Internet of Things in Tourism: Challenges and Opportunities in "The New Normal"

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Abstract: *One of the fastest-growing global industries which have been hugely affected amidst the Covid-19 pandemic is the tourism industry. Revenues generated from the tourism sector account for 10% of the world's GDP therefore, any adversity faced by the tourism sector has the potential to damage the global economy severely. Digitalization is the key that will play a major role in the revival of this industry. Internet of things (IoT) -The new paradigm has a huge effect on various sectors, like health, education, agriculture, finance, etc. In the past year, the physical world has become more restricted as everything has been shifted to a virtual platform and hence, the quantity of IoT devices is anticipated to increase to over eight billion by 2025 – and with new technologies finding their means into industrial operations, a "new normal" is emerging. To prepare for a digital "new normal", tourism corporations have been compelled to initiate a sturdy digital transformation as well. The new business atmosphere is going to be dominated by systems that enable multiple devices to connect over the internet and perform tasks simultaneously without a human interface. There are numerous advantages of integration of this new technology in any business model; however, one ought to be aware of bound challenges and risks, like confidentiality and protection. The goal of the paper is to debate how IoT can alter the means by which the tourism industry operates and to present the readers with a number of its best market practices, trends, and statistics.*

Keywords: Internet of Things (IoT), Covid-19 pandemic, tourism industry, technology, new normal

1. Introduction

Internet of Things is becoming popular and its use is growing at a very fast pace in the wake of the pandemic as everything has been shifted to a virtual platform. Due to its increasing trend and ability to detect potential disturbances in the various industries, it is believed to be a boon for the travel and hospitality sectors as well. This business is an intricate collaboration of many stakeholders and their subordinates cooperating to create the perfect experience for the tourist. This experience comprises of the local populace, tourist attractions, transportation facilities, accommodation and lodging, food and beverages, public places and services that are provided, etc. so on firmly epitomizing the local trade, craftsmanship, festivals, religion, and culture of the destination. As we all know, the tourist is the end consumer in this cycle looking for a good experience and with the use of this trending technology, we can provide travelers with a luxurious experience they expect while safeguarding their health in these trying times. Tourist Destination management firms are working continuously to refine or even change the image that people have in mind to maximize the tourist traffic. With the Internet of Things, Big Data, and blockchain advancements in the coming future, tourist destinations will turn into a closely observed space where the conduct of tourists, their shopping patterns, their visits to every attraction, time spend at certain places, and the financial benefits produced will be monitored so that these can be improved over time. These reports will prompt calculated decision-making, integration of technologies, and innovations required to manage these destinations which will boost the travel industry and, eventually, will have an impact on the country's GDP performance.

2. Research Problem

The tourism enterprise has been continuously witnessing changes and has been upgrading its way of processing data and providing the best experience for the tourists consequently. The Covid-19 pandemic which had confined everyone in their houses for almost a year had a major effect on the tourism industry. As the tourism industry consists of many stakeholders, it immensely affects the overall GDP of any country. UN Secretary-General Antonio Guterres has issued a recent report that builds on UNWTO (United Nations World Tourism Organization) evidence to measure the destructive effect of the coronavirus pandemic on global tourism. It warns that up to 120 million tourism occupations are at risk, with economic harm expected to reach $1 trillion in 2020. There was a time in the past that the internet impacted the tourism industry with multiple upgradations and currently, the internet of things is on its way yet again to influence the business vividly. The paper is crafted to discover the impacts of the internet of things on the tourism industry and proposes the model to integrate the business with such technologies which can keep track of the tourist's movement to analyze tourist's experiences fully.

3. Objectives of the study

The objectives of the research paper can be grouped under the following heads. Firstly, to gain familiarity with the new technology of the Internet of Things and to achieve new insights into it and solutions to problems that have been borne due to the Covid-19 pandemic. Secondly, to accurately portray the situation of the tourism industry in the wake of the pandemic. Thirdly, to observe the positive impacts that the internet of things can have on the tourism industry and how it can be used to bring back the industry to its core capability. Finally, consider all the challenges and opportunities this trending technology will bring along with it.

4. Research Methodology

The exploratory research on the positive effects of the internet of things on tourism amidst the Covid-19 pandemic, reported in this paper was purposely designed and articulated into four stages: the extent of the loss which the tourism industry has faced in the last year due to the

coronavirus pandemic and how we can improve its current situation, the development of the internet of things in the tourism industry and the numerous ways it can impact the means of transportation such as railway and the aviation sector; guidelines for integrating the IoT technology into a larger service network creating an extension of an existing platform for internet-based and mobile tourism services with the internet of things component. Finally, this trend-setting technology will serve as a thread to sew everything together using expertise and it will solve the problems of reliable data collection in the tourism industry.

