TOURISM IN DIGITAL INDIA, GOVERNMENT INITIATIVES AND THE NEED FOR AI-DRIVEN TRANSFORMATION: A STUDY OF KERALA, THE EMERGING KNOWLEDGE ECONOMY IN INDIA

Dr. Ratheesh K. R[1],Dr. Siji Cyriac[2],Dr. Somasekharan T. M[3],Dr. Aswathy A M[4],

Dr. Firos Khan M.C[5],Prof. (Dr.) Manoj P. K[6].

[1]*Assistant Professor and Academic Coordinator, Bharata Mata College (Autonomous)Thrikkakara, Kochi, Kerala – 682 021 (INDIA).*
[2]*Assistant Professor, St. Pius College, Rajapuram, Kasaragod, Kerala – 671 532 (INDIA).*
[3]*Head of the Department, Dept. of Commerce and Management, Amrita Vishwa Vidyapeetham, Kochi, Kerala– 682024(INDIA).*
[4]*Assistant Professor and IQAC Coordinator, Marian Academy of Management Studies (MAMS), Puthuppady, Kothamangalam, Kerala – 686 673 (INDIA).*
[5]*Associate Director, AIMER Business School, MKC Road, Kaithapoyil, Calicut – 673 586 (INDIA).*
[6]*Professor and Head, Department of Applied Economics, CUSAT, Kerala – 682 022 (INDIA).*

(Corresponding Author) (ORCID ID: https://orcid.org/0000-0002-5710-1086)

KEYWORDS

Sustainable Tourism, ICT, AI, Digital transformation, Government initiatives.

ABSTRACT

Tourism is a major contributor to the economic growth of India, including Kerala State – the southern-most State in India which is often projected as 'God's own Country' to highlight its exceptional natural beauty that could attract visitors across the world. Millions of visitors annually visit this emerging economy in South Asia because of its rich cultural heritage, scenic landscapes, and diverse ecosystems. Like many other developing nations, India too has been promoting tourism for its faster economic growth for the last few decades. As part of its thrust on ICT adoption India has embarked on a 'Digital India' policy that encourages ICT adoption in every sector of the economy and at all levels. Likewise, Kerala State, the southernmost State in the India has been using its brand 'God's own Country' globally to attract tourists. Moreover, just like the 'Digital India' drive at the national level, as a policy Kerala has accorded topmost priority for ICT integration and e-governance at the State level as it strives to transform this State into a 'knowledge economy' in the whole world. Globally, as the tourism sector evolves, technologies like ICT, particularly Artificial Intelligence (AI) and Robotics, offer unprecedented opportunities to enhance tourist experiences, improve operational efficiency, and drive sustainability. In the above context, this paper explores the opportunities for growth of Indian tourism with a focus on Kerala tourism, with special reference to AI, robotics, and sustainable practices. The study investigates the integration of advanced technologies, government initiatives, and local tourism policies, while providing actionable recommendations for enhancing Kerala's position as a global tourism hub.

INTRODUCTION

For the sake of tourism promotion, the State of Kerala in the Indian union, is often projected as '*God's Own Country*', this southernmost Indian State being globally renowned for its exceptionally beautiful natural environment, scenic backwaters, beaches, hill stations; and above all rich cultural traditions as well as global trade relations from the times immemorial. Tourism's potential for accelerating economic growth of nations is widely recognised. Government of India (GOI) as well as the State Governments within India including the Government of Kerala (GOK), are no exceptions to this global trend. While *Incredible India* is the India's band wagon in tourism promotion, the State of Kerala uses its global brand '*God's Own Country*' to parade its unique tourism resources before the whole world. While tourism contributes over 5 percent (5.2 percent, GOI estimates 2015-16), the same in respect of Kerala State is more than double of the above(viz. 12 percent, *Mission 2030*, Dec. 2023). Kerala

tourism gives employment to about 15 lakhs people in total, says *Mission 2030*, GOK. In the ongoing era of *Digital India* in India, ICT adoption is the new normal across all sectors of the economy, including the tourism sector. Similar to *Digital India* initiative of the GOI, at the State level Kerala seeks to transforms itself into a digital State, a *Knowledge Economy* before the whole globe. It projects itself as '*God's Own Country'* within such a global village.

With increasing competition in the global tourism industry, Kerala aims to remain a top destination by leveraging technological innovations and sustainable practices. This paper aims to examine the potential for AI, robotics, and eco-tourism to revolutionize Kerala's tourism sector while exploring the governmental role in supporting these changes. India, as a vast and diverse country, also presents opportunities for growth in tourism. The digital transformation of the tourism industry, with the adoption of AI and robotics, promises to offer tailored experiences for tourists, increase efficiency, and optimize resources for both tourists and tourism providers. Tourism has been an essential pillar of economic growth in India, particularly in Kerala, which is known for its rich cultural heritage, diverse ecosystems, and holistic wellness offerings. As tourism continues to evolve globally, the Indian and Kerala tourism sectors are leveraging government initiatives, technology, and AI to enhance visitor experiences and promote sustainable growth.

This paper explores the tourism initiatives of GOI and GOK, with a focus on adoption of ICT, artificial intelligence (AI), robotics, and other digital transformations in the tourism industry. Kerala, often celebrated for its rich cultural heritage and its notable achievements in literacy, healthcare and hospital services, gender equality and such other economic sectors, has been in the forefront in ICT adoption and other innovations in the tourism sector too.

LITERATURE REVIEW AND RESEARCH GAP

A tourism study of GOI (2019) *Regional Tourism Satellite Accounts (RTSA) 2015-16-Kerala*, undertaken by National Council of Applied Economic Research (NCAER), has noted the unique features of tourism in Kerala. This coastal State in the southernmost part of India is second (19.1 percent share) only to Maharashtra (19.5 percent share) in outbound tourists. A study by Dileep and Chandrasekhar (2019)'A Perspective Research on Information Systems in Tourism Sector in Kerala' in IJRTE has noted the vital need for ICT-integration including AI and such other modern technologies by Kerala tourism. A national level in India on ICT's role in economic growth, Manoj P.K (2007),"ICT industry in India: a SWOT analysis" has noted the vast growth prospects of ICT industry and this suggests the prospects of E-Commerce sector. At the global level, Pickens, M (2009) has clearly pointed out as to how a simple and relatively inexpensive ICT-based device (viz. Mobile phone) has been instrumental in empowering the masses, including rural women, in Philippines.

Chandran, C., and Bhattacharya, P. (2024).'Tourist's level of awareness and attitude about destination ecotourism development: a case study of Munnar, Kerala, India' have noted the need for ensuring environmental sustainability of tourism; and for promoting sustainable ecotourism in Kerala they have suggested the need for targeted awareness campaigns, community involvement, etc. Manoj, P.K. (2005),'Cost accounting systems in Banks-for strategic advantage through effective cost management' has noted the key need for applying scientific cost management by commercial banks and in another paper Manoj, P.K. (2005), 'Scientific pricing of bank products through cost accounting-a vital need in the LPG regime' the need for scientifically pricing the bank products. Manoj, P.K. (2014),"Role of ICT in Women Empowerment: A Study with a Focus on 'Kudumbashree' programme in Kerala State of India" has noted the vast scope of women-based empowerment programme *Kudumbashree* in empowering women through their SHGs. Manoj, P. K. (2015). "Financial inclusion through microfinance: A Study with a focus on the exposure of commercial banks in Kerala" has noted the need for promoting microfinance, especially with ICT-adoption also.Manoj (2010) "Impact of technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala" has observed that ICT-adoption by banks has made them more efficient. Manoj, P.K. (2013) "Prospects and Challenges of Green Buildings and Green

Affordable Homes: A Study with Reference to Ernakulam, Kerala" has noted the good growth potential of green homes as they can create huge employment avenues and can ensure fast and sustained economic growth. Many studies have focused on the need for sustained economic growth through diverse kinds of interventions, models and tools; right from educational loans to exports and from SEZs to ecotourism. Manoj, P.K. (2015) "International Container Transhipment Terminal (ICTT) and its impact on coffee exports from India: An analysis" has observed the vital role of ICTT to boost exports and economic growth. Manoj, P.K.(2017)"Segmentation Strategy for Promotion of Ecotourism Products: Evidence from Thenmala Ecotourism" the author has pointed out that meticulous planning using segmentation of tourists can lead to economic growth through ecotourism.

