

CLOUD-BASED DATA ANALYTICS PLATFORM IN THE HOSPITALITY INDUSTRY: A COMPREHENSIVE ANALYSIS AND FUTURE PROSPECTS

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ABSTRACT

The hospitality industry has witnessed a significant transformation with the rapid adoption of data analytics. Cloud-based data analytics platforms have emerged as a pivotal solution in managing vast volumes of data generated from various sources in the hospitality sector. This research paper explores the role and impact of cloud-based data analytics platforms in the hospitality industry, covering its benefits, challenges, and future prospects. The study highlights real-world case studies and provides insights into the potential advancements that can further revolutionize the industry. The aim of this paper is to shed light on the growing importance of cloud-based data analytics in enabling data-driven decision-making, enhancing guest experiences, and optimizing operational efficiency in the hospitality sector.

Keywords: Data Analytics, Cloud, Big Data, Big Data Analytics, Hospitality, Cloud Computing, Data Analytics as a Service, Learning System, Technology Adoption.

I. INTRODUCTION

Cloud-based data analytics platforms in the hospitality industry have emerged as a transformative solution, leveraging the power of cloud computing to revolutionize data analysis, decision-making, and customer experiences. These platforms cater specifically to hotels, resorts, restaurants, and other hospitality establishments, enabling them to extract valuable insights from their vast amounts of data and gain a competitive edge in the market.

Traditionally, the hospitality industry relied on manual data analysis and cumbersome legacy systems, making it challenging to process and utilize the ever-growing data generated by various operations, such as reservations, bookings, guest preferences, feedback, and operational performance. However, with the advent of cloud-based data analytics platforms, hospitality businesses can now centralize, store, and process large volumes of data efficiently.

One of the key benefits of cloud-based data analytics platforms is their scalability. As the industry experiences fluctuations in data volume, such as seasonal variations or unexpected events, these platforms can easily scale up or down to accommodate the changing demands without significant infrastructure investments. This flexibility enables businesses to optimize costs while maintaining high-performance levels.

Another advantage is the real-time data processing and analysis capabilities of cloud-based platforms. Hospitality establishments can now access critical insights immediately, helping them make data-driven decisions faster, enhance guest experiences, and improve operational efficiency. For example, these platforms can analyse guest preferences and behaviour patterns to personalize offers, streamline check-in processes, and anticipate demand for various services.

Security and data privacy are paramount in the hospitality industry. Cloud-based platforms invest heavily in robust security measures to protect sensitive data from breaches and unauthorized access. Cloud service providers typically comply with industry regulations, ensuring data protection and privacy compliance.

Cloud-based data analytics platforms have become an indispensable tool for the hospitality industry, offering scalability, real-time analysis, enhanced security, and improved collaboration. As these platforms continue to evolve and integrate with emerging technologies like artificial intelligence and machine learning, the hospitality industry's ability to provide exceptional guest experiences and operational excellence is expected to reach new heights.

II. LITERATURE REVIEW

Overview of the Hospitality Industry

The hospitality industry has undergone a significant transformation with the emergence of cloud-based

data analytics platforms. These platforms leverage the power of cloud computing to offer advanced data analysis, processing, and storage solutions to businesses within the hospitality sector.

Cloud-based data analytics platforms in the hospitality industry facilitate seamless integration of various data sources, such as guest preferences, booking patterns, feedback, and operational data, into a centralized repository. This data-driven approach enables hospitality businesses, including hotels, restaurants, and travel agencies, to gain valuable insights into customer behaviour, optimize operations, and make informed decisions.

By harnessing the scalability and flexibility of cloud infrastructure, these platforms can handle vast amounts of data in real-time, enabling businesses to track performance metrics, forecast demand, and personalize customer experiences. They also offer robust security measures to safeguard sensitive information, ensuring compliance with data protection regulations.

Moreover, cloud-based analytics platforms eliminate the need for extensive hardware investments, making it cost-effective for hospitality businesses of all sizes to access cutting-edge data analytics capabilities. Overall, the adoption of cloud-based data analytics platforms has revolutionized the hospitality industry, empowering businesses to stay competitive, enhance customer satisfaction, and drive sustainable growth.

