Digitalizing Tourism and Interactive Navigation: A Case Study of Pakistan

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Abstract

The emergence of technology-driven tourism is transforming Pakistan's economic landscape, prompting a detailed examination to improve tourist experiences and streamline tour planning. This study introduces a customized application framework and User Interface (UI) design to assist tourists in effortlessly locating accommodations, dining options, attractions, and leisure spots while exploring Pakistan's diverse demographic appeal. Through a structured questionnaire merging Information Technology (IT) and Pakistan's tourism industry, primary data is meticulously analyzed, revealing the pivotal role of digitization and innovation in enhancing ongoing tourism events. Descriptive and correlational analyses highlight the widespread preference among tourists for using mobile applications and social media platforms for vacation planning, with a notable 62.4% of male respondents among 398 participants. Using insights utilizing from the survey, interactive maps provide comprehensive information on tourist locales, historical contexts, imagery, and transit routes, thereby enriching navigation experiences. This research's significance lies in its potential to revolutionize Pakistan's tourism sector through digitization and interactive navigation, enabling the country to leverage its rich cultural heritage and diverse attractions to attract a broader range of visitors. Through the development of user-friendly applications and initiatives, Pakistan can enhance its economic outlook and promote sustainable tourism practices, ensuring long-term viability and inclusivity within the industry.

Keywords: Tour Management, E-Tourism in Pakistan, Information Communication Technology (ICT), Tourist Mobile Applications, Digitizing Tourism.

Introduction

Tourism is related to travel for recreation, business, family, or friends. Tourism includes transportation to different places, accommodations, leisure, entertainment, shopping, and nourishment (Manzoor et al., 2019) The dimension of tourism has changed, concentrating more on online media, which has now become a primary source of information used for collecting tourism information. Some of them focus on knowledge needs, bases of information, routes of

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navigation, and deviations in the attitude of the online tourism quest (Deb, 2020). This paper studies the impact of digital technologies on tourism development. New technologies have created remarkable digital transformations in the tourism industry (Deb, 2020; Hasni et al., 2021). Technological innovation has played a major role in the tourism industry over the past few decades. Innovative technology increases operational efficiency and improves customer services and experiences (Imran, 2014). The modern state of tourism events, management, and understanding of digital applications invite the addition of sub-culture highlighted through social media platforms, electronic, and related digital tools (Barykin et al., 2021). Incorporating digital cultural events, virtually integrated events, digital tourism events, and digital compatibility is valuable. The previous research explains that it is only feasible for tourists to visit some tourist destinations in a single trip. However, they must choose the best points of interest (POI) when visiting during their trip (Sukhbaatar, 2018). These choices are based on information tourists gather online, from mega internet printed tourist guides, etc. After finalizing the tourist spots, tourists must decide the routes according to the time required to visit the locations, the POI's visiting schedule, entrance fees, and other constraints (Sukhbaatar, 2018) All these requirements and questions are represented as tourist trip planning problems in operations research, and these problems need to be addressed through a proper tour planning process (Sylejman, 2011).

The tourism sector, which is actively focused on applying digital technologies, has been included in the digitalization process. The widespread development of the Internet and the Internet has had a prominent positive impact on the development of the tourism business (Hussain, 2020). It makes it possible to precisely analyze the preferences of the tourists, taking into account the tourist spots they visit. Technological advancement in the tourism industry includes the development of technical devices such as geolocation bracelets, mobile guide apps, online ticket payment apps, and virtual reality technologies (Natocheeva et al., 2020). Current software applications can easily respond to the tourist's preferences, help search for a destination, and perform an assessment of tourist attractions. Based on this information, tourist profile data can be analyzed, the spots they visit, the time spent visiting those tourist sites, and so on. The Internet can further analyze tourists' preferences, ensuring that the recommendations and tourist offers match the client's needs (Natocheeva et al., 2020; Hung et al., 2021). Furthermore, the appearance of tourist destinations, products, business experiences, and ecosystems is changing with technological improvement (Deb, 2020). The world's tourism industry is growing fast. Anything can be provided by a single Travel Portal, which includes ticket booking, hotel booking, car rentals, sightseeing, insurance, and even travel-related shopping. The users don't necessarily have to have different portals for all of them (Longhi, 2008; Yadav & Sethi, 2020).

However, the development of the economy in the modern world is strongly related to the digitalization of all its activities. Current advancements in Information Communication Technology (ICT) enable the growth of a digital economy. In the digital economy, converging ICT and other technologies increase the demand for digital products and services and convert processes to a digital form. (Santos et al., 2020). According to the World Wide Web Consortium (W3C), 95 % of Internet users use the Internet for Internet travel-related information (Čech et al., 2009). Therefore, the tourism sector is no exception in ICT and e-business adoption. Tourism is a dynamically expanding economic sector with a significant impact on basic economic indicators and plays a vital role in forming the regions (Čech et al., 2009; Saeed et al., 2021). The tourism industry plays an important role in the development of an economy. Pakistan is immensely blessed with diverse cultures, landscapes, and weather in all parts of the world. Beautiful mountains, glaciers, lakes, grazing fields, and zoos are valuable assets of Pakistan (Imran, 2014). Here, beauty and attractions range from the history of civilization, such as Taxila, Harapa and Mohenjo Daro, to Himalayan hill stations. Pakistan

has many mountain peaks of over 7000m; these mountains are a lot of attractions for tourists and adventurers, especially Karakorum 2, the second-highest mountain in the world. The northern area of the country has several ancient architecture and old fortresses. Chitral and Hunza valleys are well known for their beauty (Kim, 2020)

Pakistan has enormous travel industry potential as both national and international travelers visit Pakistan's tourist locations. Lahore is one of the major cities with tourist sites in Punjab province. Travelers prefer to visit Lahore as it is of great cultural importance and has an incredible Mughal heritage. According to the current tourist data from the Walled City of Lahore Authority, local and international tourists' average footfall in Lahore Fort was 2.26 million from 2017 to 2020 (Arshad, 2015) The world focuses on e-tourism, and Pakistan's tourism industry is lagging. Tourists' acceptance of social networks, mobile applications, and the Internet is considerable.

