A Study on the Assessment of Customer Readiness toward the Adoption of Technological Innovations in Indian Tourism Sector

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Abstract. The research aims to explore the positive and negative impact of customer intention (CI) to use technology in India's tourism sector. The study proposes a framework and Structural Equation Modeling is applied to determine the validity of the model and hypotheses are tested. This research uses mixed-method research where both qualitative and quantitative data are taken. The results showed that perceived ease of use, innovativeness, and benefits lead to customers' intention to use innovative technologies in tourism. Insecurity, unemployment, cyber security, and people unwilling to use technology are the main factors influencing the perceived risk of technology use in India.

Keywords: technological tools, covid-19, tourism industry, technological advancements, information technology, customer intention, India

1. Introduction

Technology can simply be defined as the proper application of scientific knowledge and understanding for resolving practical problems. Technology has changed the way the tourism industry operates and delivers its products/services. The tourism industry is an amalgamation of various small sectors, and collective efforts which make it possible for customers to travel. The tourism industry involves a wide range of products and services including transportation, accommodation, tour operators, information services, amusement centres, events, and so on. Innovative technologies have made the daily operations of the tourism sector way easier than before; according to Google's data, individuals visit at least 22 tourism-related websites before planning any vacation. 70% of business travelers rely on their mobile phones to get updates about their bookings. Likewise, tourism companies also depend on various technological tools such as social media, websites, smartphone applications, VR, etc. to reach their targeted audience and to ease their operations (Khudoyberdievich 2020). This paper aims to discuss the impacts of such technological advancements and customer readiness on the Indian tourism industry. The worth of the travel and tourism industry in India was $234bn in 2018 and it is expected to reach $460bn by the year 2028. The predicted annual growth rate is 6.9% (Invest India 2022).

This study will discuss how far the Indian tourism sector is ready to adopt innovative technological tools to ensure business growth. Based on the provided data it can be said that the Indian tourism industry has a lot of growth potential. This paper will try to understand in which ways technology has helped or will help the tourism sector to grow in the future. It will also evaluate the need of the customers and their ability to adopt technological tools. This study can guide companies associated with the Indian tourism sector to improve or adjust their technology-related strategies in accordance with the actual situation and demands of the modern age.

This paper aims to discuss the multifarious impacts of technological advancements on the Indian tourism Industry.

The objectives of this paper are:

- To identify the ways in which technology can ease the daily operations of the tourism sector.
- To discuss the challenges that technology can pose in front of the Indian tourism industry.
- To evaluate the impact of technology on the customers of the Indian tourism sector.

The question of this research is:

- What are the positive and negative impacts of innovative technological advancements and the level of customer readiness in the Indian tourism industry?

Technological advancement has provided the organisations in the tourism industry with numerous opportunities for satisfying the needs of the customers in this industry. Covid-19 has had a significant negative impact on the profitability of the organisations within this industry and therefore, it has become essential to focus on embracing proper strategies for determining the best possible ways of getting back to the normal state by addressing the persisting problems. In this regard, the study will analyze the ways technological advancements including AI, IoT and so on have influenced the tourism industry and the ways these will aid in addressing the operational issues in the industry. The study has explored the ways the organisations in this sector could be benefitted through the implementation of different types of technologies.

2. Literature Review

2.1. Technological advancements and the tourism industry

The tourism industry is one of those that adopted the industry 4.0 trends; which means the adoption of technologies to enhance operations and service experiences. With the help of Big Data Analytics, the Internet of Things, Artificial Intelligence, Augmented Reality, Virtual Reality, and Location-specific services, the tourism sector is conducting many of its operations automatically (Stankov and Gretzel 2020). The extensive use of information technologies in the tourism sector is known as smart tourism which provides customers with new tools for communication, data collection, information exchange, and analysis, etc. They can make decisions more conveniently using search technologies, digital travel distribution channels, and social media forums (Gretzel 2015).

Information Technology (IT) related tools such as telecommunication tools and computers, enable tourism companies to collect, communicate and store relevant information in various forms such as images, audio, texts, numbers, etc. IT has massively improved the internal efficiency of tourism sector organisations. IT makes it easier for the management to coordinate different types of activities such as HRM, marketing, operation, etc. which ultimately leads to better customer experiences. IT is responsible for changing customer behaviour (43%), partner networks (46.7%), and core competencies (37.2%) of tourism companies (Mosleh and Nosratabadi 2015).

Covid-19 significantly disrupted the operations of the tourism industry; the arrival of international tourists declined by 22% due to quarantine rules, travel restrictions, transport ban, and border closure. Under such circumstances, technology has played a key role in helping the tourism industry survive. Digital

technology has been adopted by many companies; Wi-Fi 6 and 5G technologies improved the system quality; Artificial Intelligence, Facial Recognition techniques, and Robots help companies to conduct their businesses in accordance with the social distancing norms (Lau 2020).

Artificial Intelligence offers insightful and customised services to customers; tourism companies can learn about customers' interests, inclinations, and behaviours with the help of AI. Previously customers had to meet travel agents physically and communicate with them for hours to provide them with the details of customers' preferences. However, those days are gone now (Samala et al., 2020).

Robotic technology is gaining huge popularity in several levels of the tourism sector; Robots exist in the tourism industry in three different forms, namely Industrial Robots (e.g. cooks, bartenders, and entertainers), telepresence devices (Unmanned Area Vehicles, Robot Avatars, etc.) and Robotic Assistance and Guide. Japan's 'Henn Na Hotel' relies on robots to welcome guests in the reception (multi-lingual robots), provide check-in guidance and assistance, store luggage, carry luggage to rooms and so on. However, such strategies also affect the aspect of human touch in the hospitality industry (Alexis 2017).

