Covid-19 and Technology Interventions: An Exploratory Study of the Indian Hospitality Industry

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Abstract. Abstract. The fear of the Covid-19 pandemic has impacted several countries around the globe. The Indian economy suffered a setback of approximately eight lakh crores due to the lockdown of factories and businesses, suspended flights, halted trains, and restricted movement of vehicles and people (The Economics Times, 2020). This research paper aims to address the new technological aspects in building customers' trust due to the impact of Covid-19. With the partial lifting of the lockdown of the hospitality industry, doors have been opened for welcoming guests with minimal human contact. Technology-driven artificial intelligence tools and big data analytics have been helpful in business segments: reservations, check-in, check-out, rooms, food experiences, conferencing, and delivery. Digital technology has become a facilitator to implement the stringent criteria of social distancing. This paper analyses the role of technology intervention during the pandemic in the hospitality industry. The literature review focuses on the impacts of Covid-19 and how technology has been imperative in the industry's revival. The research analyzed the benefits of a technology-driven environment in maintaining safety protocols and offered hotel insights into understanding the new normal during social distancing. The study highlights the role of technology such as Artificial Intelligence, Chatbots, Big Data to maintain the data of Customers, Employees, Partners and adopt staff training at a quick pace to make the hospitality industry operational. It addresses the positive impact of technology in addressing the safety protocols of Covid -19 in hospitality, leading to business continuity.

Keywords: Restart; Technology; Contactless technology; Big data; Artificial Intelligence; Internet of Things (IoT)

1   Introduction

The disease Covid-19 or the Sars-2 Novel coronavirus, discovered in Wuhan, China, in December 2019, was declared a global pandemic and has proved to be an economic catastrophe in its impact worldwide (Higgins-Desbiolles, 2020). The prime focus of the governments and hospitality businesses has been the safety of the people (Deloitte,

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2020). The impact of the pandemic has been huge on the revenue and supply chains alike, surrounded by unpredictability. Hospitality businesses are capital intensive with high fixed costs (The Economic Times, 2020). The worldwide outbreak of Covid-19 has brought the world to a standstill, and tourism has been the worst affected of all major economic sectors(Mohammed Said Al-Mughairi H, 2021) Government imposed a lockdown to maintain social distancing and break the chain of infection commencing from March to safeguard people(Bureau, 2020). Governments enforced border shutdowns, travel restrictions, and quarantine in countries that constituted the world's largest economies(News, 2020), sparking fears of an impending economic crisis and recession (GOI, 2020). This boom hit hospitality and tourism because people stopped traveling, and business was affected badly. (Sen, 2020)opined," According to the Federation of Associations in Indian Tourism and Hospitality (FAITH), direct tourism activity above Rs. five lakh crores, including foreign inflows, is at risk".The third wave of Covid -19 continues to blow the hospitality and aviation sectors as demand plummets (Abraham, 2022). As per Abraham, Indigo, India's largest private airline, has anticipated withdrawal of 20 percent of its scheduled operations due to the spreading of Covid- 19 cases and hotels are seeing an unprecedented number of cancellations of up to 50 percent.

Studies on tourism and hospitality concerning Covid – 19 are emerging. Few researchers have carried out studies on Covid – 19 and its effects on tourism in India (Jaipuria S, 2021), (Arshad, 2021), (Publishers, 2021), (Jamal, 2020). The attention has been on the effects, figures, and data on the pandemic, with scarce literature on technological response mechanisms that the hospitality industry has implemented or planning to implement to counteract the crisis.

It is essential to analyze and monitor the hospitality industry's reactions and responses taken to face the pandemic crisis. Reinvention and redesigning of guest experiences surrounding the new guest expectations and employee safety will mark the recovery of the hospitality industry (Kaushal, 2021). The research aimed to first identify the effects of Covid -19 on the hospitality industry in India since the first lockdown in March 2020. Secondly, explore hospitality's technological advancements as interventions during the Covid -19 pandemic. Given the absence of extensive literature on the topic, the study aims to summate the effects and the technological advances made in the hospitality sector of India during the pandemic.