Tourists prefer to connect with technology for journey management and planning (Kim & Kim, 2017). This research focuses on tourists' behaviors towards the digitization of Pakistan's tourism industry and how it impacts tourists' experience and satisfaction. This paper's primary concern is the importance of digitizing Pakistan's tourism industry. To achieve tourism-related information and access to fast-food hotels and restaurants in Lahore city, one of Pakistan's foremost tourist locations, the tourism industry must focus on facilitating tourists through digitizing tourism. This study evaluates the current difficulties tourists face in accessing hotels, tourist destinations, food restaurants, and transport. The study also focuses on interactive maps, a valuable tool for tourists, as it helps them navigate their way around a new city, find places to visit, and plan their itineraries. Incorporating interactive map features into tourist mobile applications will provide users a valuable and user-friendly tool for exploring the area.

The study includes the local mass transit routes and incorporates them into tourist applications. Using mass transit for tourism can help decrease a person's carbon footprint and be more economical than other forms of transportation. This can be especially beneficial for tourists on a budget who are looking for ways to save money while still being able to explore the area they are visiting. Using mass transit, tourists can often save money on transportation costs while contributing to more sustainable and eco-friendly travel (Vyborny, 2018). The research further focuses on how innovation and technology can help tourists quickly access tourist destinations and make the best trip choices.

Literature Review

More literature on technology and social media's impact on the tourism industry needs to be available from the perspective of developed economies. Many authors in the literature have highlighted this topic. Some significant studies will be discussed in this section that deal with the impact of the Internet and social media platforms on the tourism industry in Pakistan. Some critical studies suggest that the tourism industry helps create employment opportunities and economic growth and tends to support the gross domestic product (Sultan, 2021). The tourism sector is competing in terms of foreign exchange earnings, work opportunities for people, decreased poverty, infrastructure development, and generating government revenue (Konstantinova, 2019)

Tourism is the most important and continuously growing economic activity worldwide. Tourism is a multidimensional and multi-cultural activity that significantly establishes a country's economy by creating job opportunities and improving the service sector.

Figure 1: Leisure tourism spending worldwide from 2000 to 2020 in billion U.S. dollars
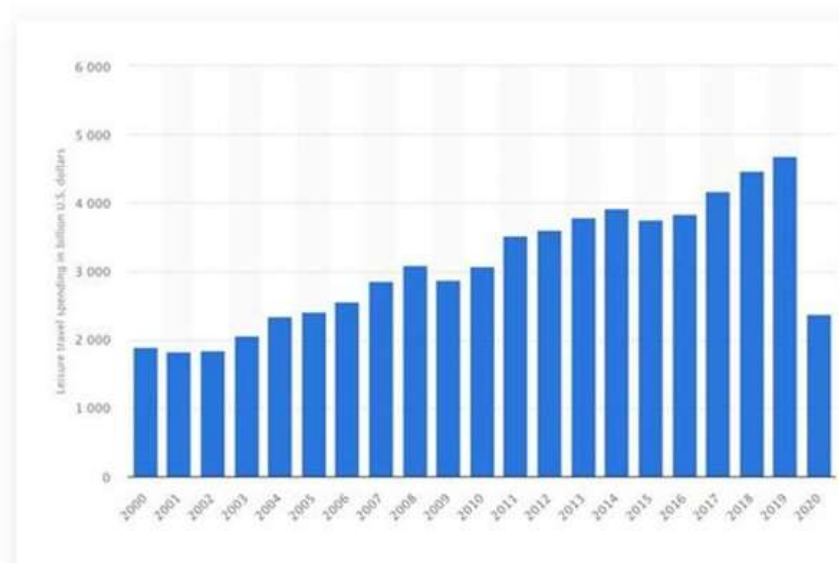
Source: WTTC Published; Oxford Economics; 2000 to 2020.

Tourism is an important source of foreign exchange for many countries, especially those with rich cultural and natural resources. The industry has been growing rapidly in recent years, driven by factors such as increased globalization, economic growth, and the expansion of middle-class populations in emerging economies (Mahammed & Hashmi, 2006)

The travel industry is a composite of activities, services, and enterprises that convey a journey experience, through transportation, entertainment, attractions, and different services accessible to explorers from home (Mahammed & Hashmi, 2006) Worldwide, the travel industry has shown a consistent increment in the course of the last few decades, changing the tourist exercises into a genuine industry (Arionesei & Stanciu, 2018) The tourism area is the world's driving industry as far as income generation with a rough worth of U.S. $ 4 trillion or more and as yet developing at a normal pace of 10% per annum (Mahammed & Hashmi, 2006) The travel industry is viewed as one of the biggest monetary sources of a country's finances. The discoveries recommend that a 1% expansion in the travel industry essentially upgrades total national output by 0.051%, unfamiliar direct venture by 2.647%, energy advancement by 0.134%, and agribusiness improvement by 0.26%, and lessens destitution by 0.51% in the long run (Khan et al., 2020) However, developing nations represent very nearly 30% of world the travel industry income. The travel industry advancement has gotten overall acknowledgment as a drive for financial development, farming, and energy improvement (Chavan & Bhola, 2014; Khan et al., 2020).

Figure 2: Direct and total contribution of travel and tourism To GDP

Characteristic	Direct contribution	Total contribution
2019	2892.94	9258.29
2018	2750.65	8810.96
2017	2567.88	8240.74
2016	2381.10	7650.17
2015	2320.93	7444.04
2014	2388.31	7674.79
2013	2304.81	7432.19
2012	2207.37	7094.29
2011	2157.06	6925.29
2010	1911.51	6108.56
2009	1794.88	5803.03
2008	1928.47	6259.57
2007	1809.37	5765.03
2006	1629.02	5160.35

Source: WTTC Published By WTTC. Feb 2020. Worldwide from 2006 to 2019.

Given in the literature, the travel industry is noticed as one of the most significant financial sources of a country's revenue, and it directly impacts the country's economy. The travel industry is one of the rapidly growing industries and is one of the finest ways to improve economic growth in developing and developed countries (Akama, 2007). It is observed that the tourism industry has evolved as a significant force for sustainable socioeconomic development all over the world (Saeed et al., 2021). Tourism and the travel industry are critical economic activities globally. In many countries, the tourism sector remains a significant source of employment and income in many sectors. In the South Asia region, a similar can be noticed in Pakistan's economy, where the improvement of the tourism industry has noted a positive increase. Pakistan is famous for its tourism. Pakistan is a beautiful country, and the tourism industry is rising gradually (Hasni et al., 2021). Pakistan offers many attractions in the developing world. The cultural and historical inheritance is evident in this ancient region.