Virtual Reality and Augmented Reality technologies can immerse the human brain in a world of computer-generated images and experiences. People start feeling that what they are experiencing is another version of reality. Implementation of this technology in the tourism sector is still under development. These technologies can be used as entertainment, booking, translation and education tool. Companies can test the potential impacts of their upcoming plans and policies on the real world depending on the world created by VR and AR. They can be used for enabling customers to experience a property before actually vising them. AR can be used in back-office operations and marketing activities too (Nayyar et al., 2018).

With changing needs of customers, the tourism industry has entered the Era of Big Data (EBD). Big data is Information and Communication Technology (ICT) based development; it depends on multisource and heterogeneous data sets. Big data technology is all about storing information, and processing and analysing those gathered data. The tourism sector gathers data from several hotels, suppliers, carriers etc. and understands customers' unique needs and demands by analysing those data sets. It helps them offer more satisfying and personalised services to customers (Zhang et al., 2021).

2.2. Disadvantages of technological advancements

The adoption of technologies can pose several challenges in front of tourism companies. A wide range of tourism-related companies such as travel agencies, hotels, tour operators, rental agencies, cruisers etc. are relying on information technology to increase their operational efficiency. However, every single innovation in IT changes the way these companies operate and develops strategies.

Such changes affect customer behaviours deeply and compel tourism companies to incorporate those changes in their systems. Customers these days mostly make decisions depending on data collected from travel websites, websites of travel agencies and suppliers etc. Therefore, companies are also bound to adopt ICT-based business models (Januszewska et al., 2015).

The adoption of technologies has turned the tourism sector into cyberspace where stakeholders such as tour operators, customers, and suppliers can meet one another without physical proximity. At the same time, it is becoming challenging for tourism sector companies to protect their clients against cyber threats. Cyber threats include identity theft, internet fraud and so on that leave detrimental impacts on the image of any tourism company if not handled efficiently. Cyber security threats are of four types, cybercrime (malicious activities), cyber terrorism (utilising system vulnerabilities to attain political goals), cyber espionage (gathering data unnecessarily) and cyber warfare (trying to gain military advantages). Uncontrolled utilisation of technologies exposes both customers and companies to cyber security threats. Therefore, making customers and employees aware of the potential security risks is essential for preventing any such events. Companies should collect all relevant data concerning security threats, develop formal security procedures, update security plans and crisis management plans at regular intervals and make sure that employees and managers have proper qualifications to deal with cyber security challenges (Magliulo and Wright 2014).

Excessive use of technology can prevent job creation and lead to unemployment. With the help of technology companies can perform several activities in a time and cost-efficient manner that used to be performed by humans previously. At the same time, the use of technologies will create different types of the current workforce that might fail to perform. Therefore, in such cases, companies should invest a huge budget in training and development activities so that the employees can successfully cope with the changes (Samala et al., 2020).

2.3. Changes in customer experiences

Even though technology can elevate the quality of customer services significantly, it can also disrupt the essence of experiences that tourists actually expect. Due to technologies, virtual and physical objects are overlapping. Competing companies and services managed by AI are making it difficult for tourists to understand which services can serve their interests in the best possible manner. The primary goal of many technological tools is not serving customers, but the companies. Besides, interactive technologies are often not human-centred at all. Added to that, problems such as information overload, technostress, dehumanisation of tourist experiences, cyber security risks, and human rights violation issues should also be taken into consideration (Stankov and Gretzel 2020).

Technology is a tool that tourism companies and customers can collectively use for value co-creation. With the help of modern technologies customers share insightful information with their family, friends and peers and such words are taken as a suggestion. Tourism companies can use customers as major brand protagonists, provided they are fully satisfied with the services. When customers promote a brand, then the effectiveness of marketing campaigns increase significantly. However, if the customers are not satisfied completely then they can negatively affect the image of a brand using the same information technology (Agrawal and Rahman 2015).

According to a recent report by Statista, globally 4.66 billion people use the internet actively which is 59.5% of the total global population. Among the active users, 92.6% access the internet through their mobile phones. 4.15 billion people in the world use social media (Statista 2023). However, the situation is not easy for elderly people. As per Eurostat, 87% of elderly adults (over 75) have never been online in their lives. 9% of elderly adults have severe visual impairments that make it difficult for them to the information technologies (Isolation 2022).

Based on the entire discussion it can be said that the advancement of technologies has opened a doorway of opportunities in front of the tourism sector. It helped the tourism sector survive during the period of lockdowns. However, it also poses several challenges in front of the tourism sector; especially when it comes to cyber security. It can also negatively affect the way individuals experience their tours. Besides, people from all age segments are not equally comfortable with technologies. The tourism sector needs to take these aspects into consideration while developing strategies and policies for organizations.

3. Research Methodology

3.1. Research philosophy, hypothesis and framework

This study proposes a research model shown in figure 1, the Conceptual framework of the research and aims to understand the positive and negative impacts of technological advancements and customer intention to use technology in the Indian tourism sector.

Answering the research question in the most appropriate manner is the primary objective of this study. Therefore, the pragmatism research philosophy will be applied to this paper. The pragmatism research philosophy holds that the research question is the most important factor in any research and should consider only those data that are important to successfully answer the research question. It also ensures various ways of interpreting data and events, as there is no single approach that understands a situation from all possible perspectives. In reality, it combines the qualities of positivism and interpretivism research philosophies (Maarouf 2019).