2 Objectives of the study were:

— To identify the effects of Covid -19 on the hospitality industry in India since the first lockdown in March 2020.
— To explore the technological advancements in the hospitality industry during Covid -19 pandemic.
— To explore the role of technology as an intervention in the hospitality industry during the Covid -19 pandemic.

3   Methodology:

The research study is carried out as an exploratory study. Using the content analysis technique, a documentary analysis was conducted from March 2020 to November 2021. This process assisted the researchers in invalidating and identifying the effects of Covid -19 on the hospitality industry in India, and the hospitality industry's new technological trends were identified. The researchers have curated and consolidated the information regarding the new normal and sustaining the business by adopting the technical aspects from secondary sources. An investigation was made about the existing situation of Covid-19 and the role of technology in the hospitality industry. This research is exploratory.

4   Review of Literature

4.1   Effects and Challenges of Covid -19 on Hospitality Industry in India

Pandemic is a mass illness and is an outbreak of disease worldwide. Travel has been disrupted due to the Covid -19 spread globally. The Covid-19 Pandemic brought the travel and tourism industry to a standstill, causing massive job and revenue losses. Roger Dow, president and CEO of the US Travel Association, emphasized that "The impact on travel is six or seven times greater than the 9/11 attacks," As per the estimate of consulting major Hotelivate, "the Indian hospitality sector is expected to see revenue losses of $6-14 billion".Domestic tourists were unwilling to take up international tourism/outbound tourism, and vice-versa was the situation of international tourists. This unprecedented situation has left the hospitality industry in a fix, and this decline is a driving reason for job losses and layoffs in hotels and the airline industry.

As per the Economic Times (Mediawire, 2020), "The coronavirus pandemic confined a huge number of people to the safety of their homes, which crippled the thriving business of all hotels across the country. Deepak Nathani, Managing Director, Devouring (Mediawire, 2020), opined, "The hospitality industry is suddenly grappling with the unprecedented impact of COVID 19. A completely new approach is needed for regaining the confidence of guests". As per American Hotel and Lodging Association (AHLA, 2020), "The hotel industry supports nearly 8.3 million jobs, but drastic occupancy rates have led to massive job losses for individuals across the industry. Hotel owners reported massive, unavoidable layoffs and furloughs".Cancelled events closed accommodations were options for operating takeaway and delivery services, yet the responses have been discouraging for the industry (Gössling S, 2020). Figure 1 shows the hotel occupancy rates, both actual (till the Year 2020) and estimated (Years 2021-2023) of the Indian hospitality industry (Sinha, 2021).

Year	Nationwide occupancy	Average daily rate (Rs)
FY 16	63.3%	5,527
FY 17	64.8%	5,671
FY 18	65.7%	5,768
FY 19	66.7%	5,973
FY 20	65.4%	6,061
FY 21*	33.8%	4,013
FY 22**	52.7%	5,016
FY 23*	64.9%	5,618

* Estimated

** FY 22 is an estimate prior to second wave and likely to be very different from the projection

FY 20-21 (COVID) VERSUS FY 19-20 (PRE-COVID)

Average daily rate Down 34%

Occupancy Down 48%
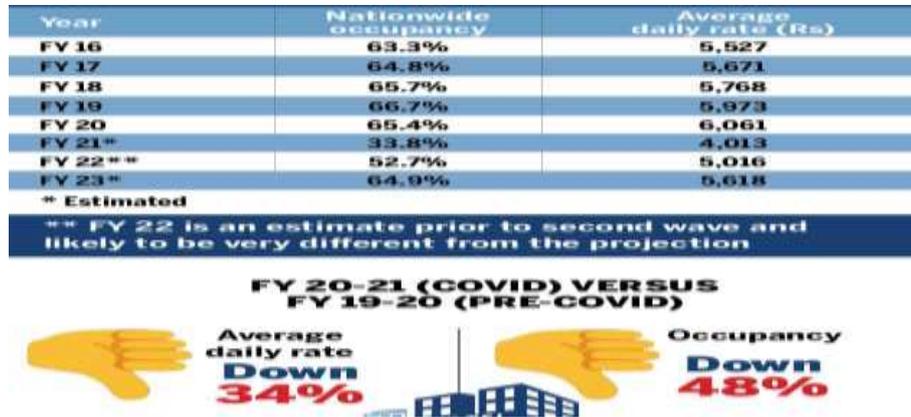
Fig. 1. Hotel occupancy rates of India (Source: Hotelivate and Sinha, 2021, Times of India)

The Indian hospitality industry has been no different in experiencing the challenges and bearing the brunt of the pandemic. Table 1 exhibits various studies by Indian researchers on the effects and challenges thrown in by the Covid -19 pandemic for the hospitality industry.

