AN INVESTIGATION OF AUTOMATION AND HUMAN INTERACTION TO GUEST LOYALTY IN THE ADVANCED TECHNOLOGY SERVICE MARKETING OF UPSCALE HOTELS IN CHINA

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Abstract

Purpose—This study examines the influence of the elements of 'High-Tech' and 'High-Touch' service on visitors' experience and how different guest characteristics can affect their satisfaction and loyalty in the hotel service process in China.
Methodology/Design/Approach—To draw broad conclusions on the balance between automation and human interaction in marketing artificial intelligence services in high-end hotels in China, it is essential to employ non-probability sampling. In this investigation, the sample frame will utilize purposive sampling.
The originality of the research – This research demonstrates high originality as it explores a relatively unexplored topic, particularly in China. This research aims to investigate the factors of high technology and personalized service and then determine whether both dimension may enhance customer loyalty among in China. This research significantly influences society, particularly in guiding hotel managers when making decisions on technology implementation.
Keywords hotel, artificial intelligence, High-Tech, High Touch, technology, human interaction

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INTRODUCTION

In the future, all tourism-related industries will experience substantial technological advancements, including the hotel industry (Buhalis, 2020). Due to the unique characteristics of these disruptive technologies, the tourism and hospitality sectors now possess significant new attributes, including real-time functionality, co-creation opportunities, data-driven decision-making, consumer-centric approaches, and enhanced experiential offerings (Buhalis & Sinarta, 2019). High technology, often high-tech, known as advanced technology, is a branch of computer science that seeks to understand the essence of intelligence that can respond in similar ways to human intelligence, including self-service and artificial intelligence, but does not require human interaction (Dong et al., 2020). In a similar vein, Ivanov et al. (2020) elucidate the pivotal significance of High-Tech in the forthcoming era and assert that the 'robonomic' economy will have a profound influence on the essence of employment, earnings, recreational time, commerce, as well as social, economic, and political facets. In addition to these benefits, implementing the Internet of Things (IoT) in hotel rooms enables personalized guest experiences by utilizing smart room controls for lighting, temperature, and entertainment systems (Buhalis & Leung, 2018).

On the other hand, high-touch generally refers to the involvement of personal attention and service (Liu & Hung, 2021). The roots of high-touch services in the hotel industry lie in the unique emotional bond of warmth and trust between hosts and guests (Lashley, 2000), suggesting that value-creation in hospitality requires a deeply human touch. Meanwhile, the study by Li and Huang (2022) proposed that hotel operators may obtain a competitive edge by controlling their guest stay experience and focusing on offering high-touch service. High-touch service fosters emotional connections between guests and staff, creating a warm and welcoming atmosphere that can lead to repeat visits and loyalty.

Problem statement

Firstly, about the factors of high-tech and high-touch service in this research. An abundance of the previous literature revealed diverse views regarding guests' preferences for 'high-tech' versus 'high-touch' (Liu & Hung, 2021; Ivanov, 2019). However, few of them can list the factors of each dimension, especially in the hospitality sector. For instance, Tussyadiah (2020) provides an intelligent automation framework in hospitality, in which devices and services are produced and deployed in ubiquitous environments on the route to and within the hospitality industry. This research indicates that intelligent high-tech can improve the efficiency of hotel operations and guest service. However, these previous studies lack exploration of specific high-tech elements. Similarly, research by Bowen and Shoemaker (1998) highlighted the importance of direct, warm interactions in creating a welcoming environment, which positively impacts guest satisfaction. These indicate high-touch service, characterized by personalized, attentive, and human-centered interactions, but hardly anyone can pinpoint all the factors in high-touch.

Secondly, guest loyalty has been widely regarded as a fundamentally important concept in the hospitality industry due to its positive outcomes, such as competitive advantage, higher profitability, and cooperative behavior (Al-Ayed, 2022; Hennig-Thurau, 2000; Jalilvand et al., 2017). This means that under the influence of new technologies, guest loyalty has changed in the context of traditional human interaction service (Bilstein & Stummer, 2023). However, most of the previous studies are not supported by extensive questionnaires and data to react to the relationship between high technology and loyalty, and some of them are just based on case studies. According to Talwar et al. (2020), 95 percent of guests expect that "hotels will increasingly look to new technologies to drastically increase efficiency, reduce costs, personalize the guest experience, and improve service." However, only a few studies have examined the impact of technological amenities on hotel guest experience satisfaction (Tavitiyaman et al., 2022). Limited findings on this aspect made it challenging to grasp market dynamics in understanding consumer preference and high touch awareness to establish guest loyalty and promote the high-quality development of the hotel industry.