Based on the selection of the research philosophy, it can be said that abductive research would be the best possible choice for this study. The research approach

helps researchers to outline the strategies using which they will collect and interpret data. In the case of the abductive research approach, researchers try to gather unexplained and surprising data (Levin-Rozalis 2010). Once the data collection is done, they try to explain those data using different kinds of tools such as cognitive reasoning and statistical reasoning.

The goal of this paper is to identify the challenges and advantages that the tourism industry is currently facing in India. For this paper, the exploratory research design will be relied upon. Exploratory research design works best when the selected research topic is vastly unidentified or not defined clearly (Ponelis 2010). Even though the tourism industry is one of the oldest industries in the world, the impacts of emerging technologies on this sector need to be explored deeply. Therefore, the exploratory design will be appropriate for this paper. However, in future explanatory studies need to be conducted on this topic for developing a better understanding.

3.2. Data collection

As mentioned already, answering the research question is the sole purpose of this research. Therefore, different types of data will be collected from different sources. Since it is mixed-method research both qualitative and quantitative data will be used. Qualitative data will be taken from authentic secondary sources such as trusted websites, newspapers, journal articles, etc. only relevant and recent (post-2018) data will be used to draw any conclusion.

Quantitative data was collected from 175 individuals that work for the tourism industry in different positions at different places. A large number of participants have been selected for reduction of risks associated with the inclusion of biases in responses from the participants, Further, it has aided in collecting a wide array of data that aided in generating proper results.

Following that, the questionnaire survey is conducted to understand the way people associated with the Indian tourism sector perceive technology in general. The questionnaire will be formed based on the points discussed in the Review of the Literature section. The Sample for this research will be selected based on the 'Convenience Sampling' method. People that are available and easily accessible will be asked to take part.

The primary goal of collecting qualitative data is to identify the current trends in the Tourism sector. Therefore, the 'Thematic Analysis' method will be applied which will help in identifying the repetitive and common patterns and themes in the collected data (Williams and Moser 2019). The thematic analysis would aid in the development of proper relationships amongst the variables and research objectives resulting in a proper understanding of the ways technological advancements can influence the tourism industry. Primary data will simply be presented using charts.

Data will be described and presented in a textual format. This analysis method is known as the 'Descriptive Statistics' method.

3.3. Hypotheses

- Hypothesis 1 (H1): Perceived ease of use of the technology positively influences perceived benefits for the tourism industry.
- Hypothesis 2 (H2): Innovativeness positively influences the perceived benefits of technology usage for the tourism industry.
- Hypothesis 3 (H3): Insecurity related to technology use positively influences perceived risks for the tourism industry.
- Hypothesis 4 (H4): Challenges related to technology use positively influence perceived risks for the tourism industry.
- Hypothesis 5 (H5): Perceived benefits associated with technology positively influence customer intention to use technology in tourism.
- Hypothesis 6 (H6): Perceived risks associated with technology negatively influence customer intention to use technology in tourism.
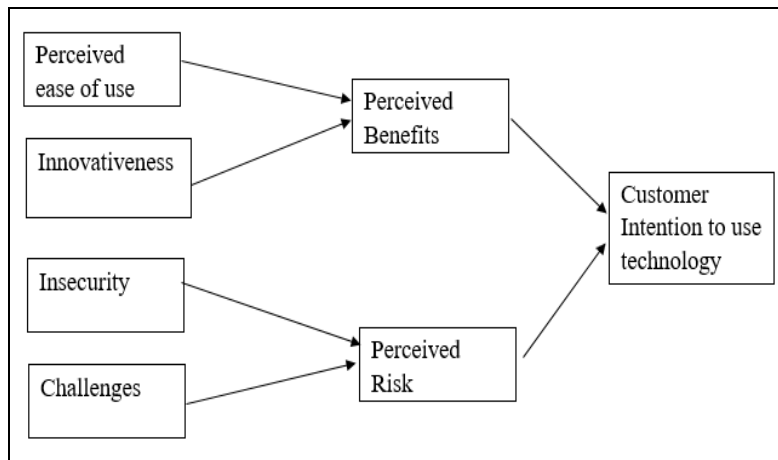

Fig. 1: Conceptual framework of the research

4. Analysis and Interpretations

The table includes demographic details like gender, age, educational qualifications, and years of experience of the respondents of a sample size 175. The collected quantitative data is analysed and the demographic details of respondents are shown in Table 1.

Table 1: Demographic details of the respondents (N=175)

Measures	Items	Frequency	Percentage
Gender	Male	120	68.5
	Female	55	31.5
Age	Below 25 years	27	15.5
	25- 34 years	99	56.5
	35- 44 years	45	25.5
	45- 54 years	4	2.5
Education Qualifications	High school	19	11
	Bachelor's degree	67	38
	Master's degree	75	43
	Professional Degree	10	5.5
	Ph.D. Degree	4	2.5
Years of experience	0-2	25	14.2
	3-5	80	45.7
	6-8	41	23.6
	>8	29	16.5

(Source: Primary Survey)

4.1. Exploratory factor analysis

EFA is a statistical procedure that is used to analyze the underlying theoretical structure of phenomena by reducing it to a smaller number of summary variables. Kaiser–Meyer–Olkin (KMO) tests determined sample adequacy before analysis. The KMO statistic is 0.828, which is above the required cut off 0.60. This indicated an adequate sample for factor analysis. The Bartlett test of sphericity was significant at 1%, supporting adequacy.