**Table 1.** Effects and challenges of the hospitality industry due to the Covid -19 pandemic

Authors	Title	Key Ideas
(Gautam, 2021).	The Effects and Challenges of COVID-19 in the Hospitality and Tourism Sector in India	- The meetings, incentives, conferences & exhibitions (MICE) segment was significantly affected. Events were cancelled or postponed across the region. - Most of the hotels had not become operational fully till December 2020.
(Jasrotia, Agarwal, & Chib, 2021)	The impact of COVID-19 on the Indian hospitality sector and tourism education	- The perspective of hospitality and tourism educators focuses on the challenges brought about by Covid 19 and reinvention.
(Patel P.K., 2020)	The Effects of Novel Corona Virus (Covid-19) in the Tourism Industry in India	- Postponing of booking plans - Domestic tourism may experience improvement due to limited outbound travel, but the Covid-19 cases in India would also limit that opportunity.
Girish K Nair, Shaheema Hameed & Swati Prasad (2021)(Girish K Nair, 2021)	Ready for recovery: Hoteliers' insights into the impact of COVID-19 on the Indian hotel industry	- Drop-in occupancies and RevPAR - Demand for hotels remained because of long-stay guests or quar-

		antine hotels as government-pre-scribed for international travellers returning to India. - Highlighted importance of staying connected with employees via social media platforms and WhatsApp groups.
Kaushal, V., & Srivastava, S. (2021)	Hospitality and tourism industry amid COVID-19 pandemic: Perspectives on challenges and learnings from India	- Issues of hygiene in an over-crowded and congested country such as India - Issues of standards of waste management and sanitation - Usage of contingency funds - Requirement of up-gradation of skills in the hospitality sector
(Kaur, 2020)	Assessing The Impact Of Corona Virus (Covid-19) On Tourism And Hospitality Industry In India- A Perspective Study	- Drop-in occupancy rates of hotels to about 65-70% for four-star or higher category hotels and 50-60% for two-star hotels. - An unorganized sector segment is already affected in terms of being jobless.
(Manikandan P., 2020)	A Study On Impact Of 'Covid-19' On Hospitality Industry In Mumbai	- The steep decline in tourists and business travel, - Poor business activities, - Unable to pay salaries to employees, - Generating low liquidity, - Inability to repay loans and dues of other nature, - Engaging minimum quantum of employees, - Not getting sufficient financial support, - Not receiving future contracts and losing their regular revenues.
(Kumar V., 2020)	The Indian tourism industry and COVID-19: Present scenario.	- Hotel bookings have been severely affected due to Covid -19. - Industries have taken cost-cutting measures, including the Indian tourism and hospitality industry.

4.2   Restarting tourism and hospitality and the way forward

On restarting tourism, UN Secretary-General Antonio Guterres mentioned, "tourism can be a platform for overcoming the pandemic. By bringing people together, tourism can promote solidarity and trust". Covid -19 Pandemic has managed to create a long-lasting impact on the job market across the world. Crisis and reformation are to be embraced with the new normal and preparedness of the Hospitality & Tourism Industry. Figure 2 illustrates a customer's journey mapping to identify health risks and design an

experience as contactless as possible(McKinsey, 2020). Hotels will have to empower themselves with the latest learning to win back the confidence of customers post reopening. "Travellers visiting hotels certainly want to know that they are as clean as possible. There will be a very low likelihood of picking up any virus or illness," said David Sangree, Hotel & Leisure Advisors president. In this regard, one of the leading hospitality brands (Oberoi, 2020) implemented additional measures across all our hotels.
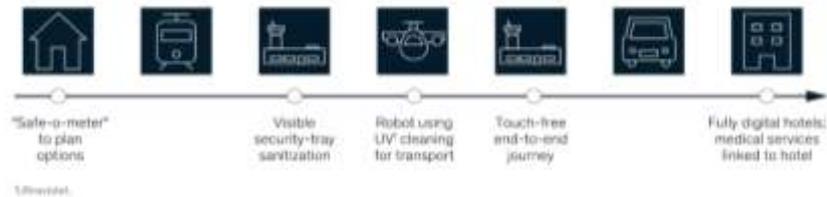
Fig. 2. Customer journey mapping for mitigating risks (Source: McKinsey & Company, 2020)

