជក្រមលេខ នស/រកម/០៦១៨/០១២ ចុះថ្ងៃទី២៨ ខែមិថុនា ឆ្នាំ២០១៨ ដែលប្រកាសឱ្យប្រើ ច្បាប់ស្តីពីការរៀបចំនិងការប្រព្រឹត្តទៅនៃគណៈរដ្ឋមន្ត្រី
- បានឃើញព្រះរាជក្រមលេខ នស/រកម/០៣២០/០០៨ ចុះថ្ងៃទី២៦ ខែមីនា ឆ្នាំ២០២០ ដែលប្រកាសឱ្យប្រើ ច្បាប់ស្តីពីការបង្កើតក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
- បានឃើញអនុក្រឹត្យលេខ៨៨ អនក្រ.បក ចុះថ្ងៃទី១៦ ខែមេសា ឆ្នាំ២០២០ ស្តីពីការរៀបចំនិងការប្រព្រឹត្តទៅរបស់ ក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
- យោងលិខិតលេខ ០០៣ ឌរបន ចុះថ្ងៃទី១២ ខែមករា ឆ្នាំ២០២២ ស្តីពីលទ្ធផលកិច្ចប្រជុំលើកទី៣វិនៃក្រុមប្រឹក្សាជាតិ វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
- យោងលិខិតចាត់តាំងសមាសភាពឱ្យចូលរួមក្នុងគណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោង អភិវឌ្ឍផែនទីបច្ចាញ់ផ្លូវសម្រាប់បច្ចេកវិទ្យាថាមពល បច្ចេកវិទ្យាទេសចរណ៍ និងបច្ចេកវិទ្យាឌីជីថល របស់បណ្តា ក្រសួង-ស្ថាប័នពាក់ព័ន្ធ
- យោងតាមសំណូមពរការងារចាំបាច់របស់ក្រសួង

សម្រេច

ប្រការ១..

ត្រូវបានបង្កើតគណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោងអភិវឌ្ឍផែនទីបច្ចាញ់ផ្លូវសម្រាប់ បច្ចេកវិទ្យាថាមពល បច្ចេកវិទ្យាទេសចរណ៍ និងឌីជីថល ដែលមានសមាសភាព

១. ឯកឧត្តមសាស្ត្រាចារ្យបណ្ឌិត **ហែម គាត់រិទ្ធី** រដ្ឋមន្ត្រីប្រតិភូអមនាយករដ្ឋមន្ត្រី និងជារដ្ឋលេខាធិការ
ក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ ប្រធាន

៩

ក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
៤៥ មហាវិថីព្រះនរោត្តម សង្កាត់ផ្សារថ្មី
ខណ្ឌដូនពេញ ភ្នំពេញ ១២២០៤ (ព្រះរាជាណាចក្រកម្ពុជា)

ខុទ្ទកាល័យឧត្តមកិត្តិសង្ឃាបណ្ឌិត ទេសរដ្ឋមន្ត្រី
ទូរស័ព្ទលេខៈ (៨៨៥) ២៣ ២១១ ៧៨៨
អ៊ីម៉ែល: misti.smcabinet@gmail.com

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២. ឯកឧត្តមបណ្ឌិត **ហ៊ុល សៀងហេង** អគ្គនាយកនៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា

និងនវានុវត្តន៍ នៃក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ អនុប្រធាន

៣. ឯកឧត្តមបណ្ឌិត **កង ច័ន្ទតារាវុត្ថ** អនុរដ្ឋលេខាធិការក្រសួងប្រៃសណីយ៍ និងទូរគមនាគមន៍ សមាជិក

៤. ឯកឧត្តម **ណេប សាមុត** អគ្គនាយកនៃអគ្គនាយកដ្ឋានគ្រប់គ្រងឧស្សាហកម្ម

ទេសចរណ៍នៃក្រសួងទេសចរណ៍ សមាជិក

៥. លោក **ជា ណារិន** អគ្គនាយករងនៃអគ្គនាយកដ្ឋានថាមពល

នៃក្រសួងរ៉ែ និងថាមពល សមាជិក

៦. លោកបណ្ឌិត **ទ្រី សុផល** អគ្គនាយករងនៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា

និងនវានុវត្តន៍ នៃក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា

និងនវានុវត្តន៍ សមាជិកអចិន្ត្រៃយ៍

ប្រការ២.

គណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោង មានតួនាទី និងការកិច្ចដូចតទៅ៖

- ធានានូវការសិក្សារបស់គម្រោង ត្រូវបានបន្សុី និងគិតគូរច្បាស់លាស់ជាមួយនឹងយុទ្ធសាស្ត្រពាក់ព័ន្ធនានា

- ធានានូវការសិក្សារបស់គម្រោង និងប្រើប្រាស់ធនធានបានយ៉ាងល្អនិងគ្រប់ជ្រុងជ្រោយ រាប់ទាំងមូលដ្ឋាន

ចំណេះដឹងក្នុងប្រទេស និងក្នុងតំបន់

- ផ្តល់យុទ្ធសាស្ត្រក្នុងការអនុវត្ត និងជួយដោះស្រាយបញ្ហានិងហានិភ័យនានាក្នុងពេលអនុវត្តគម្រោង

- ពិនិត្យនូវវឌ្ឍនភាព និងសម្របសម្រួលជាមួយថ្នាក់ដឹកនាំជាន់ខ្ពស់ និងក្រសួង-ស្ថាប័នពាក់ព័ន្ធនានា

- ពិនិត្យ និងផ្តល់យោបល់លើ សេចក្តីព្រាងកម្រងសំណុរសម្រាប់ការធ្វើអង្កេតនិងលទ្ធផលដែលទទួលបាន

- ពិនិត្យ និងផ្តល់យោបល់លើវិធីសាស្ត្រនានាដែលដាក់ឱ្យប្រើប្រាស់ក្នុងគម្រោង

- ណែនាំអំពីឱកាសដើម្បីឱ្យទទួលបានប្រយោជន៍ និងសារៈសំខាន់ជាអតិបរមាពីលទ្ធផលនៃការសិក្សាគម្រោង។

ប្រការ៣.

ត្រូវបានបង្កើតអនុគណៈកម្មការចំនួន៣ ដើម្បីទទួលអនុវត្តគម្រោងខាងលើតាមបច្ចេកវិទ្យា ដូចមានសមាសភាព

ខាងក្រោម៖

ក. អនុគណៈកម្មការអភិវឌ្ឍន៍ផែនទីបង្ហាញផ្លូវសម្រាប់បច្ចេកវិទ្យាថាមពល៖

១. លោក **ជា ណារិន** អគ្គនាយករងនៃអគ្គនាយកដ្ឋានថាមពល

នៃក្រសួងរ៉ែ និងថាមពល ប្រធាន

២. ឯកឧត្តម **នុត អ៊ុនណៃ** អគ្គលេខាធិការរងគណៈកម្មការវិនិយោគកម្ពុជា

នៃក្រុមប្រឹក្សាអភិវឌ្ឍន៍កម្ពុជា សមាជិក

៣. លោកស្រីបណ្ឌិត **ត្រី ណាល់លីស** អគ្គនាយករងនៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

៤. លោក **តាំង ម៉េងអៀង** ប្រធាននាយកដ្ឋានសេដ្ឋកិច្ចបៃតង នៃអគ្គនាយកដ្ឋាន

គោលនយោបាយនិងយុទ្ធសាស្ត្រ នៃក្រសួងបរិស្ថាន សមាជិក

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៥. លោកបណ្ឌិត ស្រ៊ុន បញ្ញារិទ្ធិ ប្រធាននាយកដ្ឋានគោលនយោបាយវិទ្យាសាស្ត្រ
បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋាន
វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិកអចិន្ត្រៃយ៍

៦. លោកស្រីបណ្ឌិត លី សុខនី ប្រធាននាយកដ្ឋានសហប្រតិបត្តិការវិស័យវិទ្យាសាស្ត្រ
បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ
បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

៧. លោកបណ្ឌិត ជាតិ សុផល ប្រធាននាយកដ្ឋានតាមដាន ត្រួតពិនិត្យ និងវាយតម្លៃ
ការអនុវត្តគោលនយោបាយវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា
និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា
និងនវានុវត្តន៍ សមាជិក

៨. លោក សាន រិទ្ធី ប្រធាននាយកដ្ឋានស្ថិតិ នៃនាយកដ្ឋានបណ្ណះបណ្ដាល
វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃវិទ្យាស្ថានជាតិ
វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

៩. លោក ប៉ាន់ សីហាៈគីរី នាយករង ផែនការយុទ្ធសាស្ត្រ និងគម្រោងការ
នៃអគ្គិសនីកម្ពុជា សមាជិក

១០. លោកបណ្ឌិត ជ័យ ចាន់អឿន ព្រឹទ្ធបុរសរងមហាវិទ្យាល័យវិទ្យាសាស្ត្រ
នៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ សមាជិក

១១. លោក តេង សារៀន អនុប្រធាននាយកដ្ឋានសេវាកម្មផលិតកម្ម
នៃអាជ្ញាធរអគ្គិសនីកម្ពុជា សមាជិក

១២. លោក ឈាង លីហួរ ប្រធានផ្នែកគ្រប់គ្រងការអភិវឌ្ឍជាមពលថ្មីនៃក្រុមហ៊ុន
TOTAL ENERGY កម្ពុជា សមាជិក

១៣. លោកបណ្ឌិត អ៊ូ ចុំរ៉ុង ប្រធានផ្នែកគ្រប់គ្រងទូទៅនៃនាយកដ្ឋានបច្ចេកទេសជាន់ខ្ពស់
នៃក្រុមហ៊ុន SCHNEITECH CO.,LTD សមាជិក

