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A Study on the Impact of Innovative Technologies in the Hospitality Industry

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Abstract

As hotels strive to compete for business, technology adoption is critical to enhance the guest experience. In the last decade, we have seen some innovative trends take shape in the hospitality industry. The objective of this study is to assess the impact of technology-based innovations on hotel customer experiences, using a framework of four types of innovation. The study aims to determine which types of innovation are most important to guests, as well as how the value of innovative technology may vary based on demographic factors and trip intent. By achieving this objective, the study seeks to provide insights into how hotels can use technology to enhance guest satisfaction and loyalty. An analysis of popular hotel websites, discussions with hotel managers, and an internet search for the latest technology-driven innovations in hotels were all part of the qualitative phase. A questionnaire for hotel guests was constructed in the quantitative stage, yielding a sample of 631 valid completed questionnaires. Considering a framework that includes four types of innovation (i.e., product innovations, process innovations, enhanced knowledge of the market, and management innovations), this paper examines the impact of existing innovative technologies adopted by hotels on customer experiences and evaluates its potential for improving their stay. This research explores technological innovations perceived by respondents as the five most important technologies to enhance their hotel experience. Based on the four-category typology, the innovations that the guest felt like the most important were process innovations followed by product innovations. Overall, the findings suggest that hoteliers need to keep up with technological advancements to maintain and acquire new guests, but also need to consider differences in guests' wants, needs, and travel patterns.

Keywords:

Technology-driven innovation, hotel amenities, guest satisfaction, hotel guest experience, technology readiness

1   Introduction

In today's competitive landscape, technology-based innovations provide a critical opportunity for hotels to enhance their guests' experiences and gain a competitive edge. Despite the challenges of creating unique competencies and the hurdles of innovation in service organizations, hotels are recognizing the importance of service innovation to meet the ever-evolving needs and expectations of tourists who seek new and exciting experiences. Guests' expectations of connecting directly to the most cutting-edge technology in hotels are steadily increasing (Wang & Xiang, 2017). Previously, guestrooms offered a variety of technological experiences that were not available at home. This has completely changed nowadays, and what clients have in their houses is sometimes substantially better than what is supplied in hotel rooms (Fuchs & Reichel, 2013). Consequently, it is vital to offer technology-based services that reflect what's currently available on the market and what customers want. The reliance on creative technology has grown in recent years, not only as a result of the technologies that hotels have deployed but also as a result of the revolution that technology has ushered in in the consumption experience of tourism services customers (Ruiz-Molina, 2018). While some hotels set themselves apart with a series of small ideas, others do so with a single big innovative concept. In either case, the real challenge is to keep these creative practices going while also ensuring that guests are aware of and appreciate them.

Innovation can be a new method, idea, or product—something that is new or different (Hostettler, 2016). Because of the rapidity with which the competition copies popular ideas, hotels are forced to innovate regularly. Continuous innovation is difficult, thus it's critical to identify long-term ideas that are difficult for competitors to copy (Latan et al., 2020). Hotels that implement innovations that incorporate implicit knowledge and create one-of-a-kind, difficult-to-copy services are more likely to reap long-term benefits and ensure guest satisfaction. When deciding whether or not to implement technology-based service innovations, hoteliers must examine not only the costs and benefits of the technology but also the attitudes of guests to the procedural changes that come with it. According to recent studies, using new technologies increases perceived warmth and competence, first-visit intention, expected service quality, and willingness to pay (Yoganathan et al., 2019).

The use of technology in the hotel industry has revolutionized the guest experience, streamlining operations and increasing profitability. Mobile apps, such as Marriott's Bonvoy app, allow guests to check-in and check-out, order room service, and access hotel amenities through their smartphones (Marriott International, 2021). Self-service kiosks, like those implemented by Hilton Hotels, expedite the check-in and check-out process and reduce the need for front desk staff (Hilton Worldwide Holdings, 2021). Keyless room entry systems, using mobile devices or RFID technology, are becoming more prevalent in hotels like the Aloft Hotel, allowing guests to unlock their rooms with their smartphones (Aloft Hotels, 2021). In-room technology, such as smart TVs and voice assistants, are also becoming increasingly popular, enabling guests to access entertainment and information or control room features like lighting and temperature

(Hyatt Hotels Corporation, 2021). Guest service robots, like the ones being tested by InterContinental Hotels Group, are able to assist with room service, housekeeping, and concierge tasks, improving the efficiency of hotel operations (InterContinental Hotels Group, 2021). Energy-efficient systems, like those used by the Westin Hotels & Resorts, reduce the hotel's environmental footprint and operating costs (Westin Hotels & Resorts, 2021). These technologies offer guests a more personalized and enjoyable experience while also enabling hotels to operate more efficiently and cost-effectively.

Previous research has shown that to improve visitor pleasure, it is vital to understand what tourists truly want. (Bilgihan et al., 2011). However, just a few studies have looked into the impact of technological conveniences on hotel guest experiences and satisfaction (Cobanoglu et al., 2011; Jung et al., 2014). Because of how quickly technology advances, it is really important to review technology-focused studies frequently. Product innovations refer to the development of new or improved products or services offered by a company. In the hotel industry, product innovations can include new room designs, unique amenities, or technology-driven enhancements. Zhang et al. (2019) suggest that product innovations can positively impact guest satisfaction and loyalty.