Rajesh and Manoj (2015) "Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala" have noted the crucial importance of a trade-off between job life and family life of employed women to improve the industrial relations. Manoj (2016)"Employment Generation from Rural Tourism: A Field Study of the Local Community at Kumbalangi, Kerala" has noted the vital capability of tourism to create employment avenues, along with suggestions like better infrastructure, ICT resources, online services, etc. Manoj (2016) "Real Estate Investment Trusts (REITs) for Faster Housing Development in India: An Analysis in the Context of the New Regulatory Policies of SEBI" has observed that innovations in financing models such as REITs are vital to bring about rapid development of India's housing status which could lead to faster development of the whole Indian economy, given the linkages of housing. Manoj (2016)"Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products" observed ICT-enabled marketing as a key need for India's banking sector in this digital era. A study by Lakshmi and Manoj (2017) "Service quality in rural banking in north Kerala: A comparative study of Kannur district co-operative bank and Kerala Gramin bank" has noted that KGB could make greater use of ICT than KDCB thus enabling the former to get a market edge. A paper by Lakshmi and Manoj (2017)"Rural Customers and ICT-based Bank Products A Study with a Focus on Kannur District Co-operative Bank and Kerala Gramin Bank" has observed that ICT-enabled services of Kerala Gramin Bank(KGB) have been accepted to a greater level than KDCB's non-ICT-enabled services. A joint study by Joju, Vasantha, and Manoj (2017) "Future of brick and mortar banking in Kerala: Relevance of branch banking in the digital era" has observed the vital need for 'human touch' as in 'brick and mortar' banking even if ICT or virtual banking is the new normal.

A study by Joju et. al. (2017) "Financial technology and service quality in banks: Some empirical evidence from the old private sector banks based in Kerala, India" has observed that Fin-Techs could significantly enhance quality of banking service and they have become essential for superior service delivery by banks. Manoj (2017) "Construction costs in affordable housing in Kerala: Relative significance of the various elements of costs of affordable housing projects" ordered the different elements of cost based on their relative priority for effective control of costs, and ICT has been noted to be a vital tool for effective cost control. Manoj (2017) "Cost management in the construction of affordable housing units in Kerala: A case study of the relevance of earned value analysis (EVA) approach" has demonstrated that EVA could be a powerful tool for effective control of construction costs. Another study by Joju et. al. (2017) "Electronic CRM & ICT-based banking services: An empirical study of the attitude of customers in Kerala, India" has noted the key significance of ICT-based banking practice called e-CRM (Electronic Customer Relationship Management) as an enabler of efficient and competitive banking, along with noting good feedback of customers to latest ICT-based products like e-CRM. Another CRM paper relating to bank management area by Manoj (2018) "CRM in old private sector banks and new generation private sector banks in Kerala: A comparison" has noted that CRM adoption by the new private sector banks (NPBs) being to a greater extent than that of the old private sector banks (OPBs) particularly in respect of the latest ICT-enabled or electronic version of CRM (e-CRM); thus

enabling the NPBs to get a clear competitive edge in the market vis-à-vis the OPBs. Manoj (2019) "Social banking in India in the reforms era and the case of financial inclusion: Relevance of ICT-based policy options" has suggested ICT-based strategic options to enhance social banking that fits into the current digital banking regime. Manoj (2019) "Dynamics of human resource management in banks in the ICT era: A study with a focus on Kerala based old private sector banks" observed the key relevance of ICT-enabled policies for the management as well as development of bank staff in this very competitive digital era. Manoj (2019) "Competitiveness of manufacturing industry in India: need for flexible manufacturing systems" pointed out the vital significance for adoption of ICT as well as other technological advances such as flexible manufacturing systems (FMS) so as to make Indian manufacturing more competitive, given the high globalization pressures.

Joju and Manoj (2019)"Digital Kerala: A study of the ICT Initiatives in Kerala state" have studied the major ICT initiatives in Kerala, the State in India with many unique 'firsts" like the topmost in internet penetration, topmost in literacy (universal literacy) etc. and has suggested strategies for the better use of Kerala's vast ICT potential for its faster development. Joju and Manoj (2019)"Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala" have observed ICT as an enabler of banking quality and as such ICT-adoption should be encouraged. Ali and Manoj (2020)"Impact of Falling Price of Rubber-A Case Study of KothamangalamTaluk in Ernakulam District" has pointed out that due to frequent price falls affect the livelihood of farmers and that governmental interventions like minimum support prices are vital. Manoj (2015) "Prospects of Responsible Tourism in Kerala: Evidence from Kumarakam in Kottayam District"has noted that responsible tourism (RT) has vast potential for supporting economic growth, if sustainably promoted. Manoj, P.K. (2016) [45] "Determinants of sustainability of rural tourism: a study of tourists at Kumbalangi in Kerala, India" has noted the key variables affecting tourism's sustainability in the rural context and also suggested strategies like upgrading digital (ICT) resources. Manoj, P.K.(2015),"Impact of Rural Tourism on the Environment and Society: Evidence from Kumbalangi in Kerala, India" noted certain adverse impacts that are imminent in rural tourism and that it is vital to control such effects. Manoj, P.K. (2023) "Housing Sector in India: An ESG Route into a Greener Future" has noted imminent need for an ESG approach for the long term sustainability of the housing sector in India".

Manoj (2019) "Tourism Sector in Kerala in the Post-Flood Scenario: Strategies for its Sustainable Growth With a Focus on Responsible Tourism" noted the key role that RT plays for revival of flood-hit Kerala. Manoj, P.K.(2015) "Housing Microfinance: A Study on Quality, Cost and Default Rate with Respect to Bhavanashree in Kerala" has noted that housing microfinance (HMF) type home loans have lower quality and that their transactional costs are higher. Manoj (2023) "Affordable Healthcare and Affordable Housing: Need for an Integrative Approach for the Holistic Growth of the Digital Economy of Kerala, India" has noted that a knowledge society like Kerala must promote housing and healthcare sectors holistically using ICT. A macro level analysis by Manoj, P.K.(2022)'ESG Reporting for Business Sustainability: Role of CMAs in Internal Audit' has noted the key benefits of ESG adoption for business sustainability in India in this ICT-oriented and globalised economic environment. Joju. et. al. (2023) "ICT for Enhanced Competitiveness of Micro Enterprises in Digital India: A Tool for Women Empowerment and Rural Development" have noted the key significance of using ICT for competitiveness and business growth. A study by R Nayar and PK Manoj (2023), "Special Education and Training for the Differently Abled In the ICT Era: Evidence from the Knowledge Economy of Kerala In Digital India" have noted that ICT adoption can be very effectively used in special education. Saritha, C.K and Manoj, P.K (2023) in Social inequalities in IT sector: Evidence from Kerala State in India" have identified significant inequalities in Kerala's IT sector and accordingly have suggested strategies to combat this menace based on their study findings. Manoj et.al. (2023) "ICT and Women Empowerment in Digital India: A Global Perspective" have noted that going by international experiences and success stories