According to the current research 2017, 1.75 million tourists travelled to Pakistan. The Pakistan Tourism Development Corporation (PTDC) confirmed that 30% of tourists were locals, and almost 90% of the travelers preferred to journey by road (Arshad, 2015). In 2017, the World Travel and Tourism Council (WTTC) mentioned that Pakistan's tourism sector revenue was 19.4 billion US dollars, making up 6.9% of the GDP (Dewan & Kim, 2020) According to WTTC, that amount is expected to increase by 36.1 billion dollars by 2030. In 2016, the tourism industry contributed 6.0% to total employment; in 2017, a rise of 6.3% was noticed. In 2019, the overall economy of Pakistan was backed by the tourism sector, which had a figure of 5.9%, and the GDP growth was 4.7%. (Sultan, 2021) This total is likely to increase in the coming years. In 2018, Pakistan's tourism industry was ranked 124 out of 136 countries on the Travel and Tourism Competitiveness Index. Pakistan's tourism industry occupied the 121st position out of the 140 ranked countries in 2019.

Tourism is a significant industry that will greatly lift because of Pakistan's China-Pakistan Economic Corridor (CPEC). Pakistan offers a tremendous infrastructure network for worldwide sightseers through CPEC and a vast road network, the Motorways (Khan et al., 2020). The details show that 31% of the total outbound travel industry is from China for leisure reasons (Arshad, 2015). Pakistan's Tourism and Development Corporation (PTDC, 2019) reported that tourist arrivals from late 1995 to 2012 averaged 602,500 people. Similarly, Lahore, the capital city of the Punjab region, receives an enormous number of visitors, and CPEC will increase the number of tourists visiting Lahore city. According to the most recent

statistics from the Walled City of Lahore Authority, 2.26 million local and foreign visitors would see the fort annually from 2017 to 2020 (Arshad, 2015).

Figure 3: Average tourist footfall inside Lahore fort from 2017-2020

FOOTFALL INSIDE LAHORE FORT IN 2017, 2018, 2019 & 2020												
	YEAR 2017			YEAR 2018			YEAR 2019			YEAR 2020		
Total for 2016	Local	Foreigner	Total for 2017	Local	Foreigner	Total for 2018	Local	Foreigner	Total for 2019	Local	Foreigner	Total for 2020
167,745	201382	269	201651	365749	395	366144	357669	279	357948	293354	521	293875
152,602	394043	300	394343	418684	365	419049	166869	495	167364	293397	652	294049
158,145	396300	312	396612	487536	652	488188	488264	432	488696	92513	252	92765
123,542	189201	121	189322	373000	433	373433	358000	397	358397	Closed due to Covid-19		
93,462	144771	92	144863	256401	326	256727	93572	124	93696			
101,440	144872	86	144958	528785	392	529177	474001	290	474291			
131,484	309388	162	309550	411056	498	411554	327700	262	327962			
143,434	169209	88	169297	457057	379	457436	295128	201	295329	122595	24	122619
167,474	201727	162	201889	361891	333	362224	257956	241	258197	143493	31	143524
152,154	218239	88	218327	473556	197	473753	382654	324	382978	185181	39	185220
162,837	269173	139	269312	404522	266	404788	394000	651	394651	176329	59	176388
179,777	419656	139	419795	481742	323	482065	352385	541	352926	223273	108	223381
1,734,096	3057961	1958	3059919	5019979	4559	5024538	3948198	4237	3952435	1530135	1686	1531821

Source: Walled City of Lahore Authority (WCLA)

The success of tourism in Pakistan will contribute to reducing its poverty level. Tourism positively influences Pakistan's economic progress, which continues to grow. However, compared with the revenue generated by other countries due to technological advancement in tourism, Pakistani tourism is not providing that much advantage to the country's economy as we lag in innovation in the tourism sector.

The era of technology began through the internet in the 1960s. By the end of the 20th century, smartphones, intelligent roads, and cars facilitated tourists, and now, with the advancement of technology in the 2000s, bitcoins become considerable and vital (Inversini & Rega, 2020) The versatile and different cultures, natural surroundings, and service quality continue to attract foreign travelers to Asia and the Pacific region. Thus, the digitization of tourism takes various forms of manifestation, including online bookings of pre-planned tours formed by tour planners and the development and implementation of mobile applications.

Furthermore, with the advancement in Information Technology, there is a clear impact on every field of industry. Promoting products and services through digitization and innovation has become essential to the modern economy. Every central area of businesses and industries is developing with the help of digital technologies, using them to improve sales and product awareness and create specific trends related to the company's activities (Hung et al., 2021). Tourism sees digital technologies as the direct and most active way to reach its goal. Since the end user can be thousands of miles away from their travel route, digital promotion is vital in creating awareness regarding tourist' spots and improving a country's tourism image.

Moreover, it positively affects the travel industry. (M. Christian, 2015) In an exploration paper, Malaka and Zipf clarify the combination of the travel industry and IT areas. As per them, the travel industry has changed due to new IT objects, and IT research is applied to the travel industry domain to explore new and interactive information systems (Souto & Cristo, 2015). According to Höpken et al., the significance and accomplishment of portable applications for travelers are because of their capacity to help the traveler during all phases of travel (Souto & Cristo, 2015) The main properties of the industry structure and the operation of new technologies are examined, and informational case studies are split with all aspects of IT applications in several sectors, such as airlines, hotels, tour operators, road transport, etc. (Le-Klähn, 2014) It includes transportation, food, shopping, entertainment, and services for travelers and a nation's economy. Studies have demonstrated that it is now essential for businesses to survive on the Internet and strategically implement IT for the economy's growth. Technological use is rapidly growing in the global economy, introducing new ways for people to work in a more progressive and automated way. Every sector of the economy needs technology to survive in this current era. Technology is gradually growing and expanding

across all industries (Kumar & Soni, 2020). Technological use is critical to be used in the areas of marketing and distribution. Likewise, tourism is also developing around technological innovations such as information technology that contribute a lot to the tourism industry. Technology is penetrating and converging in the tourism sector.

