

## The Impact of COVID 19 on the Tourism Industry: The Role of Fourth Industrial Revolution Technologies in Mitigating the Impacts

Rosemary Matikiti-Manyevere

*Department of Tourism and Event Management, Central University of Technology, Email, [matikiti@gmail.com](mailto:matikiti@gmail.com)*

Patient Rambe

*Department of Business Support Studies, Faculty of Management Sciences, Central University of Technology, Email, [prambe@cut.ac.za](mailto:prambe@cut.ac.za)*

*\*Corresponding Author*

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### Abstract

The tourism industry has suffered because of countries' strict measures to combat the spread of COVID-19. The goal of this research was to uncover the effects of the coronavirus disease and develop solutions to keep the tourism industry afloat in the aftermath. Through a thorough review of the literature, the objectives of this study were to identify the key impacts of the COVID-19 pandemic on the tourism industry and to determine the role that Fourth Industrial Revolution technology can play in reviving the business sector. The study used the desktop research technique, consulting published articles and reports. International tourist arrivals have decreased, key tourism events have been cancelled, hotel occupancy declined, and poaching has increased as a result of COVID-19. The findings of the study also indicate that the tourism industry might also benefit from virtual technologies, artificial intelligence, 5G technologies and robot automation technologies. These technologies could be used to sustain the industry in times of crisis.

**Keywords:** COVID-19; tourism industry; fourth industrial revolution; pandemics

### Introduction

The COVID-19 pandemic has greatly revolutionised the manner in which human beings interact. Because of the radical coronavirus disease, relationships among human beings shifted substantially (Adebayo et al., 2020). Most sectors of the financial system worldwide were critically affected. To reduce the impact and to curtail the spread of the virus, new travel regulations were applied, primarily based on the severity of the cases in each country. There has been little evidence that limiting of travel minimises the spread of infectious illnesses and manages transmission rates in communities (Kallbekken & Saelen, 2021; Ioannides & Gyimothy, 2020). Research has proven that human mobility and interactions are critical to the spread of infectious sicknesses in the course of pandemics (Rizzo., 2014; Yan., 2018). As a result, several precautionary measures have been taken to prevent the spread of COVID-19 and to “flatten the curve”; these measures were non-pharmaceutical as no vaccine was available at the time (Woyo & Nyamandi, 2021). Measures such as closing of borders, closure of eating places, banning of social gatherings, journey bans, and social distancing (Rogerson & Rogerson, 2020) precipitated the tourism industry globally to sustain good sized harm that will take a great deal of time to recover from. The tourism industry, which is a life blood of many economies and is regarded as the driver of economic growth of many nations (Centeno & Marquez, 2020), was devastated by the COVID-19. When travel is restricted, tourism ceases

to exist and there are no profits for commercial tourism enterprises, tourism associated organisations and other groups that rely on tourism (Musavengane et al., 2022).

Since the emergence of COVID-19, researchers have been conducting studies to examine its effects on the tourism industry. Notable among these studies are the works of Dinarto et al. (2020) who studied the impact of the virus on Brintan's tourism industry, and Centeno and Marquez (2020) who focused on how the Philippines tourism industry was affected by COVID-19, Correa-Martínez et al. (2020) who examined the spread of the virus in a ski area in Austria. In addition, some studies concentrated on the impact of the virus on the global tourism industry. For instance, Ugur and Akbiyik (2020) examined the impacts of the virus on the global tourism industry using a cross-regional analysis method, whereas Gössling et al. (2020) looked at the impact of global travel limitations and stay-at-home behaviour on tourism and forecasted global change. Musavengane et al. (2022) also examined the challenges around the COVID-19 pandemic in the Southern Africa region.