Lastly, in the real operation area, Buhalis and Sinarta (2019) argue that hotel services have new essential features such as co-creation and data-driven owing to the innovative nature of automatic and intelligent technologies. However, there is no follow-up research on guest acceptance and feedback on such new features. Guests may feel uneasy or distrustful of interactions with AI-powered technologies because the human interaction services were ignored (Mazurek & Małagocka, 2019). It increases the difficulty for guests to learn the application of artificial intelligence technology; for the elderly or people with learning disabilities or mental disabilities, it affects the guest using experience.

1. LITERATURE REVIEW AND HYPOTHESES

1.1. High-Tech Factors

Previous researchers categorized high-tech into different aspects from different perspectives and strengths (Table 1), including intelligentization, functionalization, privacy, and usability. This literature is focused on hospitality and marketing research, which facilitates the better discovery of similar ideas to distill the factors of high-tech.

Table 1: **Benefits of High-tech factors**

Factors	Function / Benefits	Reference
Intelligentization	• High technology combined with intelligentization can make guests' stay more comfortable and convenient by enabling seamless interactions and personalized services. • Intelligentization of high-tech can improve service speed and operational efficiency, reduce costs, and enhance customer experiences. • Hotels have a competitive edge by setting others apart through intelligent service offerings.	Buhalis & Leung, 2018; Chai et al., 2021; Huang & Rust, 2018; Ivanov & Webster, 2019; Tussyadiah, 2020
Functionalization	• Functions of robots influence the interaction with hotel guests and shape their experience by optimizing operational processes, hotels can achieve greater efficiency and cost savings. • Functionalization can enhance and diversify hotel functions to meet the evolving needs of guests; hotels can successfully navigate the dynamic landscape of the hospitality industry and secure a competitive edge.	Bilgihan & Wang, 2016; Davari et al., 2022; Fuentes et al., 2020; Gottesfeld et al., 2018; Huang & Rust, 2018
Privacy	• Keep guest information safe and make sure that rules are followed. • Lower the chance of data breaches and increase guest trust. • Privacy enhanced hotel guests' acceptance of social media networks	Gretzel et al., 2020; Miliotis et al., 2020
Usability	• If guests find the technology difficult to use or cumbersome, they are unlikely to perceive it as beneficial, so usability can enhance the overall experience for users, leading to higher satisfaction and repeat visits. • Usability also significantly optimizes resource allocation within hotels, as staff can dedicate more time to personalized and attentive interactions.	Kim et al., 2019; Law et al., 2018

1.2. High Touch Factors

Table 2 lists the factors of high touch from previous research. These elements are crucial in shaping service design because they ensure that services are tailored to meet guests' specific needs and preferences, thereby enhancing their overall experience.

Table 2: **Benefits of High touch factors**

Factors	Function / Benefits	Reference
Special care	• Attracting new guests and encouraging repeat visits, but also creating emotional connections that lead to higher levels of guest satisfaction and loyalty. • Special care differentiates hotels in a competitive market by offering unique and tailored services that meet diverse guest needs.	Bowen & Chen, 2001; Elshaer & Marzouk, 2024; Lee et al., 2020; Mattila, 2001; Padma & Ahn, 2020; Shoemaker & Lewis, 1999
Opportunely	• Opportune service can play a critical role during peak seasons or high-demand periods for efficient handling of guest requests by reducing bottlenecks, operation costs, and wait times • Opportune service in high-star hotels' traditional service is more satisfying than constant service. It is a critical factor in influencing guest satisfaction, loyalty, and overall hotel performance.	Alzoubi et al., 2021; Buhalis & Leung, 2018; Gerdt et al., 2019; Ruan et al., 2020; Rust & Oliver, 1994; Stefko et al., 2020
Deep-friendliness	• Deep-friendliness fosters a sense of belonging and trust, it differentiates hotels in a competitive market by creating memorable and emotionally resonant guest experiences. • Deep-friendliness leads to memorable and enjoyable stays as well as higher levels of guest satisfaction as it makes guests feel special and appreciated.	Barsky & Nash, 2002; Berry et al., 2006; Mattila, 2001; Padma & Ahn, 2020; Peterson, 2019; Tsang & Ap, 2007

1.3. Guest Satisfaction

Oliver et al. (1997) coined one of the most popular definitions of satisfaction in retail marketing as an assessment of the surprise inherent in product purchase or use. This means that the consumer should not only buy the thing itself but should also be pleasantly surprised by a certain emotional experience. Moreover, Vansteenkiste et al. (2020), based on these points of view, defined satisfaction as a need-based notion, inextricably linked to motivation; hence, satisfaction derives from met needs. Many studies use alternate terms, such as service quality and guest satisfaction, even though most writers feel that these notions are separate, even if they overlap (Dabholkar et al., 2000; Medberg & Gronroos, 2020; Rust & Oliver, 1993). Meanwhile, here is a model of research done by Nurcahyo et al. (2017) about the influence of facility and service quality on customer satisfaction in hotels in Jakarta (Figure 1), and their modeling corroborates this viewpoint.