People are getting used to online hotel and plane reservations and prefer to have a lot more dealings on their smartphones. There are many different tourist applications or websites that can help you plan and organize your travels. These can include features such as booking flights and hotels, creating itineraries, and finding local attractions and restaurants. Some famous tourist applications include TripIt, Google Trips, Tripadvisor Roadtrippers, Sygic Travel TripHobo, Wego Flights and Hotels, Visit A City, TripCase Lonely Planet Guides, Expedia, and Kayak. These applications offer various features to help users plan and organize their trips effectively, including itinerary creation, booking accommodations and transportation, discovering attractions, and navigation assistance. Additionally, many tour planning applications provide real-time updates, maps, and navigation features to help users navigate unfamiliar destinations seamlessly. These applications aim to simplify the travel planning process, save time and effort, and enhance the overall travel experience for users. These applications can make planning and managing your travels easier and help you find the best deals on flights and accommodation (Lim et al., 2017). These advanced technologies are saving the workforce and empowering consumers and users of these facilities by being cost-effective and efficient. Tourists make their bookings online. Google stats show that online travel booking is the most established part of the internet economy. According to previous research, tourists face significant barriers to visiting Pakistan, mainly due to the need to promote and advertise top destinations on proper media platforms. The Pakistani tourism sector is in massive need of understanding tourists' drivers and capitalizing on the role of technology and innovation in influencing this industry (Hasni et al., 2021).

Incorporating IT will also supplement the improvement of Pakistan's travelling industry. It is influencing the tourism industry worldwide, but Pakistan's tourism industry is lagging as little work has been done to incorporate IT. Considering the importance and need of IT regarding tourism, it is essential to work in the tourism industry of Pakistan regarding the digitization of tourism and tour management planning. It is necessary to provide tourists with an interactive map to improve their travelling experience within Lahore. Similar work has been done to facilitate tourists in other developing countries like Bangladesh, Indonesia, and India, but no research has been done on the tourist industry of Pakistan. It is deduced from the above study that the number of tourists is increasing in Pakistan due to CPEC and is expected to increase more.

The study suggests that the development of tourist applications and interactive maps is likely driven by the increasing popularity of mobile devices and the need for convenient, easy-to-use tools to help tourists plan and manage their travels. Currently, the Lahore tourist attraction map is a static 3D map that shows all the tourist attractions of Lahore city. It includes Mughal architectural sites, amusement parks, shopping malls, and all the walled city gates. The map is not interactive and does not have navigation features. It just depicts the value of Lahore city for Pakistan tourism.

Figure 4: Lahore tourist attractions map

Secondly, the sightseeing Lahore route map shows the route of the tourist locations, which are covered by the sightseeing trip. This map is a static 2D map that shows the visual images of the tourists' locations in Lahore city. This tourist map is not interactive and gives no information regarding tourists' locations.

Figure 5: Sightseeing Lahore route map

However, globally, the dependency on mobile devices and tour planning tools has led to the development of a wide range of tourist applications and interactive maps specifically designed for mobile devices. These applications and maps provide helpful information and tools that can help make it easier for tourists to plan and manage their travels and can help them make the most of their time at a destination. Indeed, some popular tourist maps and navigation applications include Google Maps, Apple Maps, MapQuest, Waze, HERE WeGo, Citymapper, Sygic, GPS Navigation & Maps, OsmAnd, and Maps. Me, Gaia, GPS. These applications provide users with detailed maps, navigation assistance, real-time traffic updates, and Points of Interest (POIs) to help them navigate cities, find tourist attractions, and explore new destinations efficiently.

As the global tourism industry advances rapidly in embracing e-tourism and leveraging digital technologies to streamline tour planning processes, Pakistan finds itself in a significant research gap regarding the digitization of its tourism sector. While other countries are harnessing digital platforms to enhance the accessibility and convenience of tourist services, Pakistan's tourism industry lags in effectively utilizing such technologies. Currently, digital media endeavors to boost Pakistan's tourism through advertising efforts, yet there still needs to be more initiatives within the realm of information technology to enhance the tourism sector (Investing, 2020). Limited static tourist maps are available for Lahore city that highlight tourist attractions but

need clearly defined route (the-Pakistani-traveler, 2020). Building upon previous research, the identified research gap underscores the need for further investigation to bridge the divide between information technology (IT) and the tourism industry. This research program aims to address this gap by concentrating on the tour management process and digitization of the tourism industry. Specifically, it seeks to analyze tourists' experiences in Lahore city and across Pakistan. Notably, there is a need for more studies that explore how Pakistan can incorporate digital tools to enhance the tourist experience and streamline tour planning processes.

A notable gap exists in making local transit routes accessible to tourists through digital means. Despite the importance of efficient transportation in enhancing the overall tourist experience, there is limited research on incorporating local mass transit routes into digital tourist maps to improve accessibility and convenience for tourists navigating Pakistan's cities. Therefore, research is urgently needed to explore strategies and technologies that can bridge these gaps, ultimately enhancing Pakistan's tourism sector and making it more competitive globally. Such research can provide valuable insights for policymakers, tourism authorities, and industry stakeholders to develop effective digital solutions tailored to tourists visiting Pakistan.

Research Questions

1. What are the recent trends and emerging information technology technologies within Pakistan's tourism industry, as indicated by existing literature?
2. How does the integration of information technology influence the tourist industry in Pakistan, focusing on Lahore city, and what are the perceptible impacts on tourists' experiences?

Study Objectives

The primary aim of this research program is to analyze the impact of IT on Pakistan's tourism industry, such as mobile applications, interactive maps, and digitized tourist journey management planners to assist tourists in having an organized tour plan for Lahore city. And to study how it will enhance tourists' experience by integrating IT with the tourism industry. Furthermore, mass transit can be incorporated into tourism so that carbon footprint can be reduced, and it can help to make the environment and tourist places greener and less smoggy.

The research above aims will be achieved through the following series of research objectives:

1. To conduct a literature review to analyze the existing trends within Pakistan's IT and tourism industry domain.
2. To analyze the impact of IT on the tourist industry of Pakistan and how it affects tourists' experience in Lahore city.
3. To design and create the user Interface of an application that will facilitate international and local tourists.
4. To work on interactive map design for tourist sites in Lahore, Punjab, Pakistan.
5. To study local mass transit routes and incorporate them in tourist maps to make them accessible.

Research Methodology

This study thoroughly focused on the literature review based on previous studies and theories that helped justify a clear state of incorporation of IT and tourist applications in Tourism. As recommended by many literary works, mixed methods have been used to progress the collection of data instruments for the study.