Key Challenges in the Hospitality Sector

The hospitality sector's adoption of cloud-based data analytics platforms presents numerous challenges that must be addressed to maximize its benefits. Firstly, data security and privacy are critical concerns due to the sensitive nature of customer information, including personal and financial data. Hospitality businesses must ensure robust encryption, authentication, and access controls to safeguard against data breaches and unauthorized access.

Secondly, integrating diverse data sources is challenging, as the industry generates vast amounts of data from various systems like hotel management software, customer relationship management, and online booking platforms. Ensuring seamless data flow and compatibility between these sources is vital to gain valuable insights.

Thirdly, scalability and performance are essential, as the hospitality industry experiences fluctuations

in demand during different seasons or events. The data analytics platform must handle high volumes of data and provide real-time analytics to support timely decision-making.

Additionally, data quality and accuracy are crucial in driving reliable insights. Data from different sources may vary in formats and cleanliness, requiring data cleaning and standardization processes.

Furthermore, ensuring user adoption and data literacy among employees is vital. Training staff to effectively use the platform and interpret analytics can enhance operational efficiency and customer experiences.

Lastly, cost optimization is a challenge. While cloud-based platforms offer flexibility, they may also incur substantial expenses, making it necessary for businesses to choose the right pricing model and manage their resources efficiently.

Addressing these challenges will empower the hospitality industry to harness the full potential of cloud-based data analytics platforms, leading to enhanced guest experiences, streamlined operations, and improved overall business performance.

The Need for Data Analytics in Hospitality

In the hospitality industry, the need for data analytics has become increasingly vital in recent years, and cloud-based data analytics platforms have emerged as a game-changer. These platforms leverage the power of the cloud to efficiently store, process, and analyse vast amounts of data from various sources, enabling hospitality businesses to make informed decisions and gain a competitive edge.

Data analytics in hospitality allows businesses to understand customer preferences, behaviour, and expectations. By analysing data from guest reviews, feedback forms, and social media, hotels and resorts can identify trends and patterns, enabling them to enhance guest experiences and tailor personalized services. This leads to higher customer satisfaction and loyalty.

Additionally, data analytics helps optimize operations and resource allocation. It enables hotels to forecast demand, manage inventory, and streamline staffing, ultimately reducing costs and maximizing revenue. With real-time insights, hospitality businesses can respond quickly to changing market dynamics and make data-driven decisions on pricing and promotions.

Cloud-based data analytics platforms offer scalability and flexibility, allowing hospitality organizations of all sizes to access advanced analytics tools without the need for significant upfront investments in hardware and software. Moreover, cloud solutions ensure data security, compliance, and seamless data integration across different departments, enhancing collaboration and efficiency.

III. OBJECTIVES

The objective of the study on a cloud-based data analytics platform in the hospitality industry is to explore and understand how the integration of cloud technology can enhance data analytics capabilities, thereby improving operational efficiency, customer satisfaction, and overall business performance for hospitality establishments. The study aims to investigate the potential benefits and challenges associated with adopting such a platform, providing valuable insights for hospitality businesses and the industry as a whole.

Firstly, the study aims to assess the impact of cloud-based data analytics on hospitality operations. By utilizing the cloud, hospitality businesses can process, store, and analyse vast amounts of data in real-time. This empowers decision-makers to make data-driven choices, optimize resource allocation, and streamline operations. Additionally, the study seeks to identify the most effective use cases of the cloud-based data analytics platform, such as revenue management, demand forecasting, personalized marketing, and guest experience enhancement.

Secondly, the research aims to evaluate the implications of cloud-based data analytics on customer satisfaction and experience. By harnessing customer data from multiple sources, such as reservation systems, social media, and feedback platforms, hospitality providers can gain deeper insights into customer preferences and behaviours. Consequently, they can deliver personalized services, improve customer engagement, and tailor their offerings to meet individual needs. The study seeks to measure the impact of these improvements on customer loyalty and retention.

Thirdly, the study aims to explore the economic benefits of adopting a cloud-based data analytics platform. By reducing the need for on-premises infrastructure and operational expenses, the cloud

can lead to cost savings for hospitality businesses. The research seeks to analyse the Return on Investment (ROI) and Total Cost of Ownership (TCO) associated with such a platform, considering factors like initial setup costs, maintenance expenses, and potential revenue growth.