Figure 1: **Facility and Service Quality Towards Customer Satisfaction**

Source: Nurcahyo et al. (2017)

From the findings of this model, 'facilities' have a substantial and direct impact on hotel client satisfaction. It suggests that a better facility will lead to increased customer satisfaction. In addition, 'service quality' directly and considerably impacts client satisfaction. There is a positive relationship between facility and service quality and guest satisfaction. This study accepts and adopts Such a path model, dividing guest satisfaction into two aspects: facilities, equipment, and service categories.

1.4. Guest Loyalty

There is a chronological overview of significant research studies that have contributed to understanding and enhancing guest loyalty in the hotel industry. For instance, Zeithaml et al. (1996) researched hotel service quality, customer satisfaction, and

customer loyalty. This study develops an integrated model linking service quality, customer satisfaction, and loyalty in the hotel sector, emphasizing the importance of delivering high-quality service to retain customers. Furthermore, after 2000, Kandampully and Suhartanto (2000) investigated the link between customer satisfaction and loyalty, focusing on how different hotel ownership types influence this relationship.

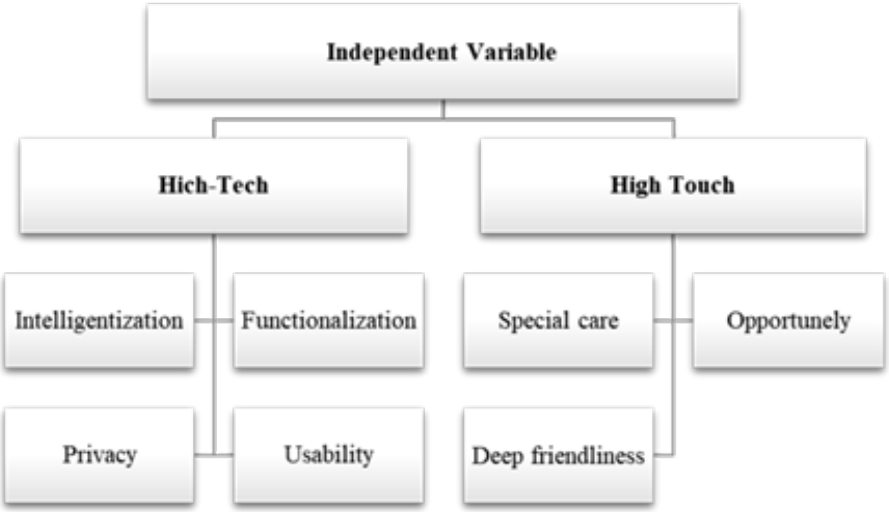
According to Zhang et al. (2020), loyal guests help promote the hotel and increase sales by purchasing a wider variety of the hotel's products and making frequent purchases. Moreover, studies by Serra-Cantallops et al. (2020) indicate that positive word-of-mouth from loyal guests can significantly enhance a hotel's reputation and attract new customers. Not only that, but fostering guest loyalty from a hospitality perspective is also quite significant and beneficial, such as competitive advantage, higher profitability, and cooperative behavior (Akbari et al., 2021; Chen et al., 2021). Obviously, guest loyalty has been widely regarded as a fundamentally important concept in marketing literature due to its positive outcomes.

1.5. Framework and Hypothesis Development

1.5.1. Independent Variables of 'High-Tech' and 'High Touch'

This study includes two independent variables, 'High-Tech' and 'High Touch'. Each variable contains several measurements: intelligentization, functionalization, privacy, and usability in the 'High-Tech' dimension and special care, opportuneness, and deep-friendliness in the 'High Touch' dimension (Figure 2). This study will validate the identified factors and investigate additional metrics through surveys using multidimensional measurements, which collectively represent advanced technology and personal service from previous research.

Figure 2: M**easurements of 'High-Tech' and 'High Touch' Dimensions**



Firstly, in the high-tech dimension, Tussyadiah (2020) believes 'intelligentization' encompasses smart systems that manage room environments, predictive analytics for personalized marketing, and AI-driven customer service solutions. Moreover, Buhalis and Sinarta (2019) also believe 'intelligentization' can enhance guest experiences by providing seamless, personalized, and efficient services. The 'functionalization' refers to the ability of high-tech systems and devices to perform tasks effectively and reliably, meeting the specific needs of hotel operations and guest services (Law et al., 2018). It is crucial for improving operational efficiency, reducing costs, and enhancing the overall guest experience. Meanwhile, 'usability' refers to the ease with which users can interact with a system to achieve their goals effectively and satisfactorily (Gretzel et al., 2020). It highlights that intuitive interfaces and seamless integration of these technologies significantly enhance guest comfort and satisfaction. However, high-tech services handle large amounts of personal data, raising concerns about security and privacy. It means ensuring high technologies are secure and maintaining high usability while protecting guest data is critical.