Process innovations involve changes to the methods and procedures used to provide a service. This can include streamlining operations, reducing costs, and improving quality. In the hotel industry, process innovations can include implementing new software systems or automating tasks like check-in and check-out. A study by Koens et al. (2018) found that process innovations can improve the efficiency of hotel operations and enhance the guest experience.

Enhanced knowledge of the market involves gaining a deeper understanding of customer needs, preferences, and behavior. In the hotel industry, this can include conducting market research to identify new target markets or developing customer personas to tailor marketing efforts. A study by Sigala et al. (2017) found that enhanced knowledge of the market can lead to more personalized and relevant services for guests.

Management innovations refer to changes in the way a company is managed or organized. This can include restructuring departments, implementing new training programs, or adopting new management practices. In the hotel industry, management innovations can include shifting towards a more customer-centric approach or implementing sustainability initiatives. Management innovations can lead to improved financial performance and guest satisfaction (Hjalager & Richards, 2017).

The purpose of this study was to: evaluate the importance of technology-based innovations in hotel customer experiences based on the four types of innovation. (i.e., product innovations, process innovations, enhanced knowledge of the market, and management innovations). The aim is also to analyse if there are difference in technological preference and the extent of difference across types of technology according to purpose of travel, nature of travel and age.

2 Literature Review

Technological advancements continue to have an impact on travel agents, airlines, and hospitality businesses (Leung, 2019). In the hotel sector, user-generated material is seen as a useful source of information for improving quality and better understanding consumer satisfaction (Torres et al., 2015). Hotels will increasingly look to new technologies to substantially boost efficiency, decrease costs, personalise the customer experience, and improve service (Talwar, 2012). Advances in guest room technology have led to increasing guest agreement, which may now raise the importance of technological advancements in hotels, as today's luxury is tomorrow's expectation (Lukanova & Ilieva, 2019). Understanding the factors that influence technology adoption and use in the hospitality industry has become a popular research topic (Pourfakhimi et al., 2018), and it is necessary to make a variety of decisions related to innovation (Ahmad & Scott, 2019). While technology evolves, it is important to think about how human customers will engage with technological advancements in the hospitality business. If hotel guests are hesitant to adopt technological advancements, it will be difficult for hotels to incorporate these innovative technologies into their operations (Ivanov et al., 2018). Customers' technological readiness varies, and these variances may have an impact on customer satisfaction with the hotel. (Pham et al., 2018). Customers with a high level of technology confidence would value the product's technological characteristics more than customers with a low level of technology confidence. Examining technology adoption from the perspective of hotel guests can provide a more contextualised knowledge of the perceptions that influence technology-related decision-making in hotels.

Technological advancements improve guest pleasure, improve hotel service quality, and allow hotels to raise their profitability and competitiveness (Almomani et al., 2017). According to existing research, self-service technology has a favourable impact on customer happiness and loyalty, and its implementation can greatly deepen the positive relationship between customers and hotels (Shahid et al., 2018). Innovative technologies can assist customers to directly engage in the delivery of value-added services for themselves and thereby also allowing hotels to increase their quality of service (Wang & Sparks, 2014). The internet and related self-service technologies are increasingly being shown to play a major part in hotel renovations (Beldona et al., 2018). Pham et al. (2020) have argued that hotel services in general, and personalised services in particular, are becoming more popular as a result of technological advancements. Integrated self-service technology on hotel websites is projected to benefit not just hotels but also customers (Xiang et al., 2015). Innovative technology can offer more value for both consumers and frontline personnel by providing more pleasurable and tailored service experiences (Marinova et al., 2017).

Enz and Harrison (2008) argue that business models, products, services, processes, and marketing channels are all significant areas for innovation. Product innovations, which develop or improve products, and process innovations, which address how a company does business, including external processes and service advancements, are the

most notable distinctions in the innovation literature (Kahn, 2018). Theorists that have attempted to improve a typology for the service industry have further differentiated these two categories of innovation within tourism services. For instance, in her typology of service innovation, Hjalager (1997) separates management, institutional, and information handling innovations. Others have used her paradigm, including Novelli et al. (2006), and it has been adapted here to incorporate four forms of tourism innovation. According to Novelli et al. (2006), product innovation refers to the creation of new or improved products, services, or amenities that provide enhanced value to customers. Process innovation, on the other hand, is about improving the way in which products or services are produced, delivered, or consumed. This can involve the adoption of new technologies or the implementation of more efficient business processes. Enhanced knowledge of the market refers to the ability to better understand customer needs, preferences, and behaviors through market research, data analysis, or other means. Finally, management innovation refers to the implementation of new organizational structures, management practices, or leadership styles that improve the effectiveness and efficiency of a company's operations. These four types of innovation are important for the success and growth of any business, including those in the hotel industry.

It is vital to comprehend what hotel guests want and desire. This knowledge aids hotels in determining which products or services they should offer, as well as how to make existing offers more appealing to visitors, thus meeting their needs and expectations (Kotler et al., 2003).

It is important to examine the significant difference between the value of technology-based innovations based on (leisure and business) and (domestic and overseas) because the value of technology-based innovations may vary based on different types of guests and their trip purposes. For instance, business travelers may have different technology requirements compared to leisure travelers, as they often need to work while on the go. In contrast, leisure travelers may prioritize entertainment and relaxation options over work-related technologies. Similarly, domestic guests may have different expectations and preferences compared to overseas guests, as cultural differences and travel patterns may influence their technology usage.