The innovation adoption curve is changing gradually. Hotel Industry is adopting the change from big data analytics to Chatbots and Artificial Intelligence. Early adopters, upskilled, and highly educated people will be job-ready to grab the jobs in industry 4.0. The machine learning platform will accelerate with time. The globe is including new tech revolutions that are regressing in development. The hospitality industry has included contemporary digital technology for constant growth and development. Artificial intelligence has become a tech aid for the hospitality industry due to its intelligence transforming work by being tech-smart. Hotel Industry is undergoing the mega shift from high touch to high tech with the proper domain knowledge.

The adversity of threat and fear resulted in the search for new evolutions. Necessity is the mother of invention, and this necessity has brought the revolution of innovations such as; immunity boosters, power-packed foods,i.e., golden latte, ashwagandha chai, new business ideas like home delivery of food via cloud kitchens, service of washed and ironed laundry opened for the general public are provided by five-star brand hotels to sustain their businesses. According to Chaturvedi (2020), ITC Hotels' Lavanderia' allows customers to hand over the items at a designated point at the hotel. As the laundry gets ready to be picked up by the customer within 24 hours, the customer is intimated via messages, including a payment link to enable contactless payment.

Due to the ongoing crisis of the Pandemic Covid -19, the 'New Normal' of the Hotel Industry has undergone a rapid change to entrust faith in their customers. Premium brand properties have made changes in serving their customers with high levels of hygiene and safety. (Oberoi, 2020). Food takeaways and home delivery of bespoke dishes are made contactless with a small menu at affordable prices. Hotel Industry is gearing up to deliver a contactless personalized experience to guests with incredible features like check-in & check-out, mobile key, multilingual chat, in-room ordering. Ready-to-use mobile platforms empower a wholly safe and delightful experience.

4.3   Technology as a game-changer

Technology is advancing at a rapid pace. Hotel Industry has started leveraging technology to serve customer needs. It is paving the way for empowering the Hotel Management system. It maximizes revenue generation by offering the best available rates, yield management strategies, and other advantages. Hotels are also extending virtual voice assistants, Chatbots, robotic concierges to meet customers' needs. No-touch check-in and check-outs using technology and maintaining low-touch services have been implemented.

According to (Revfine, 2020), "Hilton robot concierge 'Connie' uses speech recognition and AI to respond to customer queries. For security purposes, Knightscope robots deployment is being done at some airports. At the same time, the Henna Hotel in Japan is the world's first robot-staffed hotel, with robots being used as front desk staff, customer information tools and even as luggage porters".

The advent of pioneering high-tech innovative solutions with tech advancements is assisting the hospitality business to go contactless—the state-of-the-art technology tendencies will enhance prevailing progressions and simplify the formation of tailor-made services and experiences.

Integratingprogressive technology like app platforms for hotel rooms helps guests order room service, reserve a spot at the poolside,r communicate virtually with a hotel staff member for assistance (Zain, 2021). Zain J. also highlighted the importance of cloud-based software, allowing management and the staff to streamline operations and communication.

Due to the constant rise of technology intervention, people with core competency in digital processes will be preferred. The future of employees will depend on their tech skills.

The researcher has explored that hotels in India are following physical distancing and cleanliness practices rigorously to safeguard the health of everyone, guests, and employees likewise.