១៤. លោក ឈឿន ក្រីម ប្រធានផ្នែកលក់ នៃក្រុមហ៊ុន VP-SMART TECHNOLOGY សមាជិក

១៥. លោក ប្រិង ការុនីន និយោជិត នាយកដ្ឋានផែនការយុទ្ធសាស្ត្រ
និងគម្រោងការ នៃអគ្គិសនីកម្ពុជា សមាជិក

ខ. អនុគណៈកម្មការអភិវឌ្ឍន៍ផែនទីបង្ហាញផ្លូវសម្រាប់បច្ចេកវិទ្យាទេសចរណ៍ៈ

១. ឯកឧត្តម ណោប សាមុត អគ្គនាយករងគ្រប់គ្រងឧស្សាហកម្មទេសចរណ៍
នៃក្រសួងទេសចរណ៍ ប្រធាន

២. ឯកឧត្តម អាំង សុវណ្ណរិទ្ធ អគ្គនាយករងអភិវឌ្ឍន៍ទេសចរណ៍ និងសហប្រតិបត្តិការ
អន្តរជាតិ នៃក្រសួងទេសចរណ៍ សមាជិក

៣. ឯកឧត្តម ឆាយ យុនឡុង អគ្គនាយករងគ្រប់គ្រងឧស្សាហកម្មទេសចរណ៍
នៃក្រសួងទេសចរណ៍ សមាជិក

៤. ឯកឧត្តម ហុង សុហួរ ទីប្រឹក្សារបស់មជ្ឈមណ្ឌលកម្ពុជា ៤.0 សមាជិក

៥. ឯកឧត្តម គឹម សេរីវុង្ស ប្រធាននាយកដ្ឋានគ្រប់គ្រងសេវាស្នាក់ទេសចរណ៍
និងមូបអាហារ នៃក្រសួងទេសចរណ៍ សមាជិក

<center>៣</center>

ក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍
៤៥ មហាវិថីព្រះនរោត្តម សង្កាត់ផ្សារថ្មី
ខណ្ឌដូនពេញ ភ្នំពេញ ១២២០៥ (ព្រះរាជាណាចក្រកម្ពុជា)

ខុទ្ទកាល័យឯកឧត្តមកិត្តិសេដ្ឋបណ្ឌិត ទេសរដ្ឋមន្ត្រី
ទូរស័ព្ទលេខៈ (៨៥៥) ២៣ ២១១ ៧៣៧៥
អ៊ីម៉ែល: misti.smbabinet@gmail.com

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៦. លោក **សេង ប៊ុនឿៀន**	ប្រធាននាយកដ្ឋានរៀបចំដែនដីនៃអគ្គនាយកដ្ឋានរៀបចំដែនដី	
	និងនគរូបនីយកម្ម នៃក្រសួងរៀបចំដែនដី នគរូបនីយកម្ម	
	និងសំណង់	សមាជិក
៧. លោក **អឿៀន មករា**	ប្រធាននាយកដ្ឋានផែនការ ស្ថិតិ និងសរុប	
	នៃក្រសួងវប្បធម៌ និងវិចិត្រសិល្បៈ	សមាជិក
៨. លោកបណ្ឌិត **ហេង សុភាព**	ព្រឹទ្ធបុរសមហាវិទ្យាល័យទេសចរណ៍ និងបដិសណ្ឋារកិច្ច	
	នៃសាកលវិទ្យាល័យជាតិគ្រប់គ្រង	សមាជិក
៩. លោកបណ្ឌិត **សុខ គីមឈិន**	ព្រឹទ្ធបុរសមហាវិទ្យាល័យសេដ្ឋកិច្ចកសិកម្ម	
	និងអភិវឌ្ឍន៍ជនបទ នៃសាកលវិទ្យាល័យភូមិន្ទកសិកម្ម	សមាជិក
១០. លោក **ម៉ម វាសនា**	ប្រធានមន្ទីរទេសចរណ៍រាជធានីភ្នំពេញ	
	នៃសាលារាជធានីភ្នំពេញ	សមាជិក
១១. លោក **ថែម សិរីវិត្តិវិឡៀម**	ប្រធានមជ្ឈមណ្ឌលសេដ្ឋកិច្ចឌីជីថល	
	ប្រកបដោយបរិយាប័ន្ននៃវិទ្យាស្ថានចក្ខុវិស័យអាស៊ី	សមាជិក
១២. លោក **ជា ឡង់ជា**	នាយកប្រតិបត្តិក្រុម BOOKMEBUS CO.LTD	សមាជិក
១៣. លោក **ឡាយ គីមស្សរ**	អនុប្រធានសមាគមសហគ្រិនវ័យក្មេងកម្ពុជា	សមាជិក
១៤. លោក **ហេង ជលសា**	តំណាង ក្រុមហ៊ុន LASMILE	សមាជិក
១៥. លោកបណ្ឌិត **សេង ទូច**	អនុប្រធាននាយកដ្ឋានគោលនយោបាយវិទ្យាសាស្ត្រ	
	បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ	
	បច្ចេកវិទ្យា និងនវានុវត្តន៍	សមាជិកអចិន្ត្រៃយ៍
១៦. លោក **ប៉ុ សំណាង**	អនុប្រធាននាយកដ្ឋានផ្ទេរបច្ចេកវិទ្យា	
	នៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍	សមាជិក
១៧. កញ្ញា **តាំង ចាន់ស្មើ**	ប្រធានការិយាល័យ នាយកដ្ឋានសហប្រតិបត្តិការវិស័យ	
	វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋាន	
	វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍	សមាជិក
១៨. លោក **ដ៉ែត សំឿៀន**	ជំនួយការព្រឹទ្ធបុរស មហាវិទ្យាល័យពាណិជ្ជកម្ម	
	និងសេដ្ឋកិច្ចនៃសាកលវិទ្យាល័យបញ្ញាសាស្ត្រកម្ពុជា	សមាជិក
១៩. កញ្ញាបណ្ឌិត **ថៃ ចិន្តា**	មន្ត្រីនាយកដ្ឋានស្រាវជ្រាវ និងអភិវឌ្ឍន៍បច្ចេកវិទ្យា	
	នៃវិទ្យាស្ថានជាតិវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍	សមាជិក