In the high touch dimension, 'special care' in hotels is the comprehensive approach to meeting guests' individual needs through personalized and exceptional service, ensuring comfort, safety, and well-being (Pizam, 2004). Then, 'opportunely' service is the prompt and timely delivery of services that align with guests' specific needs and preferences at the right moment (Zeithaml et al., 1996). It involves anticipating guest needs and responding quickly to service requests and issues. Lastly, 'deep-friendliness' is characterized by genuine, heartfelt interactions between hotel staff and guests, creating an atmosphere of warmth and hospitality (Chathoth et al., 2014; Tung & Ritchie, 2011). It involves personalized service, empathy, and a proactive approach to anticipating and fulfilling guest needs. Based on these, the first hypothesis of this study is:

H_0: 'Intelligentization' 'functionalization' 'usability' 'privacy' are the factors in the high-tech dimension; 'special care' 'opportunely' and 'deep friendliness' are the factors that belong in the high touch dimension.

1.5.2. Independent Variables and Dependent Variable of 'Guest Loyalty'

The hospitality industry is undergoing a significant transformation driven by advancements in high-tech solutions. Upscale hotels are pursuing a system combining sophisticated hardware and software with elaborate databases and knowledge-based processing models to demonstrate the characteristics of effective guest decision-making and establish loyalty (Enz & Siguaw, 1999; Cobanoglu et al., 2011; Um et al., 2020).

Similarly, 'high touch' refers to a high level of personalized service and human interaction that caters to individual guest needs and preferences. It involves the personal attention a customer service agent provides and tailors to each customer based on their specific wants and needs to get high-value outcomes (Liu & Hung, 2021). Furthermore, research by Belanche et al. (2021), Guenzi and Pelloni (2004) underscored that personalized service, particularly through human interaction, is a key factor in enhancing guest loyalty. These studies collectively emphasize the importance of emotional connections in the hospitality industry.

In the competitive hospitality industry, guest loyalty is crucial for sustained success. The multi-dimension of high-tech and high touch solutions has become increasingly prevalent, aiming to enhance the guest experience and foster loyalty. Accordingly, this study develops the hypothesis as follows:

H_1: There is a significant relationship between 'High-Tech' and Guest Loyalty
H_2: There is a significant relationship between 'High Touch' and Guest Loyalty

1.5.3. Independent Variables and Mediating Variables of 'Guest Satisfaction'

According to Talwar and Crossman (2012), *"Hotels will increasingly look to new technologies to drastically increase efficiency, reduce costs, personalize the guest experience, and improve service."* These indicate that high-tech operations can lower costs, increase productivity, and improve efficiency and dependability. On the other hand, the service literature is replete with studies on how high-touch services, such as authentic smiles (Grandey et al., 2005), a warm welcome with the opening of the doors, friendly greetings with help handling luggage (Solnet et al., 2019), and authentic caring behavior straight from the heart, add value to a guest experience and effect satisfaction (Ariffin & Maghzi, 2012). So, for hospitality businesses, investing in high-touch service practices is a strategic imperative to meet and exceed guest expectations, ultimately driving long-term success. Therefore, the hypotheses are:

H_3: There is a significant relationship between 'High-Tech' and Guest satisfaction
H_4: There is a significant relationship between 'High Touch' and Guest satisfaction

Research consistently shows a positive correlation between guest satisfaction and loyalty (Buttle & Burton, 2002; Khan et al., 2022; Kurdi et al., 2020; Moorman et al., 1993; Rauyruen & Miller, 2007). Several authors (Askariazad & Babakhani, 2015; Chumpitaz & Paparoidamis, 2004; Sasono et al., 2021) investigate how satisfaction influences composite loyalty in B2B marketing. Furthermore, there are a lot of recent studies that indicate a positive relationship between guest satisfaction and loyalty in the hospitality industry. For instance, Han and Hyun (2018) found a strong positive correlation between guest satisfaction and loyalty in the luxury cruise sector. Satisfied travelers exhibited higher loyalty, characterized by their willingness to return and recommend the service to others. In line with the above findings, the following hypotheses are developed:

H_5: Guest satisfaction has a significant effect on Guest loyalty

1.5.4. Mediating Variables of 'Guest Satisfaction'

Satisfaction is a post-usage phenomenon that is purely experiential and results from comparative processes (Abd et al., 2020; Tarasi et al., 2013). Moreover, studies by Kandampully and Suhartanto (2000) indicate that service quality dimensions, such as reliability, assurance, and responsiveness, are crucial in building guest satisfaction. These studies indicate consistent service quality leads to positive evaluations and higher satisfaction levels. Besides these, according to research by Han and Jeong (2013), positive emotions experienced during a stay can strengthen the emotional bond between guests and the establishment, fostering loyalty. Briefly, as a mediator, satisfaction bridges the gap between high-touch service and guest loyalty.