While previous studies focused on the impacts of COVID-19 on the tourism industry, little has been done thus far to look beyond these impacts especially since it is a new pandemic. While this study recognizes the relevance of past research, it is critical that more research be conducted on how to mitigate these impacts, as well as how to sustain or keep the sector afloat in the future should comparable pandemics occur. Given the human nature of the tourism sector, and the emergency of social distancing as a “new norm”, it becomes relevant to examine implications for the future of the tourism industry. Previous research recommended that the tourism industry should be better prepared for future pandemics (Lo et al., 2006; Wilder-Smith, 2006). The effects of COVID-19, according to some academics, necessitate fresh research studies centred entirely on e-tourism (Abbas et al., 2021). Thus, it was deemed necessary to conduct a study on how newly developed technologies can assist the tourism industry in crises times.

Against this background, the purpose of this study was to identify the major impacts of COVID-19 on the tourism industry and to explore how 4IR technologies can be used to alleviate the impacts of COVID-19 and sustain the tourism industry. In the wake of the epidemic, there are early indications that 4IR technologies have been widely deployed to address several important daily living and travel concerns. Thus, in building resilience in tourism, technologies have become a major factor (Hall et al., 2017). The reality of the new norm of social distancing and constrained human contact give the context of the questions of this study, which are:

- What are the impacts of COVID-19 on the tourism industry?
- What role can 4IR technologies play in the COVID era and post-COVID-19 tourism in Africa
- What recommendations can be put forward to the tourism industry and tourism stakeholders

In the next sections the article reviews literature on the impacts of previous pandemics on the tourism industry, the impact of the novel coronavirus on the global tourism industry the impact of the pandemic on the African tourism industry. Proposed 4IR technologies that can be adopted by the tourism industry to alleviate the impacts of COVID-19 are also discussed.

### **Epidemic outbreak episodes and the tourism industry**

Pandemics have the potential to cause significant economic and human losses (Ozbay et al., 2021). According to Yaganeh (2019), even economies that are not touched by pandemics suffer as a result of the dread and uncertainty caused by the epidemic. Because travel limitations enforced by governments induce a drop in both domestic and international travel, the tourism industry is particularly affected by pandemics and epidemics. Furthermore, owing to human

interaction with soils, animals, and plant life, pandemics and epidemics are sometimes unavoidable (Nikiforuk, 2018). Some microorganisms from the soil, plants, and animals may be transferred to humans as a result of this interaction. According to Nikiforuk (2018), this transfer has caused some of the largest epidemics in history.

### ***The severe acute respiratory syndrome***

As an unusual pneumonia, the Severe Acute Respiratory Syndrome (SARS) broke out in Guangdong province in southern China (Breda, 2004). The World Health Organization (WHO) designated Hong Kong and Guangzhou as high-risk tourist destinations on April 2, 2003. International tourists were advised not to visit China, and Chinese tourists were barred from travelling to other countries (Zeng et al., 2005). Far beyond the SARS-affected countries, the warnings had a significant impact on the travel sector. Several sporting events were cancelled, including the Women's Ice Hockey World Championship and the Cathay Pacific Squash Open (Breda, 2004). Following the outbreak of SARS, international arrivals dropped by 1.2 per cent globally, with a decline of 12 million arrivals to Asian and Pacific countries (Wilder-Smith, 2006) and a loss of \$20 billion. SARS claimed the lives of 774 people in 26 nations, as the epidemic spread across five continents (Hung et al., 2018; Skare et al., 2021). To minimise further impacts, Hong Kong's health officials set recommendations for hotels shortly after the outbreak. The guidance detailed how to put control measures in place, including maintaining stringent hygiene on hotel grounds (Skare et al., 2021).

