

Development of Tourism Management Information System (TMIS) to Enhance Tourism Attraction to Sri Lanka

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Abstract—Tourism is the largest and fastest-growing sector of the world economy. It is also the third largest source of foreign exchange in Sri Lanka. The tourism system consists of stakeholders and operational scales. They focus on the behavior of the generations, especially Generation Z. According to the current economic crisis, we should study other tourist destinations and focus on our tourism business. Maldives tourism strategic plan has studied here along with the Sri Lanka tourism strategic plan. According to the negative factors, suggestions made by the tourists and reviews, we identified online transport reservation, standard guide service, online access through official website and complaint management as some of the key areas to be addressed. All systems must be interconnected and work together to provide effective and efficient service to tourist. Gathering and analyzing customer data such as personal information, preferences, and purchase history provides a better understanding of the tourist's personalized experiences. We can further study foreign tourist destinations like Maldives, Singapore, Thailand and develop our tourism business by focusing on virtual reality, augmented reality, AI, IoT, etc. Furthermore, Sri Lanka has a high potential for the advancement of the tourism industry as we have a large biodiversity to promote tourism from various perspectives.

Keywords—Generation z, stakeholders, strategic plan, tourist management

I. INTRODUCTION

The global economy's largest and fastest-growing industry, tourism makes a significant economic contribution to both developed and developing nations. According to the World Travel and Tourism Council (WTTC 2019), one of the biggest economic sectors is travel and leisure. Over the past decade, Sri Lanka has also been enjoying the advantages brought by a thriving tourism sector. To ensure the ongoing success and sustainable growth of Sri Lanka's tourism industry, it is crucial that we gain a deeper understanding of the travel behavior of international tourists who visit the country.

To identify the strategies of tourism industry development, we gather information from our neighboring Maldives and Sri Lanka by using statistics and their published strategic plans for coming years.

Maldives land total area is only 300 km² (116 mi²) and a total coastline of 644 km (400.2 mi). The population of the

country is 520,159 [1]. In other way Sri Lanka measures about 255 miles (415 km.) from north to south, and about 135 miles (220 km.) from east to west, with a total land area of about 25,300 mi² (65,600 km²). Although Sri Lanka's land area is relatively small, its marine economic zone, which covers approximately 230,000 km², is nearly four times larger than its land area. It consists of a coastline of some 1790 km [2]. Sri Lanka has a rich biodiversity and can do/visit Beach and Sea, Cultural Sites, Wildlife, hiking, and tracking. Therefore, we have different doors to improve our tourist industry within a few years. The revenue and tourist arrival of the Maldives and Sri Lanka in 2022 are in "Tab. 1".

TABLE I. TOURIST FACTS ARE COMPARED AS FOLLOWS BETWEEN THE MALDIVES AND SRI LANKA IN 2022

	Maldives	Sri Lanka
Revenue (Billion) 2022	\$3.9	\$1.1
Tourist Arrival (2022)	1,675,303	719,978

After introducing the context, the paper presents the Information technology requirement in the Tourism industry, and we discuss it with the Maldives and Sri Lanka Strategic plans. Based on that methodology section gives a proposed tourist management information system and outcomes are discuss in the results.

II. LITERATURE REVIEW

The sector of travel and leisure heavily relies on information, making it closely linked to the progress of emerging information technologies [3]. Moreover, increased competition in the global tourism industry has allowed associate establishments to incorporate contemporary ICT in order to gain a competitive advantage and ensure significant progress [4]. To reduce expenses, minimize workforce, enhance operational effectiveness, and most importantly enhance the level of service and customer satisfaction, ICTs have been extensively utilized in this field [5].

Tourism in Sri Lanka emerged as the third most substantial and most advancing contributor of foreign exchange in 2018, following private remittances and textile and garment exports. It makes around \$4.4 billion, equivalent to 4.9 percent of the country's gross domestic product. The tourism sector plays a crucial role in boosting economic development through generating substantial

foreign currency earnings and relieve poverty by creating employment opportunities, both directly and indirectly, for local communities. [6].