The emergence of the Internet of Things

The Internet of Things is an upcoming technology that connects devices through an internet or cloud service by fitting the sensors into machines to assemble and circulate data and make the analysis of data collection easier, precise, and synchronized. The devices are not only communicating the numbers, figures, and statistics but also supporting customer service in consumer-focused companies, and overall analytics. This technology has already revolutionized many industries and now the customer experience in the tourism industry will also be enhanced through the integration of automation. Fast-paced advances within the field of the Internet of Things (IoT) are making it doable for the exploitation of responsive networks of sensors and actuators to facilitate new information services. In the 'New Normal', end-users of tourism information services will be able to reap benefits from the different modes for gaining information and satisfying their visiting goals: both through online services such as mobile information guides as well as through the interaction with physical objects such as smart cards that activate services and digitally augmented places through public displays activated by presence. However, in the domain of tourism, all these different forms of interaction have hardly been integrated yet. If we want to revive the tourism industry we must integrate this technology into a universal system that offers a flawless and personalized user experience across several features of tourism products and services. For this to happen, there is a need for a system infrastructure that consists of the reasoning of users' requests and actions monitored by diverse applications, sensors, and other such devices. In such an infrastructure, tourists would be able to effortlessly search for information about specific points that appeal to them and search for local purchase opportunities through their devices. Moreover, they would be recommended about the presence of nearby interesting places and other related opportunities on their smartphones or public displays that will be completely available to all. To sum up the understanding with the definition quoted by ITU International Telecommunication Union in their Recommendation in the framework and functional architecture "The IoT can be viewed as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies (ICT)."

Current situation of the Tourism Industry

Tourism and hospitality businesses have been deeply affected by COVID-19 that has been declared a pandemic on 12th March 2020 (WHO, 2020). Due to the COVID-19 pandemic restrictions, the travel and tourism industry's employment loss is anticipated to be 100.08 Million worldwide (Statista, 2020). Due to COVID-19, tourism is such a highly affected sector and may remain affected in the long term, i.e. approximately more than 1.5 years. It had been reported that tourism growth has outperformed the world GDP growth record from the past consecutively from the year 2011–2017 (WTTC, 2018). In many countries, tourism is one of the major sources of revenue collection and employment. It is a generator for employment, income, tax collections, and foreign exchange earnings. As the number of infected cases rising throughout the nation, and with the execution of firm measures and campaigns like social distancing, community lockdowns, work from home, self- or mandatory quarantine, etc., pressure had been created for halting the tourism industry (Gretzel et al., 2020; Sigala, 2020). Furthermore, it has been estimated that there is a drop of international tourists of about 78%, causing a loss in export revenue of US$ 1.2 trillion and representing the largest decline in the tourism job cuts, which is about seven times the impact of the 9/11 incident (UNWTO, 2020). Additionally, the drop in the tourists' demand has led to severe financial problems. Hence, in this scenario, it is necessary to measure the losses due to the pandemic so that policies can be redesigned to manage tourism activities. The travel industry, which includes airlines, hotels, and restaurants, has shrunk by 50% in 2020, which would mean a critical loss of jobs and revenue. According to the International Air Transport Association (IATA), Airlines worldwide are expected to lose a record of $84 billion in 2020, more than three times the loss made during the Global Financial Crisis (The World Economic Forum, 2020). Most of the airlines are undergrounded. Hotels are being closed due to fewer tourists and many five-star hotels turning into quarantine facilities. Most restaurants have seen operating costs rise further because of social distancing, hygiene, and sanitation-related costs. Therefore, sustaining this crisis is a challenging task for the tourism industry.

Influence of IoT of Means of Transportation

The impact of IoT has revolutionized the railways as well as the aviation industry and still, multiple advancements are awaited to be implemented. The trains are becoming smarter through the integration of data collection and analysis from numerous sensors which are installed in the train and its path that produces a huge amount of data from each sensor per second with IoT technology adopted by SAS ("Statistical Analysis System") Analytics. The reliable instantaneous data is generated by a thousand locomotives across North America by using SAS to analyze data streaming from sensors per second infers a lot of data to keep the journey of the passengers convenient, secure, and efficient (Goodnight, 2017). The overall effect of IoT in railways is significant and has impacted not only the industrial front but also the passenger front of the industry. The industrial IoT is broadly classified under five heads consisting of information, train control system, predictive maintenance, smart infrastructure, and energy efficiency. Smart infrastructure fitted with intelligent IoT technology sensors and actuators can enable connectivity, control, and monitoring of track conditions, signaling, surveillance, and emergency communication systems.

The aviation industry has also been greatly impacted by the integration of this emerging technology. The next-generation Airbus (A380 Neo) is coming up with 10,000 sensors on its wing. Panasonic technology, which is the provider to many airline firms, has already begun to meet the requirements of advanced aircraft and system management (in-flight communication, 4D weather prediction, aircraft monitoring operations, etc.) and is expecting to advance IoT integrations for 10,000 airlines in the coming decades. Honeywell has also used the data from the IoT sensors through their software and identify ways to reduce the fuel cost by more than 5 percent per flight. The information of wind and temperature to pilot will improve the fuel performance considerably through Honeywell's FMS datalink service. Moreover, internet connectivity and in-flight video conferencing worldwide have been added to 6000 new aircraft ("The Aircraft's Place in the IoT Revolution," 2016). Wind River, the worldwide pioneer in embedded applications, incorporates the IoT approach through the use of real-time system data for predictive maintenance and flight tracking to minimize the total operating expense of commercial aviation. Real-time networking and data flow will optimize performance and benefit both stakeholders by reducing landing and take-off times across measured flight paths. Additionally by sharing real-time scenarios like turbulence, the other can plan alternatives to avoid the route and save consumption and customer satisfaction ("The Internet of Things in Commercial Aviation," 2015).