women empowerment demands digital transformation in every walk of like, whether in self-employment or in service or in family. A study by Joju. et. al. (2023), "ICT for Promotion of Retail Banking in Digital India: A Study with a Focus on Housing Finance", have noted that ICT-integrated processes and systems, and ICT-based marketing of retail banking are vital in this ICT era. The need for ESG adoption coupled with ICT-integrated development policies has been pointed out by Manoj, P.K. (2023) in Housing Sector in India: An ESG Route into a Greener Future; as an ICT-enabled development paradigm in sectors like housing accelerates the economic growth. The need for an integrative approach to healthcare and housing has been pointed out in a study by Manoj, P. K. (2023). Affordable Healthcare and Affordable Housing: Need for an Integrative Approach for the Holistic Growth of the Digital Economy of Kerala, India; wherein the utmost need for adopting ICT-based techniques and processes is specially noted. A study by Manoj, P.K. (2023) ICT For Sustained Community Development in India in the 5G Era, has noted the crucial need for adopting ICT advances in accelerating the pace of social and community development in India. The need for ICT-integration and AI adoption for the players in housing finance has been noted by Manoj, P. K (2024) in Housing finance by banks and housing finance companies in India: A review, because such ICT-based tools ensure superior quality customer service and competitiveness. Saroj Kumari et. al. (2023) in "Health Monitoring Based Cognitive IOT Using Fast Machine Learning Technique" have proved that ICT-based technologies like IOT (Internet of Factors) could be used meaningfully for effective health monitoring and better standard of living. A paper in *RBI Bulletin* (2024) by Chattopadhyay, S.K. et. al., "New Digital Economy and the Paradox of Productivity" has critically studied ICT's role as a driver of productivity growth. It is noted that ICT capital could really support output and labour productivity growth during the post-liberalisation period (1980-2000), with some moderation thereafter; thus refuting Solow's productivity paradox. All these studies underscore ICT's key role in economic growth.

Despite many studies on tourism including a few that look into ICT's role in tourism sector, studies dealing with Governmental initiatives on tourism promotion with a focus on the need for ICT-integration and AI adoption are rare. This is the research gap for this study.

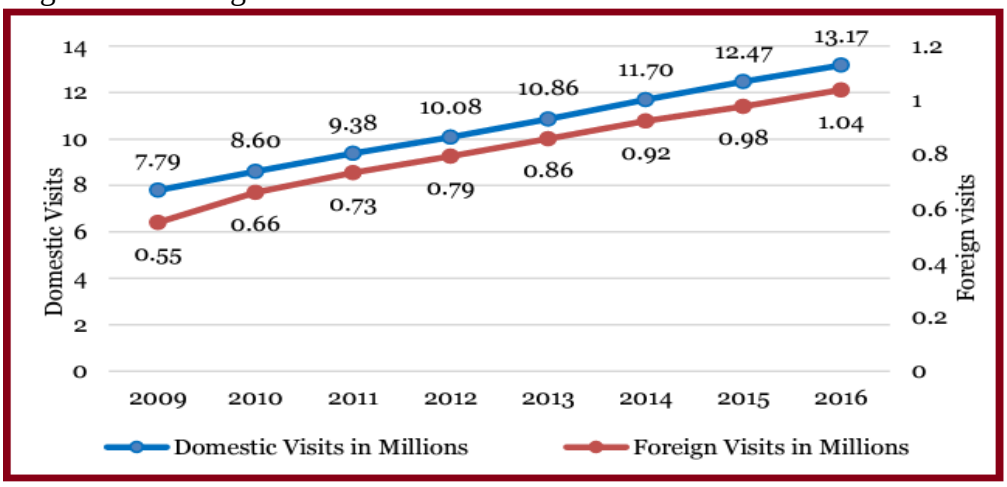
STATEMENT OF THE PROBLEM

In view of the widely acknowledged fact that tourism accelerates economic growth, nations like India, mostly the developing nations, have been keen in encouraging their tourism sector, and also attracting the tourists. Earnings from tourists, especially those from foreign tourists, i.e. the so called FEEs (Foreign Exchange Earnings), have a significant role in accelerating the growth in tourism sector and hence the economy as a whole, given the vast linkage effects of tourism – both forward and backward. The huge employment creation of this key sector is another attraction for a State like Kerala with abundance of highly qualified and technically skilled manpower. As of 2024, as high as 15 lakhs employment opportunities are created by Kerala tourism. As fast technological advances, like ICT and its allied forms i.e. AI, roboticsetc. are creating revolutionary changes in every walk of life, this paper seeks to explore the opportunities for growth of Indian tourism focusing on Kerala tourism, with special reference to the adoption of AI, robotics, and various sustainable tourism practices. Thus, this study seeks to investigate closely the issue of integrating advanced technologies, government initiatives, and local tourism policies, for the purpose of providing actionable recommendations for enhancing Kerala's position as a global tourism hub.

SIGNIFICANCE OF THE STUDY

There was consistently growing trend in both domestic tourist arrivals (DTAs) and foreign tourist arrivals (FTAs) to India as a whole as well as the State of Kerala in specific during the pre-Covid era. (Figure I). In the post-Covid scenario, while DTAs have attained normalcy the case of FTAs is still very poor. Unless the FTAs also reach its pre-Covid status and improve further, the economic growth of the region (like, Kerala) and the whole nation (say, India) may not pick up fast; because higher FEEs would mean higher GDP and economic growth.

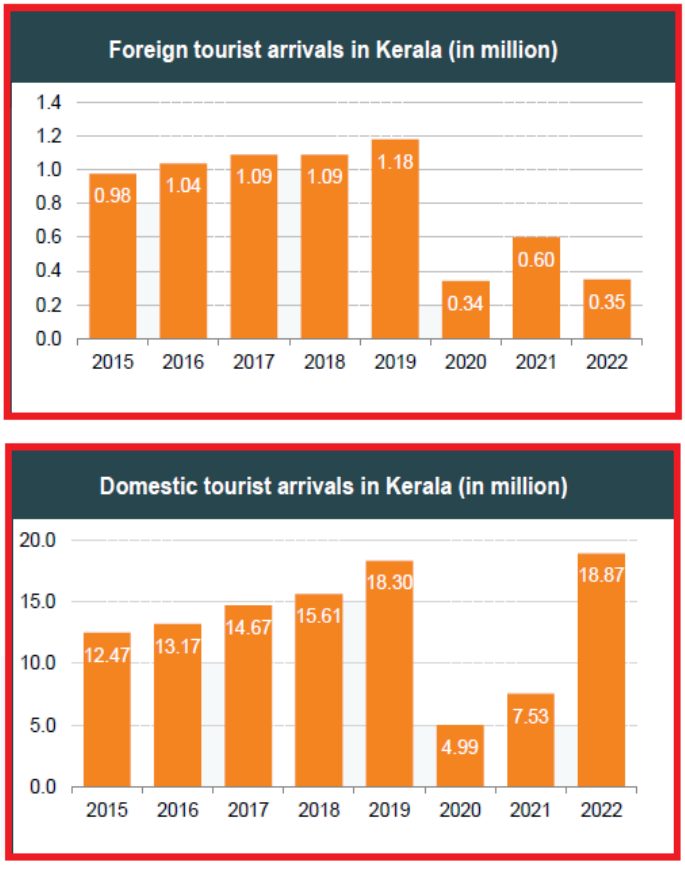
Figure I: Growing Trend in DTAs and FTAs to Kerala – Pre-Covid Scenario



Source: GOI (2019), *India: Regional Tourism Satellite Accounts, 2015-16 Kerala*.

In the post-Covid scenario, the DTAs to Kerala could gradually catch up growth momentum, reach the pre-Covid threshold figure and even surpass the same by 2022; and this is evident from a DTA 18.3 million in 2019 and a higher figure of 18.87 million in 2022. This gradual recovery to the pre-Covid levels and even exceeding the same is clear from Figure II. However, in respect of FTAs to Kerala which is a vital determinant of FEEs the situation is still very discouraging, and the number of foreign tourists that fell drastically in the wake of Covid-19 is yet to pick up growth momentum and even after three years since the onslaught of Covid-19 attaining the normalcy in respect of FTAs. This poor trend needs to be corrected, normalcy needs to be regained vis-à-vis the pre-Covid scenario and also further growth too as is the case with DTAs to Kerala. Then only higher FEEs and hence faster growth of the economy through a vibrant tourism sector can be attained in the Kerala context. (Figure II).