The current study used Principal component analysis with Varimax rotation to conduct the EFA. Using the factor selection criteria of Eigenvalue> 1, seven factors were retrieved explaining 78.276% of the total variance; this is a promising sign for further analysis.

4.2. Reliability and validity assessment

Cronbach's alpha and Composite reliability (CR) were used to determine the internal consistency for the proposed scale items. As defined by Hair et al., (2010) study alpha and CR values equal to or above 0.70 confirmed the reliability of the data. From the data in table 2, it can be concluded that both the values are greater than 0.70, assuring the proposed scale is reliable.

The Average Variance Extract (AVE) values greater than 0.5, assured the convergent validity. In order to determine if the constructs being measured are unrelated, the discriminant validity test is applied. Maximum shared variance (MSV) > average variance (AVE) is the test for this. The discriminant validity criteria are satisfied because all MSV values are less than AVE.

Table 2: List of constructs with factor loadings and cronbach's alpha

Factor		Loadings	Cronbach's alpha	CR	AVE	MSV
Perceived ease of use (PE)	Technology can positively contribute to the growth of the tourism sector	0.853	0.835	0.842	0.640	0.244
	More customers are likely to use technology with the perceived ease of use	0.818				
	The customer's technological experiences improve with the perceived ease of use	0.825				
Innovativeness (IN)	Technology can create a new imagining experience	0.872	0.911	0.911	0.773	0.213
	Brings the virtual reality effects instantly	0.878				
	The different feel of customer service	0.875				
Perceived benefits (PB)	Technology can improve customers services experiences (e.g. VR, AR)	0.788	0.866	0.867	0.621	0.263
	Technology can properly coordinate different aspects of tourism services (bookings, check-ins, etc.)	0.743				
	Technology helps in better decision-making (big data)	0.812				
	Technology can decrease the workload by the automation process	0.827				
Insecurity (IS)	Rapid changes create an environment of	0.798		0.842	0.641	0.242

	uncertainty		0.842			
	It puts businesses and customers at risk of different kinds of cybercrime.	0.827				
	Panic scenario for people with limited awareness of technology	0.862				
Challenges (C)	It limits the human factor in the tourism and hospitality sector	0.868	0.891	0.892	0.675	0.209
	The unwillingness of people to use technology	0.832				
	Technology imposes the threat of unemployment	0.805				
	Funds for technological advancements	0.873				
Perceived risk (PR)	The use of technology in tourism would involve security and privacy risk	0.810	0.851	0.852	0.657	0.242
	Customers are sceptic about the technological tools	0.816				
	Customer lack of awareness regarding the technological tools	0.836				
Customer intention to use (CI) technology	I intend to use technology while traveling in future	0.817	0.900	0.901	0.751	0.263
	I predict I will use the latest technology for tourism purposes	0.873				
	I will strongly recommend others to use technology for travel & tourism	0.837				

4.3. Hypotheses testing using SEM model

The proposed hypothesis of the study was tested using the Maximum likelihood estimation method of Structural equation Modelling. The structural model to derive the influence of various factors on customer intention to use technology in the tourism industry along with significance test results were mentioned in table 3. The criteria for acceptance of the hypothesis are based on a significant p value of less than 0.05 and a critical ratio (C.R.) value above 1.96. The path which fulfills this criterion was considered a significant relationship. The Standardized path coefficients (regression weights) denoted by β indicate the impact of the predictor variable on outcome variables higher the β value stronger the impact.

By referring to Table 3 and Figure 2, it is concluded that the standardized path coefficient (β) of perceived ease of use on perceived benefits of technology in tourism is 0.362 with p value less than 0.05, confirming the significant positive impact of technology ease of use perceived by the customers. Hence, hypothesis H1 was accepted.

Another factor influencing perceived benefits of technology is innovativeness, which is having $\beta = 0.340$, since p value less than 0.05 with CR > 1.96, confirming the acceptance of hypothesis H2.

The two factors influencing the perceived risk of technology in the tourism industry are insecurity and challenges of technology usage. The findings indicate that insecurity ($\beta = 0.421$, p= 0.000) and challenges ($\beta = 0.367$, p= 0.000) have a positive and significant impact on the risk perceived by the customer. Thus, hypotheses H3 & H4 are supported.

Finally, from the two determinants of customer intention to use technology in travel and tourism, perceived benefits have a significant positive impact on Customer intention for usage. The standardized coefficient of this path is 0.437 with p=0.000 and C.R.= 5.446, therefore, hypothesis H5 was accepted. However, the standardized coefficient of the path from perceived risk to customer intention to use technology is -0.401. The CR value is -4.990 with p<0.000, confirming that perceived risk negatively influences CI, therefore hypothesis H6 was approved.

The coefficient of determination (R^2) value is 0.352, for CI inferred 35.2% of the variation in CI explained by perceived benefits and risks associated with tourism technologies.