Influence of IoT on tourist destinations
The IoT technology can control everything therefore it is also referred to as the Internet of Everything. The tourism industry has been constantly evolving over the past few decades with the changing technologies and has shown multiple advancements in its operations. The emerging trend of IoT is the core technology that is transforming the tourism industry with the help of cloud computing, mobile communication, big data, and artificial intelligence aligned together to boost the tourist experience (Wu, 2017). In some of the smart cities where this technology has already been implemented, it is proving to be a boon. In Singapore, it is offering the tourist self-driven taxi services, which can be monitored by the business owners by tracking the taxi and even profits them by reducing the cost and saving resources. At the same time, smart parking services and astutely synced traffic signals are reducing the travel time and the time that is wasted. They even provide immediate navigation alerts which reduce fuel consumption and even benefit the company. This technology yields the capability to allow cities to develop a smooth transportation system and ensure better certainty and predictability to allow tourists and tour companies to choose the destination properly. Moscow has implemented the intelligent traffic management tool and due to that even after an increase of thousands of more cars in the city, the travel speed is still 13% better than it was previously ("SMART CITIES: DIGITAL SOLUTIONS FOR A MORE LIVABLE FUTURE," 2018). The numbers of growing smart cities are continuously on the rise and with the usage of such technologies, they can seek 70 % of achievement in the sustainable development goals. The growth of smart cities is a feasible way to ensure an efficient and sustainable future that will be able to cater to the needs of our society. The tourism sector will be actively growing

with the age of smart cities not just by witnessing the smart city infrastructure but with the substantially reduced disease burden and crime rates in the reports which will ultimately enhance the outlook of a destination and the emergency response will build a long-lasting trust among the tourist. The door-to-door unobstructed transportation facility and the high-quality public transit will enable the destination to hold a good position on the list of the top tourist destinations.

5. Impact of IoT

The IoT has already created a lot of impact on various industries and the tourism industry is also striving to match the pace with other global corporations. The technology is still in the initial stages of development and implementation. Therefore currently the impacts are both positive and negative with several challenges too.

The positive impacts of IoT are addressed throughout the paper and in a summarized version they are precise data collection, keen personalization user control, smooth and efficient travel, strong connectivity and smart solution to sustainability goals, energy-saving, maintenance, repairs, and detailed understanding of the tourists' behavior through analysis of data in real-time. With the use of IoT, the assessment and inference will not be based on data that had been collected in the past but will be available instantly for well-calculated decisions in real-time (Wyman, 2015). This will improve the tourist experience and the efficiency of services and quality can be effortlessly monitored. This will provide a higher standard of efficient and effective services through cost reduction by enforcement of regulations and deliberate planning based on the improved forecasting and trend analysis in a user-empowered environment (Brous and Janssen, 2015).

The negative impacts will be taking extra measures for securing the data from the cyber-attacks and security breaches, technological challenges with the data sharing and collection, installation cost, self-sustainability of sensors, overdependence on sensors, Data management, Data authenticity, and lack of sufficient knowledge. The data will be of no use until it is being analyzed correctly and effective measures are being taken to reach the desired requirements. The huge changes in the industry will bring the structure of the corporation to be altered and managed at pre and post-installation for the technology to be effective. The integration of this technology requires an absolute change in the supply chain and tourist adaptation, which seems feasible only in smart cities even if not in developing cities (Wu, 2017). In conclusion, IoT is a good and smart resource-saving tool for tourist convenience, products, and enterprise categories ("2019 IoT Products | Overview of the Most Popular Smart Home Devices," 2019).

6. Findings of the Study

The Covid-19 pandemic has set the global tourism industry back by 20 years. The industry is being compelled to digitalize its processes to maintain a good position among the other global industries. The Internet of Things allows new opportunities to harness the linkage between the real and the digital world and thus promises a more transparent

and engaging link between visitors and local goods and locations. The tourism enterprise revolves around the tourist's necessities and to cater to the same. In the wake of the coronavirus pandemic, the requirements for safeguarding the health of travelers have increased immensely. The latest trends and technologies act as a medium to achieve these. The internet of things technology is impacting the tourism industry in an exceedingly positive way and bringing about significant changes for its progress. The industry is growing as a global business enterprise by giving in to the quality and flexibility demand through the expertise of travel and accommodation. This business has started taking big steps and soon it will be revolutionizing the whole cycle of operations. The tourists have already started expecting the services to be benchmarked and positioned in such advanced means of the internet of things. This expectation and coinciding development will lead to these luxuries becoming a necessity shortly. I can foresee the incorporation of localized internet of things solutions into a robust digitalized system of tourism.

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