### ***H1N1 virus influenza (Swine flu)***

The H1N1 influenza virus is spread when people come into physical contact with an infected person (Haque & Haque, 2018). The virus was detected first in the United States of America in April 2009 (Centres for Disease Control & Prevention, 2009), but the first case was traced back to March 17, 2009 (Rassy & Smith, 2013). The virus had a considerable impact on the majority of countries in North and South America. Approximately, 18 500 people died because of the virus and 622 482 cases were reported. However, the figures were regarded to be underestimates because accurate figures particularly from developing countries, were difficult to get (WHO, 2009). In several countries, the virus had an influence on travel and on the tourism industry. The swine flu had the greatest impact on Mexico's travel and tourism business, since restaurants were told to only offer take-out, entertainment venues were closed, and public transportation was briefly shut down during the pandemic (MICE report, 2009). Bookings for airlines and hotels fell in Japan and Hong Kong as well (MICE report 2009). Travel plans to Mexico were cancelled, and a large number of airline customers were stranded (Rassy & Smith, 2013). During the epidemic, one million international visitors were lost, resulting in a loss of US\$2.8 billion. To stop the virus from spreading, neighbouring countries like Thailand and Canada imposed travel restrictions and issued travel warnings to their nationals (Rassy & Smith, 2013).

### ***The middle east respiratory syndrome (MERS)***

MERS is a coronavirus-related respiratory illness (Heeso et al., 2019). MERS was originally detected in June 2012 in Saudi Arabia, and the virus has now spread to 27 countries, resulting in 2260 cases and 803 deaths. The virus had an impact on the United States of America, Europe, Asia, and the Middle East (WHO, 2018). In May 2015, a case was reported in the Republic of Korea, with the virus eventually resulting in 38 deaths and 186 hospitalisations. To stop the virus from spreading, 16 000 persons were quarantined because of the risk of infection (Centres for Disease Control & Prevention, 2018). The virus had the greatest impact in the Republic of Korea, where it is estimated that the MERS outbreak affected approximately half of the

country's 332 travel agents, resulting in 1.53 million fewer tourists than during the same period the year before (Korea Culture & Tourism Institute, 2015). Some countries near Korea issued travel warnings, resulting in a drop in international travellers between October and December 2015, with an estimated loss of US\$2.6 billion in tourism earnings (Korean Ministry of Foreign Affairs, 2015). Despite the fact that the virus was declared eradicated in December 2015, the depressed Korean tourism industry took a long time to recover (Choe et al., 2021).

### ***Ebola virus disease (EVD)***

The Ebola pandemic was first reported in Guinea in March 2014, and it was most felt primarily in the west African countries of Sierra Leone, Guinea, and Liberia, where it claimed 11 325 lives. Nigeria, Mali, and the United States saw fewer casualties (Centers for Disease Control and Prevention, 2014). Ebola is a virus that causes severe bleeding, organ failure, and death. It is spread by direct contact with infected blood, tissues, or body fluids from infected individuals (European Centre for Disease Prevention & Control, 2020). It is considered one of the most dangerous viruses because it kills within one week of infection (Kongoley, 2015). The tourism industry in Sierra Leone was hit hard a week after the virus was announced, with aircraft cancellations, hotel booking cancellations, and several hotel closures (Kongoley, 2015). Furthermore, in an effort to confine the virus, most nations neighbouring Sierra Leone closed their borders, while others restricted air and sea travel (Reuters, 2014). Sierra Leone, as one of the worst-affected countries, lost 101 000 international tourists during that time, and tourist expenditure fell by 35%, while hotel occupancy in Guinea fell by 35% (WTTC, 2018). The impact was also felt by other Western Africa countries as people were afraid of travelling anywhere in the continent (Reuters, 2014). As a result, international tourist arrivals across West Africa dropped.

While past pandemics had an influence on the travel and tourism business, they were not as severe as the COVID-19 pandemic. The majority of pandemics were limited to certain regions or countries and had no long-term impact on global tourism. By contrast, many countries have felt the effects of COVID-19 and continue to do so. COVID-19 has had a more catastrophic economic impact than any prior epidemic in modern history (Hall et al., 2020). This prompts a brief discussion about the impact of COVID-19 on the tourism sector in general, and on the African tourism industry in particular. Only a few African countries rich in tourism are used for reference purposes.