គ. អនុគណៈកម្មការអភិវឌ្ឍផែនទីបង្ហាញផ្លូវសម្រាប់បច្ចេកវិទ្យាឌីជីថល៖

១. ឯកឧត្តមបណ្ឌិត **កង ចិន្តាវារ័ត្ន** អនុរដ្ឋលេខាធិការក្រសួងប្រៃសណីយ៍និងទូរគមនាគមន៍	ប្រធាន
២. ឯកឧត្តម **នាង ម៉ៅ** អគ្គនាយកនៃអគ្គនាយកដ្ឋានបច្ចេកវិទ្យាគមនាគមន៍និងព័ត៌មាន	
នៃក្រសួងប្រៃសណីយ៍ និងទូរគមនាគមន៍	សមាជិក
៣. ឯកឧត្តមបណ្ឌិត **សំ សិទ្ធិសេរី** ប្រធានវិទ្យាស្ថានស្រាវជ្រាវនិងនវានុវត្តន៍ឌីជីថល	
នៃក្រសួងប្រៃសណីយ៍ និងទូរគមនាគមន៍	សមាជិក

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៤. ឯកឧត្តម **យ៉ឹម ប្រសិទ្ធិប្រុទ្ធិ** អគ្គនាយកក្រុមហ៊ុនខូនប៊ីម អេនជីនារិង អេន មនុហ្វេកធឺរិង ៦.ក

និងជាសមាជិកគណៈប្រឹក្សាយោបល់វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា

និងនវានុវត្តន៍ របស់ក្រុមប្រឹក្សាជាតិវិទ្យាសាស្ត្រ បច្ចេកវិទ្យា

និងនវានុវត្តន៍ សមាជិក

៥. លោក **កៀន តាក់** សាកលវិទ្យាធិការរងនៃសាកលវិទ្យាល័យភូមិន្ទភ្នំពេញ សមាជិក

៦. លោកស្រី **សេង មុលិកា** ប្រធាននាយកដ្ឋានគ្រប់គ្រងព័ត៌មានវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋាន

វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

៧. លោក **គន់ ឌីរ៉ង់** ប្រធាននាយកដ្ឋានផែនការ ស្ថិតិ និងព័ត៌មានឧស្សាហកម្ម

នៃក្រសួងឧស្សាហកម្ម សមាជិក

៨. លោក **ចាន់ទី ពិសាល** ប្រធានមជ្ឈមណ្ឌលស្រាវជ្រាវគោលនយោបាយឌីជីថល

នៃវិទ្យាស្ថានស្រាវជ្រាវនិងនវានុវត្តន៍ឌីជីថល

នៃបណ្ឌិត្យសភាបច្ចេកវិទ្យាឌីជីថលកម្ពុជា សមាជិក

៩. លោកស្រី **LEE Yun Nii** អគ្គនាយិកាប្រតិបត្តិក្រុមហ៊ុន អ៊ុហ្វ៊ីខម សមាជិក

១០. លោកបណ្ឌិត **សៀវ សុខលី** អនុប្រធាននាយកដ្ឋានគោលនយោបាយវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋាន

វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

១១. លោកបណ្ឌិត **ចិន សុវណ្ណ** អនុប្រធាននាយកដ្ឋានគ្រប់គ្រងព័ត៌មានវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃអគ្គនាយកដ្ឋានវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិកអចិន្ត្រៃយ៍

១២. កញ្ញា **ហ៊ូ សុតាស៊ីង** ប្រធានការិយាល័យ នៃនាយកដ្ឋានបណ្ដុះបណ្ដាលវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ នៃវិទ្យាស្ថានជាតិវិទ្យាសាស្ត្រ

បច្ចេកវិទ្យា និងនវានុវត្តន៍ សមាជិក

១៣. លោក **ស្រី លីហ៊ីល** បុគ្គលិកស្រាវជ្រាវនៃមជ្ឈមណ្ឌលបណ្ដុះកិច្ចថ្មី «គេជៀ» សមាជិក

ប្រការ៤.