In 1997, the term ICT was initially use by Dennis Stevenson, and later it was endorsed in the new National Curriculum documents for the UK in 2000. Here are a few examples where the use of ICT in the tourism industry can be discussed. Oversee the allocation of destination resources, supervise the inventory of tourism resources, administer tourist sites and attractions, identify appropriate tourist locations, and monitor tourist statistics [7].

Over the years, the tourism sector has encountered numerous obstacles because of technological advancements and shifting social attitudes. The future of tourism is believed to be greatly influenced by Generation Z, as this generation possesses challenging characteristics [8]. Since they are born in the age of digital technology and utilize it throughout every phase of their experience [9]. Hence, it is important to consider the behaviors of generation z tourists in the Tourism industry as well. [10].

A tourism system consists of stakeholders and operational scales and must be addressed at several levels of the development of the system. It is depicted in “Fig. 1” [11].

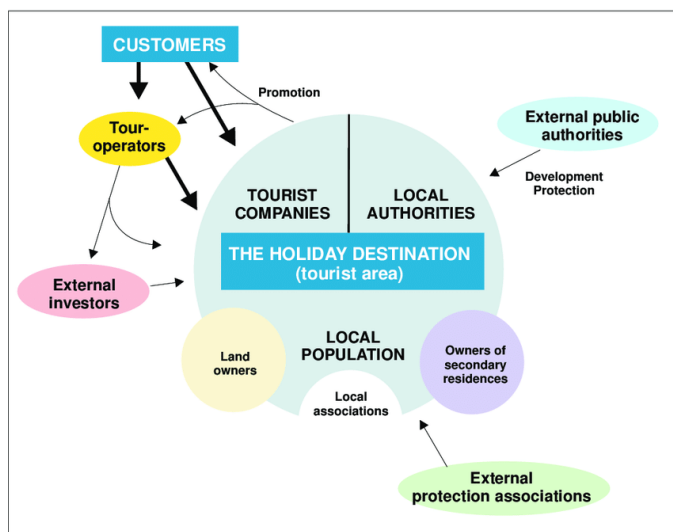


Fig. 1. Tourism system: stakeholders and operational scales

Further, tourism plays a substantial role in the economy of numerous Small Island Developing States (SIDS) such as the Maldives. The tourism industry's growing dependence on information and communication technology (ICT) has emerged as a significant hurdle for developing countries, specifically the SIDS. The utilization of ICT applications and e-business techniques plays a vital role in the prosperity of the tourism sector in SIDS. [12].

Maldives' National Center for Information Technology (NCIT) has developed Tourism Information Management System (TIMS) to integrate the eGovernment systems of the Maldives. It results in a convenient and eco-friendly working environment without the need for paper. It offers an

extensive range of functionalities that facilitate secure login for data uploading and retrieval. All tourist accommodation facilities must comply with the tourism statistics regulation, which mandates the submission of weekly and monthly reports to the Ministry of Tourism (MoT). TIMS will serve as a medium for the tourism sector to share this information regularly and conveniently with all relevant parties involved. Resorts will have the convenience of directly uploading the necessary data from their systems, eliminating concerns about formats and extra tasks. Moreover, once the system is fully operational, it will also cater to other services offered by the Ministry, including facility registration applications and general inquiries. In addition, the system can also serve as a research tool to instantly obtain combined information on the tourism sector of the Maldives.

Benefits of the TIMS are discussed and it says gathering and analyzing customer data such as personal information, their preferences and their purchase history can creates personalized experiences and expectations.