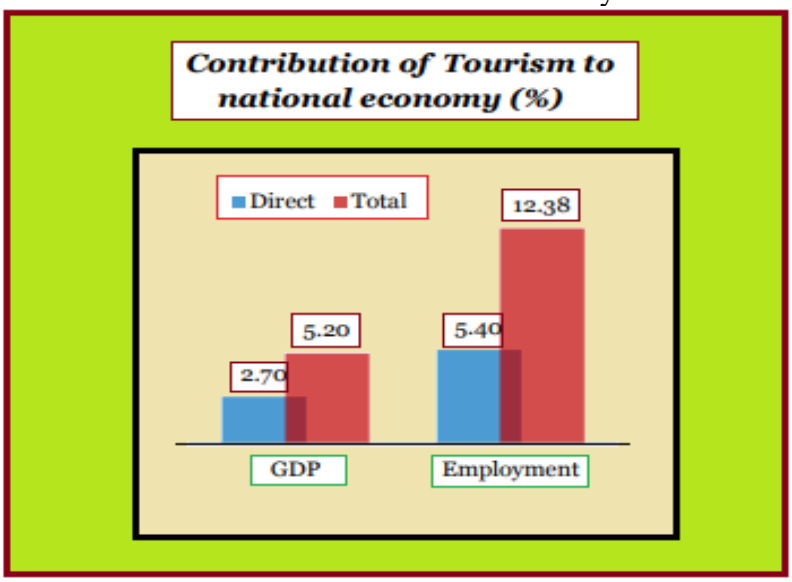
Figure II: Trend in DTAs and FTAs to Kerala– Pre and Post Covid.



Source: IBEF (2024), *Kerala*, Aug. p.37.

The role of more aggressive adoption of ICT and its variants like AI, robotics for the purpose of tourism promotion and hence suitably revising the extant tourism policies of the Government on the desired ways with the ultimate aim of attaining sustainable and inclusive growth of Kerala tourism and hence the whole Kerala economy is significant in the above context. And, this in turn needs to be done within the broader framework of Indian tourism and the national priorities of the Government of India (GOI) and the GOI's tourism policy, GOI's ICT policy (like, *Digital India*, for instance). Besides the immediate need for attaining normalcy with the pre-Covid level in respect of FTA, there is the long-term need of ensuring sustained economic development of the State through tourism promotion in a systematic manner. This is because of the fact that the contribution of Kerala's tourism sector to the State's GDP (i.e. GSDP of Kerala) is about 12 percent which in turn is more than double the national average for India as a whole which is only 5.2 percent. This suggests the superior growth potential of Kerala tourism vis-à-vis Indian tourism. Similarly, the potential for creating employment is also very high in the Kerala context which is 23.5 percent as against 12.38 percent at the national level, i.e. India as whole. Thus, Kerala's tourism sector could contributes more than double to the State's GSDP compared with the contribution Indian tourism sector to India's GDP. So also, the percentage of employment created by Kerala tourism to the total employment generated in the State is also about double the percentage share of employment created by India's tourism sector to the total employment created in India. (Figure III). The above facts suggest high analytical significance of the current paper.

Figure III: Contribution of Tourism to India's national economy.



Source: GOI (2016). *Third TSA for India - 2015-16.*

OBJECTIVES OF THE STUDY

1) To make an overall study of the dynamics of tourism in India in the ongoing era of *Digital India* with a focus on Kerala State, the fast emerging *Digital Economy* in India;
2) To closely study the government initiatives and policies on tourism and to explore how ICT integration, including the adoption of AI, robotics etc., can propel tourism growth.
3) To check whether AT-powered services enhance satisfaction of tourists in Kerala.
4) To make suggestions for the effective use of ICT advances, including AI and robotics, for the faster, inclusive and sustainable growth of tourism in India, especially in Kerala.

METHODOLOGY OF THE STUDY

The present study used a mixed-methods approach by combining the qualitative interviews with key tourism stakeholders and quantitative surveys to understand the opportunities and challenges within Kerala's tourism sector.

This study used primary as well as secondary data. Primary data were collected using field surveys. Using personal interviews with 300 tourists, 100 tourism industry professionals (hoteliers, tour operators, and government officials), and 50 personnel involved in policymaking relating to tourism and hospitality sector in Kerala, the relevant primary data were collected. The specific views of the respondents regarding the use of advanced ICT-based technological advances (including AI, robotics etc.) in tourism, their tourism experiences, and the suitability and adequacy of the Government initiatives etc. were sought to be analysed using such personal interviews. Secondary data were collected from authentic sources, like, the reports of the Department of Tourism of the GOI and GOK, international agencies like UNWTO, reputed research agencies like Statista, IBEF etc. Using these sources statistical data on the trends in tourism, technological innovations, Government initiatives on tourism promotion etc. were collected. The data collected were analysed using the computer-based statistical package, SPSS. The key survey findings were summarised so as to understand tourist preferences, awareness of AI-driven initiatives, and their satisfaction with sustainable tourism practices in Kerala. Chi-Square analysis was used to assess the relationship between the integration of AI technologies and customer satisfaction in Kerala's tourism industry. Besides, regression analysis was used to explore the correlation between government support, technological adoption, and the growth of Kerala's tourism industry.

RESEARCH QUESTIONS

This paper is exploratory in nature and is also descriptive-cum-analytical. Due to its exploratory nature no specific hypothesis has been framed, rather some research questions are sought to be answered. The research questions set for this research are as follows:

(i) What are the features of the Government's tourism initiatives and its future vision?
(ii) What are the details regarding the adoption of ICT (including AI, robotics) in tourism?
(iii) Whether AI-powered services lead to greater satisfaction of the tourists in Kerala?
(iv) What are the strategies for sustained tourism development in this era of ICT and AI?

ANALYSIS AND DISCUSSION

World Tourism Initiatives: Leveraging Technology and Sustainability

Globally, governments and tourism bodies are implementing AI, robotics, and sustainable practices to transform the tourism landscape.

AI and Digital Transformation in Global Tourism: AI is increasingly being adopted in the global tourism sector for tasks such as personalized travel planning, real-time customer service, and predictive analytics for demand forecasting. Countries like Japan and Singapore are at the forefront of integrating AI-driven solutions in tourism.

Sustainability and Green Tourism: Many countries have adopted sustainable tourism practices, promoting eco-friendly travel options and reducing the environmental impact of tourism activities. The European Union, for example, has incentivized sustainable tourism through various funding programs. The major facts in this regard are given in Table I.

Table I: Use of Robotics in Hotels and Resorts

Region	Key Initiative	Impact
European Union	Green tourism initiatives, sustainability standards	Increased eco-friendly tourism options
Japan	AI-powered travel services, smart destinations	Improved visitor experience through automation
Singapore	Sustainable city tourism, carbon-neutral initiatives	Promoted responsible tourism on a global scale

Source: UNWTO (2023), European Commission (2022), Japan Tourism Agency (2023).

AI and Robotics in Global Tourism: AI and robotics have made significant strides in the global tourism industry. According to a 2022 report by the World Tourism Organization (UNWTO), AI technologies, such as personalized recommendation engines, virtual assistants, and

chatbots, are becoming key drivers in shaping customer experiences. Robotics applications, such as automated concierge services, robotic room attendants, and smart luggage handling, are expected to revolutionize hospitality and tourism operations.

Kerala's Position in the Tourism Market: Kerala has positioned itself as a leader in eco-tourism and wellness tourism, with a rich tradition of Ayurveda and sustainable travel experiences. According to Kerala Tourism's 2023 report, the state attracted over 10 million tourists in the previous year, contributing significantly to the state's GDP. However, with growing competition from other global destinations, Kerala needs to embrace advanced technologies to retain its competitive edge.

Government Initiatives in Kerala Tourism: The Kerala government has already recognized the potential of AI and digital transformation. Through initiatives like the "Responsible Tourism Mission" and "Sustainable Kerala," the state aims to balance economic growth with environmental sustainability. Kerala's Department of Tourism has partnered with technology companies to develop AI-driven platforms that offer personalized travel recommendations and improve tourism-related infrastructure.