អនុគណៈកម្មការអភិវឌ្ឍផែនទីបង្ហាញផ្លូវបច្ចេកវិទ្យាទាំងពា3នេះ មានតួនាទី និងការកិច្ចដូចតទៅៈ

- ទទួលអនុវត្តការងារទៅតាមទិសដៅដែលបានដាក់ចេញដោយគណៈកម្មការដឹកនាំ និងសម្របសម្រួល
ដល់ការអនុវត្តគម្រោង

- សម្របសម្រួល ប្រមូល និងផ្តល់ធាតុចូលនានាតាមក្រសួង-ស្ថាប័ន ឬអង្គភាពសាមី ដែលពាក់ព័ន្ធនឹងការ
សិក្សារបស់គម្រោងទៅតាមរបៀបវារៈនៃការអនុវត្ត

- ធានាស់សង្គតិភាពព័ត៌មាន និងទិន្នន័យដែលទទួលបាន និងផ្តល់ជូន និងទទួលស្គាល់ដោយក្រសួង-ស្ថាប័ន
ឬអង្គភាពសាមី

- សម្របសម្រួលការងារទៅបច្ចេកទេស និងរដ្ឋបាលនៅតាមក្រសួង-ស្ថាប័ន ឬអង្គភាពសាមី

- ពង្រឹងសមត្ថភាពបន្ថែមលើវិស័យ តាមរយៈសិក្ខាសាលា និងវគ្គបណ្ដុះបណ្ដាលនានា ដែលរៀបចំដោយគម្រោង

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- ជាមន្ត្រីបង្គោលតាមក្រសួង-ស្ថាប័ន ឬអង្គភាពសាមីសម្រាប់ការអនុវត្តសកម្មភាពនានារបស់គម្រោង
- ទទួលអនុវត្តការកិច្ចផ្សេងៗទៀតដែលបានដាក់ចេញដោយគណៈកម្មការដឹកនាំ និងសម្របសម្រួលគម្រោង។

ប្រការ៥.

ពេលប្រធានគណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោង អវត្តមាន ឬមានករណីចាំបាច់ ប្រធានគណៈកម្មការដឹកនាំនិងសម្របសម្រួលដល់ការអនុវត្តគម្រោង អាចផ្ទល់សិទ្ធិជូនអនុប្រធាន ដើម្បីដឹកនាំការប្រជុំ តាមការប្រគល់សិទ្ធិពីប្រធាន។

ប្រការ៦.

សមាជិកគណៈកម្មការ និងអនុគណៈកម្មការនីមួយៗ ត្រូវចូលរួមប្រជុំតាមការអញ្ជើញរបស់ប្រធាន និងទទួល ឧស្សាហ៍វាតាមបន្ទុកការងារវែដែលបានបែងចែក។ ប្រធានអនុគណៈកម្មការនីមួយៗ ត្រូវវាយការណ៍ការងារជាប្រចាំ និងតាម ការចាំបាច់ ជូនប្រធានគណៈកម្មការដឹកនាំ និងសម្របសម្រួលដល់ការអនុវត្តគម្រោង។

ប្រការ៧.

នាយកខុទ្ទកាល័យ អគ្គនាយក អគ្គាធិការ ប្រធានមជ្ឈមណ្ឌល គ្រប់អង្គភាពពាក់ព័ន្ធ និងសាមីខ្លួន ត្រូវទទួល បន្ទុកអនុវត្តសេចក្តីសម្រេចនេះ ចាប់ពីថ្ងៃចុះហត្ថលេខាតទៅ។

ថ្ងៃ*ច័ន្ទ ៦ កើត* ខែ*សាវណ*ឆ្នាំខាល ចត្វាស័ក ព.ស.២៥៦៦
ធ្វើនៅរាជធានីភ្នំពេញ ថ្ងៃទី *១៨* ខែ *កក្កដា* ឆ្នាំ២០២២

ទេសរដ្ឋមន្ត្រី
រដ្ឋមន្ត្រីក្រសួងឧស្សាហកម្ម វិទ្យាសាស្ត្រ បច្ចេកវិទ្យា
និងនវានុវត្តន៍ * A.C*

កិត្តិសេដ្ឋាបណ្ឌិត ចម ប្រសិទ្ធ

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Annex 2. Evaluation of technologies based on 2 criteria for strategic products and services