Fourthly, the study aims to address security and privacy concerns related to cloud-based data analytics in the hospitality industry. By storing sensitive data on the cloud, businesses need to ensure robust security measures to protect customer information from cyber threats and unauthorized access. The research seeks to identify best practices for data encryption, access controls, and compliance with data protection regulations.

The study on a cloud-based data analytics platform in the hospitality industry aims to provide a comprehensive understanding of how this technology can transform hospitality operations, enhance customer experiences, deliver cost savings, and address security challenges. The findings of this study can guide hospitality businesses in making informed decisions regarding the adoption of cloud-based data analytics platforms, contributing to the overall improvement and advancement of the hospitality industry.

IV. METHODOLOGY

A Cloud-based data analytics platform in the hospitality industry leverages the power of cloud computing to process, store, and analyse vast amounts of data generated within the sector. The methodology involves several key steps:

Data Collection: Gather data from various sources, including guest bookings, loyalty programs, social media, and IoT devices, to create a comprehensive dataset.

Data Integration: Integrate data from different systems and formats into a unified, cloud-based data repository, ensuring seamless access and analysis.

Cloud Infrastructure: Utilize scalable and flexible cloud infrastructure to handle the dynamic data volumes, ensuring cost-effectiveness and adaptability.

Data Processing: Apply data cleansing, transformation, and enrichment techniques to ensure data accuracy and relevance.

Data Analysis: Employ advanced analytics tools, such as machine learning algorithms and data mining techniques, to uncover patterns, trends, and insights from the data.

Visualization: Present the analysed data through intuitive and interactive dashboards, facilitating easy interpretation for decision-makers.

Real-time Insights: Enable real-time data processing and analytics to respond swiftly to changing trends and enhance guest experience.

Data Security: Implement robust security measures to protect sensitive guest information and comply with data privacy regulations.

Continuous Improvement: Regularly monitor platform performance and user feedback to make iterative improvements and optimize data analysis processes.

By following this methodology, the cloud-based data analytics platform empowers hospitality businesses to make data-driven decisions, improve operational efficiency, enhance guest satisfaction, and gain a competitive edge in the industry.

Cloud-Based Data Analytics Platform: A Primer

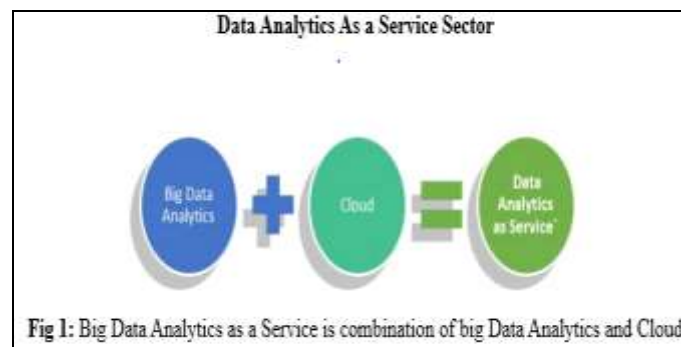
A cloud-based data analytics platform in the hospitality industry is a comprehensive solution that leverages cloud computing to analyse vast amounts of data from various sources within the sector. This platform enables hotels, restaurants, and other hospitality businesses to make data-driven

decisions, enhance operational efficiency, and improve guest experiences.

By harnessing the scalability and flexibility of cloud infrastructure, the platform can handle large datasets in real-time, optimizing data processing and analysis. It integrates data from diverse channels like customer feedback, online reservations, social media interactions, and financial transactions.

Key benefits of such a platform include predictive analytics for demand forecasting, personalized guest recommendations, revenue management, and resource optimization. Additionally, it facilitates sentiment analysis to gauge customer satisfaction and preferences.

Cloud-based data analytics platforms empower hospitality businesses to identify trends, measure performance, and uncover valuable insights, leading to improved customer satisfaction and loyalty. It also aids in streamlining operations, reducing costs, and boosting revenue through data-informed decision-making. Moreover, as cloud-based solutions are cost-effective and offer remote accessibility, they allow businesses of all sizes to benefit from advanced data analytics capabilities that were once exclusive to large enterprises.



Advantages of Cloud-Based Data Analytics

Cloud-based data analytics platforms offer several advantages for the hospitality industry. Firstly, they provide scalable and flexible infrastructure, allowing hospitality businesses to easily accommodate fluctuating data volumes and analysis needs. This scalability ensures efficient processing of data, regardless of the size or complexity of the dataset.