Government of India Initiatives in Tourism

India has taken various steps to boost the tourism sector, focusing on infrastructure, promotion, and innovation. Key programs initiated by the Indian government aim to elevate the country's position on the global tourism map, enhance domestic tourism, and increase the number of international visitors.

Swadesh Darshan Scheme: The Swadesh Darshan Scheme was launched to develop and promote tourism in thematic circuits across India. These circuits focus on various aspects of tourism such as coastal, heritage, and adventure tourism. This scheme seeks to develop theme-based tourist circuits for enhancing the tourism infrastructure across India. The impact of this scheme is that it could create world-class facilities in tourist hotspots, drawing domestic and international visitors. The major details of this scheme are given in Table II.

Table II: Major Features of Swadesh Darshan Scheme

Tourism Circuit	Allocated Funds (Rupees)	Year of Launch
Coastal Circuit	150 Crore	2020
Buddhist Circuit	250 Crore	2020
North East Circuit	300 Crore	2021
Himalayan Circuit	200 Crore	2021

Ministry of Tourism, Govt. of India (2023).

Dekho Apna Desh Campaign: This initiative promotes domestic tourism, encouraging Indian tourists to explore their own country rather than travelling abroad. The campaign targets both leisure and business travellers. This scheme seeks to encourage Indians to travel within the country, promoting the unique cultural and natural diversity of India. The major impact of this scheme has been that it could help to boost local tourism, especially in regions that were previously underdeveloped for tourism.

Incredible India 2.0: An upgraded version of the Incredible India campaign, focusing on niche tourism segments such as medical tourism, adventure tourism, and wellness retreats. The basic objective of this scheme is to position India as a premier global destination for niche tourism segments. Its major impact has been that it could ensure increased international interest in India's wellness tourism, particularly Ayurveda. Table III gives its details.

Table III: Major Features of Incredible India 2.0

Tourism Initiative	Focus Areas	Impact
Medical Tourism	World-class healthcare services	Boost in foreign tourists
Wellness Tourism	Ayurveda, Yoga, Spiritual retreats	Growth in wellness tourism
Adventure Tourism	Trekking, water sports	Increased youth participation

Ministry of Tourism, Govt. of India (2023).

Government of Kerala Initiatives in Tourism

Govt. of Kerala (GOK) has long been a leader in promoting sustainable and responsible tourism. GOK tourism initiatives focus on local community participation, sustainable tourism development and embracing technological advancements. Some of these are discussed below.

Responsible Tourism Mission (RTM): The Responsible Tourism Mission in Kerala was launched to promote eco-friendly tourism practices while ensuring the welfare of local communities. The mission focuses on developing green infrastructure and involving locals in tourism services such as homestays and cultural tours. RTM seeks to encourage sustainable and responsible tourism with a focus on environmental conservation and community benefits. Regarding its impact, it ensured higher participation of local communities in tourism, enhancing their income and preserving Kerala's natural and cultural heritage. (Table IV).

Table IV: Major Features of RTM under GOK

Area of Focus	Key Actions	Impact
Eco-friendly Tourism	Promoting green certifications for businesses	Growth in sustainable tourism operators
Community Involvement	Local community-driven initiatives (e.g. homestays)	Increased local income generation
Waste Management	Reduction of plastic usage in tourism hotspots	Cleaner, more sustainable destinations

Source: Kerala Tourism Department (2024).

Kerala Tourism 2030 Vision: Kerala's Tourism 2030 Vision seeks to position the state as a global leader in sustainable tourism, utilizing cutting-edge technology to improve the visitor experience. This vision outlines the adoption of AI, digital platforms, and smart tourism solutions to create a seamless and personalized experience for visitors. The above vision document of the GOK seeks to leverage AI, data analytics, and smart technologies to enhance Kerala's tourism infrastructure. Its impact includes improvement in Kerala's rankings as a tech-driven tourism destination, enhancing the tourist experience. The salient features of *Kerala Tourism 2030* Vision are given in Table V.

Table V: Major Features of Kerala Tourism 2030 Vision

Key Objectives	Digital and AI Focus Areas	Expected Outcome
Smart Infrastructure	IoT-enabled services, smart signage	Improved infrastructure management
AI Integration	Virtual tour guides, AI-powered travel assistants	Personalized travel experience
Sustainability	AI-driven waste management, carbon footprint reduction	Eco-friendly, low-carbon tourism

Source: Kerala Tourism Department (2024).

Kerala Tourism Development Corporation (KTDC) Initiatives: KTDC has invested heavily in tourism infrastructure, including resorts, hotels, and cultural centers. These investments aim to improve Kerala's appeal as a luxury, wellness, and adventure tourism destination. KTDC's objectives include enhancing Kerala's luxury and adventure tourism offerings, particularly in eco-tourism and wellness sectors. The impact of KTDC's initiatives include higher foreign and domestic tourist arrivals due to increased infrastructure quality. The major features of KTDC's initiatives are given in Table VI.

Table VI: Major Features of KTDC's Tourism Initiatives

KTDC Initiatives	Investment	Target Area	Expected Outcome
Ayurvedic Wellness Resorts	Rs. 150 Crore	Wellness Tourism	Growth in international wellness tourism market
Adventure Tourism Infrastructure	Rs. 100 Crore	Adventure Tourism	Increased youth engagement in outdoor activities
Cultural Heritage Centres	Rs. 80 Crore	Cultural Tourism	Preservation of Kerala's traditional arts and culture

Source: Kerala Tourism Development Corporation (2024).

Artificial Intelligence (AI) in Kerala Tourism

The integration of AI and robotics has the potential to revolutionize the tourism sector, improving operational efficiency and creating novel visitor experiences.

AI-Powered Travel Assistance Systems: AI-powered travel assistance systems, such as chatbots and virtual assistants, are being implemented in Kerala's tourism platforms. These systems provide tourists with personalized itineraries, real-time information, and booking services. Such systems seek to use AI to streamline tourism services, reduce wait times, and provide tourists with personalized experiences. Their impact include enhanced convenience for tourists and operational efficiency for service providers. The details are given Table VII.

Table VII: AI-Powered Systems in Kerala

AI Service	Features	Impact
Virtual Tour Assistants	24/7 assistance, personalized itineraries	Increased engagement and satisfaction
AI Chatbots	Real-time responses, booking assistance	Improved customer experience

Source: Kerala Tourism Department (2024).

Robotics in Hotels and Resorts: Robotic systems are being integrated into Kerala's luxury hotels and resorts, assisting with tasks such as room service, concierge services, and event management. These systems aim to reduce human workload while enhancing customer service. Robots seek to use robots to automate routine tasks, allowing staff to focus on more complex customer needs. Its outcome includes improved guest satisfaction and increased operational efficiency. The features of robotics in hotels and resorts are given in Table VIII.

Table VIII: Use of Robotics in Hotels and Resorts

Robot Service	Features	Impact
Service Robots	Delivering food, providing information	Improved operational efficiency, quicker service
Concierge Robots	Assisting with check-ins, bookings	Streamlined service delivery

Source: Kerala Tourism Department (2024).