Not only this, empirical studies support the mediating role of guest satisfaction in the relationship between high-tech implementation and guest loyalty. For instance, research by Kim et al. (2016) found that technology-based service innovations positively affect guest satisfaction, enhancing loyalty. In the same way, a study by Iqbal et al. (2018) demonstrated that guest satisfaction fully mediates the relationship between perceived technology quality and guest loyalty. Understanding the mediating role of guest satisfaction helps hotel managers prioritize investments in high-tech solutions that are most likely to enhance satisfaction (He & Li, 2010). For example, focusing on technologies that improve convenience and efficiency can lead to higher satisfaction and, consequently, greater loyalty. Therefore, hypotheses for satisfaction and loyalty are formulated for both components:

H_6: Satisfaction mediates the relationship between 'High-Tech' and Guest Loyalty
H_7: Satisfaction mediates the relationship between 'High Touch' and Guest Loyalty

1.5.5. Moderating Variables of 'Customer Segmentation'

Customer segmentation is a fundamental concept in marketing and business strategy. It involves dividing a market into distinct consumer groups with different needs, characteristics, or behaviors (Varadarajan, 2020). Meanwhile, demographic segmentation is a key component of customer segmentation. Specifically, demographic segmentation divides the market based on variables such as age, gender, income, education, and family size (Elena-Bucea et al., 2021), which often used as a moderating variable to understand how different customer groups respond to strategies, products, or services. It is particularly useful for products or services that have a strong demographic appeal, such as luxury goods targeting high-income individuals. This type of segmentation is widely used because of its simplicity and data availability. To some extent, tailored marketing efforts can resonate better with specific groups, leading to higher engagement and conversion rates. The following research hypothesis sought to test this:

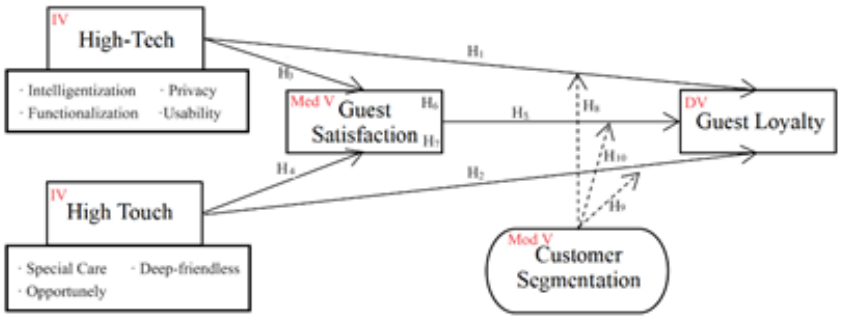
H_8: Customer segment (age, gender, education, and travel purpose) as the moderating variable has a significant relationship between 'High-Tech' and guest loyalty.

H_9: Customer segment (age, gender, education, and travel purpose) as the moderating variable has a significant relationship between 'High Touch' and guest loyalty.

Research suggests that customer segments may influence customer satisfaction and loyalty relationships (Barsky & Labagh, 1992; Dash et al., 2021). For example, older guests and leisure travelers showed a stronger positive relationship between satisfaction and loyalty than younger guests and business travelers (Lee et al., 2012). A similar study by Kim, Vogt, and Knutson (2015) examined the moderating effects of demographic variables on the satisfaction-loyalty relationship in the hotel industry. The findings suggested that age, gender, education, and travel purpose significantly influenced how satisfaction impacted loyalty. Thus, based on the findings of the previous studies, the study hypothesizes the following:

H_{10}: The customer segment (age, gender, education, and travel purpose) as the moderating variable has a significant relationship between guest satisfaction and loyalty.