Secondly, cloud-based analytics platforms enable real-time data processing, facilitating rapid decision-making and actionable insights. Hospitality businesses can monitor customer behaviour, preferences, and feedback in real-time, allowing them to tailor services and offerings accordingly, enhancing customer satisfaction and loyalty.

Thirdly, these platforms promote cost-effectiveness by eliminating the need for on-premises hardware and reducing maintenance and operational expenses. Pay-as-you-go pricing models ensure that hospitality businesses pay only for the resources they consume, making it a more economical option.

Additionally, cloud-based data analytics platforms offer enhanced data security and compliance features. Top-tier cloud providers implement robust security protocols, data encryption, and access controls to protect sensitive customer information, thereby assuring data integrity and confidentiality.

Lastly, the cloud's collaborative capabilities foster team collaboration and data sharing, enabling stakeholders to access analytics and insights from various locations seamlessly. This facilitates cross-

functional decision-making, streamlining operations and boosting overall efficiency in the hospitality industry. Overall, adopting cloud-based data analytics platforms empowers hospitality businesses to stay competitive and innovative in today's data-driven landscape.

Key Features of a Cloud-Based Data Analytics Platform

A cloud-based data analytics platform in the hospitality industry offers numerous benefits to streamline operations and enhance customer experiences. Key features of such a platform include:

Scalability: The platform can efficiently handle large volumes of data, accommodating the hospitality industry's dynamic and diverse data requirements, such as customer preferences, booking details, and guest feedback.

Real-time Insights: Cloud-based analytics provide instant access to real-time data, enabling hoteliers to make data-driven decisions promptly, respond to trends, and optimize operations on the fly.

Data Security: Top-notch security measures protect sensitive customer information, ensuring compliance with industry regulations like GDPR and PCI DSS, instilling trust among guests and stakeholders.

Integration Capabilities: Seamless integration with existing hotel management systems, booking engines, and other data sources allows for comprehensive analysis and holistic insights across different aspects of the business.

Predictive Analytics: By employing machine learning algorithms, the platform can forecast demand, identify patterns, and anticipate customer needs, empowering hotels to proactively tailor services and offers.

Personalization: With comprehensive guest profiles and behavioural analysis, the platform enables personalized experiences, enhancing customer satisfaction and loyalty.

Cost-Effectiveness: The cloud-based model eliminates the need for extensive on-premises infrastructure, reducing upfront capital expenditure and ongoing maintenance costs.

Accessibility and Collaboration: Cloud-based accessibility facilitates data sharing and collaboration among hotel staff, enabling cross-functional teams to work together efficiently and make informed decisions.

By leveraging these key features, a cloud-based data analytics platform empowers the hospitality

industry to optimize operations, deliver exceptional guest experiences, and gain a competitive edge in the market.

Use Cases of Cloud-Based Data Analytics in Hospitality

Cloud-based data analytics platforms have become increasingly essential in the hospitality industry, revolutionizing the way businesses analyse data, gain insights, and make informed decisions. The seamless integration of data analytics with cloud technology offers numerous use cases that enhance operational efficiency, customer experience, and overall business performance. Here are some key use cases of cloud-based data analytics in the hospitality industry:

Personalized Customer Experience: Cloud-based data analytics enables hotels and restaurants to collect and analyse vast amounts of customer data, including preferences, booking history, and feedback. By leveraging this data, businesses can create personalized experiences for their guests. For example, recommending tailored services, providing special offers, and customizing amenities based on individual preferences, leading to improved guest satisfaction and loyalty.

Revenue Management: Hospitality businesses can optimize pricing and revenue strategies by utilizing cloud-based analytics. These platforms can process real-time data on room occupancy, historical booking patterns, seasonal demand, and competitor pricing to dynamically adjust room rates and offerings. This ensures maximum revenue generation and occupancy rates.

Operational Efficiency: Cloud-based data analytics can streamline operational processes within the hospitality industry. By analysing data from various sources like property management systems, point-of-sale terminals, and guest feedback platforms, hotels and restaurants can identify bottlenecks, optimize resource allocation, and improve overall efficiency.

Predictive Maintenance: Hotels can utilize cloud-based data analytics to monitor and predict equipment maintenance needs. By analysing sensor data from various systems such as HVAC, elevators, and kitchen appliances, businesses can anticipate breakdowns, schedule preventive maintenance, and reduce downtime, thereby cutting costs and enhancing guest experience.