Understanding these differences in technology requirements and preferences can help hotels tailor their technology offerings to different guest segments and enhance guest satisfaction and loyalty. It can also help hotels allocate resources more effectively, ensuring that investments in technology-based innovations are aligned with guests' needs and expectations.

Research has shown that examining the value of technology-based innovations based on different guest segments and trip purposes can provide valuable insights for hotel managers. For example, a study by Neuhofer et al., (2014) found that the importance of technology-based innovations varied significantly among different guest segments, with younger guests placing a higher value on technology compared to older guests. Similarly, a study by Kim et al., (2018) found that the importance of technology-

based innovations varied based on the trip purpose, with business travelers placing a higher value on technologies that support work-related tasks.

Overall, understanding the differences in the value of technology-based innovations based on different guest segments and trip purposes can help hotels enhance their competitiveness, improve guest satisfaction and loyalty, and allocate resources more effectively.

Each generation has different needs and aspirations, and as technology continues to rapidly change the global business environment, it is critical to stay current with new technologies as well as future guest desires (Fenich et al., 2011). Most studies have focused on the overall impact of technology on hotel guest experiences, without examining the specific types of innovation that are most important to guests (Buhalis & Amaranggana, 2014; Neuhofer et al., 2014; Sigala, 2016). This study aims to address this gap by exploring the impact of product, process, market knowledge, and management innovations on guest satisfaction and loyalty. Therefore this study evaluates the importance of technology-based innovations in hotel customer experiences based on the four types of innovation. (i.e., product innovations, process innovations, enhanced knowledge of the market, and management innovations) as well as explores the outcome of these innovations by the guests. It is also critical to understand how the value of technology-based innovations varies depending on travel intentions and demographics. The following research hypothesis sought to test this:

H1: There is a significant difference between guest preferences across all technology-driven innovations to the purpose of travel (leisure and business)

H2: There is a significant difference between guest preferences across all technology-driven innovations to the nature of travel (domestic and overseas)

H3: There is a significant difference between guest preferences across all technology-driven innovations across age groups.

3   Methodology

3.1   Scale Development

A two-step technique was used in this research. An analysis of 12 hotel websites was conducted in the qualitative phase to acquire a better knowledge of the present technology facilities in premium hotels. Premium hotels can be defined as "properties that offer high-quality amenities, facilities, and services in desirable locations, catering to affluent travelers seeking exceptional experiences" (Kim & Ko, 2019). These hotels often provide guests with luxurious accommodations, personalized services, and a range of high-end amenities such as fine dining, spas, fitness centers, and entertainment options (Kim & Ko, 2019). In addition, interviews with six hotel managers from five star hotels in Goa were conducted to determine the types of innovative technological practices in their hotels. A list of 59 technologies was generated based on the technologies given on the hotel websites and interviews with hotel managers. The list

was sorted based on the four types of tourism innovation i.e. Product innovations, Processes innovations, Knowledge of the market and Management innovations.

In our exploratory study, hotel guests were surveyed to capture overall impressions of the industry's innovation process from the guests' perspectives, based on these four types of innovation. The questionnaire was divided into four sections. The first part focused on demographic characteristics. The second part concentrated on guests' opinions regarding the importance of technology-based innovations they experienced in their last hotel stay. They were asked to rate 50 technologies using five-point Likert-type scales on the technology's importance (1 = 'Not at all important' and 5 = 'Very important'). The 50 technologies were identified through a review of hotel websites and discussions with hotel management and were thus likely to have been encountered by visitors. In the third section, respondents were asked to rate the outcomes of technology-based innovations (9 items) on a five-point scale (1= 'Strongly agree' and 5= 'Strongly disagree'). The items were developed based on perceived outcomes through literature review.

Four research experts who were familiar with the subject and scale creation process were asked to review the items for content coverage, clarity, consistency, and relevance to the scale's objective. Corrections were made to some terminologies and three reverse coded items in light of the expert opinion. Before administering the items for pilot testing, we sought professional advice to determine the content and face validity of the items. Finally, the 59-item scale was employed to examine the factor structure in the pilot test.

A pilot study was conducted by collecting data from 80 guests (30 females and 50 males) staying or had previously stayed in 3-5 star hotels in Goa. To check the factor structure of the technology-based innovations, the dataset obtained in this stage was put to Exploratory Factor Analysis. With a KMO value of 0.832, the EFA results with the 50 items showed the appearance of four components at first. The Cronbach's alpha was noted as 0.979 (Product Innovation), 0.933 (Process Innovation), 0.930 (Management Innovation) and .903 (Market Knowledge). On obtaining the desired Cronbach's alpha values, the final 59 item scale was administered for further data collection.

3.2   Data Collection

The study collected quantitative data from respondents who were leisure or business travelers and had stayed in 3-5 star hotels in Goa. The sample was collected using a non-probability purposive sampling technique. The total number of questionnaires received was 680 through various means such as contacting hotel guests, Google Drive, and social media. However, only 631 samples were considered for analysis. It is important to note that the responses obtained during the scale's pilot testing were not included in the final analysis. The study aimed to examine the impact of existing innovative technologies adopted by hotels on customer experiences.