The results are expressed as follows for the purpose of forecasting the measurement model's goodness-of-fit index: Results: CFI =0.96, GFI =0.910, AGFI =0.840, NFI =0.876, TLI =0.955, RMSEA = 0.046, DF =224, CMIN/DF =1.409. The CFI, GFI, and TLI values are all greater than 0.9, suggesting a good model fit, and the bad indicator index RMSEA value is less than 0.08, showing that the proposed structural model generally fits the data well.
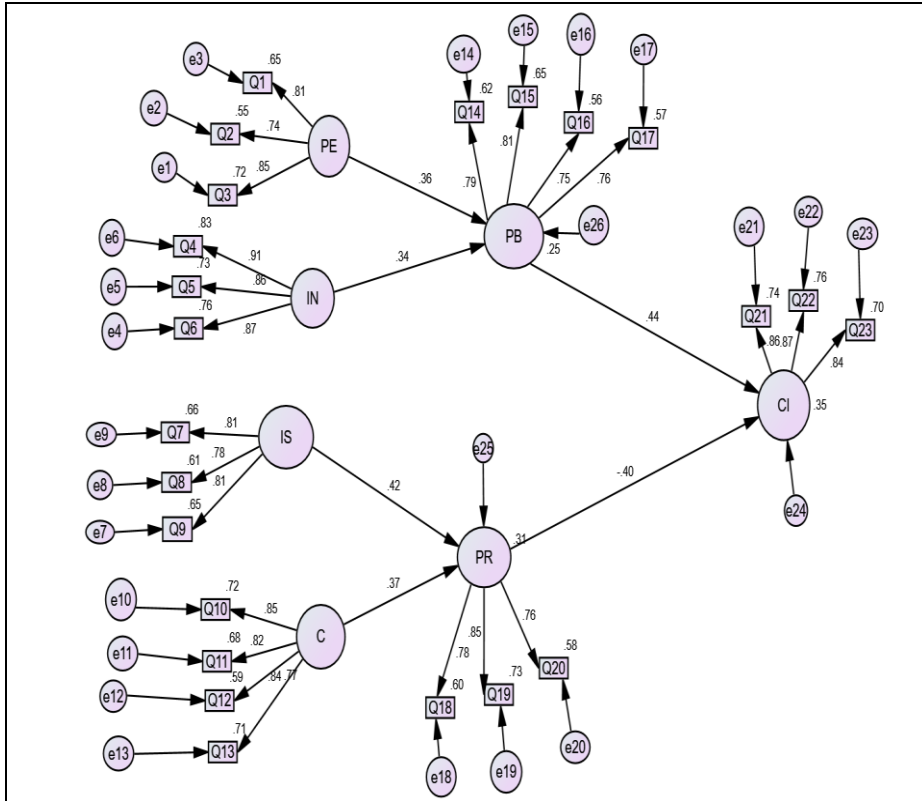
Fig. 2: Casual structure

Table 3: Path coefficients of the structural model

Hypotheses				Standardized Regression Weights	S.E.	C.R.	P	Results
H1	PB	<---	PE	0.362	.074	4.263	***	Supported
H2	PB	<---	IN	0.340	.070	4.222	***	Supported
H3	PR	<---	IS	0.421	.079	4.845	***	Supported
H4	PR	<---	C	0.367	.097	4.421	***	Supported
H5	CI	<---	PB	0.437	.103	5.446	***	Supported
H6	CI	<---	PR	-0.401	.115	-4.990	***	Supported

*Note: P refers to the differential probability. ***: P<0.000*

5. Findings and Discussion

5.1. Qualitative data

Theme 1: Government Initiatives and Support to Facilitated Technological Advancement

The Indian government is playing a leading role in incorporating technology in the tourism and hospitality industry. As per a very recent report published by the Economic Times, the Ministry of Tourism has started the digitisation process of the hospitality and tourism sector during the Covid-19 pandemic. Arvind Singh, the tourism secretary said, digitisation is a crucial factor that can unify the tourism operations in India. Such an approach will increase competitiveness in this industry (Kumar 2021). The government also launched the NIDHI project that stands for, National Integrated Database of Hospitality Industry. This project is a part of the Aatmanirbhar Bharat mission; the goal is to use technology to empower Indian businesses. NIDHI registration guarantees the electronic delivery of different types of benefits and services to hospitality entities (National Integrated Database of Hospitality Industry 2022). Therefore, it can be said that the incorporation of technologies in the tourism sector is being considered seriously even by the national government.

Theme 2: Covid-19 and its Impacts on the Indian Tourism Industry

Covid-19 has affected the tourism industry severely; on 24th March 2020 the government imposed a nationwide lockdown on Indians; at the same time, all tourist visas got suspended. Social distancing norms have become a common practice in Indian tourism (Arshad et al., 2021). Labour shortage is another impact of Covid-19. During the first quarter of 2020, 14.5 million jobs were lost in the Indian tourism sector (Mathur 2021). Based on the literature review it can be said that the Indian Tourism industry should adopt technologies under such circumstances as technological tools can help them conduct business operations staying compliant with the social distancing norms. It can also handle a shortage of labour well due to its automated task handling capabilities.