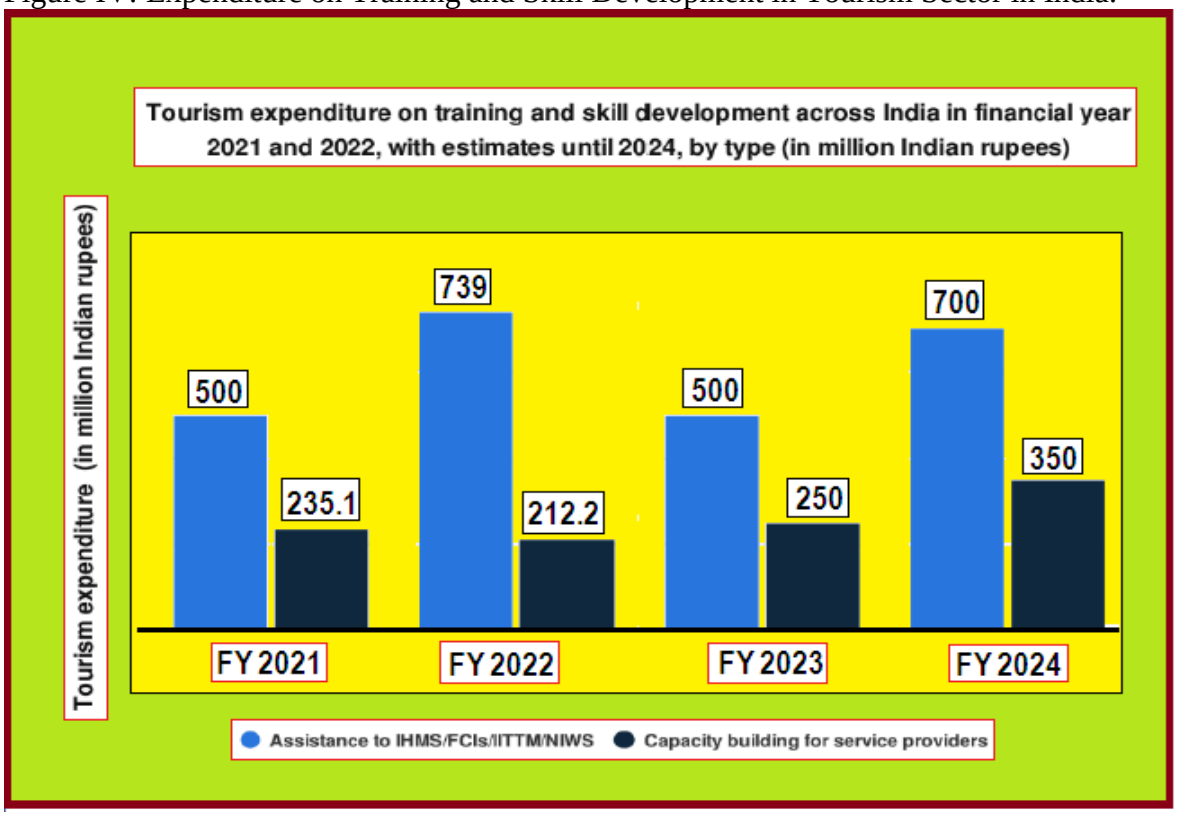
Advent of ICT and AI-Powered Systems: Training and Development inTourism

In view of the rapid advancements in ICT-integration and adoption of the modern technological platforms like AI and Robotics in the tourism sector in India, there is the need for huge training requirements and that too on an ongoing basis so that those involved in tourism-based services are maintained abreast of the changes in this most dynamic ICT field. The expenditure anticipated in training and skill development in the tourism sector in India is quite substantial and such an expenditure is essential in the current scenario so as to maintain the competitiveness of the individual players in this vital sector.

The huge expenditure involved for the training and development in tourism sector in India include two broad items viz. (1) the financial assistance granted to the institutes like, the IHMSs (Institute of Hotel Management Studies) in India; and (2) Capacity Building training imparted to the service provided to the service providers in this vital sector. According to a

recent estimate (2023) by M/s. Statista, Rs. 500 Million is the estimated expenditure towards the financial assistance required to be granted to institutions like IHMSs and such other institutions, as of 2023. A half of this amount may be required for capacity building of the respective service providers, i.e. Rs.250 Million. And, as of the next years viz. 2024, the estimated tourism expenditure in India for the purpose of training and development would be Rs.700 Million towards the financial assistance and a half of that i.e.Rs.350 Million towards providing capacity building training to service providers. Figure IV gives the details.

Figure IV: Expenditure on Training and Skill Development in Tourism Sector in India.



Source: Based on *Statista*data.

In the Kerala scenario, superior IT resources and other infrastructure facilities have already been put in place by the Govt. of Kerala (GOK). These ICT and allied resources, including human resources (e.g. trained manpower) and also the concomitant IT infrastructure facilities (like, internet penetration) need to be effectively used for the purpose of tourism promotion in this State. The relevant Governmental policies of the GOK or the State Government need to be suitably revised so as to incorporate the imminent need for ICT adoption, including the need for adoption of AI, Robotics etc. The present ICT infrastructure of the GOK (Exhibit I) needs to be effectively utilized by engaging personnel who have been imparted the right training including the capacity building training. Then only the huge ICT infrastructure in Kerala can be optimally utilised. (Exhibit I).

Exhibit I: ICT Infrastructure being developed in Kerala State in India.

- The phase I of KFON project is envisages to provide internet connection to 30,000 Government institutions and offer free internet to 20 lakh economically backward families and internet services at a lower rate for others. At present 26993 offices were connected through KFON , 3345 BPL families were provided with free internet connectivity
- 2792 Akshaya Centres are functioning across the State giving employment to 8509 persons.
- Completed installation of 2023 Wi-Fi hotspots and nearly 15 lakh unique mobile users are availing the facility. Per day data consumption is up to 8 TB.
- Techno Park has become the largest employment base campus in Kerala and with the commissioning of Technopark Phase III; it became one of the largest IT parks in India with 380 acres of land, 10.6 million square feet built-up area.
- The number of tech start-ups eco system in 2021-22 is 3650 as compared to 3143 in 2020-21.

Source: GOK (2024), *Economic Review*, p.236.

MAJOR FINDINGS OF AN EMPIRICAL STUDY IN KERALA

Descriptive Statistics: A field survey conducted on 300 respondents comprising of 220 males and 80 females indicated a growing interest among tourists in AI-driven experiences, with 70 per cent expressing interest in personalized travel guides powered by AI and 55 per cent interested in robotic concierge services. Additionally, 60 per cent of industry professionals felt that AI could improve customer satisfaction and operational efficiency in the tourism sector. It was noted that majority of tourists have responded positively towards the adoption of AI-powered tourism services. The details are given in Table IX.

Table IX: Satisfaction of Tourists with AI-Powered Services

Experience with AI-Powered Services	Male	Female	Total Respondents	Percentage
Positive Experience	188	52	240	80.00
Negative Experience	32	28	60	20.00
Total	220	80	300	100.00
p-value	0.032			

Source: Field Survey Data

Chi-Square Analysis: A Chi-Square test was performed to assess the relationship between the use of AI technologies in tourism and customer satisfaction. The results showed a statistically significant association ($\chi^2 = 14.76$, $p < 0.01$), indicating that tourists who interacted with AI-powered services reported higher satisfaction levels.

Table X: AI Technologies and Customer Satisfaction in Kerala

AI Technology	Level of Satisfaction (Per cent)
Personalized Travel Guides	78
Robotic Concierge Services	85
AI-Driven Virtual Assistants	80
Chi-Square Analysis	$\chi^2 = 14.76$ p-value < 0.01 (significant)

Source: Test Results based on Field Survey Data

Regression Analysis: Regression analysis revealed that government support, technological infrastructure, and the adoption of AI-driven platforms were strong predictors of tourism growth. Specifically, for every unit increase in government investment in AI infrastructure, tourism growth increased by 1.5 per cent.

SUGGESTIONS BASED ON THE FINDINGS

Based on the findings of the study, the following suggestions are made in order to maximize the opportunities in Kerala's tourism industry.

- *AI-Powered Personalized Travel Experiences:* It is suggested to develop AI-driven mobile apps that offer personalized travel recommendations, dynamic itineraries based on individual preferences, and real-time updates for tourists. Such platforms can provide tourists with tailored experiences, enhancing satisfaction and increasing tourist

engagement with Kerala's diverse offerings. Example: An app like "Kerala Travel AI Assistant" could recommend specific cultural events, restaurants, and eco-tourism activities based on user preferences and real-time data (such as weather conditions, crowd levels, etc.).