3.3　Exploratory Factor Analysis

Using all 50 items, the EFA was run to explore the structure underlying the initial scale. The Varimax rotation method was used to determine the structure of the scale factor, and the principal component factor analysis approach was applied to the scores obtained from the results. The Kaiser-Mayer-Olkin (KMO) coefficient was used to assess the sample adequacy for factor analysis (Ugulu et al. 2013). In principal component factor analysis, the KMO value was found to be 0.949 (See Table 1), which is regarded as excellent (Hair et al. 2010). Bartlett's test of sphericity is another indicator of the strength of the relationship between variables (Ugulu et al. 2013). As seen in Table 1, the observed significance level in this investigation was $p < 0.001$, indicating that the strength of relationships between variables was significant (George & Mallery 2001).

Table 1: KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.949
Bartlett's Test of Sphericity	Approx. Chi-Square	43340.012
	df	1711
	Sig.	.000

The approach suggested by Pett et al. (2003) was then used to extract factors to capture overall impressions of the industry's innovation process from the guests' perspectives. On the 50-item scale, EFA identified four components with Eigenvalues greater than 1.0 as seen in Table 2. These constructs include Product innovations, Processes innovations, Knowledge of the market, and Management innovations and they derived from the previous literature review, as well as the qualitative phase of this study and were confirmed in the EFA during the pilot study. These variables explained 73 percent of the variance in the results.

Table 2. Factor names, Eigenvalues and Variance of Factors

Factor names	Eigenvalues	% of Variance	Cumulative %
Product innovations	20.159	40.319	40.319
Processes innovations	8.440	16.881	57.200
Knowledge of the market	6.076	12.152	69.351
Management innovations	1.957	3.914	73.265

To determine the structure of the scale factor, Varimax rotation method was used and principal component factor analysis method was applied to scores obtained from the responses. Table 3 displays the Rotated component matrix to show the factor structure and loadings of all the 50 items scale.

Table 3. Factor structures and loadings of the 50 items

	1 Product innovations	2 Processes innovations	3 Knowledge of the market	4 Management innovations
Rotated Component Matrix				
Component				
PT10	.949			
PT19	.934			
PT1	.929			
PT15	.915			
PT2	.906			
PT3	.894			
PT12	.893			
PT17	.890			
PT8	.881			
PT18	.860			
PT5	.859			
PT7	.853			
PT11	.851			
PT6	.847			
PT9	.843			
PT4	.758			
PT20	.670			
PT14	.663			
PT16	.434			
PR14		.915		
PT13		.912		
PR15		.911		
PR2		.904		
PR10		.882		
PR9		.878		
PR13		.874		
PR11		.870		
PR4		.867		
PR1		.853		
PR7		.844		
PR12		.814		
PR16		.808		
PR6		.804		

PR8	.798		
PR3	.769		
PR5	.593		
MG10		.888	
MG9		.847	
MG6		.833	
MG8		.833	
MG5		.829	
MG7		.824	
MG3		.774	
MG4		.772	
MG2		.749	
MG1		.746	
MK3			.825
MK4			.748
MK1			.690
MK2			.654
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

The researchers had to check for any chance of common method bias (CMB) in the following stage of the scale validation, which is an error that happens when a single questionnaire is used to collect data on several factors. Harman's single factor test is one approach to determining the presence of common method variance (Podsakoff & Organ 1986). A non-rotated EFA with a forced single factor solution is required for this test using the Principal Axis factoring method. It was established that the single factor accounted for just 40.31% (which is < 50%) of the variation, implying that CMB was unlikely (Podsakoff et al. 2003). Cronbach's coefficient alpha was employed in this study to examine the internal consistency of the survey scales in terms of their reliability. The Cronbach's Alpha reliability was calculated, and the results showed that all of the instruments' reliability coefficients were greater than 0.900, indicating that the instrument was reliable to use.

4 Findings

4.1 Demographic Profile

The guest questionnaire was completed by 631 respondents of which 61% were male, and 39% were female. Categorised by age, 60% of respondents were less than 35 years old, 35% were between 36 and 50 years and only 5% were above 51 years old. In

terms of the purpose of travel, most of the respondents were on leisure (82%), and the remainder of the respondents were on a business trip (18%). Categorised by the Income level, 34% of the respondents earned between Rupees 0-5 lakhs p.a, 37% were of the income group of Rupees 5-10 lakhs p.a, 23% were of the income group of Rupees 10-15 lakhs p.a whereas 5% earned more than Rupees 15 lakhs p.a. While 82% of the respondents were domestic travellers, merely 18% were overseas tourists this was mainly due to the travel restrictions due to Covid-19. The demographic characteristics of the respondents are presented in Table 4

Table 4. Respondents Demographic Profiles (N=631)

		Frequency	Percent
Gender	Female	248	39.3
	Male	383	60.7
Age	Below 35 yrs	379	60.1
	36-50 yrs	222	35.2
	Above 51 yrs	30	4.8
Income group	Rs 0-5 lakh p.a.	218	34.5
	Rs. 5-10 lakh p.a.	234	37.1
	Rs. 10-15 lakh p.a.	145	23
	More than Rs. 15 lakh p.a.	34	5.4
Purpose	Business	114	18.1
	Leisure	517	81.9
		631	100
Nature of travel	Overseas	116	18.4
	Domestic	515	81.6
	Total	631	100

To analyse how guest preferences differ according to the purpose of travel, a one-way analysis of variance (ANOVA) was computed to estimate a model with the importance score for each technology as the dependent variable and the purpose of travel (i.e. leisure or business) as the independent variable. The data show significant differences between Product Innovations and the purpose of travel ($p < 0.05$; F = 3.925) as seen in Table 5. Product Innovations are significantly more important for leisure travellers (mean=2.96) than for business guests (mean= 2.81). However, results indicated that there was no significant difference between the purpose of travel (i.e. leisure or business) and Process Innovations ($p > 0.05$; F=.239), Management Innovations ($p > 0.05$; F=2.235) and Marketing Innovations ($p > 0.05$; F=3.535). Overall, it was observed (see table 5) that there was no significant difference between guest preferences across all technology-driven innovations to the purpose of travel ($p > 0.05$; F=1.062). Therefore, we reject the proposed hypothesis 1.