### **COVID-19 and the global tourism industry**

The COVID-19 pandemic, which started in Wuhan, China, has spread to practically every continent in the world (Karabulut et al., 2020). The virus was initially reported to the WHO offices in China on December 31, 2019, and fourteen people had been admitted to Chinese hospitals because of coronavirus infections by early January 2020 (Huang, 2020). Despite the fact that the virus was contained in Wuhan, by mid-March, the virus had been detected in 146 nations as a result of worldwide air travel (Hall et al., 2020). Local transmissions boosted the number of illnesses, and by April 15, 2020, the world had recorded nearly two million cases, with over 125 000 deaths (ECDC, 2020). COVID-19 had infected over sixty million people by November 2020, and over one million people have died as a result of the unique coronavirus disease. There were 420,279,158 verified COVID-19 cases by February 2022, with 5,881,465 confirmed deaths (WHO, 2022). The United States led the way, followed by Europe, with the Western Pacific reporting the fewest incidents (WHO, 2021). Many countries reacted by imposing travel restrictions. According to the World Tourism Organization (2020), during the second quarter of 2020, 100% of worldwide destinations-imposed travel restrictions, and international tourism was nearly completely halted. The world's economy nearly shut down

overnight as a result of the COVID-19 pandemic, posing enormous problems to the tourism and hospitality industries (Dube et al., 2020). The onset of the COVID-19 pandemic, according to Jelilov, Iorember, Usman, Paul and Yua (2020), interrupted global economic activity and greatly slowed tourism development internationally.

### ***COVID-19 and the African tourism industry***

Tourism is the Africa's second-fastest-growing economic sector (Palop et al., 2020). According to the African Travel and Tourism Association (2019), tourism is one of Africa's most important businesses, accounting for 8.55 percent of the continent's GDP in 2018. The African tourism industry grew at the fastest rate in the world in the decade leading up to 2020 (Adam, 2021; Stats, SA 2020). The tourism industry, however, was not spared when the new coronavirus spread to Africa in early 2020. On 17 March, 2020 the first case in Africa was reported. By July 2020, the continent had recorded 18 177 deaths, with the worst outbreaks occurring in South Africa, Egypt, Nigeria, and Ghana (Rogerson & Baum, 2020). Africa's most prominent tourism attractions were shut down as early as April, and safari lodge occupancy in some Eastern and Southern African countries sank to zero (Nkengasong & Mankoula, 2020). Several countries in Southern Africa, including Botswana and South Africa, and some in North Africa as well as islands like Seychelles and Mauritius, took swift and strong measures to stop the virus from spreading (Rogerson & Baum, 2020). The tourism industry in the continent thus came to a complete halt as a result of these measures.

### ***Forth industrial revolution and the tourism industry***

Industry 4.0 is the Fourth Industrial Revolution (4IR), which consists of improved production and information technologies to meet the tailored requirements of many human domains in less time (Javaid et al., 2020). Wireless communication is provided by these technologies in the manufacturing and service sectors to improve automation. The 4IR is defined by technical developments in artificial intelligence, automation, and robots, as well as mobile device connectivity and data and information access (Fwaya, 2018). According to Schwab (2016), the fourth industrial revolution presents new opportunities and dangers for all sectors of the economy, and it is a technological revolution that will radically alter the way we live, work, and interact. To be competitive in the commercial world, governments and many economic sectors must embrace the use of these rapidly emerging technologies (Manda & Dhou, 2019).