Theme 3: Level of Technology- Readiness among Indians

However, the question is whether Indian customers are prepared to use technological tools or not. According to a government report, in 2018 Indian tourism sector welcomed 1854 million domestic visitors and 10.56 million foreign visitors. Therefore, it is quite evident that a huge portion of income comes from domestic visitors (India tourism statistics 2019). According to Statista.com, only 45% of Indians used the internet in 2021. This means more than 50% of them do not even use the internet (Statista 2022). A few studies show that only 24% of Indians have a smartphone (Krishnan 2019). In a country like India, where more than 75% of people do not have a smartphone, the incorporation of technology can be difficult in any sector.
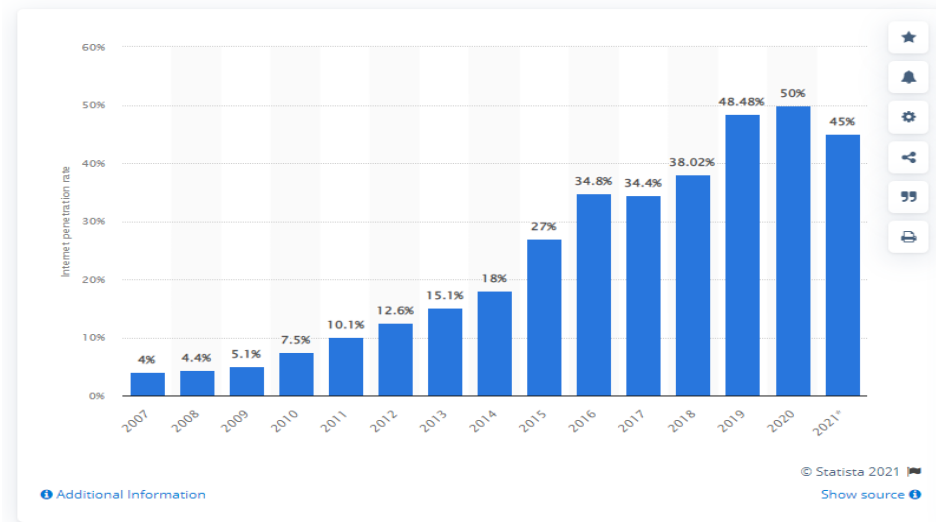
Internet penetration rate in India from 2007 to 2021

Fig. 3: Internet Penetration in India *(Source: Statista.com))*

5.2. Quantitative Data

Q1. In which way innovative technologies can benefit the Indian tourism industry the most?

Table 4: Respondent details on technological benefits

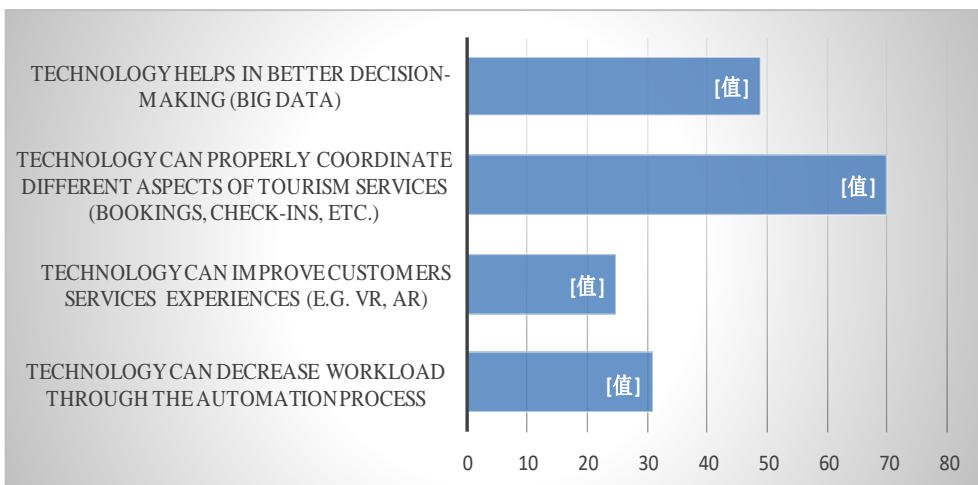|		
a.	Technology can decrease workload through the automation process	31
b.	Technology can improve customers services experiences (e.g. VR, AR)	25
c.	Technology can properly coordinate different aspects of tourism services (bookings, check-ins, etc.)	70
d.	Technology helps in better decision-making (big data)	49
	Total	175

Fig. 4: Respondent details on technological benefits

The respondents were asked to choose any one option as the most notable benefit of technologies for the Indian tourism sector. 40% of the respondents chose the ability of technological tools of coordinating different aspects of tourism operations. The role of big data has also been recognised by 28% of the respondents. They feel technology can help companies in better decision-making. 18% believe that technology significantly decreases workload and only 14% think improving customers' experience is the most crucial contribution of technological tools.

Q2. What is the most negative impact of innovative technologies on companies associated with the tourism sector?

Table 5: Respondent details on the negative impact of technology

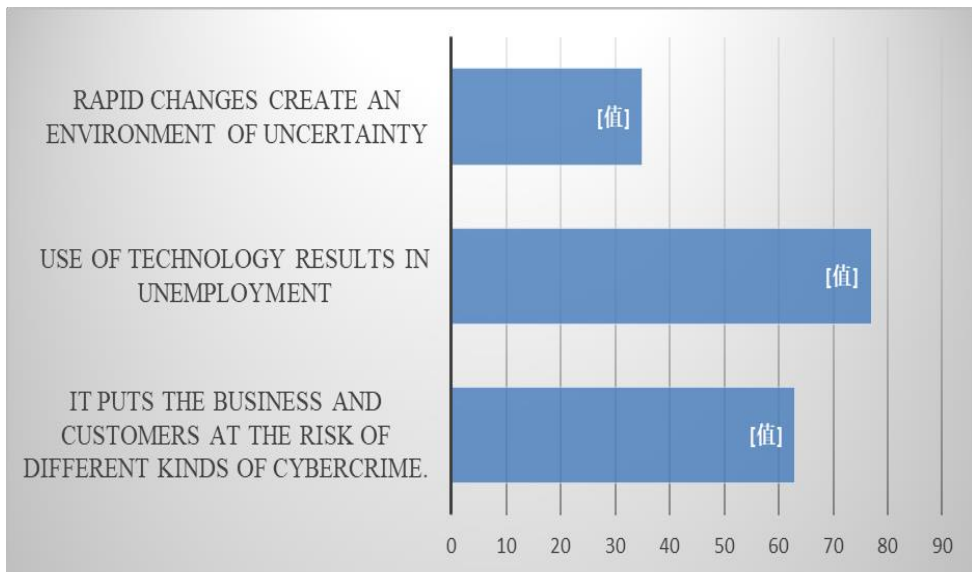|	
It puts business and customers at the risk of different kinds of cybercrime.	63
Use of technology results in unemployment	77
Rapid changes create an environment of uncertainty	35
Total	175