Sri Lanka Tourism Strategic Plan

Sri Lanka tourism development authority (SLTDA) has come with the strategic plan for tourism 2022-25. They have discovered and intend to establish Sri Lanka's presence in the international travel and tourism industry. This drive and initiative will be supported by the implementation of a mobile application, transitioning to advanced online ticketing for attractions via the app, as well as the establishment and maintenance of an information portal for visitors and the industry known as 'hello again'. It is important to acknowledge that these initiatives have faced various limitations which have hindered their progress.

In addition to making Sri Lanka more open to independent travelers, providing a safer tourist experience at attractions, reducing rent seeking around tourist sites and improving cash-flow, and promote the dispersal of tourists away from over congested tourist sites. In addition, they anticipate improving the standard of service quality provided at the destination. This includes completing the development and launch of the Tourism Travel App, integrate online ticket booking of all Government tourist sites, trains to the app working with ICTA and ministry.

In Sri Lanka, they gather information from the questionnaire, and they give them in the departure time at BIA. So, their sample is most probably around 5000 annually. Their negative factors are categorized into 07 categories in 2018/19 survey.

1. Hotels, Restaurants and Food (Hotel Price, hotels were not up the standard)
2. Airport, Immigration and Air Transportation Services (Airport facility, expensive taxi service)
3. Roads and Road Transport (standard of public transport should be upgraded, lack of travel information, train booking, overcharging)
4. Environmental Protection

5. Pricing, Tourist Attractions and Infrastructure Facilities (Entry fee to cultural sites, they are discriminating in terms of all goods and services.)
6. Tourist Information and Tourist Guide Service (should be standardized)
7. Harassments and Other Forms of Disturbances (Thieves, beggars, beach boys and beach vendors are a nuisance for the tourists)

Followings are the Suggestions received by the Tourist [13].

1. More highways should be made available to reduce the travel time.
2. Airport should be developed and facilities including Wi-Fi should be upgraded.
3. Public transport system needs to be improved with modern technology and facilities such as online booking. Further, passenger's security should be improved.
4. Credit card payments should be made available in tourist destinations.
5. Standardization of guide services is required.
6. Taxi drivers including tuk tuks, guide services, and hotels should be regulated and monitored.
7. The official website should provide online access to information about public transportation, tourist attractions, prices, restaurants, maps, and currency exchange.
8. Tourist sites should be developed with infrastructure facilities and more activities and price discrimination against tourists should be addressed.

Maldives Tourism Strategic Plan

Maldives has come up with their fifth tourism master plan (5TMP) -2023 -27 and their goal is to enhance their digital skills and technology to establish successful enterprises in the tourism sector that provide excellent products and services, enabling them to compete effectively. The intention is to enhance the delivery of services and improve business efficiency by optimizing digital applications. This strategy will motivate and facilitate the industry to fully embrace advancements in digital technologies, which have propelled numerous innovations. As a result, the industry will become more competitive and better equipped to withstand challenges.

Followings are the key performance indicators they have identified.

- Increase in islands with access to high-speed fibre internet.
- Increase in businesses completing visitor journey transactions via digital applications
- Increase in resorts who offer smartphone-based digital visitor journeys
- Increase in SMEs competent with digital technologies
- Increase in the level of user satisfaction with smart regulatory and management services

To address the above key performance, they have come up with Strategies. According to them tourists have high

expectations when it comes to a smooth digital experience, and their habits have rapidly changed in terms of researching, booking, and completing travel transactions, with a particular emphasis on using smartphones for these activities. The amount of time international travelers spends browsing travel-related information on mobile devices has exceeded the time they spend on laptops and desktops, when booking their trips online.

Their proposal is to create a comprehensive digital service that combines the registration process for tourist establishments, provides easy access to regulatory information, and facilitates coordination among various authorities involved. Additionally, another strategy involves investigating possibilities in utilizing predictive analytics and digitalizing customer journeys. The efficient utilization of e-wallets, mobile payment platforms, and blockchain requires a certain level of digital literacy.

Therefore, considering the behavior of information and communication technology in travel and tourism industry, we suggest that Tourism Management Information System (TMIS) can increase the revenue of tourism industry and recover from the current economic crisis in a shorter period than waiting for decades.