- Robotics in Hospitality and Tourism Services: It is suggested to invest in robotics for concierge services, automated check-ins at hotels, and AI-powered chatbots for seamless customer service. This will not only improve service efficiency but also position Kerala as a futuristic and tech-savvy destination. Example: The introduction of robots like "Pepper" in high-end hotels and tourist attractions for customer engagement, check-ins, and information dissemination.
- *Eco-Tourism and Green Certifications:* It is suggested that Kerala should strengthen its position in the global eco-tourism market by offering green certifications to environmentally conscious businesses. This will encourage hotels, resorts, and travel agencies to adopt sustainable practices, such as reducing waste, conserving water, and promoting renewable energy. Example: The "Green Kerala Certification" for eco-friendly tourism businesses could become a recognizable symbol, attracting tourists who prioritize sustainability.
- *Community-Based Eco-Tourism Projects*: It is suggested to encourage more and more community-based tourism initiatives, where local communities are actively involved in tourism activities, thereby ensuring the economic benefits are shared among local stakeholders. These initiatives should be marketed as authentic, experiential travel opportunities. Example: In places like Munnar or Wayanad, local communities could host tourists for nature walks, tea farm visits, and traditional cooking experiences, thereby promoting cultural exchange and sustainability.
- *Digital Infrastructure and Smart Tourism Solutions:* Recommendation: Invest in smart tourism infrastructure, including digital ticketing systems, real-time monitoring of tourist hotspots, and seamless online platforms for bookings. This will reduce tourist frustrations and make planning a trip to Kerala easier and more efficient. Example: Kerala could introduce an integrated digital platform that enables tourists to book accommodations, transport, and tours in one place, providing them with complete control over their travel plans.
- *Promotion of Wellness and Ayurveda Tourism*: Recommendation: Expand Kerala's wellness tourism offerings by integrating AI-driven wellness consultations and personalized Ayurveda treatments. The state can position itself as a leader in global wellness tourism by combining ancient practices with modern technologies. Example: Wellness resorts could integrate wearable health devices with personalized Ayurveda treatments, enabling tourists to receive tailored wellness plans based on the real-time health data of the tourists.
- *Training and Development on an Ongoing Basis*: Given the ever-changing nature of the technological advances in ICT and allied fields including AI and Robotics, periodical training needs to be imparted to the tourism personnel at all levels, so that they all become abreast of the changes in the field. Only the personnel with the right technical skills, including the soft skills (like, the language and interpersonal skills) would be successful in a highly competitive industry like tourism in this era of ICT and AI. Thus, training and skill development in the use of all relevant technologies is an imperative in the tourism sector. In Kerala, the requisite ICT resources and infrastructure being already in place, imparting of training and skill development would be relatively easy.

SUGGESTIONS BASED ON THE FINDINGS

The tourism industry in Kerala and India is poised for significant growth, driven by the integration of AI, robotics, and sustainable tourism practices. The Kerala government has already laid the foundation for this transformation through strategic initiatives aimed at digitalizing tourism and promoting eco-friendly travel. By continuing to innovate and invest in

technologies that enhance the tourist experience and operational efficiency, Kerala can very effectively and meaningfully solidify its position as a leading global tourism destination. Training and skill development may be required on a continuous basis to ensure high level of competitiveness for the human resources in this sector, as the foreign tourists, new generation customers etc. are highly discerning and they expect more from tourism service providers.

BIBLIOGRAPHY

Chandran, C., Bhattacharya, P. (2024). Tourist's level of awareness and attitude about destination ecotourism development: a case study of Munnar, Kerala, India. *Environment, Development and Sustainability*, 26 (10). 26607-26622.

Dileep, M. R., and Chandrasekhar, K. S. (2019). A perspective research on information systems in tourism sector in Kerala. *International Journal of Recent Technology and Engineering (IJRTE)*, 8.2S10.927-934. (DOI: 10.35940/ijrte.B1155.0982S1019).

Govt. of India (GOI). (2024). *India: Regional Tourism Satellite Accounts, 2015-16 Kerala*. Ministry of Tourism. New Delhi. (https://tourism.gov.in/)

Manoj PK (2007). ICT industry in India: a SWOT analysis. *Journal of Global Economy*, 3(4): 263–282. (doi: 10.1956/jge.v3i4.143.)

Pickens, M (2009). Window on the unbanked: Mobile money in the Philippines. https://www.cgap.org/sites/default/files/CGAP-Brief-Window-on-the-Unbanked-Mobile-Money-in-the-Philippines-Dec-2009.pdf

Manoj, P.K. (2005). Cost accounting systems in Banks-for strategic advantage through effective cost management. *The Management Accountant.* 40(7). 534-537.

Manoj, P.K. (2005). Scientific pricing of bank products through cost accounting-a vital need in the LPG regime.*The Management Accountant.* 40 (11). 890-896.

Manoj, P.K. (2014).”Role of ICT in Women Empowerment: A Study with a Focus on 'Kudumbashree' programme in Kerala State of India”. *International Journal of Information Technology & Computer Sciences Perspectives.* 3(2). 938-947.

Manoj, P. K. (2015). “Financial inclusion through microfinance: A Study with a focus on the exposure of commercial banks in Kerala”. International Journal of Entrepreneurship Business Environment Perspectives, 4(1). 1508-1519

P.K. Manoj (2010). “Determinants of profitability and efficiency of old private sector banks in India with focus on banks in Kerala state: An econometric study”. International Research Journal of Finance and Economics, 47. 7–21

P.K. Manoj (2010). “Benchmarking housing finance companies in India: Strategies for enhanced operational efficiency and competitiveness”. *European Journal of Economics, Finance and Administrative Sciences*, 21.21-34.

P.K. Manoj (2010).“Impact of Technology on the efficiency and risk management of old private sector banks in India: Evidence from banks based in Kerala”. *European Journal of Social Sciences*, 14(2), 278-289.

P. K. Manoj (2010). “Prospects and problems of housing microfinance in india: Evidence from Bhavanashree project in Kerala State”. *European Journal of Economics, Finance and Administrative Sciences*, 19.178–194.

S. Rajesh.,and PK, Manoj (2013). Job satisfaction and quality of work life: Impact on industrial relations in textile units in kannur district, Kerala. *Indian Journal of Applied Research*, 3 (11), 305-308

Manoj, P.K. (2015). International Container Transhipment Terminal (ICTT) and its impact on coffee exports from India: An analysis. *International Journal of Trade and Global Business Perspectives*, 4(3):1872-1875.

Manoj, P. K. (2009). Revival of Indian agriculture for sustainable development: a global perspective. *Asian Journal of Environmental Science*, 4 (2), 249-257.

Manoj, P. K. (2017).Segmentation Strategy for Promotion of Ecotourism Products: Evidence from Thenmala Ecotourism. *South Asian Journal of Socio-Political Studies*, 18(1). 112-119.

Narayan, P., & Suman, V. (2021). AI-driven tourism: Benefits and challenges for the Indian hospitality industry. *Asian Tourism Studies Journal*, 8(3), 130-142.

Manoj, P.K.(2016), "Impact of Rural Tourism on the Environment and Society: Evidence from Kumbalangi in Kerala, India". *International Journal of Advance Research in Computer Science and Management Studies*, 4(2). 148-159.

S Rajesh and Manoj P.K (2015). Women Employees work life and challenges to Industrial Relations: Evidence from North Kerala. *IPASJ International Journal of Management*, 3.(4).1-8.

P.K. Manoj (2016). Real Estate Investment Trusts (REITs) for Faster Housing Development in India: An Analysis in the Context of the New Regulatory Policies of SEBI. *International Journal of Advance Research in Computer Science and Management Studies*, 4(6), 152-167.

P.K Manoj (2016). Bank marketing in India in the current ICT era: Strategies for effective promotion of bank products. *International Journal of Advance Research in Computer Science and Management Studies*, 4 (3), 103-113.

Lakshmi and Manoj, P.K. (2017). Service quality in rural banking in North Kerala: A comparative study of kannur district co-operative bank and Kerala Gramin bank. *International Journal of Applied Business and Economic Research*, 15(18), 209-220.