### **Methodology**

The study was based mainly on literature review approach, including conceptual analysis of secondary data sources comprising of peer-reviewed journals, reports together with document analysis. These constituted the sample for this study. Recently published journal articles on COVID-19, reports, and policy from national and international organisations such as WHO, the National Institute for Communicable diseases were consulted and assisted in the compilation of this study. Using the key phrases 'COVID-19 pandemic, impacts, and 4IR,' a review methodology was developed as a guide for the literature search (Pickering & Byrne, 2014). A literature search was then undertaken using these search phrases in the most popular journal databases of scientific papers connected to tourism. Emerald Insight, Science Direct (Elsevier), EBSCO Host (Hospitality and Tourism Complete), Scopus, Web of Science, ProQuest, and Sage publications were the databases used. The study's keywords influenced the criteria for inclusion in the preliminary summative analysis, as indicated by Hsieh and Shannon (2005). The search results were then retrieved, analyzed, and cleaned to ensure that their scope and emphasis matched the study's objectives and that duplicate entries were removed. The authors recorded all necessary information in appropriate categories for each text and web

content analyzed in order to find patterns and draw conclusions relevant to our study. The study also benefited from peer reviewed journals on 4IR and the tourism. A literature review approach can address research concerns with a power that no one study has by combining findings and viewpoints from multiple empirical studies (Snyder, 2019). Moreover, the aim of this study was to identify the impacts of COVID-19, that have already experienced since the emergence of the virus as well as to establish 4IR technologies that have been successfully adopted by tourism business which are essential in this crisis era. Being the case, it was deemed necessary to conduct a literature review to establish what has been documented regarding the impacts of COVID-19. To achieve this, literature that was outside the cover period (2020-2022) was also excluded. To identify 4IR technologies that can be used to mitigate the impacts of COVID-19 pandemic, literature that was outside the cover period (2016-2022) was also excluded. Due to the limited nature of data and the fact that COVID-19 and 4IR are ongoing happenings, the conceptual nature of the paper provides a special limitation (Mhlanga & Moloi, 2020). Thus, journal articles, reports and newspaper articles on COVID-19 and the tourism industry as well on the impacts of previous pandemics on the tourism industry were consulted and this contributed to shaping the direction of this study.

## **Secondary findings**

### ***Major impacts of COVID-19 on the tourism industry***

COVID-19 has had and continues to have an influence on many countries, with the tourism industry being one of the hardest damaged. Since the emergence of the lethal COVID-19 virus, a slew of changes has occurred to slow the virus's spread, all of which have had a severe influence on the tourism business. Some of the significant impacts are explained in the following subsections.

#### *Imposition of travel restrictions*

Many nations as way of curbing the spread of the virus responded through imposing travel restrictions and this severely impacted the tourism industry since when there is travelling tourism ceases to exist. According to the World Tourism Organization (WTO, 2020), during the second quarter of 2020, 100% of worldwide destinations-imposed travel restrictions, and international tourism was nearly completely halted. Governments established travel restrictions and forced people to stay at home (Chirisa et al., 2020; Swart & Maralack, 2020). The tourism industry is prone to measures put in place to counteract pandemics because of restricted movements and social distancing (Hall et al., 2020). As a result, the tourism industry was left in a devastating state as when travel is restricted tourism ceases to exist.

#### *Cancellation of flights and hotel bookings*

Due to the imposition of travel restrictions, many flights and hotel bookings were cancelled, and this greatly affected the airline industry as well as the accommodations sectors (IATA, 2020; Schiopu et al., 2021; Hao et al., 2020). The virus wreaked havoc on the African continent's main markets, with average hotel occupancy in Kenya and South Africa reaching 24 and 20 percent, respectively, by late 2020, and a substantial number of small hotels across the continent failing to withstand the storm (Adams, 2021). In the United State of America, the hospitality industry was also affected as most hotel rooms across the country were empty as of June 2020 (Davahli et al., 2020). As a result of lock down measure, Likewise, China's 7th largest hotel group, the Sunmei Group, closed 2,544 hotels, on the back of an average OCC of only 23.7% during February and a revenue loss surpassing 700 million Yuan during January and February (approximately US\$98.64 million) (Ma, 2020b).