Figure 3: **Theoretical framework of the study**



2. METHODOLOGY

2.1. Population and Sample

This study aimed to align with the pragmatic paradigm. This philosophical stance provides a comprehensive epistemological explanation and rationale by effectively conducting research and using the strengths of both objectivism and constructivism worldviews (Feilzer, 2010). As this study has to make general conclusions about the balance between automation and human interaction in the artificial intelligence service marketing of upscale hotels in China, it is necessary to use non-probability sampling. Compared to probability sampling, non-probability sampling is often less expensive and quicker to implement; it has more flexibility for the selection of specific individuals who can provide unique insights. This study will apply purposive sampling, which is also supported by previous similar researchers. Choi and Chu (2001) used purposive sampling to select hotels in Hong Kong to study determinants of hotel guests' satisfaction and repeat business. Zabkar et al. (2010) used purposive sampling to select hotels and tourists in a popular European destination. They targeted tourists who had stayed at mid to high-end hotels to ensure quality feedback on service quality and satisfaction. These studies highlight how purposive sampling can effectively be used in hospitality research to target specific groups or settings most relevant to the research objectives. So in this study, purposive sampling allows researchers to focus on specific groups or cases that are particularly relevant to the research question, providing deep insights into those areas. Following this, in this study, the interview session, the researcher will select some representative upscale hotels in Shanghai and choose the managers or directors of the Food & Beverage and front office departments who often interact with guests to be the samples for the purpose of sampling. In the questionnaire section, the researcher will select some target groups who have stayed in upscale hotels in the past 12 months through the WeChat application online and distribute the questionnaire to them. Hotel technologies can change significantly within a year, and focusing on this period enables researchers to observe and analyze these changes and effects on the research subject. Moreover, within 12 months requirement can also ensure that there is a sufficient number of respondents who have had the opportunity to participate in the activity to match the sample size.

Before calculating the sample size, the population size should be determined (Riley et al., 2020). This study's population consisted of upscale hotel operators and their guests in Shanghai, China. However, it is common to have an unknown number or an estimated range as huge numbers of guests stay in upscale hotels in Shanghai every year. On the other hand, for sampling errors are caused by changes in collected samples or disparities between collected samples and the larger population (Vabalas et al., 2019). Non-sampling errors arise due to erroneous sample definitions, a shortage of competent surveyors, an incorrect target population definition, and other issues (Van der Poll et al., 2019). Furthermore, answer errors might be defined as errors induced by discrepancies between participant responses and actual facts (Ross et al., 2019). Increasing the sample size is one of the most basic approaches to decrease sampling errors in this study. The fundamental criterion researchers should follow for non-sampling errors is responsible sample collection at appropriate times. In addition, following the research of Nisar et al. (2021), a comprehensive questionnaire must also be created, and surveyors and data processing personnel must be trained.

2.2. Research Instruments

The instruments will be divided into two broad categories: semi-structured interviews and self-administered questionnaires. In this study, referring to the previous research, even though some intelligent technologies have been used in the smart hospitality industry to enable decision-making and support seamless interoperability for guests and to improve their experience dynamically (Buhalis & Sinarta, 2019), however, there are some gaps for the detail elements included in this kind of technology and how are they influence guest stay experience. On the other hand, Dellaert et al. (2020) believe that human interaction service plays a significant role in satisfaction formation, but how about the outcomes in automatic service marketing? Following the semi-structured interview procedure, researchers will ask five open-ended questions to hotel senior managers face-to-face (Table 3), from the leading and straightforward questions to the complex and deep questions. The question design is to fulfill the theoretical gaps and confirm the framework of this study. Before the question screening, the ethics and confidentiality statement will be presented to the respondents. Completing these ten semi-structured interviews based on the open-ended questions is intended to confirm and explore the factors in the 'high-tech' and 'high touch' which can affect guest loyalty and satisfaction in this study.

Table 3: **Semi-structured Interview Questions**

1	How about the evolution of the 'high-tech' in your department? Is there any specific application that you feel needs to be introduced in the upscale hotel industry?
2	How about your guest feedback about the 'high-tech' introduced in your department?
3	Referring to guests' feedback, what are the benefits of adopting 'high-tech' equipment to improve customer satisfaction?
4	What do you think is the difference between 'high touch' services with the application of 'high-tech' as compared to the standard service?
5	How can the hotel maximize more personalized service with the advent of 'high-tech' applications in upscale hotels?

On the other hand, the questionnaire will ask respondents to classify themselves according to the personal, demographic, and professional criteria chosen for this study based on their experience with the 'High-Tech' and 'High Touch' services in the upscale hotel. The self-administered questionnaire will be the instrument during the data collection. Since it is completed by a respondent independently, who can provide more honest or trustworthy responses, thus it is widely used to collect quantitative research data.

In order to gather supporting evidence, triangulation "involves the use of multiple and different methods, investigators, sources, and theories" (Natow, 2020). By examining the replies from many sources, triangulation aids in the investigator's effort to minimize bias. There are three main methods for triangulation. First, there is investigator triangulation, which involves using several researchers to look at a single issue. This approach brings in a variety of viewpoints for the investigation and enhances the reliability of the results. The second method is called data triangulation, and it involves using several data sources or research instruments, including focus groups, participant observation, interviews, or discussions, or using many informants to improve the quality of the data from various sources. Methodological triangulation is the third of several research techniques.