Table 5. Difference in Technological Preference according to Purpose of Travel

Technology innovation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.238	1	0.238	1.062	0.303
Product Innovations					
Between Groups	2.048	1	2.048	3.925	0.048
Process Innovations					
Between Groups	0.105	1	0.105	0.239	0.625
Mkt Innovations					
Between Groups	1.450	1	1.450	3.535	0.061
Mgmt Innovations					
Between Groups	1.014	1	1.014	2.235	0.135

Similarly to analyse if there are differences in guests' preferences according to the nature of travel, a one-way ANOVA was computed between the respondents' nature of travel (domestic or overseas) and the importance score of each technology (dependent variable). The results indicate that the importance score of the majority of the technologies is statistically significant across domestic and overseas respondents ($p < 0.05$; F = 10.317). Hence Hypothesis 2 was accepted.

To understand the extent of difference across types of technology, the mean scores were calculated for each technology across groups. Results indicated that there was a significant difference across the respondents' nature of travel and the Product Innovations ($p < 0.05$; F = 8.870) Product Innovations are more important for domestic travellers (mean=2.97) than for overseas guests (mean= 2.75). Results also indicated a significant difference across the respondents' nature of travel and the Management Innovations ($p < 0.05$; F = 9.023). Management Innovations are more important for domestic travellers (mean=2.64) than for overseas guests (mean= 2.43). However, results indicated that there was no significant difference between the nature of travel and Process Innovations ($p > 0.05$; F=2.950), and Marketing Innovations ($p > 0.05$; F=1.375) as seen in Table 6.

Table 6. Difference in Technological Preference according to Nature of Travel

Technology Innovations	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.283	1	2.283	10.319	0.001
Product Innovations					
Between Groups	4.591	1	4.591	8.870	0.003
Process Innovations					

Between Groups	1.292	1	1.292	2.950	0.086
Mkt Innovations					
Between Groups	0.566	1	0.566	1.375	0.241
Mgmt Innovations					
Between Groups	4.049	1	4.049	9.023	0.003

Likewise, to analyse if there are differences in guests' preferences according to age groups, a one-way ANOVA was computed between the respondents' age (independent variable) and the importance score of the technology-driven innovations (dependent variable). The results indicate (see Table 7) that the importance score of technologies is not significant across ages ($p > 0.05$; F=1.731). Therefore, the third hypothesis was not supported.

Table 7 Difference in Technological Preference according to Age groups

Technology Innovations	ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.775	2	.388	1.731	.178
Within Groups	140.675	628	.224		
Total	141.450	630			

4.2 Findings related to the importance of technology-based innovations

Regarding the 50 technology-based innovations, Digital meeting facilities (3.09), Flexible check-in check-out time (3.04), Check-in check-out procedures by by-passing the Front office (2.98), Online bookings (2.97) disposable cutlery and glassware (2.97) are perceived by respondents as the five most important technologies to enhance their hotel experience. Furthermore, respondents reported Restaurant table management (2.56), Social media marketing (2.55), Guests' feedback with the hotel in real-time (2.54), Digital communication (2.53) and Closed social network (2.46) were the five least important technological amenities to be available in a future hotel stay. Table 8 presents the mean and standard deviation of the importance level for technology-based innovations reported by respondents.

Table 8. Importance of technology-based innovations

Descriptive Statistics (Frequency Table)					
Technological innovations	N	Min	Max	Mean	Std. Dev
Digital meeting facilities to avoid physical meetings	631	1	4	3.09	.765
Business bar to rent out gadgets such as tablets, laptops, e-readers, chargers, headphones or other digital lifesavers for business or leisure	631	1	4	3.04	.790
Check-in check out process that allows you to bypass the front desk	631	1	4	2.98	.780

Shifting focus to direct bookings through hotel websites instead of going through travel agents.	631	1	4	2.97	.793
Self-service concierge stations that provide Interactive customer experience	631	1	4	2.97	.759
Disposable cutlery and glassware	631	1	4	2.97	.785
Offering to individualise a guest stay by giving a more flexible check-in check out time which adds convenience for travellers arriving or departing at unusual hours	631	1	4	2.96	.804
Technology that sends an updated bill statement to the guest before checkout, at any time during the stay	631	1	4	2.95	.711
Free online booking service that lets the customers customize their evening out by pre-selecting their menus and drinks	631	1	4	2.95	.699
Water conservation app where Guests are given an option of not changing linen such as towels and bed sheets daily, rather when they choose to get the linen cleaned	631	1	4	2.94	.723
Contactless Reservation and Registration	631	1	4	2.93	.707
Room Personalization with the help of Master Remote control in the room which controls curtains, AC, TV, lights from one device	631	1	4	2.93	.872
Automated Reservation systems that help customers search for and reserve tables at restaurants at any time, based on cuisine, price, location, reviews, and other criteria.	631	1	4	2.93	.701
A technology wherein the hotel staff can communicate visually with the guests by casting media and information like room service, dining, way finding, etc. to the TV screen.	631	1	4	2.92	.815
Creation and scheduling promotions and events with special alerts for guests, to drive incremental revenue	631	1	4	2.91	.809

Considering our four-category typology, the innovations that the guest felt like the most important were the Process innovations followed by the Product Innovations. Management innovations were also frequent, while market knowledge innovations were least frequent.