III. METHODOLOGY

According to the negative factors, suggestions made by the tourists and reviews made above, we identified online transport reservation, standard guide service, online access through official website and complaint management as some of the key areas to be addressed. Therefore, this system is proposed to be developed separately by dividing it into various sub-modules. But all the submodules should be developed in parallel. We assume that it will improve tourist attraction and tourism in short period of time. This TMIS web portal consists of the following online systems.

1. Online Ticket Booking System (Tourist sites, wildlife parks and other services)

Tourists can see tourist sites, wildlife parks and other services along with prices on this page. Then they can book the tickets before the visit online. Once they reach the place, all they need to do is scan the QR to claim the ticket/s. At the same time a notification is sent to the tourist. Hence, this enhances contactless transactions among tourists.

2. Online Transport Reservation System

- a. Public transport reservation system (train, buses, small flights, Boats)
- b. Tourist guide management system (guides, vehicles)

The system needs to interconnect the existing transport (ticketing) reservation systems (eg: online railway ticket reservation) and can add other transport systems like buses, small flights, and Boat services to the system. Tourists can then plan their tour before arriving in Sri Lanka. Also, tour guides and their vehicles must be registered in the system and tourists can book them before they travel.

3. Online Customer Tracking System

a. Hotel/restaurant management system

It consists of two parts, one for tourist and the other for hotels/ restaurants. Hotel/ restaurants should register in the system and update their tourist (guest) information daily. Then we can analyze tourist preferences for our future tourism strategies. Tourists can book a hotel/ restaurant online if they require.

4. Online Complaint Management System

This system can manage tourist complaints and send them directly to the relevant authorities (E.g.: Sri Lanka Police) for immediate action. Relevant authorities should response to the complaint and provide feedback to the system. Tourists can upload harassment and other forms of disturbances during his/her travel.

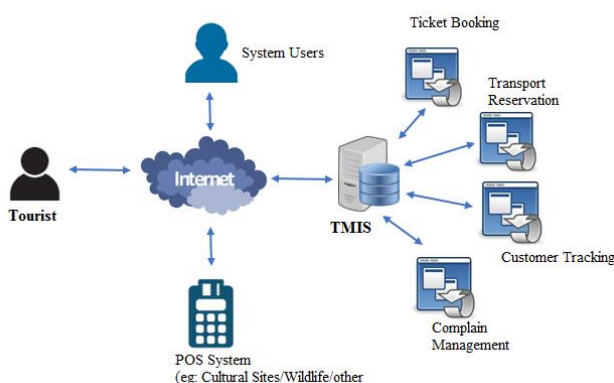


Fig. 2. Top level diagram of proposed system

Initially, tourist has to register in the system by entering his/her personal information (eg: name, nationality, passport details, leisure activities, entertainment, etc). This information may be used to identify personal preferences. Then he/she can access the above suggested sub systems for reservations under his/her login. Once he completes his reservations, he/she will receive the reservation information and generate a single QR for the specific tour. All information is verified by username, passport number and tour start and end dates. A single user can also make group reservation through his/her single login and use the services reserved by his QR code. All systems must be interconnected and work together to provide effective and efficient service to tourist.

IV. RESULTS

The proposed TMIS is developed using HTML, PHP, MySQL, CSS, JavaScript, JQuery and WSDL. Also, we can integrate existing systems into TMIS. All sub-systems are accessible through the same web portal and tourists can reserve/ book all services prior to visit and QR code will be generated for easy access. It is a responsive page as most tourists prefer smartphone. Then they can use it when they travel around the country. It is his/her identity. But there should be a mechanism to verify whether the actual tourist has the QR. Once the tourist arrives at the Bandaranayake International Airport (BIA), the reservation should be activated and able to use it. The tourist will receive a

message on his/her email/mobile when it is scanned throughout the trip.