Succeeding the phase, a descriptive investigation design (survey and observation methods) is used to accumulate primary facts (through structured questionnaires) from the respondents. After data collection, data analysis used hypothesis testing, frequency distribution, Pearson correlation, and reliability tests.

Literature Method

To ensure the comprehensiveness and universality of the paper, documents and literature on digitizing tourism and information technology's impact on tourism have been consulted. I have read more than 50 articles and doctoral and master's dissertations related to tourism innovation and tourists' mobile applications, which have been published in various technology and tourism-related journals. I used Google Scholar, Web of Science, Doctoral Dissertation Database, and other literature search platforms, and the materials related to the digitation of tourism in developed and developing countries, including Pakistan, were collected to provide valuable references for this study.

Field Investigation Method

Before writing the paper, I conducted a field inquiry at the Walled City of Lahore Authority (WCLA) and Mass Transit Speedo Bus office before composing the paper. During the visit to WCLA, I interviewed the marketing head regarding the current state of Pakistan tourism and to what extent information technology is incorporated in the tourism sector. I learned about the facilities provided to tourists during their visit to Lahore. The conversation highlighted the significant occasions, tourist attractions, and cultural history of Lahore city. In addition, the difficulties travelers encounter are brought on by the need for mobile applications and sophisticated trip-planning tools. Field investigation provided the most intuitive and accurate on-the-spot investigation impression and first-hand information for the writing of this study.

Questionnaire Survey Method

After consulting related literature and combining this article's research objectives and survey objects, I finally selected the Digitizing Tourism and Interactive Navigation Questionnaire. For a comprehensive evaluation of the current condition of tourist facilities in Lahore city and tourists' acceptance and need for Internet and mobile technology, questions were scored on a 5 Ordinal scale from "Extremely disagree" to "Extremely agree". The bigger the number, the more critical it is. The questionnaire was created using Google Forms. The survey was conducted by physically collecting data through respondents and online mediums. Questionnaire forms were distributed via the Internet with the cooperation of tourism-related groups of Pakistan and international tourists on social media platforms. Several questionnaires were collected from travelers at different tourist' locations in Lahore. A total of 400 copies were distributed. According to the needs of this study, the questionnaire is based on the relevant literature related to this paper and modified under the guidance of tutors and experts. Then, the final complete questionnaire is formed. The questionnaire of this study has 16 items in total, which measure the four factors related to the digitization of tourism in Pakistan, including digitizing tourism, tour management, feeling like a local, and dependency on the Internet or social media.

Formal Questionnaire Survey and Collection

This paper adopts a convenient sampling method. Before the questionnaire was formally issued, 15 respondents were given the questionnaire to make the first prediction of the questionnaire. Then, the questionnaire was modified based on feedback and suggestions. A total of 190 online questionnaires were distributed. Whereas 210 questionnaires were collected directly from respondents, while two invalid questionnaires were found in the questionnaire screening, 398 valid questionnaires were finally available for further analysis.

Mathematical Statistics

The data is analyzed systematically by Statistical Package for Social Sciences (SPSS) software. Firstly, the data was processed using MS Excel, and then a brief understanding of the SPSS

software was taken with the help of the experts. Then, the data was analyzed, which mainly includes the following aspects. First, reliability analysis is used to show the reliability of the questionnaire by Cronbach alpha coefficient; Second, descriptive analysis is used to analyze the mean of each variable; Third, the Pearson correlation is used to evaluate the relation between the Development of tourist applications and interactive maps.

Development of Lahore Tourist Attraction Map

Interactive maps can be a valuable tool for tourists, providing detailed information about a destination and allowing users to navigate their way around easily. The research develops interactive maps for tourists based on the analysis and results. The maps are created using Google MyMaps. The maps show the tourist locations of Lahore city along with local mass transit routes connecting with tourist locations. They provide detailed information about a destination and allow users to navigate easily. These maps include features such as the locations of important landmarks and attractions of Lahore city, information about public transportation, and the ability to search for specific tourist spots. Overall, interactive maps can be a valuable resource for tourists, as they provide helpful information and make it easier to explore a new destination. The map shows 57 tourist locations in Lahore and 12 walled city gates. Historical importance, photographs, and navigation routes are attached to each location for travelers' ease. The tourist locations include Mughal architectural sites. Modern architectural locations, museums, amusement parks, shopping malls, mosques, and famous food streets of Lahore City (Google Maps, n.d.).

Figure 6: Tourist attraction map
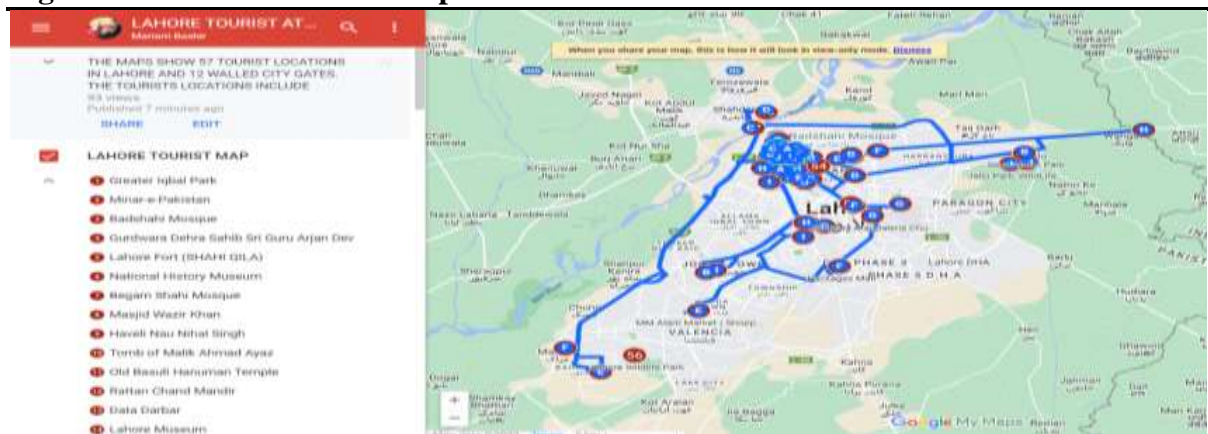
Development of Lahore Mass Transit Routes

The maps further show the local mass transit routes which are near the tourist spots of Lahore city. The local transport covers most of these tourist locations. The Speedo bus has Feeder Routes while the metro and Orange Line have several stations near tourist spots (Google Maps, n.d.).