Innovations in Processes: The most important Process innovation cited by respondents includes flexible check-in check-out time, Check-in-check-out by by-passing the Front Office, Online bookings, Use of disposable cutlery and glassware & Self-service Concierge.

Innovations in Products: Foremost among innovations of this type were Digital meeting facilities, Contactless Reservation and Registration, Room personalization with remote, Automated mini bar consumption and Property-wide free Wi-Fi access.

Innovations in Management: In terms of technology-based innovations in management, Rainwater harvesting was considered most important followed by the use of Property Management Systems, Air processing technology, Electronic virtual menu for restaurants and Automatic order-taking systems.

Innovations in Market Knowledge: The most important market knowledge innovation was virtual tours and picture galleries on websites. Offering deals through social media pages and Use of Social media marketing was also considered important technological facilities.

Table 9: Guests' perceptions regarding outcomes of technology-based innovations

	N	Min	Max	Mean	Std. Deviation
I will prefer to stay at a hotel with innovative practices	631	3	5	4.25	.781
Innovation helps hotels to differentiate from competitors	631	2	5	4.23	.823
Innovation creates a higher reach to guests.	631	3	5	4.21	.789
Innovation leads to customer convenience.	631	2	5	4.16	.790
Hotels with innovative practices will have a competitive advantage	631	1	5	3.97	1.016
I will remain loyal to a hotel with innovative practices	631	1	5	3.94	.941
Hotels with innovative practices create customer satisfaction	631	2	5	3.91	.817
Hotels with innovative practices will be more profitable	631	2	5	3.83	.936
Hotels with innovative practices will have higher sales	631	2	5	3.63	.962
Valid N (list wise)	631				

Table 9 shows the results of guests' perceptions regarding outcomes of technology-based innovations. Most guests believed that they will prefer to stay at a hotel with innovative practices (mean=4.25). 46% of the respondents strongly agreed, 33% of the respondents agreed whereas 21% were undecided when asked if they will prefer to stay at a hotel with innovative practices as seen in Figure 1.
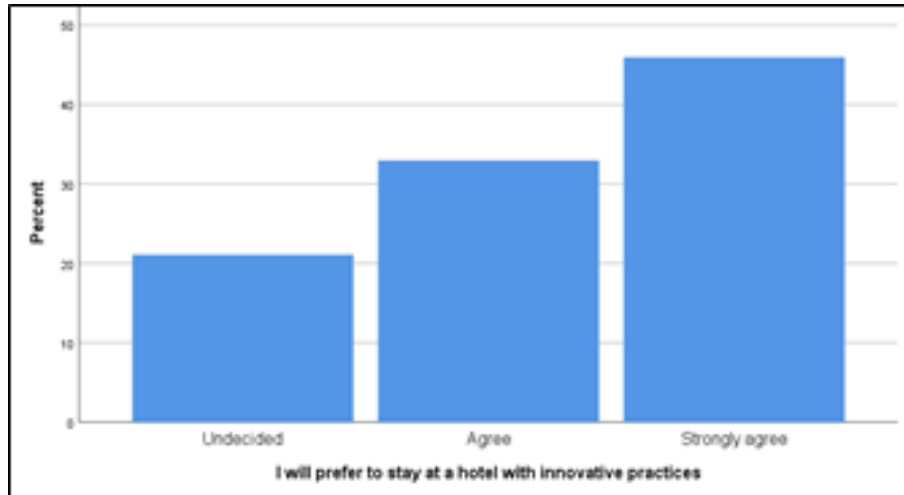
Figure 1: I will prefer to stay at a hotel with innovative practices

When asked if Innovation helps hotels to differentiate from competitors 44.4% strongly agreed, 37.6% of the respondents agreed, 14.6% were undecided whereas 3.5 % of the respondents disagreed as seen in Figure 2
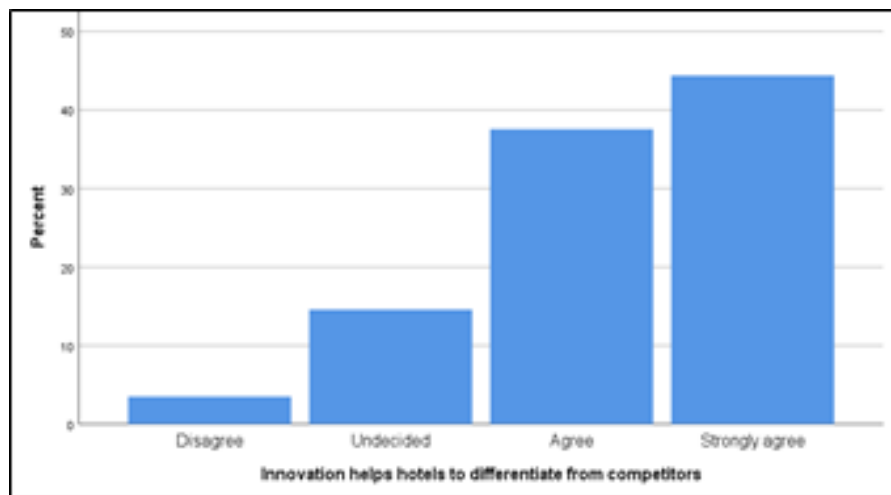