In addition to the above,

— The policy of collecting the hard copy of the identity card is replaced by collecting all the guest Identity Documents or ID proofs online. Hotels are not taking a photocopy of guest ID proofs. The original document is verified at the time of check-in. Digital transactions are carried out via credit, debit cards, National Electronic Fund Transfer (NEFT), etc. Restaurant, room, or other services feedback is sent to guests' email IDs or phone to avoid contact.
— Guests are given the virtual display and information about the rooms, food and beverage products, and other merchandise to provide an insight into saleable products.
— Hoteliers believe that the implementation of technology helps identify the issues of Covid-19 in hotels. Hotels are installing innovative room access systems to allow guests to unlock hotel room doors by swiping their phones across a keyless pad on the door.

— Automated check-in and check-out with application-based software will allow guests to operate hotel services via mobile phones. Technology-driven automated kiosks will be used to order room service with a digital device instead of long queues.
— All the technology gadgets are likely to identify and provide service from a distance. Online check-in/check-out portals at reception have gone contactless by offering access to the computer system to the guest. All formalities of payments are carried through Apps without contacting the guests.
— Automation of Technology empowers hotels to deliver services safely for employees and guests without coming in direct contact. Mobile applications and Uniform Resource Locator or URL-based links for contactless interaction, menu, etc., are being extended.

Technology has aided screening employees or visitors for any possible infection and tracking and monitoring movement and disinfecting to ensure safety. Employees at the time office undergo contactless body temperature checks via infrared Digital Thermal Scanner, sanitization via contactless dispensers, attendance via retina scanner or skull scanner.

No punching in and no punching out on biometric machines is permitted. Some organizations have adopted thermal gadgets for a face recognition/eye scanning instead of punching to avoid touch. Thermal scanners, automatic hand sanitizers, and attendance through Apps are the development seen in hotels. Technology has gone through a paradigm shift, and the transformation needs to adopt the change. Installation of the Arogya Setu app on staff/guests' and vendors' mobile has been helpful in contact tracing of infected persons.

Technology is transforming and simplifying communication in the hotel industry, and User-friendly hospitality solutions simplify day-to-day management. Communication has become effortless and interactive with Voice Assistants, Chatbots, Mobile Apps, and social media with a robust online presence in the Internet-powered world.

4.4   Utilization of Artificial Intelligence (AI), big data, and Internet of Things (IoT) during Covid-19

4.3.1.1 Utilization of Artificial Intelligence in Hotels and Covid -19

AI, which refers to intelligent behaviour by machines or computers, has entered the hotel mainstream functions. The application is used in the guest's entire journey with the hotel (Preveden, 2018). This includes optimizing revenue management better quality voice interactions with humanoid robots adding to the quality of service instead of replacing them.
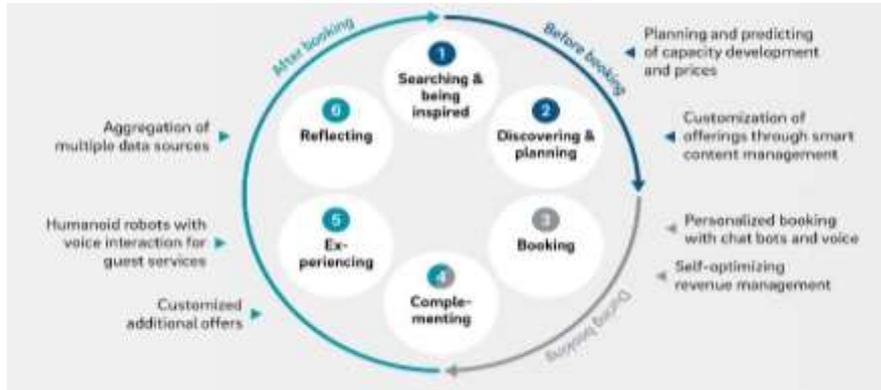
Fig. 3. Artificial Intelligence (AI) in the hospitality industry (Source: Preveden, 2018)

With the innovation of contactless ordering and digital payment, the guest experience can be customized. Food experience technology can be developed with Quick Response (QR) codes and dynamic digital menus with creative vision. Technology intervention can make dining an immersive experience with a profitable and sustainable dynamic venture designed to bring an optimum profit.