Fig. 5: Respondent details on the negative impact of technology

The second question tries to assess respondents' perceptions regarding the risk factors associated with the technological tools. 44% of the respondents said that technology can lead to massive unemployment. 36% of respondents on the other hand took the aspect of security threats into consideration most seriously. The aspect of constant changes did not get much attention from respondents.

Q3. What is the most crucial barrier to the adoption of technology in the Indian tourism sector?

Table 6: Respondent details on the challenges in adopting the technology

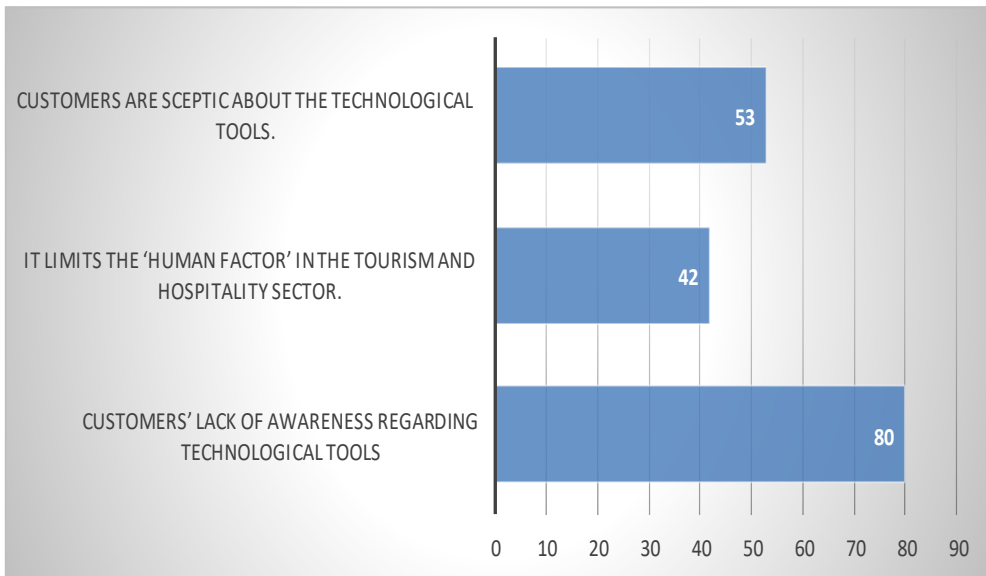| Customers' lack of awareness regarding technological tools	80
It limits the 'human factor' in the tourism and hospitality sector.	42
Customers are sceptic about the technological tools.	53
Total	175

Fig. 6: Respondent details on the challenges in adopting the technology

A large number of respondents think that customers' lack of awareness is the greatest challenge in India that prevents tourism companies to incorporate technological tools into the system. 30% of them said that customers still do not believe the technological tools completely. 24% said that the use of technologies curtails the 'human factor' in the tourism industry.

6. Conclusion

The results indicate that perceived ease of use and innovativeness as well as perceived benefits have a significant positive impact on customer intention to use innovative technologies in travel and tourism. The major factors influencing the perceived risk of technology use in the tourism sector in India are insecurity and challenges. The tourism industry in India has great growth potential and is very imminent in today's world. The growth of this industry from now on will be the use of new and advanced technological tools which can help the Indian tourism sector to improve its operational efficiencies. It can also smoothen the customers' experiences and improve their decision-making process. Artificial Intelligence and

Virtual Reality technologies are being used lately which creates various new opportunities for the tourism industry to grow and prosper. However, while doing the research we could see that there are certain problems such as cyber security and other privacy matters making constant technological development and ultimately creating an environment uncertain for the tourism businesses. Technology is also a major reason behind unemployment. Increased use of such applications can significantly reduce the morale of the workers and can cause huge problems. Many technological tools are there that do not work to protect customers' interests. Another factor is that, a significant scale of Indians is still not ready to use the updated technologies properly because of a lack of awareness. They are not aware of the fact that most of the Indian tourists are the major source of income for this industry. However, the government is taking the necessary steps to digitize the tourism and hospitality sector and make most of the people user-friendly software. The utilization of these technologies has played a crucial part in India during the aftermath of covid-19. However, it is also necessary for the government to create new jobs; in order to do so, proper training and development programs are required to be introduced so that they can access the applications and give proper knowledge to others. At the same time, proper data security-related rules and regulations should be introduced and privacy should also be ensured for customer safety. By adopting the mentioned methods, the tourism industry can flourish and increase its revenue multi-fold.