### *Cancellation of major events*

COVID-19 has had a significant impact on all sectors of the international sport industry, including sport tourism (Parnell et al., 2020; Ratten, 2020). All events that were deemed “super spreader” events were cancelled or postponed (Woyo & Nyamandi, 2021). There has been a global sport shutdown due to massive crowds linked with major sporting events (Evans et al., 2020). Some of the cancelled events include the Comrade Marathon in South Africa, Olympics in Japan, and ICC Men’s T20 world cups were postponed by a year (Woyo & Nyamandi, 2021). The EURO 2020 men’s international tournament located across 12 European cities; and the 2020 Summer Olympic Games where, 206 nations potentially gather in Tokyo, Japan were also cancelled (Parnell et al., 2020). The Two Oceans Marathon (TOM) hosted annually in Cape Town over the Easter weekend was cancelled due to this novel corona virus (Swart & Maralack, 2020). The budgets that were drafted for such events were also affected and stakeholders and some other organisation involved in the planning of such events made some significant losses.

### *A decline in international tourist arrivals*

According to the World Tourism Barometer, global actions to prevent the spread of the virus had a significant impact on foreign tourist arrivals (UNWTO, 2020). Governments established travel restrictions and forced people to stay at home. According to the UNWTO (2020) report, international tourist arrivals (overnight visitors) decreased by 72 percent from January to October 2020 compared to the same period the previous year. In comparison to the same period in 2019, this translates to 900 million fewer international tourists. According to the airline industry (IATA, 2020), as of April 2020, there has been an 80% reduction in flights compared to the previous year. It was also reported that the number of passengers may not recover to the levels seen in 2019 until 2023-2024 (Abbas et al., 2021). This alone translates to a huge revenue loss to the tourism industry (Abbas et al., 2021). Table 1 below shows how each region was affected in terms of international tourist arrivals.

Table 1: Decrease in international tourists (January - October 2020)

Region	% Decrease
Asia & Pacific	82%
Middle East	75%
Africa	69%
Europe & Americas	68%

Source: UNWTO (2020)

According to the United Nations World Tourism Organization (UNWTO), by 2020, this decline will amount to 1 billion arrivals and US\$1.1 trillion in international visitor earnings, with a return to 2019 levels of foreign arrivals taking 2.5 to 4 years. These statistics were retrieved by the time of this writing. Statistics in Table 1 above shows that COVID-19 pandemic affected all the regions, and all effort should focus on how the tourism industry can be resuscitated.

### *Wildlife threat*

Due to lockdown measures, wildlife patrollers could not provide protection services to the wildlife in national parks or game reserves as people were forced to work from home to reduce the spread of the virus (Dube, 2021). Due to the absence of protection services, wildlife poachers could freely roam around killing some of the most precious wildlife, destroying the future tourism (Washington, 2020; Dube, 2021). Several incidences were reported in Botswana and South Africa. An increase in poaching activities was also observed in India (Behera et al., 2022). Because of business closures, the lockdown has generated economic uncertainty in rural

areas, forcing residents to rely on poaching and fishing to survive (Badola, 2020). An abrupt halt in ecotourism, decreased management and law enforcement as a result of lockdown and movement restrictions, which reduced local revenue, enforcement staffing, and funds to enforce poaching regulations, all had an impact on wildlife management (Spenceley et al., 2021; Waithaka et al., 2021). The economic impact of COVID-19 on the private wildlife industry in South Africa was also highlighted by van Der Merwe, Saayman and Jacobs (2021). Their study revealed that the estimated financial impact of COVID-19 on the private wildlife industry is R6.694 billion (ZAR). Furthermore, decreased income collection could have a negative impact on conservation efforts and various national park programs.