The researcher applied the triangulation approach using a variety of informants and data sources. The informants, who comprised the data sources, belonged to diverse departments, hotel brands, vocations, racial and ethnic backgrounds, and age groups. Individual opinions and experiences may be cross-checked with those of others in this situation, and a comprehensive picture of the attitudes, needs, or behavior of the subjects of the investigation can be created by assembling a diverse group of contributors. According to Cisinski & Déglise (2019), triangulation is the process of verifying evidence from several sources. Thus, in order to facilitate triangulation, data was gathered from various hotel departments and backgrounds.

2.2.1. Measurement Scale

According to Taherdoost (2019), using a correct scale is ideal for items with distinct positive and negative values. In this study, a five-point Likert-type scale will be used for statements expressing ideas or feelings about an object or individuals to assess specific attitudes (Leon-Mantero et al., 2020). Each item will have a minimum of "1" and a maximum of "5" on the rating scale. A score closer to "5" means a robust attitude in favor of the statement, while a score close to "1" means a robust attitude against the statement. There also will be a "3" as a neutral point, which means the respondent does not care about this statement or has no attitude about this.

It should be mentioned that continuous data are highly wanted in inferential statistics, which is why the study's evaluation of the distribution of continuous variables is related to the normalcy of the data distribution (Kwon et al., 2021). Guests at the upscale hotel experienced high-tech and high-touch services, an example of a continuous variable in this study that may have an endless number of values between the lowest and highest evaluation points. Moreover, the Structural Equation Modelling - Partial Least Square (SEM-PLS) using SmartPLS 4 for advanced statistical analysis will be used to establish measurements and structural models. There are two stage techniques will be adopted to analyze the data. Firstly, the measurement model will be used to explain or assess the construct's reliability and validity of this study. Secondly, the structural model will be used to conduct bi-variate correlation analysis and simultaneous regression analyses to establish correlations and relationship effects among constructs under investigation. The SEM-PLS is also introduced in the data analysis technique's part.

2.2.2. Pre-Test and Pilot Test

The pre-test phase of survey research involves testing semi-structured interview questions and self-administered questionnaires on participants in the study population to determine the validity and reliability of the survey instruments before their final distribution (Talaee et al., 2020). According to Ikart (2019), pretesting is necessary to ensure that the researcher will acquire accurate, reliable data from the survey technique, and it is essential to emphasize the importance of the pretesting questions, (1) the way the survey is carried out; (2) the duration of the interview; (3) problems with the question; and (5) the challenge of appropriately interpreting the meaning of each word. Prominent research scholars and hotel senior directors or managers will confirm all these. The second part of the pre-test is about the quantitative study. The administered questionnaire will be provided with a cover letter outlining the study purpose, the confidentiality of the information, and the researcher's contact information. During the pretesting, an English professional editor will check on the language first, and then the researcher will translate the questions from English to Chinese using a professional translator. Finally, another expert will back-translate from Chinese to English to let the respondent understand the question and check whether the meaning is similar to the original one. In addition, the questionnaire is issued to evaluate the suitability of the design, organization, word choice, and spacing; the clarity of the instructions; and the suitability of the language used for the survey so that respondents can understand (Pearce et al., 2021). The surveys will not change much, and the instructions for respondents will be streamlined by cutting out words that are not necessary.

Following the pre-test, a semi-structured interview pilot will be conducted. Teresi et al. (2022) believe that a proposed research study is evaluated in a small-scale pilot study before being applied to a larger performance. In this pilot test, these five senior managers will go through the open-ended questions and discuss the modifications from their perspectives. Comments and responses during the process will be obtained, carefully reviewed, and refined to avoid any ambiguity and ensure the theoretical framework makes sense. On the other hand, for the self-administered questionnaires, thirty samples from prominent research scholars will be asked to do the pilot test after the semi-structured interview pilot test. This pilot research is being carried out in order to make sure that the study's target respondents will comprehend all of the instructions and statements in the questionnaire and to check for any potential chatbot problems, identify questionnaire deficiencies and problems with layout and design, solicit feedback, evaluate the suggested allotment of time for responding to the questionnaire, and assess the degree of understanding of the built-in questionnaire. A modification to the survey instruments will be made after a review of the pilot test results.

2.2.3. Validity and Reliability

Validity is the capacity of research findings to accurately predict outcomes in groups of individuals who behave similarly outside the study (Stachl et al., 2020). The content validity of a test or assessment instrument is one way to gauge its reliability. In this research, prominent research scholars in the hospitality industry will be invited to confirm the validity of each question on the questionnaire, and the senior managers and hotel general managers will be asked to check the validity of each interview dialogue sentence separately. Moreover, in this study, EFA was used to assist researchers in figuring out the structure of the components that would be the subject of hypotheses developed after analyzing the data. It may be possible to determine the correlation of a group of variables by looking for a value of the factor loading of an item over 0.5 (Sakib et al., 2020).