Figure 7: Speedo bus routes
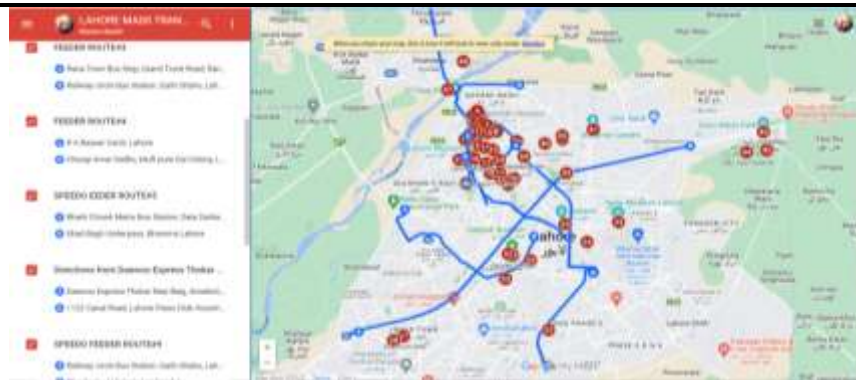
Figure 8: Orange line and Metro bus stops

Wireframe of Tourist Mobile Application

Furthermore, the wireframe for the application design is created which is further fooled by UI design of the proposed tourist application. The wire frame is created by using design tool Figma. These tourism-related applications can provide a variety of useful services and information for tourists. which include services like maps and navigation to help travelers find their way around a new destination, information about local attractions and activities, and the ability to book flights, hotels, and other travel arrangements.

The design and features of a tourist app are illustrated with the help of application wireframe. The features included in a tourist app are:

1) A search function that allows users to find and discover places to visit, things to do, and other points of interest in a particular destination.
2) Maps and navigation tools that provide directions and help users find their way around a destination.
3) Information about local attractions, events, and activities, as well as tips and recommendations from other travelers.
4) Details regarding local mass transit routes and bus stops which are near to tourist locations to facilitate the tourists to easily access the local transport.
5) A way for users to share their experiences and photos with others, either through the app itself or through social media.
6) Integration with other travel-related apps and services, such as flight and hotel booking apps, to provide a seamless and convenient experience for users.

Figure 9: Application wireframe

User Interface of Tourist Application

In terms of design, a tourist app should be easy to use and navigate, with a clean and user-friendly interface. The user interface design of the app is visually appealing, with high-quality photos and other graphics that help to showcase the destination and its attractions. The wireframe of the application is further processed on Figma to develop UI design of the application. considering the approach of better user experience. It has access to travel-related apps like Pak Rail, Airbnb, Daewoo Express, Uber Careem, and SWVL services for online bookings and payments. Furthermore, the details regarding local events and festivals are given along with the facility to purchase event tickets online.
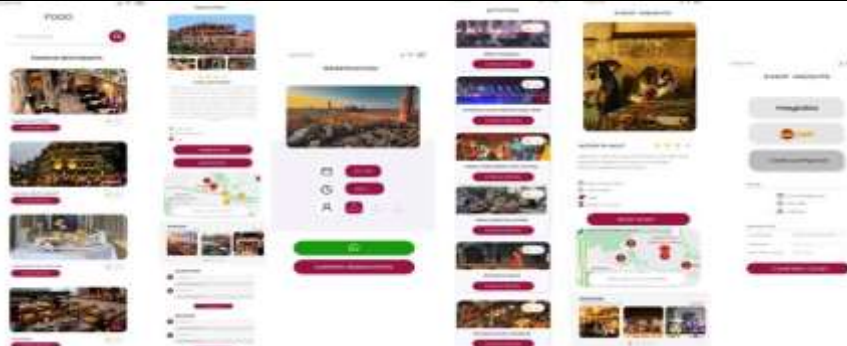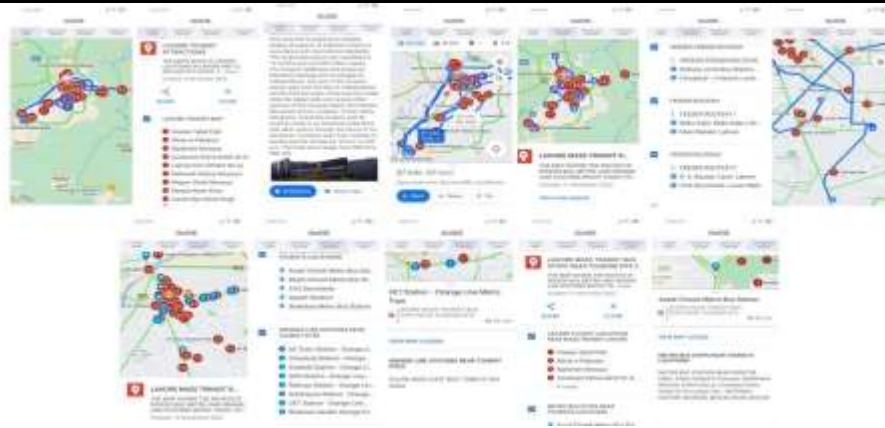
Figure10: User interface of tourist application

Figure 11: UI of tourist app

Figure 12: Travel guide

Research Results and Analysis

A formal questionnaire was carried out in the data analysis that has been mentioned in the section of methodology. Data was collected on the five-point Likert scale from strongly agree to strongly disagree. Out of 398 respondents, the basic categories are students, tourists, service holders, businessmen, and others. This section contains the survey results.

Socio-demographic Profile of the Respondents

Table 1; the findings revealed a total number of respondents 398 with 62.6 percent of respondents being male and 37.4 percent female. The results also stated that 79.8 percent of respondents are Pakistani, who belong to different regions of the country and 20.2 percent of respondents are from abroad. About 95.2 percent of participants have achieved a higher level of education,2 percent from secondary level, and 2 percent from primary level education. The age group of the respondents is highest at 89.9 percent, which is between 18-29 and almost 6.3 percent of the respondents' age group is in the range of 30-39 which means the majority of respondents are adults.

Table 1: Respondents' socio-demographic profile

Factor	Frequency (N)	Percent (%)
Male	249	62.4
Female	149	37.3
Pakistan	317	79.4
Abroad	80	20.1
Primary	8	2.0
Secondary	11	2.8
Higher	379	95.0
Age 18-29	358	89.7
Age 30-39	25	6.3
Age 40-49	8	2.0
50 and above	7	1.8
Source: Survey data.		