Declaration of conflicting interests
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References

Alexis, P. R. (2017). Tourism: Introducing the potential impact of robotics and service automation in tourism. *Ovidius University Annals, Series Economic Sciences*, 17(1). https://stec.univ-ovidius.ro/html/anale/RO/2017/Section-III/16.pdf

Agrawal, A., & Rahman, Z. (2015). Roles and resource contributions of customers in value co-creation. *International Strategic Management Review*, *3*(1–2), 144–160. DOI:https://doi.org/10.1016/j.ism.2015.03.001

Arshad, M. K. M., Khan, S., Haleem, A., Mansoor, H., & Arshad, M. K. M. (2021). Understanding the impact of Covid-19 on Indian tourism sector through time series modelling. *Journal of Tourism Futures*. DOI:https://doi.org/10.1108/jtf-06-2020-0100

Gretzel, U., Koo, C., Sigala, M., & Xiang, Z. (2015). Special issue on smart tourism: Convergence of information technologies, experiences, and theories. *Electronic Markets*, *25*(3), 175–177. https://doi.org/10.1007/s12525-015-0194-x

Internet and social media users in the world 2023 | Statista. (2023, February 24). Statista. https://www.statista.com/statistics/617136/digital-population-worldwide/

Isolation, N. (2022, October 4). Why do many seniors have trouble using technology? No Isolation. https://www.noisolation.com/research/why-do-many-seniors-have-trouble-using-technology

Januszewska, M., Jaremen, D. E., & Nawrocka, E. (2015). The effects of the use of ICT by tourism enterprises. *Service Management*, *16*, 65–73. https://doi.org/10.18276/smt.2015.16-07

Khudoyberdievich, A. O. (2020). Innovation technologies on the tourism. https://cyberleninka.ru/article/n/innovation-technologies-on-the-tourism

Kumar, P. K. (2021, August 6). National Digital Tourism Mission may be reality soon. ETHospitalityWorld.com. https://hospitality.economictimes.indiatimes.com/news/travel/national-digital-tourism-mission-may-be-reality-soon/85093993

Krishnan, V. B. (2019, February 8). 24% of Indians have a smartphone, reveals Pew study. https://www.thehindu.com/news/national/24-pc-of-indians-have-a-smartphone/article26212864.ece

Lau, A. N. (2020). New technologies used in COVID-19 for business survival: Insights from the Hotel Sector in China. *Information Technology & Tourism*, *22*(4), 497–504. DOI:https://doi.org/10.1007/s40558-020-00193-z

Levin-Rozalis, M. (2010). Using abductive research logic: 'the logic of discovery', to construct a rigorous explanation of amorphous evaluation findings. *Journal of Multi-Disciplinary Evaluation*, 6(13), 11-24

Maarouf, H. (2019). Pragmatism as a supportive paradigm for the mixed research approach: Conceptualizing the ontological, epistemological, and axiological stances of pragmatism. *International Business Research*, *12*(9), 1. DOI:https://doi.org/10.5539/ibr.v12n9p1

Magliulo, A., & Wright, A. C. (2014). Cyber security in tourism: The role of awareness. *Consumer Protection-selected Issues of the Information Safety*, 71

Mathur, S. (2021, July 20). Covid impact of tourism: 14.5 million jobs lost in 2020's Q1 alone. The Times of India. https://timesofindia.indiatimes.com/business/india-business/covid-impact-of-tourism-14-5-million-jobs-lost-in-2020s-q1-alone/articleshow/84573975.cms

Mosleh, A., & Nosratabadi, S. (2015). Impact of information technology on tehran's tourism agencies' business model's components. International Journal of Business and Management, 10(2), 107

National Integrated Database of Hospitality Industry. (2022) https://nidhi.nic.in/HotelDivision/Default.aspx

Nayyar, A., Mahapatra, B., Lam, V. D., & Suseendran, G. (2018). Virtual reality (VR) & augmented reality (AR) technologies for tourism and hospitality industry. *International Journal of Engineering & Technology*, *7*(2.21), 156. https://doi.org/10.14419/ijet.v7i2.21.11858

Ponelis, S. R. (2015). Using interpretive qualitative case studies for exploratory research in doctoral studies: A case of information systems research in small and medium enterprises. *International Journal of Doctoral Studies*, 10(1), 535-550. http://www.informingscience.com/ijds/Volume10/IJDSv10p535-550Ponelis0624.pdf

Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. D. (2020). Impact of AI and robotics in the tourism sector: A critical insight. *Journal of Tourism Futures*, *8*(1), 73–87. DOI:https://doi.org/10.1108/jtf-07-2019-0065

Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. D. (2020). Impact of AI and robotics in the tourism sector: A critical insight. *Journal of Tourism Futures*, *8*(1), 73–87. https://doi.org/10.1108/jtf-07-2019-0065

Stankov, U. & Gretzel, U. (2020). Tourism 4.0 technologies and tourist experiences: a human-centered design perspective. *Information Technology & Tourism*, *22*(3), 477–488. DOI:https://doi.org/10.1007/s40558-020-00186-y

Statista. (2022, June 9). Internet penetration rate in India 2007-2021. https://www.statista.com/statistics/792074/india-internet-penetration-rate/

Tourism.gov.in. india tourism statistics. (2019). https://tourism.gov.in/sites/default/files/2020-04/India%20Tourism%20Statistics%202019.pdf

Tourism Industry in India - FDI, Investment, Market Share. Invest India. (2022) https://www.investindia.gov.in/sector/tourism-hospitality

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, 15(1), 45-55. http://www.imrjournal.org/uploads/1/4/2/8/14286482/imr-v15n1art4.pdf

Zhang, H., Guo, T., & Su, X. (2021). Application of big data technology in the impact of tourism e-commerce on tourism planning. *Complexity*, *2021*, 1–10. https://doi.org/10.1155/2021/9925260