Social Media and Online Reputation Management: Cloud-based analytics can track and analyse online mentions, reviews, and sentiment

about the hotel or restaurant on social media platforms and review websites. This allows businesses to promptly address negative feedback, identify areas for improvement, and capitalize on positive experiences to bolster their online reputation.

Supply Chain Optimization: Cloud-based analytics can aid in optimizing inventory management and supply chain processes. By analysing data related to supplier performance, inventory levels, and demand patterns, businesses can make data-driven decisions, ensuring timely procurement and minimizing waste.

Event Planning and Resource Allocation: Hotels that host events and conferences can leverage cloud-based data analytics to forecast attendance, allocate resources effectively, and optimize event planning. This ensures that the venue is

appropriately sized, amenities are sufficient, and staff is well-prepared to cater to guests' needs.

Fraud Detection and Security: Hospitality businesses can enhance security by using cloud-based data analytics to detect suspicious activities, unauthorized access, and potential fraud. By analysing transaction data and user behaviour patterns, businesses can proactively prevent security breaches and safeguard sensitive information.

Cloud-based data analytics platforms offer a plethora of use cases in the hospitality industry, ranging from personalized customer experiences to operational efficiency and security enhancements. By harnessing the power of data, hotels and restaurants can stay competitive, optimize their operations, and deliver exceptional guest experiences, ultimately leading to increased revenue and brand loyalty.

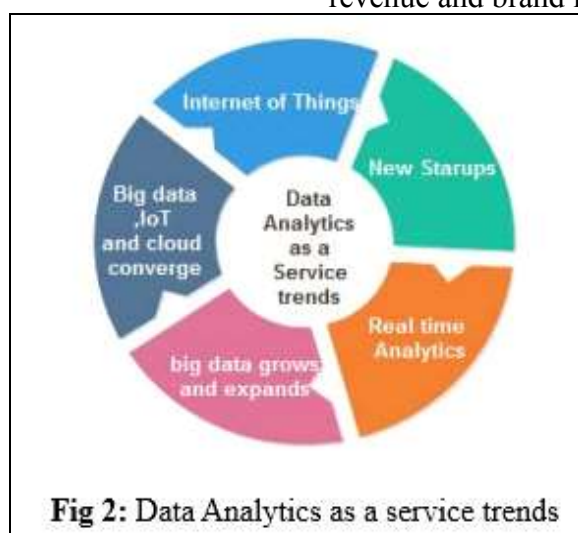


Fig 2: Data Analytics as a service trends

V. SUMMARY OF FINDINGS

Our investigation highlighted several key findings. Firstly, cloud-based data analytics enables hotels to collect, store, and analyse vast amounts of data from various sources, such as guest bookings, on-site activities, and feedback. This data-driven approach facilitates better understanding of guest preferences and behaviour patterns, leading to personalized services and targeted marketing strategies. Secondly, the flexibility and scalability of cloud-based platforms allow hospitality businesses to adapt quickly to changing demands, ensuring seamless operations and improved resource allocation. Additionally, cloud-based analytics offers cost-effective solutions compared to traditional on-premise systems, eliminating the need for extensive IT infrastructure and reducing maintenance expenses. Finally, it was evident that

cloud-based data analytics fosters collaboration among different departments, enabling cross-functional teams to work cohesively towards achieving common goals.

Importance of Cloud-Based Data Analytics in Hospitality: The significance of cloud-based data analytics in the hospitality industry cannot be overstated. It empowers hotels and resorts to leverage data-driven insights to enhance guest experiences, optimize pricing strategies, and improve overall operational efficiency. With real-time data accessibility, decision-makers can respond swiftly to emerging trends and challenges, maximizing revenue potential and mitigating risks. Cloud-based platforms also facilitate seamless integration with other applications and systems, fostering an ecosystem of interconnected technologies that streamline processes and reduce manual efforts. Additionally, cloud-based data

analytics opens up opportunities for predictive analysis, empowering hotels to anticipate guest needs and preferences, thereby strengthening customer loyalty and satisfaction.