Descriptive Statistics

According to the survey, 36.8 percent of people plan a trip annually.35.3 percent of people get to know about tourist locations through the Internet and 15.3 through social media. While 90.3 percent of respondents would like to use a digital interactive tourist map while visiting

different tourist attractions in Lahore. 79.7 percent of tourists while exploring the city would like to feel like a part of Lahore. 85 percent of respondents would prefer to have a mobile application for interactive navigation and tour management process for their trip to Lahore city.

Table 2 shows that the results of the study showed that the overall score of factors in terms of their accessibility while planning a trip is above average and shows that tourists face more difficulties in accessing these services. The highest score among the tourism services is 3.16 for budget handling followed by 2.94 for travel guide and 2.83 for accommodation bookings while Spotting tourist location has score2.67 that means the respondents face issues and difficulties during their trip and there is a need for the upgradation of the tour planning process. According to the survey, 20.3 percent of participants believe that there should be an upgradation in attractive tourist site suggestions, 19.5 percent demand for digitized tour planning system 16.3 percent would like to have nearby restaurants and traditional food recommendations and 15.8 percent of the respondents demand for tourists' mobile applications.

Table 2: Descriptive Statistics from survey data

Rating Scale Question: Rate the following factors on a scale of 1 (extremely easy) to 5(extremely difficult) in terms of their accessibility while planning your trip.

	N	Min	Max	Mean	Std. Deviation	Variance
Transport	398	1	5	2.65	.976	.953
Accommodation bookings				2.83	.930	.864
Spotting tourist locations				2.67	.909	.827
Finding Restaurants/food				2.63	1.073	1.151
Travel guide				2.94	1.001	1.002
Budgets Handling				3.16	1.052	1.106

Correlation

Table 3 displays Pearson's correlations. It shows cultural awareness importance in the tourist experience $.875^{**}$(Cultural Events) + $.877^{**}$(Local Food) + $.847^{**}$(Street Markets) this equation shows that all the critical success factors are of similar importance for a better tourist experience and create a strong impact on to tourists' satisfaction.

Table 3: Results from 2-Tailed Correlation Test (on cultural awareness)

		Total Score
Cultural events and festivals	Pearson Correlation	$.875^{**}$
Local food		$.877^{**}$
Street markets		$.847^{**}$
	Sig. (2-tailed)	<.001
	N	398

Table 4 displays mobile applications in the tour planning process = $.750^{**}$ (Use of Internet) + $.821^{**}$ (Use of social media) + $.810^{**}$(Social media review and recommendations) + $.646^{**}$(social media posting) This equation shows that all the critical success factors have great importance for the tour management system.

Table 4: Results from 2-Tailed Correlation Test (on use of smart devices)

		Total Score
Use of internet		.750**
Use of social media	Pearson Correlation	.821**
Social media review and recommendations		.810**
Social media posting		.646**
	Sig. (2-tailed)	<.001
	N	398

Thus, the results of Pearson's correlation analysis accept that "Knowing the culture is strongly related to tourist experience" and "Tourists will prefer mobile applications for tour planning process".

Reliability
To measure the reliability of cultural impact on tourist experience and mobile applications in tour planning process that is used in the questionnaire was adopted the internal consistency test by Cronbach's alpha. This test also measures the participants answer consistency of all items used in the questionnaire.

Therefore, table 5 illustrates Cronbach's alpha scale as a measure of reliability. The Cronbach's alpha coefficients of cultural awareness and use of mobile applications achieved reliability value of 0.834 and 0.735, which means the study is standard and reliable. According to the study, the value of Cronbach's alpha is suggested above 0.70 is considered as acceptable. The results show that knowing about the culture is strongly related to tourist experience. It also suggests that the study of digitizing tour planning systems and incorporating mobile applications have a positive impact on tourism is reliable and also acceptable.

Table 5: Reliability value from Cronbach's Alpha

Variables	Cronbach's Alpha	N of Items
Cultural awareness	.834	3
Use of mobile applications	.735	4

Discussion

The research question concerning the integration of information technology in the tourist industry of Lahore, Pakistan, is strongly supported by the findings of this survey. With nearly 37 per cent of individuals planning trips annually, a significant portion of the population is engaged in tourism activities, highlighting the relevance of understanding the factors influencing their experiences. The substantial reliance on digital platforms, with 35.3 per cent using the Internet and 15.3 per cent using social media for destination information, underscores the growing influence of technology in shaping travel decisions. Furthermore, the overwhelming interest in utilizing digital interactive tourist maps (90.3 per cent) and mobile applications for navigation and tour management (85 per cent) indicates an apparent demand for technologically enhanced experiences among tourists in Lahore. However, despite this enthusiasm for digital tools, the study reveals challenges in accessing certain tourism services, suggesting a need to upgrade your planning processes. Participants' calls for improvements, including digitized tour planning systems and mobile applications, further emphasize the significance of technology in enhancing tourists' experiences. Moreover, the strong correlations identified between cultural awareness factors and tourist satisfaction, as well as the importance

of mobile applications in the tour planning process, highlight the critical role of information technology in facilitating more fulfilling and immersive travel experiences. Given these findings, investigating the influence of information technology on Lahore's tourist industry becomes imperative for stakeholders to meet evolving consumer expectations and ensure a more seamless and enjoyable travel experience for visitors to the city.

The digitization of tourism has become increasingly important in enhancing tourists' experiences and satisfaction levels, particularly in regions like Lahore, Pakistan. This research paper explores the impact of technology on the tourism sector, focusing on factors such as digitizing tourism, tour management, feeling like a local, and dependency on the Internet and social media. By analyzing data collected from local and international tourists, the study provides insights into the current trends and challenges within the tourism industry and the potential benefits of incorporating IT solutions.

The survey results and correlation analysis shed light on four key factors influencing tourists' experiences and preferences in Lahore: digitizing tourism, tour management, planning, and feeling like a local. These factors significantly shape tourists' perceptions and satisfaction levels, as indicated by descriptive survey results and Pearson's correlation analysis.