Figure 2: Innovation helps to differentiate from competitors

When asked if Innovation creates a higher reach to guests, 44.1% of respondents said that they strongly agreed, 33.3% agreed, whereas 22.7% of the respondents were undecided. See Figure 3.
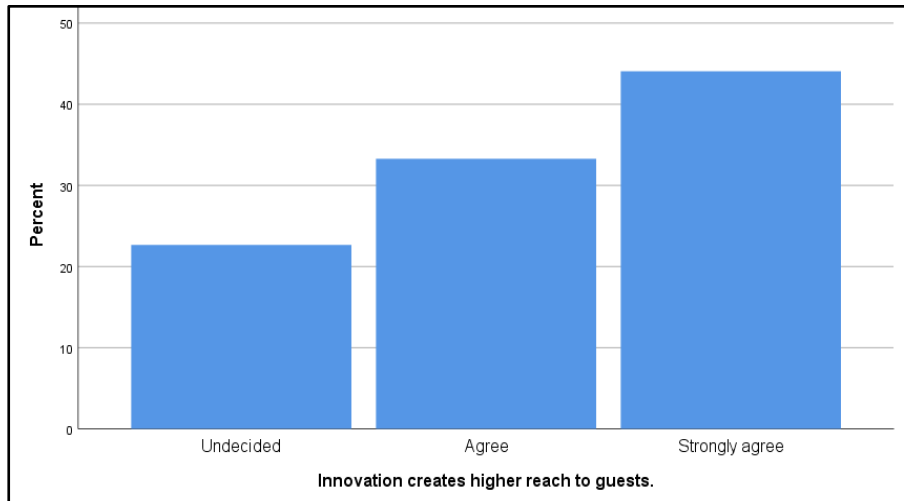
Figure 3: Innovation creates a higher reach to guests

In response to the question of whether Innovation leads to customer convenience, 38.5% of the respondents strongly agreed, 40.9% agreed, 18.7% were undecided whereas 1.9% disagreed as seen in Figure 4.
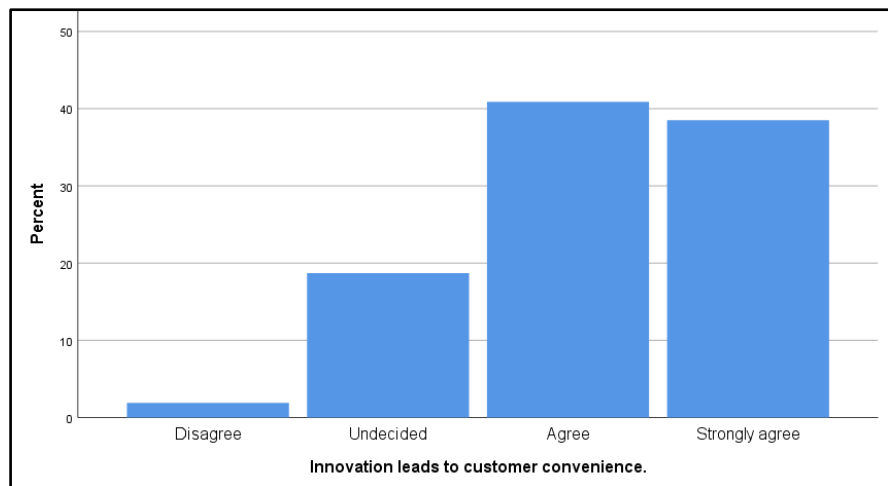

Figure 4: Innovation leads to customer convenience

In response to the question, if hotels with innovative practices will have a competitive advantage, 29.3% of the respondents strongly agreed, whereas a majority of the respondents (52.6%) agreed. While 11.1% were undecided, 7% of the respondents felt that innovative practices won't have a competitive advantage (see figure 5).
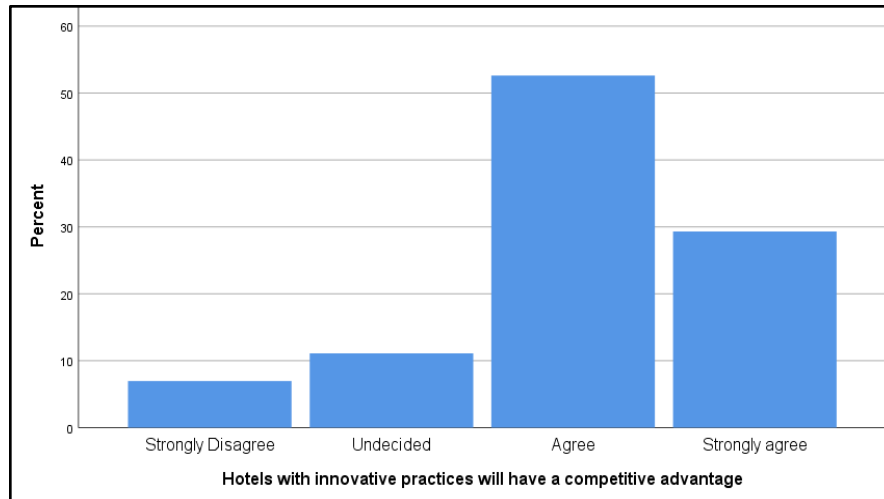
Figure 5. Hotels with innovative practices will have a competitive advantage

5   Discussion

The hotel industry has been forced to think about innovation as never before. Installing specific new technology can dramatically improve visitor experiences, which hotel management should be aware of. Hotel guests benefit from technology as a value-added service. Thereby hotels can differentiate themselves, increase guest satisfaction, and build long-term loyalty based on the results of our questionnaire. This study attempted to identify the most and least important technology-based innovations in hotels from the guest's perspective and also to examine its impact on satisfaction and loyalty intentions. The findings have several implications for practitioners. This study examines the most cutting-edge technologies and offers advice to hoteliers looking to upgrade or install new technology. Hoteliers may differentiate themselves by providing guests with the most important and cutting-edge technologies, boosting their experience and attracting new consumers, potentially leading to increased revenue. In today's highly competitive guest environment, managers must understand their guests' essential expectations to retain existing guests and acquire new guests.