Technologies	Code	Smart Experience			Green Tourism			Integrated Transportation			Digital Transaction & Communication			Tourism Safety & Security			Digital Marketing			Research and Innovation			Destination Management		
		Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum	Importance	Feasibility	Sum
OBP	T1	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	3	3	6	3	4	7	5	5	10
Social media	T2	4	5	9	4	4	8	3	3	6	3	3	6	4	4	8	5	5	10	4	4	8	5	5	10
Web/Mobile apps	T3	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	4	4	8	4	4	8
Portable devices	T4	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10
Imagery technology	T5	5	5	10	4	5	9	5	5	10	4	4	8	5	5	10	5	5	10	4	5	9	5	5	10
Internet	T6	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10
IoT	T7	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10
Blockchain	T8	4	4	8	4	4	8	5	5	10	3	3	6	3	3	6	2	2	4	3	3	6	5	5	10
Cloud computing	T9	5	5	10	5	5	10	5	5	10	5	4	9	5	5	10	4	4	8	4	4	8	4	4	8
Digital signature	T10	4	5	9	5	5	10	5	5	10	4	4	8	4	4	8	2	2	4	1	5	6	3	3	6
IRT	T11	4	3	7	4	3	7	5	5	10	4	3	7	4	3	7	3	3	6	3	4	7	3	4	7
Smart label (QR code)	T12	4	4	8	4	5	9	5	5	10	5	5	10	3	5	8	5	5	10	4	5	9	5	5	10
Navigating technology	T13	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	3	5	8	5	5	10
GIS	T14	4	4	8	4	4	8	5	5	10	4	4	8	5	5	10	3	3	6	4	5	9	5	5	10
VR	T15	5	5	10	4	4	8	3	3	6	2	2	4	4	4	8	5	4	9	2	3	5	5	5	10
AR	T16	5	4	9	4	4	8	3	3	6	2	2	4	4	4	8	5	4	9	2	3	5	5	5	10
AI	T17	5	5	10	5	5	10	5	5	10	5	5	10	4	4	8	5	5	10	3	3	6	5	5	10
Voice search	T18	5	5	10	4	5	9	5	5	10	3	3	6	5	5	10	3	3	6	1	3	4	5	5	10
Robotics	T19	3	3	6	2	2	4	5	3	8	4	4	8	4	4	8	3	3	6	1	1	2	3	3	6
Sensor	T20	5	5	10	5	5	10	4	3	7	4	4	8	4	4	8	4	4	8	2	2	4	4	4	8
Analytical tool	T21	4	4	8	3	3	6	3	3	6	4	4	8	5	5	10	2	2	4	4	4	8	4	5	9
Big data	T22	5	5	10	4	4	8	5	5	10	4	4	8	3	4	7	4	4	8	5	5	10	5	5	10
PMS	T23	2	2	4	2	2	4	1	1	2	3	3	6	5	5	10	2	2	4	3	3	6	4	5	9
Hologram	T24	5	5	10	4	4	8	N/A	N/A	N/A	3	3	6	2	2	4	4	4	8	N/A	N/A	N/A	4	4	8

3D printing	T25	3	3	6	2	3	5	N/A	N/A	N/A	3	3	6	2	2	4	5	5	10	N/A	N/A	N/A	3	3	6
Audio tools	T26	5	5	10	4	4	8	3	3	6	4	4	8	5	5	10	4	4	8	2	2	4	5	5	10
Touch Screen	T27	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	5	5	10	3	5	8	5	5	10
Solar panel	T28	2	2	4	5	5	10	3	3	6	2	2	4	1	1	2	1	1	2	2	2	4	4	4	8
Wind turbine	T29	1	1	2	5	5	10	2	2	4	1	1	2	1	1	2	1	1	2	2	2	4	4	4	8
Battery	T30	3	3	6	5	5	10	4	4	8	3	3	6	1	1	2	2	2	4	3	3	6	4	4	8