Firstly, digitizing tourism is crucial to enhancing tourists' experiences in Lahore. The survey findings reveal an intense desire among respondents for digital interactive tourist maps, with 90.3 per cent expressing interest in using such tools to navigate different tourist attractions. Additionally, 85 per cent of respondents prefer mobile applications for interactive navigation and tour management, highlighting the importance of digital solutions in facilitating tourists' city exploration. Furthermore, the correlation analysis underscores the importance of digitization in enhancing tourist satisfaction, with factors such as cultural events, local food, and street markets significantly contributing to tourists' experiences.

Secondly, tour management is another essential factor in ensuring a positive tourist experience. The correlation analysis demonstrates a strong relationship between the use of mobile applications and various aspects of tour management, including internet usage, social media engagement, and recommendations. This highlights the importance of leveraging digital technologies to streamline the tour planning process and enhance tourists' overall experience.

Moreover, planning plays a crucial role in shaping tourists' experiences and satisfaction levels. While the descriptive survey results indicate that tourists face difficulties accessing certain services, such as budget handling and accommodation bookings, the correlation analysis underscores the importance of cultural awareness in enhancing tourist experiences. Cultural events, local food, and street markets are critical success factors that significantly impact tourists' satisfaction levels.

Finally, feeling like a local is critical to tourists' experiences in Lahore. The descriptive survey results indicate that many tourists aspire to feel like a part of Lahore while exploring the city. This desire for cultural immersion and engagement underscores the importance of incorporating local experiences and traditions into tourism offerings to enhance tourist satisfaction.

Overall, the findings from both the descriptive survey results and Pearson's correlation analysis support the hypotheses that cultural awareness strongly influences tourist experiences and that tourists prefer mobile applications for the tour planning process. These insights highlight the significance of digitizing tourism, optimizing tour management processes, facilitating effective planning, and promoting cultural immersion to enhance tourists' experiences and satisfaction levels in Lahore.

One of the study's key findings is the growing reliance of tourists on digital platforms for trip planning and navigation. The data revealed that many local and international travelers prefer to gather information about tourist locations, accommodations, and dining options through the

Internet and social networks. This underscores the importance of digitizing tourism services to meet modern travelers' evolving needs and preferences.

Furthermore, the study highlights the demand for mobile applications that facilitate tour management and interactive navigation. Tourists strongly prefer digital interactive maps, which provide them with convenient access to information about tourist attractions in Lahore. Additionally, tourists desire to feel like a part of the local culture, with many expressing interest in connecting with cultural events and festivals through digital platforms.

However, despite the benefits of digitization, the study also identifies challenges tourists face in accessing certain services. Difficulties in finding transportation, booking accommodations, and managing budgets indicate the need for improvements in the tour planning process. The research underscores the importance of upgrading tourism services, including developing digitized tour planning systems and mobile applications, to address these challenges effectively.

Regarding design principles for tourism applications, the study emphasizes the need for user-friendly interfaces that cater to the diverse needs of both international and local tourists. Key considerations include providing real-time updates, personalized recommendations, and language options to enhance usability and accessibility. Moreover, optimizing interactive map design is crucial for improving the navigational experience of tourists visiting Lahore's tourist sites.

The study's findings support the integration of information technology in the tourism industry, as evidenced by the high demand for digital solutions among tourists. By embracing emerging technologies and leveraging digital platforms, stakeholders in the tourism sector can enhance tourists' experiences, improve accessibility to services, and ultimately boost satisfaction levels. Moving forward, continued investment in digital infrastructure and the development of user-friendly applications will be essential for driving the growth and competitiveness of the tourism industry in Lahore, Pakistan.

In summary, the findings provide empirical evidence supporting the research question, indicating the increasing influence of information technology on the tourist industry in Lahore city, Pakistan, and the perceptible impacts on tourists' experiences. Integrating digital tools and enhancements in tourism services is crucial for meeting tourists' expectations and improving overall satisfaction.

Conclusion

In today's digital age, mobile phones have become indispensable tools for effective communication, especially for travelers seeking satisfaction from tourism services. The preference for mobile applications as a means to access the Internet on mobile devices underscores the importance of focusing on mobile phone applications in delivering efficient tourism services now and in the future.

Survey results reveal a strong inclination towards utilizing mobile applications for trip planning, with 88.7 per cent of respondents expressing a desire to use such applications. Additionally, 68.4 per cent of tourists prefer a universal application that consolidates various features such as booking, transportation, accommodation, and navigation. This data indicates a significant opportunity to enhance Lahore tourists' experiences by introducing new mobile applications, with 95.7 per cent of respondents believing it would positively impact them.

The study's findings advocate for a digitized upgrade in various tourism-related services. Critical areas for improvement include online access to transport and accommodation bookings, event bookings, restaurant recommendations, attractive tourist site suggestions, digitized tour planning systems, and tourists' mobile applications.

Moreover, digitizing the tourism sector is poised to enhance its competitiveness by offering customers better service while enabling tourism service companies to generate higher revenues.

This aligns with current trends in the industry influenced by digital transformation, wherein innovative and digital technologies are leveraged to make the tourism industry more competitive in the modern digital landscape.

Furthermore, this study is a valuable resource for future research endeavors, providing insights into tourists' expectations and the challenges they currently face in the tour planning process. By incorporating IT into Pakistan's tourism industry, this research aims to improve the tourist experience by making tourism services more accessible.

To maximize the impact of this research, additional efforts should focus on broadening its scope to generalize findings across Pakistan, thereby adding more value to the tourism sector. The government must invest in ICT related to tourism, potentially through subsidies, while fostering collaboration between the public and private sectors to drive improvements in the tourism industry.

Creating awareness about the role of technology in the tourism sector will also play a significant role in developing tourism in Pakistan. Given the positive impact of tourism on the economy, the incorporation of ICT is poised to elevate the tourism sector, ultimately contributing to an increase in GDP and overall economic growth.

Recommendations

Pakistan should prioritize the development of tourism-focused applications and e-tourism initiatives to revolutionize its tourism sector. By leveraging digital platforms, such as mobile applications and virtual tours, Pakistan can significantly enhance the accessibility and attractiveness of its diverse tourist destinations. These digital tools can provide tourists comprehensive information about attractions, facilitate seamless travel planning, and offer immersive experiences that transcend geographical barriers. Moreover, embracing technology-driven solutions will enable Pakistan to effectively market its tourism offerings to a global audience, attract more visitors, and ultimately drive economic growth by generating revenue from tourism-related activities and services. Investing in app development and e-tourism initiatives can transform Pakistan's tourism landscape, making it more competitive, sustainable, and inclusive.

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