Recommendations for Future Implementation of Cloud-based Data Analytics Platform in the Hospitality Industry: As the hospitality industry continues to evolve, implementing a cloud-based data analytics platform becomes imperative for sustained success. Here are some recommendations for future implementation:

Data Security and Privacy Measures: Prioritize robust data security measures to safeguard sensitive guest information. Invest in encryption, access controls, and regular security audits to ensure compliance with data protection regulations.

Staff Training and Adoption: Provide comprehensive training to employees on how to use the cloud-based analytics platform effectively. Encourage a data-driven culture within the organization to foster the adoption of data insights in decision-making.

Integration and Interoperability: Choose a cloud-based analytics platform that seamlessly integrates with existing hotel systems and third-party applications. Interoperability enhances data accuracy and reduces data silos.

Scalability Planning: Anticipate future growth and plan for scalability accordingly. The cloud-based solution should accommodate increasing data volumes and user demands without compromising performance.

Continuous Monitoring and Analysis: Regularly monitor and analyse data trends to identify opportunities for improvement and innovation. Use predictive analytics to proactively address potential issues and capitalize on emerging opportunities.

Guest Personalization: Leverage data insights to personalize guest experiences further. Tailor offerings, services, and marketing messages based on individual preferences and behaviour.

Collaborative Partnerships: Collaborate with data analytics experts and hospitality industry consultants to stay abreast of the latest trends and best practices in the field.

By implementing these recommendations, hospitality businesses can harness the full potential of cloud-based data analytics, driving operational excellence and customer satisfaction. Embracing a data-driven approach will enable them to thrive in an ever-changing and competitive landscape, setting the stage for continued growth and success.

VI. FUTURE PROSPECTS AND TRENDS

The future prospects and trends in the hospitality industry are heavily influenced by technological advancements. One of the key areas that will shape the industry's growth is the integration of Artificial Intelligence (AI) and Machine Learning (ML) into cloud-based data analytics platforms. This integration will revolutionize how hospitality businesses collect, process, and leverage data to enhance customer experiences, optimize operations, and drive better decision-making.

Artificial Intelligence and Machine Learning Integration: AI and ML will play a crucial role in analysing vast amounts of data generated by the hospitality industry, such as guest preferences, booking patterns, and feedback. By leveraging these technologies, businesses can gain valuable insights to personalize services, improve revenue management, and predict customer behaviour accurately. AI-driven chatbots and virtual assistants will also become more prevalent in addressing customer queries and enhancing overall guest satisfaction.

Edge Computing and IoT in Hospitality Analytics: Edge computing will become integral to the hospitality industry as it allows data processing to occur closer to the source, reducing latency and enhancing real-time analytics. The Internet of Things (IoT) devices will be utilized extensively to gather data from various touchpoints like smart rooms, wearable devices, and smart facilities, enabling hotels to offer personalized experiences and optimize resource allocation.

Blockchain for Enhanced Data Security and Transparency: Blockchain technology will be employed to improve data security and transparency within the hospitality industry. It will enable hotels to secure customer data, prevent unauthorized access, and provide a tamper-proof audit trail for transactions and guest interactions. This will enhance trust among customers and partners and streamline data sharing across the supply chain.

Hybrid Cloud Solutions for Data Sovereignty: As data privacy regulations become more stringent, hospitality businesses will adopt hybrid cloud solutions to ensure data sovereignty. Critical guest data can be stored in private, on-premises clouds, while non-sensitive data and analytics workloads can be processed in the public cloud. This approach will offer the necessary balance between data security and scalability.

Personalized Virtual Assistants and Chatbots:

Personalized virtual assistants and chatbots will become more sophisticated and widely adopted in the hospitality industry. These AI-powered agents will engage with guests throughout their journey, from pre-booking inquiries to post-stay feedback. They will use guest history and preferences to offer personalized recommendations, optimize service delivery, and improve customer satisfaction.

The integration of AI and ML into cloud-based data analytics platforms will be a game-changer for the hospitality industry. These technologies will enable businesses to leverage data effectively, enhance

guest experiences, and optimize operations. Additionally, the adoption of edge computing, IoT devices, blockchain, and hybrid cloud solutions will contribute to improved data security, real-time insights, and compliance with data privacy regulations. As personalized virtual assistants and chatbots become more prevalent, they will redefine the guest experience by providing tailored and responsive services throughout their stay. The hospitality industry must embrace these trends to stay competitive and meet the evolving demands of modern travellers.

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