N/A=Not applicable

Annex 3. Finalisation of key technologies for products and services

Products & Its timeframes	Technologies	Online Booking platforms (T1)	Social Media (Facebook, Blog, Twitter, YouTube, TikTok, etc.) (T2)	Web/Mobile apps (T3)	Portable Devices (Smartphone, iPad/tablet, computer/laptop) (T4)	Imagery technology (digital and security camera) (T5)	Internet (T6)	Internet of things (T7)	Cloud computing (T9)	Smart labelling Technology (QR code) (T12)	Navigating technology (T13)	GIS (T14)	Artificial intelligence (T17)	Big data (T22)	Touch Screen (T27)
P1	S	■●⊙○	■●	■●⊙○	■●	■●	■●	■●	■●	■●	■●	■●	▣●	▣●	■●⊙
	M	■●⊙○	■●	■●⊙○	■●	■●	■●	■●⊙◎	■●	■●	■●	■●	■●	▣●	■●⊙
	L	■●⊙◎○	■●	■●⊙	■●	■●	■●	■●⊙◎	■●	■●	■●	■●⊙	■●	▣●	■●⊙
P2	S	▣●⊙◎	■●	■●⊙○	■●	■●	■●	■●	■●	■●	■●	▣●	□●	■●	■●
	M	▣●⊙◎	■●	■●⊙○	■●	■●	■●	■●⊙	■●	■●	■●	▣●	▣●	■●	■●
	L	▣●⊙◎	■●	■●⊙	■●	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●
P3	S	■●⊙◎	▣●	■●⊙○	■●	■●	■●	■●	▣●○	■●	■●	■●	■●	■●	■●
	M	■●⊙◎	▣●	■●⊙	■●	■●	■●	■●	■●◎	■●	■●	■●◎	■●	■●	■●
	L	■●⊙◎	▣●	■●⊙	■●	■●	■●	■●	■⊙	■●	■●	■●◎	■●	■●	■●⊙
P4	S	■●◎○	□●	■●	■●	■●	■●	■●	■●	■●	□●	□●	■●	▣●	■●
	M	■●◎○	□●	■●⊙	■●	■●	■●	■●⊙	■●	■●	□●	□●	■●	▣●	■●
	L	■●⊙◎	□●	■●⊙	■●	■●	■●	■●⊙	■●	■●	□●	□●	■●	▣●	■●⊙
P5	S	■●	□●	■●⊙	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	▣●	■●
	M	■●⊙	□●	■●⊙	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	▣●	■●
	L	■●⊙	□●	■●⊙	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●
P6	S	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	▣●	▣●	■●	■●	■●⊙
	M	■●⊙	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●⊙
	L	■●⊙	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●⊙

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P7	S	■●	■●	■●	■●	■●	■●	■●	▣●	■●	■●	■●	■●	■●	■●
	M	■●	■●	■●	■●	■●	■●	■●	▣●	■●	■●	■●	■●	■●	■●
	L	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●⊙
P8	S	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	▣●	■●	■●
	M	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●⊙
	L	■●	■●	■●⊙	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●	■●⊙

1. Importance High ↔ Low ■ ▣ □

2. Tech Acquisition Strategy ● Licence ⊙ R&D ◎ International Collaboration ○ Outsourcing

3. Timeframe: S = Short term (2022-2024) M = Medium term (2025-2027) L = Long term (2028-2030)

Annex 4: Description of key technologies

Online booking platform: An online booking platform assist tourists and visitors to book and pay for tourism products or services online. Although online booking platforms are commonly used for making a reservation for accommodation (Chaw & Tang, 2019), the platforms have also played crucial roles in other sectors such as transportation, attraction, and entertainment. For example, integrated with chatbots technology, online booking platforms have become more convenient for visitors to do shopping online for hotels, airlines, and restaurants (Dube, Nhamo, & Swart, 2023).

Social media: Social media is a user-generated content Web 2.0 Internet-based application that allows individuals and a group of people to create profiles and keep connections with other people or groups (Obar & Wildman, 2017). In the tourism sector, social media has gained more and more popularity and played important roles in providing and sharing information about tourism products and services and become one of the key drivers for purchasing decision-making and marketing strategies (Zeng & Gerritsen, 2014).

Web/Mobile App: According to Tuama (2023), "a web application is a program stored on a remote server and delivered to the user via a browser while a mobile application is a software application designed to deliver services run on mobile." Web Applications and Mobile Applications have provided substantial opportunities for tourism enterprises and destination marketers to promote, interact, and sell their products and services and at the same time empower tourists and visitors to create their personal experience through instant access to necessary information at any time and places (Albattat, 2022).

Portable Device: Portable devices are smart devices which include wearable and portable devices such as a smartwatch, smart glasses smartphones, and other emerging smart devices. These devices have played important roles in improving visitors' experiences by providing information about tourism facilities and facilitating transactions such as self-check-in kiosks at hotels, self-service ticket machines, flight check-in machines at the airport, and access to information at the destination (Pai, Liu, Kang, & Dai, 2020).

Image recognition technology: Image Recognition technology refers to software able to identify and detect objects or people in a digital feature (Hamann, et al., 2015). Some examples of the application of image recognition technology in tourism include performing the tasks of a doorbell, recognizing the individual tourist, opening doors automatically if use as a smart room key, and recognizing the face at multimedia exhibitions. Additionally, image recognition technology also improves social inclusiveness and security, and provides access to other technology platforms that are important in the tourism industry.

Internet: According to GCFGlobal (2023). "the Internet is a global network of billions of computers and other electronic devices". Standin, Tang-Taye, and Boyer (2014) provided some examples of the important roles of the Internet which include having access to almost any information, communicating with anyone around the world, and doing much more. The roles of the internet in the tourism industry can be categorised into seven main areas: tourism sector studies, e-business, information search, online purchasing, marketing, website analysis, and e-research methods (Standing, Tang-Taye, & Boyer, 2014).