Through artificial intelligence, hotels use humanoid robots that provide information to guests on interaction and speak like humans. Interaction with Alexa, another application, guests have multiple options of adjusting lighting, opening drapes, setting the room temperature, turning on the music, turning on the TVor ordering the tea. Robots can be used for delivering laundry and other guest supplies. AI chatbots have been extensively used in the hotel industry during the pandemic that allowed guests to ask queries and get immediate responses round the clock. Oberoi Hotels uses AI to automate some processes in reception and restaurants (Ahaskar, 2020).

4.3.1.2Utilization of Big Data in Hotels and Covid -19
. Big data is an action-oriented task for undertaking an innovative marketplace sector or regulating rate plans against the hotel's competitors. The use of big data in the hospitality industry is associated with strategic marketing, managing revenues, guest experience, and management (Yallop & Seraphin, 2020). Figure 4 shows how hotels use big data analytics to maximize revenue in the hotel industry.
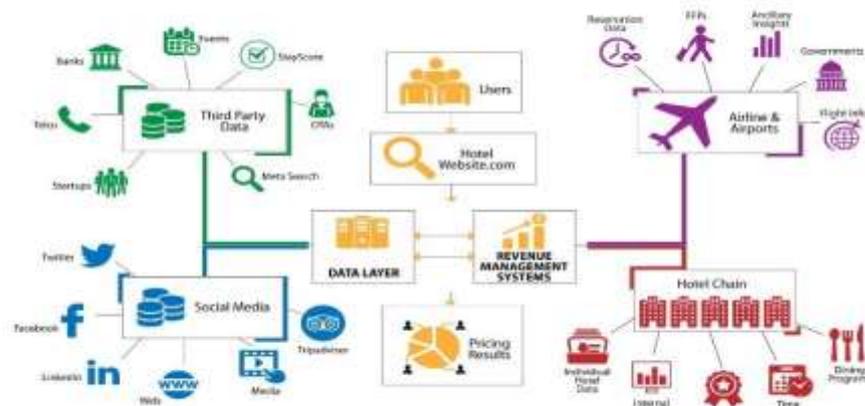
Fig. 4. Big Data analytics usage in Hotels (SOEG, 2021)

However, the significant apprehension about big data analytics and the obligatory data harboring is its safety. Every data harbourer's goal is to keep their clients' data safe, though it is a difficult task. Hotel staff, through training, are required to familiarize themselves with the Property Management System (PMS), which enables them to utilize big data efficiently. AI and big data are going to stay even after Covid -19. Marriot International is the biggest name in data analytics (Beatrice, 2021). Marriot uses data to identify streams of revenue that are new and not limited to rooms tracking competition activities of their brands and hotels. Intercontinental Hotels Group's (IHG) usage of predictive, operational, and advanced analytics is directed towards the satisfaction of all stakeholders, understanding guests, and proactively comprehending guests' future requirements(SOEG, 2021). The famous fast-food chain KFC utilizes big data to analyze customer feedback and food preferences, thus bettering experienced customer sales (Byteant, 2020). Automatic check-in and check-out through Apps, health information through Apps, and dependency on machine algorithms will be the new norms with hotels. Mobile applications and URL-based software for contactless documentation will be in demand.

4.3.1.3 Utilization of IoT in Hotels and Covid -19

The IoT is defined as a "system of wireless, interrelated, and connected digital devices that can collect, send, and store data over a network without requiring human-to-human or human-to-computer interaction"(Kelly, Campbell, Gong, & Schuffham, 2020). In the hotel industry, integrated services are provided via the IoT, such as voice assistance, light switches, automated locks on doors, with all these being connected to a network(Zhu, Wang, & Cheng, 2021). Daylight –harvesting is done using IoT devices, which detects the natural light and automatically adjusts the guestroom lights (Light Emitting Diode ones). IoT senses maintenances before they occur, thus sending prior alerts. It can also record guest preferences setting them up for the following days of his stay, such as room temperature, lighting, etc. APIs or Application Programming

Interfaces in IoT help consolidate vendors and create a pool of small, efficient vendors with comprehensive and cohesive offerings. Figure 5 exhibits the use of IoT in hospitality. The guest can monitor all this through a central server such as a tablet or a mobile phone.