Lakshmi and Manoj, P.K. (2017). Rural customers and ICT-based bank products: A study with a focus on kannur district co-operative bank and kerala gramin bank. *International Journal of Economic Research*, 14(14), 423-434.

Jacob Joju, Vasantha, S. and P.K. Manoj. (2017). "Future of brick and mortar banking in Kerala: Relevance of branch banking in the digital era". *International Journal of Civil Engineering and Technology*, 8(8), 780-789.

Jacob Joju, Vasantha, S. &Manoj, P.K. (2017). "Financial technology and service quality in banks: Some empirical evidence from the old private sector banks based in Kerala", India, India. *International Journal of Applied Business and Economic Research*, 15(16), 447-457.

Manoj, P.K. (2017). "Construction costs in affordable housing in kerala: relative significance of the various elements of costs of affordable housing projects". *International Journal of Civil Engineering and Technology*, 8(9), 1176-1186.

Manoj, P.K. (2017). "Cost management in the construction of affordable housing units in kerala: A case study of the relevance of earned value analysis (EVA) approach. *International Journal of Civil Engineering and Technology*, 8(10), 111-129.

J Joju, S Vasantha, PK Manoj (2017). Electronic CRM & ICT-based banking services: An empirical study of the attitude of customers in Kerala, India. *International Journal of Economic Research*, 14 (9), 413-423.

Manoj, P.K. (2018). "Crm in old private sector banks and new generation private sector banks in kerala: A comparison". *Journal of Advanced Research in Dynamical and Control Systems*, 10 (2 Special Issue), 846-853.

Manoj, P.K. (2019). "Social banking in India in the reforms era and the case of financial inclusion: Relevance of ICT-based policy options". *Journal of Advanced Research in Dynamical and Control Systems*, 11(7 Special Issue), 1654-1666.

Manoj, P.K. (2019). "Dynamics of human resource management in banks in the ICT era: A study with a focus on Kerala based old private sector banks". *Journal of Advanced Research in Dynamical and Control Systems*. 11(7 Special Issue), 1667-1680.

Manoj, P.K. (2019). "Competitiveness of manufacturing industry in India: Need for flexible manufacturing systems". *International Journal of Innovative Technology and Exploring Engineering*. 8(12). 3041-3047. (DOI: 10.35940/ijitee.K2452.1081219).

J Joju and Manoj PK (2019).Digital Kerala: A study of the ICT: Initiatives in Kerala state. *International Journal of Research in Engineering, IT and Social Sciences*; 9: 692-703.

J Joju and P K Manoj (2019). Banking Technology and Service Quality: Evidence from Private Sector Banks in Kerala, *International Journal of Recent Technology*, 8 (4), 12098-12103.

Ali, O.P. and Manoj, P.K. (2020). "Impact of falling price of rubber-a case study of kothamangalamtaluk in Ernakulam district". *Indian Journal of Economics and Development*, 16(1), 118-124.

Manoj, P.K. (2019). Tourism Sector in Kerala in The Post-Flood Scenario: Strategies For Its Sustainable Growth With A Focus on Responsible Tourism. *Think India Journal*. 22 (33). 167-174.

Manoj, P.K.(2015). Housing Microfinance: A Study on Quality, Cost and Default Rate with Respect to Bhavanashree in Kerala. *International Research Journal of Finance and Economics*. 139. 7-20.

Kerala Tourism. (2022). *Responsible tourism mission: A step towards sustainable travel*. Kerala Tourism Department.

Kerala Tourism Development Corporation. (2023). *Annual report: Growth and challenges in Kerala's tourism sector. Kerala Tourism*.

Kumar, S., & Bansal, A. (2023). AI-powered tourism experiences: A case study of Kerala's tech initiatives. *Journal of Tourism and Technology*, 5(2), 114-125.

OP Ali., & PK Manoj. (2018), "A review of current noticeable trends in institutional credit to agriculture in India". *ZENITH International Journal of Business Economics & Management Research*, 8(6).13-27.

PK Manoj, Lakshmi, S Krishna & R Sebastian.(2023)."Women empowerment in digital India and the Kerala knowledge economy". *Academy of Marketing Studies Journal*,27 (1). 1-11.

Manoj, P.K. (2022). ESG Reporting for Business Sustainability: Role of CMAs in Internal Audit. *The Management Accountant*, 57 (7). 68-71.

J Joju, RV Palanivel, J Balu, PK Manoj, TC Sijin. (2023). "ICT for Enhanced Competitiveness of Micro Enterprises in Digital India: A Tool for Women Empowerment and Rural Development". *Academy of Marketing Studies Journal*, 27(5). 1-16.

R Nayar, PK Manoj (2023). "Special Education and Training for the Differently Abled In the ICT Era: Evidence from the Knowledge Economy of Kerala In Digital India". *Academy of Marketing Studies Journal*, 27 (1).1-16.

Saritha, C.K & Manoj, P.K (2023). "Social inequalities in IT sector: Evidence from Kerala State in India". *Environment and Social Psychology*, 8(2). 1-13. DOI: 10.54517/esp.v8i2.1644.

PK Manoj, S Krishna, J Jacob, R Sebastian, & Lakshmi. (2023). "ICT and Women Empowerment in Digital India: A Global Perspective". *Academy of Marketing Studies Journal*, 27 (2 Spl), 1-10.

Govt. of India, Ministry of Tourism. (2022). *National tourism policy: Embracing digital transformation and sustainability*. Ministry of Tourism, India.

Govt. of Kerala. (2023). *Sustainable Kerala: A blueprint for tourism and environmental sustainability*. Kerala Department of Tourism.

J Joju, GK Sankar, K Ranjith, PK Manoj, K Prajith. (2023). "ICT for Promotion of Retail Banking in Digital India: A Study with a Focus on Housing Finance". *Academy of Marketing Studies Journal*, 27 (5). 1-18.

Manoj, P.K. (2023). Housing Sector in India: An ESG Route into a Greener Future. *The Management Accountant*. 58 (3). 51-55.

Manoj, P. K. (2023). Affordable Healthcare and Affordable Housing: Need for an Integrative Approach for the Holistic Growth of the Digital Economy of Kerala, India. *Community Practitioner*. 20(9). 412-435.

Manoj, P.K. (2023) ICT For Sustained Community Development in India in the 5G Era. *Community Practitioner*. 20 (12). 340-356

Manoj, P. K (2024). "Housing finance by banks and housing finance companies in India: A review".*Environment and Social Psychology*, 9(6). 2601

Sarojkumari, Shrinivasa, MD Souza, S Padmalal, VM Reddy, PK Manoj. (2023). "Health Monitoring Based Cognitive IOT Using Fast Machine Learning Technique". *Journal of Data Acquisition and Processing*, 38(1).405-417.

Sharma, R., & Patel, N. (2022). Robotics in hospitality: Enhancing tourist experiences in India. *International Journal of Hospitality Management*, 42(6), 145-159.

Thomas, R., & George, J. (2020). Sustainability and eco-tourism practices in Kerala: A modern outlook. *International Journal of Tourism and Sustainability*, 6(4), 210-225.

IBEF (2024) (India Brand Equity Federation). *Tourism and Hospitality*, Industry report. Aug.

RBI (2024), Chattopadhyay, S.K., Sengupta, S. and Joshi, S. "New Digital Economy and the Paradox of Productivity". *RBI Bulletin,* Oct.271-279. (https://rbidocs.rbi.org.in).

RBI (2024) *Report on Trend and Progress of Banking in India,* Reserve Bank of India, Mumbai, Dec. (www.rbi.org.in).

UNWTO. (2022). *AI in tourism: Opportunities and challenges*. United Nations World Tourism Organization.

World Economic Forum. (2021). Shaping the future of tourism through AI and robotics. *World Economic Forum Insights*.

World Bank. (2023). *AI and robotics in tourism: The future of hospitality*. World Bank Publications.