#### *Loss of revenue*

Due to the induced lockdown measures and travel restrictions, the tourism industry was hit hard in 2020, with emergency measures adopted by many governments massively disrupting international travel. At the time of this writing, it was estimated that the United States recorded a tourism revenue loss of roughly 147 billion U.S. dollars between January and October 2020. Meanwhile, Spain reported the second-highest drop in tourism revenue, losing about 46.7 billion U.S. dollars over the period considered (Statista Research Department, 2022). African countries had lost approximately \$55 billion in travel and tourism revenues during the months April of to June 2020 (Euronews, 2020).

#### ***4IR technologies that can be used in tourism during the pandemic and after the pandemic***

The emergence of technologically adept businesses that rely on technical infrastructure for the majority of their operations has marked the twenty-first century (Chin, 2019). One of the industries that has embraced these business tools is the tourist industry. Throughout the history of hotel technology, there have been numerous important and major advancements in hospitality and tourism, today we have hotels that can offer hotels keys in Apple wallet (Intelity, 2022). In the tourism business, technology has been used for a variety of objectives, and the acceptance of these technologies is expanding with each passing day. Because the world has been struck by the new coronavirus, 4IR technologies can be used to mitigate the virus' influence on the tourism industry's performance. During this period of "stay at home, social distancing," several 4IR technologies can be utilised to substitute physical tourism. Some of the technologies are presented in the following sections.

#### *Virtual realities technologies (3D/4D technologies)*

Virtual realities in tourism make use of 3 Dimensional technologies, which combine visual, kinetic, and audio elements to enable users to view a real object from the user's perspective (Berg & Vance, 2017). It reduces the incidences of movement and allows consumers to experience tourist attractions without physically visiting them (Correia et al., 2020; Akhtar et al., 2021). Virtual technologies can be used in sport tourism. For instance, when the Comrade Marathon in South Africa was cancelled owing to COVID-19, runners were asked to participate in a virtual run on 14 June 2020. Although the runners were not very content, they appreciated that the event was not officially cancelled (Woyo & Nyamandi, 2020). Thus, virtual technologies can be successfully adopted in sport tourism. This was successfully used in South Africa implying that some African countries can also follow suit.

Virtual tour is another way to get safari organisations in business during trying times like this. For example, Beyond Virtual tour company offers facilities that allow guides to chat with guests while on virtual live safari rides (Washington, 2020). When faced with catastrophic pandemics such as the new corona virus, safari companies should organize virtual tours where travelers can pay to see wildlife as well as beautiful sceneries.

Virtual tours in the form of the 3D models can also be used to sustain religious tourism. An example is the case of Romania where iPanorama 360 degrees was used to integrate the panoramas into virtual tours to provide an opportunity for tourists to visit and admire the monuments (Wooden churches) remotely. A website was then created for visitors to navigate through and zoom in on the monuments to see sections of the monuments, and a facility was also created for visitors to interact with the host. The exact location of each wooden church was inserted through plug-in from Google maps (Caciora et al., 2021). Even religious tourism in Africa can benefit from 3D technologies; for example, virtual tours can be utilized to explore Moria, Zion Christian Church in South Africa's Limpopo province. Many African countries could employ virtual reality as a strategy to stabilize and maintain tourism-related economic flows in times of crisis (Chirisa et al., 2020). There is a virtual tourist package available in Zimbabwe for the Expo 2020 Zimbabwe Pavilion in Dubai. The presenter creates a virtual guided video that can be viewed online (Chirisa et al. 2020). As a result, Virtual Reality in a setting that restricts direct contact with people and objects allows travelers to experience their desired destination from the comfort of their own homes (Jenny, 2017). This can also be adopted by other tourism business or safaris companies in the African continent.