In India, IDS, a service provider, has developed an application based on IoT solutions called FX-GEM, integrating the local PMS aiding guests in prior check-ins, uploading required documents, blocking off rooms, enabling mobile devices to open the guest room doors, as per Amit Dalvi of Pride Hotels (Nath, 2020). OYO, the Indian chain of hotels and homes, aims to adopt the Microsoft Azure IoT experience for their guests, which will support self-check-in by the guests, self KYC (Know Your Customer), IoT enabled intelligent locks offered virtual assistance (PTI & Standard, 2021).

(Maitra & Jasleen, 2020) examined the role of technology in operating Cloud kitchens, which have an online ordering website and online ordering apps to accept orders through the various food delivery platform. These internet restaurants serve through online ordering platforms, such as Swiggy, FoodPanda, Zomato, etc. Point of sales software makes it globally acceptable through technological advancements".

Technology, hospital-level sanitization, and fewer employees are the new normal. The 'New Normal' has less customer contact and maintains social & physical distancing. Whereas the Indian hospitality industry is famous for its rich, warm welcome,i.e., Arti, Tika, and Garland, the new normal has become contactless. The recent regular technology-driven check-ins at hotels are replacing the warmth and personalization with a focus on a safe and conducive environment for all.

5   Discussion and Conclusion

Covid-19 is impacting the world in disruptive ways, and India is no different. Though a long way off, the recovery will see new transformations and new needs of customer's safety have developed opportunities. The hospitality industry has to find new avenues to make the customers feel safe for building trust with technology interventions: big data, artificial intelligence, the Internet of things, and more. Data-driven supply chain management with records of hygiene, volume of order, temperature control, customer preferences, guest history, revenue management system, digital conferences, cybersecurity will emerge as entrepreneurship and technology business opportunities for Young and Skilled India. This research paper thus brings into light and contributes to the effects of Covid-19 on hospitality and how the sector is striving to respond to the crisis.

Key conclusive points include:

— Post Covid-19, as an experience, hotels will offer their guests lean hospitality (operating with reduced staffing), virtual services, contactless check-in counters functional with mobile apps, face scanners, etc. These are likely to be the future of hotels.
— When guests start revisiting hotels, their expectations will change. They may look for reserved tables with minimal seating and electronic communication via

PDAs,i.e., mobile, Tablets, etc., designed to cater to their needs with minimal contact. These practices are likely to induce instant gratification.

— The future sky will belong to millennials who are willing to learn, adapt and overcome relentlessly. An entrepreneur's business idea is budding entrepreneurs with an unquenchable thirst for doing something new, i.e., an online supply of handpicked apples from apple orchards of the Himalayas.

— The young brigade needs to upskill themselves to be equipped with new Standard Operating Procedures (SOPs), a unique skill set,i.e., IoT, Big data, etc. The adoption of upcoming technologies needs to be embraced with successive planning.

— Hotels can embrace new-age skills related to booking engines, mobile applications, digital concierge services, contactless check-in, check-out, and a keyless entry system. In the new normal, technology involvement will offer a seamless experience.

— To make the tourism and hospitality sector self-reliant, Indians need to be vocal about local and invest in domestic tourism to effectuate the demand-supply chain. Hotels must welcome guests with hygiene, luxury, Flexi rates, easy cancellation policy, etc.

This study attempts to comprehensively describe the role of technological interventions in AI, Big Data, and IoT and their role in the Covid -19 pandemic. However, research in the field is minimal as new developments in the pandemic are emerging. Hence, data and studies on the topics are limited in the Indian Hotels scenario. Future research could be concentrated upon such issues and data collection.

It can be concluded that hotels must adopt the best standards of hygiene and cleanliness to ensure the safety and wellbeing of employees, employers, and guests. This can be aided with technology interventions at every step to pave the way for success and will yield new entrepreneurship opportunities for Self-reliant India (आत्मनिर्भरभारत).

6   Practical Implications

The study recommends practical solutions for hotels and hoteliers in optimizing technology utilization. The research synthesized the usage of technology in maintaining social distancing norms. To strive and survive, the hospitality industry has embraced technological advancements: online travel agents, smartphones, and personal digital assistance, transforming the way of interactions. Brands such as Marriott, Hilton, IHG, and Accor utilize artificial intelligence, robotics, and big data. The new technology introductions offer lucrative opportunities for budding entrepreneurs.

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