Regarding the first objective of this study that focused on the 50 current technologies, the findings provide evidence that the following technologies have a significant impact on customer experiences: Digital meeting facilities to avoid physical meetings, business bar to rent out gadgets such as tablets, laptops, e-readers, chargers, headphones or other digital lifesavers for business or leisure, A check-in check out process that allows you to bypass the front desk, Shifting focus to direct bookings through hotel websites instead of going through travel agents, Self-service concierge stations that provide Interactive customer experience. Other facilities of importance include disposable cutlery and glassware, offering to individualise a guest stay by giving a more flexible check-in check out time which adds convenience for travellers arriving or departing at unusual hours, technology that sends an updated bill statement to the guest before checkout, at any time during the stay, free online booking service that lets

the customers customize their evening out by pre-selecting their menus and drinks and a water conservation app where guests are given an option of not changing linen such as towels and bed sheets daily, rather when they choose to get the linen cleaned. These technologies are rated by guests as having considerable levels of importance and improving their satisfaction. Therefore, hoteliers must maintain these systems in order to promote guest satisfaction and improve customer experiences. Managers may want to consider reallocating the budget for those technological practices that weren't considered important to other amenities to which guests give more importance. Since some of these technologies are not as widespread in homes as they are in hotels, visitors may not consider them priority technology in hotels at this time. However, while non-mainstream technologies may be regarded as intrusive by guests, as these technologies become more prevalent, demand for them may increase, giving hotels a competitive advantage. This is something to consider if hoteliers are thinking about investing in technology in the near future. Concerning the guests' technological preferences for check-in and check-out, as well as ordering services or controlling their room, the majority of customers are interested in the digital world. Thus, hoteliers need to keep up with technological advancements to be able to maintain and acquire new guests. These findings indicate that respondents have a great desire to try something new and unique, and that standard techniques of upgrading processes and technologies are no longer effective in exceeding guests' expectations. In terms of stay and facilities, a sizeable amount of clients are seeking for something distinctive or different. Differences in guests' technological preferences according to age, nature of travel and purpose of travel were also analyzed. Results indicated that the importance score of technologies is not significant across ages. Results also indicated that there was a significant difference across the respondents' nature of travel (domestic and overseas) and the Product Innovations as well the Management Innovations. However, there was no significant difference between the nature of travel and Process Innovations and Marketing Innovations. The findings also revealed that Product Innovations are significantly more important for leisure travellers than for business guests. However, results indicated that there was no significant difference between the purpose of travel (i.e. leisure or business) and Process Innovations, Management Innovations and Marketing Innovations. This supports the conclusion that leisure travellers exhibit a greater desire to have technology-based involvement with the hotels in which they stay. Despite leisure guests' growing interest in technology, hoteliers need to consider some differences that still exist between business and leisure guests who have different wants, needs and travel patterns.

6 Conclusion, Limitations and Future Research Directions

The goal of this study was to throw light on the most appealing features of the hotels' technology-driven amenities from the perspective of guests to improve guest satisfaction. This research contributes to academic research by updating information on the most important technologies now available to guests and identifying the most cutting-edge technologies with the greatest potential to improve visitor experiences.

This study's results are relevant since they focus on the perceptions of customers related to technology based innovations in hospitality firms. When it comes to the hotel's usage of technology, hospitality managers should be fully cognizant of their guests' priorities. The findings of this study can assist hotel management in better understanding the impact of various technologies on guest experiences, as well as helping hoteliers in upgrading or installing new technologies that visitors desire to utilise throughout their stay. Hotels can take advantage of opportunities to improve technology on a regular basis, allowing it to stand out from the competition and obtain a competitive advantage. As a result, if hoteliers take this study's recommendations, they can gain significant distinctiveness by providing the most crucial amenities among the latest technology to guests, boosting their experience and potentially attracting new clients, which could result in improved revenues.

A limitation of this study was the small number of overseas guests and business travellers in the sample due to travel restrictions due to the Covid 19 pandemic. Therefore, a study with an equal number of business travellers and leisure guests as well as domestic and overseas guests may provide different results. Future research needs to ensure a heterogeneous sample to analyse the technology preference differences between leisure and business guests in greater depth. A replication of this study might be conducted in multi-national countries with sophisticated technological development, such as Europe and America, to see if there are any regional differences in the perceived relevance of technologies. Other new technologies could be included in future studies to see if there are any changes in guest preferences for them. The hotel sector is always advancing technologically. Future research could examine emerging technology to determine if customer preferences have changed. While the price of hotel rooms with these advances was left out of this study, future research might examine how guests prefer hotels with various levels of technology but comparable prices.

7　References

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