#### *Robot automation technologies*

Robots can be used in the hotel industry for room service and housekeeping deliveries, they can be used as waiters. During the outbreak of the virus (COVID-19) several hotels in China, Gangzhou robots have been used as waiters, they have been used to dispense facemasks and hand sanitisers. They are basically used in the frontline to protect guests and employees and to prevent the spread of COVID-19 (Lau, 2020). The use of robots also helps to maintain social distance (Assaf & Scuderi, 2020). The Henn na hotel in Tokyo has successfully replaced the frontline staff with robots (Yallop, & Seraphin, 2020). Hotel Sky in South Africa is the first African hotel to deploy robot staff members (Pillay, 2021). This does not only assist in reducing costs especially this time where hotels are getting very little revenue, but this can also assist in preventing the spread of COVID-19 to the frontline staff. Robots are ideal especially where most people are required to work from home. Thus, as a way of reducing costs even in the post COVID-19 era.

#### *5G & artificial intelligence (AI)*

It can be used in the hotel industry as it enables swift check-in and payment through facial recognition and non-contact body temperature measurement. This system has been successfully used by hotels in China during the pandemic to reduce the risk of infection and to improve traffic efficiency. It reduces congestion of hotel employees and guests (Lau, 2020). Singapore resorted to AI-enabled digital concierge (Vouch sells) which is designed to answer guest queries, make bookings, and take room services. This has been adopted by hotels in Singapore such as Adziz. It has the capacity to conduct health declarations, facilitate contact less ordering of service and manage crowd control (Chandram, 2020). Though, this has been implemented in Hotels outside the African continent, AI technologies can also be adopted by chain hotels in Africa to manage crowd control.

### **Recommendations**

The technologies suggested above are not a permanent solution to the tourism industry; they can only help keep the industry afloat during COVID-19 and when future or similar pandemics are experienced. In as much as technologies such as virtual reality cannot totally replace physical experience, they can be used as a 'stepping stone' in times of crisis. In essence, these are only alternatives to keep the hospitality and tourism industry. A list of technologies that

can be used to assist the tourism industry have been identified from the literature. However, there is need for businesses in the tourism industry to reinvent their business structure and narrow down some of their product offerings to focus on those that can be provided virtually, or through online technologies. Tourism businesses must adapt to the new business structure by embracing a variety of new technology and business strategies. As a result, they must seize this opportunity to become more technologically advanced. This also calls for the intervention of governments and other stakeholders to financially support the tourism industry to adopt these 4IR technologies, especially in the African continent where economies are poor, and most countries are still lagging in terms of technology adoption. This new era of digital transformation requires compatible technologies since the existing capabilities may not be able to handle them. Thus, governments must ensure that these compatible technologies are made available for tourism businesses. Based on a survey of the literature, it was revealed that by organizing virtual tours, safari organizations can keep the tourism business afloat even in difficult periods like the COVID-19 pandemic era. This can be utilized to generate cash for the industry, as well as aid in the preservation of national parks and protected places during times of crisis. Africa is rich in wildlife and 3D virtual technologies can assist immensely not only in sustaining the industry but can also serve as an effective marketing tool.

### **Conclusion and future research direction**

The novel coronavirus disease (COVID-19) has led to some devastating effects globally and the tourism industry was one of the hardest hit owing to travel restrictions imposed to curb the spread of the virus. Flights hotel bookings and some tourist major events were cancelled or postponed, and wildlife poaching also increased. This severely costed the tourism industry as no revenue was coming in. The future of the tourism industry in the face of COVID-19 is bleak; hence, strategies to sustain the tourism industry during these trying times and post the COVID-19 era are much needed. A review of literature revealed that 4IR technologies can play a pivotal role in keeping the tourism industry afloat. Virtual technologies can be used, especially when travel restrictions are imposed, as consumers can experience tourism destinations without visiting them. Robot automation technologies, Artificial Intelligence and 5G can be used in hotels. Thus, instead of completely shutting down the tourism industry when we experience severe pandemics such as the COVID-19, 4IR technologies can be adopted to sustain the tourism industry. This study was literature based, and it might thus have some limitations; future studies can adopt a case study methodology and investigate how these 4IR technologies are being used in specific tourism sectors. This will help uncover some of the challenges and benefits associated with using such technologies in the tourism industry.

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