IoT: Car, Stifanich and Šimunić (2019) define the "Internet of Things as anything that will able to communicate to the Internet at any time from any place to provide any service by any network to anyone" (p.165). Some examples of the application of IoTs in tourism include enhancing the visitor experience through smart homes and smart vehicles, notifying about services and products, energy saving, security and safety, automation, communication and entertainment. Particularly in the hotel industry, IoTs can be used for application-driven devices and automated triggers such as light switches, automated door locks, voice-based interaction, telephones, set-top-boxes, thermostats and other devices connected on a common network that customers want.

Cloud computing: According to Nadda and Arnott (2020) Cloud Computing is "a model for enabling, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction". With Cloud Computing technology, businesses in the tourism industry can improve effectiveness in tourism resources management throughout the tourism destination which can be called a smart tourism destination. Additionally, Cloud Computing technology also provides opportunities for tourism organizations to store large amounts of data and enables tourism business operators to effectively interact with their customers.

Smart label technology: Kröner and Haupert (2015) define a **smart label** as "a small transponder (generally a radio-frequency identification tag) consisting of a processing chip and an antenna included in a regular print-coded **label"**. One example of smart labels using widely in the tourism industry is a QR *(Quick Response)* Code (Katlav, 2020). According to Katlav (2020), QR Code has been used in different organisations throughout the tourism industry including providing information about the destination, digital business card, paying transaction, access to interactive games, digital menu, booking and reservation, receiving customers' complaint, and much more.

AR/VR: Chang and Chiang (2022) define Augmented Reality (AR), Virtual Reality (VR), and sometimes Mixed Reality (MR) as part of immersive technology. The role of AR/VR in the tourism industry is to improve the visitor experience throughout their holiday from the start to the end of the trip (Fan, Jiang, & Deng, 2022). These immersive technologies have been used in the tourism industry ranging from providing alternative travel to a real destination or tourism business location in a form of a virtual tour, enhancing the visitor experience through virtually interact with tourism products/services, facilitating the tourism destination navigation (such as google map 360) as a marketing tool to increase visitor's intention to visit and revisit to destination areas through environmental stimulation and a high-quality virtual experience (Huang, Backman, Backman, & Chang, 2015).

Navigating Technology: National Geographic (2023) defines a "geographic information system (GIS) as a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface". With GIS technology the tourism industry can develop a modern map that facilitates the tourist's navigation to and within the destinations areas (Jovanovic & Njegus, 2008).

AI: "Initially introduced as a branch of "computer science," artificial intelligence (AI) was frequently described as the mechanisation of an intelligent mindset" (McCarthy, 2007). Some examples of the roles of AI in the tourism industry include facilitating tourists' decision-making about choices of destinations, accommodations, and recreational activities, and improving tourist satisfaction through providing smart experiences (Bulchand-Gidumal, 2022).

Big Data: "Big data" refers to the large, diverse, structured and unstructured datasets of information that organizations, people, and machines (sensors) constantly generate and transmit at ever-increasing rates (ADB &UNWTO, 2021). Big data has played significant roles in the tourism industry such as improving the effectiveness of the governance of tourism destinations through providing sources of data for research, innovation and management of tourism destinations and enterprises. For example, with big data destination management organisations and enterprises can improve their operations and sustainability.

Touchscreen technology: Touchscreen technology has been used widely in tourism and hospitality "Touch screen is the input/output device that accept the input directly from monitor, user used words, geographical graphical icons, or symbols, or display on the screen to achieve comment" (Krithikaa, 2016, p. 74). Touchscreen technology is not limited to smart mobile phones or tablets. This technology has been increasingly used as a source of information for customers or visitors in the tourism industry, such as hotels, airports, transportation, and tourist attractions (Akdu & Akdu, 2022). Self-service Kiosks are one example. Visitors to an attraction, such as a museum, experience artefact production process virtually through the touchscreen. Table games have gained popularity among attractions such as museums; for example, the SOSORO Museum in Phnom Penh provides table touchscreen games for visitors to understand the currencies more interactively and information about the currency and history of the Cambodian economy (SOSORO MUSEUM, 2023). The touchscreen kiosk provides information about the tourist facilities and attractions around the destination (Kervankıran & Çuhadar, 2014, as cited in Akdu & Akdu, 2022). Smart touchscreen at an airport provides information to travellers about the density of passengers at the gates, average waiting time, and flight gates by scanning the air tickets and showing how to navigate to the gate from their current location (Akdu & Akdu, 2022). In the hotel industry, touchscreen technology can enhance the visitor experience through integrated in-room facilities management systems on digital touchscreen tablets (Carter, 2019). Guests can order food, drinks, and other services in hotels and restaurants (Kim et al., 2012). Hospitality firms can sell their products and services on the screen of kiosks or in-room TV without expense to staff (Kim et al., 2012).