Also, we need to implement a Point of Sale (POS) system for the most visited tourist/cultural places to meet the system access. These systems can be run on-premises or in the cloud. We need capital for infrastructure development and to keep 99.99% system uptime. System management has to be planned. Further, all the parties should work together to improve the system (E.g. Department of Railway, Wildlife, Police, Immigration and Emigration, tourism, etc.). Collecting and analyzing tourist data such as personal information, their preferences and purchase history provides a better understanding of personalized travel experiences. This data can also be used to create targeted marketing campaigns that help attract and retain more tourists. We expect that this will increase tourist satisfaction and will improve Sri Lanka's tourism industry and economy.

V. CONCLUSION

The modules proposed should be implemented together with the existing systems to create an effective, efficient, and attractive system for tourists. Currently we have seen that the government and other related organizations are not developing these modules in a single system. It will never improve the tourist attraction and will not bring immediate changes in the tourism industry. Foreign tourist destinations like Maldives, Singapore, Thailand can be further studied to improve our tourism industry through information technology like virtual reality, augmented reality, AI, IoT etc. Furthermore, Sri Lanka has a high potential for the advancement of the tourism industry as we have a large biodiversity to promote tourism from various perspectives.

REFERENCES

- [1] Maldives population (live) Worldometer. Available at: <https://www.worldometers.info/world-population/maldives-population/> (Accessed: 20 September 2023).
- [2] Department of Census and Statistics. Available at: <http://www.statistics.gov.lk/abstract2021/CHAP1> (Accessed: 20 September 2023).
- [3] Velázquez BM, Blasco MF, Gil Saura I (2015) ICT adoption in hotels and electronic word-of-mouth. *Academia Revista Latinoamericana De Administración* 28(2):227–250
- [4] Ahrám J, Wang J (2017) Novel trends on using ICTS in the modern tourism industry. *Czech J Soc Sci Bus Econ* 6(1):37–43
- [5] Law R, Leung R, Buhalis D (2009) Information technology applications in hospitality and tourism: a review of publications from 2005 to 2007. *J Travel Tour Mark* 26(5–6):599–623
- [6] Anandasayanan, S. & Balagobei, Saseela & Amaresh, M.. (2020). Impact of Tourism Industry on the Economic Growth of Sri Lanka. *International Journal of Accounting and Financial Reporting*. 10. 60. 10.5296/ijaf.v10i4.15991.
- [7] Jadhav, Vidyullata & Shivaji, Dhanshree & Mundhe, Shivaji. (2012). Information technology in Tourism.
- [8] Ilhan, Ö.A.; Balyalı, T.Ö.; Akta,s, S.G. Demographic change and operationalization of the landscape in tourism planning:Landscape perceptions of the Generation Z. *Tour. Manag. Perspect.* 2022,43, 100988
- [9] Possamai, M.E. Gen Z: How will the Newest Generation of Travelers Impact the Tourism Industry? Available online: <https://www.treksoft.com/en/blog/gen-z-how-will-the-newest-generation-of-travelers-impact-the-tourism-industry> (accessed on 14.10.2023)
- [10] Pricope, Alina & Baltescu, Codruta & Brătuclu, Gabriel & Tecău, Alina & Chițu, Ioana & Duguleana, Liliana. (2023). Examining the

Disruptive Potential of Generation Z Tourists on the Travel Industry in the Digital Age. Sustainability. 15. 10.3390/su15118756.

- [11] Spilanis, Ioannis & Tellier, Julein. (2012). Towards an Observatory and a "Quality Label" of tourism sustainability in the Mediterranean.
- [12] Ali, V. (2014). Factor affecting the adoption of information and communication technology in the tourism sector of the Maldives.
- [13] Sri lanka tourism - the official website of sri lanka tourism. Available at: <https://www.srilanka.travel/documents/Airport%20Survey%202018-2019.pdf> (Accessed: 22 September 2023)