Additionally, reliability is defined as the extent to which results are consistent over time, an accurate representation of the total population, and can be reproduced under a similar methodology (Baker et al., 2021). In order to find the link, Biasio et al. (2020) examined the usage of inter-item scales to validate that the items are measured independently and following the same notion. They functioned under the precept that the greater the coefficient, the more precise the device's measurement. In this research, Cronbach's Coefficient Alpha analysis is employed to test this reliability, which should all be greater than 0.70 (Table 4).

Table 4: **Rule of Thumb for Cronbach's Alpha Coefficient Score**

Reliability	Internal Consistency Rate
Excellent	>0.90
Good	0.70-0.90
Acceptable	0.60-0.70
Poor	0.50-0.60
Unacceptable	<0.50

Source: Smith et al. (2020)

Moreover, ethics are behavioral norms or principles that help people make moral choices about their actions and interactions with other people (Fathallah et al., 2020). The respondents' voluntary engagement in this study, which is supported by consent letters, and the assurance of their safety while participating in and answering the questionnaire that will be supplied to them are covered by research ethics, which is related to the researcher's moral character. The respondents provided their responses willingly, and the researcher in no way coerced them. Furthermore, in August 2021, China passed its Personal Information Protection Law (PIPL), which includes some new rules on personal information processing (Calzada, 2022), as well as two other key cybersecurity and data protection laws, namely the Cybersecurity Law and the Data Security Law, which introduce a new data protection regime for China, which will be involved in the collection process.

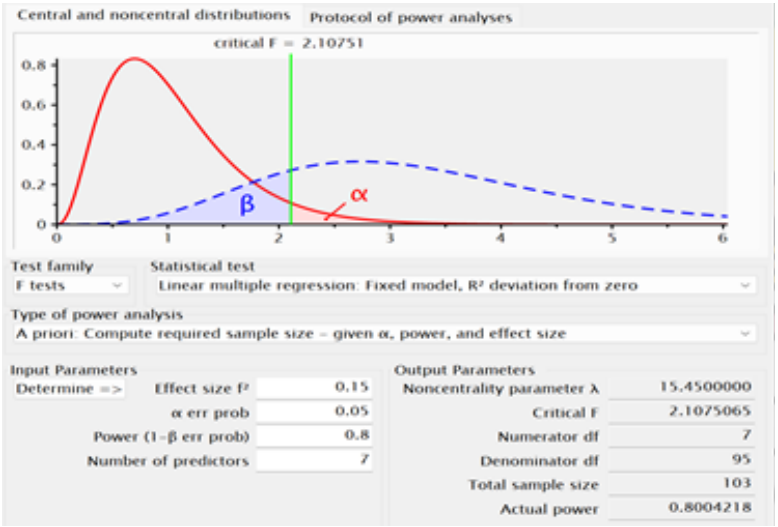
3. RESULT

3.1. Sample Size

The sample size is frequently used in statistics and market research (Sarstedt et al., 2022). Patton (2002) argued that gathering information from, testing, or studying every aspect of a research investigation encompassing hundreds or thousands of essentials would be nearly complicated. He suggested that a qualitative approach should be conducted with five to twenty persons so that the data can be collected to account for all features of the phenomenon.

Questionnaires will be distributed among upscale hotel guests who have experienced High-Tech Touch service during the last 12 months to obtain information from guests. China Tourism Academy (2023) posted that in 2022, the total number of domestic tourist arrivals in China was 2.53 billion; the population is huge, and it is difficult to calculate the exact data regarding the size of the population that has five-star hotel stay experience in the last 12 months. Thus, G* power analysis will be used to calculate the sample size in this study. According to AlKahtani et al. (2021), Appiah (2019), and Nunkoo et al. (2020), using the software G*Power 3.1.9.7 for a model like this (Figure 4), the minimum required sample size for this study should be 103 respondents to generate a power of 0.80, a significance threshold of 0.05 and medium size effect of 0.15 (Brydges, 2019; Serdar et al., 2021). However, this is a minimum sample size. Statistically, there is no exact measurement of the sample size; the larger the size, the more conducive to the verification of the hypothesis (Sheng, 2021). Statistically, the sample size is usually five to ten times the number of questions in the questionnaire, and a standard questionnaire should have more than 30 questions, so the sample size should be between 150 and 300 (Lakens, 2022; Serdar et al., 2021). According to the study of Abbas et al. (2021), they chose a sample size of five times the questions about hospitality insecurity. Thus, in this study, the number of questions in the questionnaire is 40, and five times the sample size is 200, to ensure that a valid response rate of 95% can be achieved, at least 210 questionnaires should be sent to respondents.

Figure 4: **The sample size calculated by G*Power**



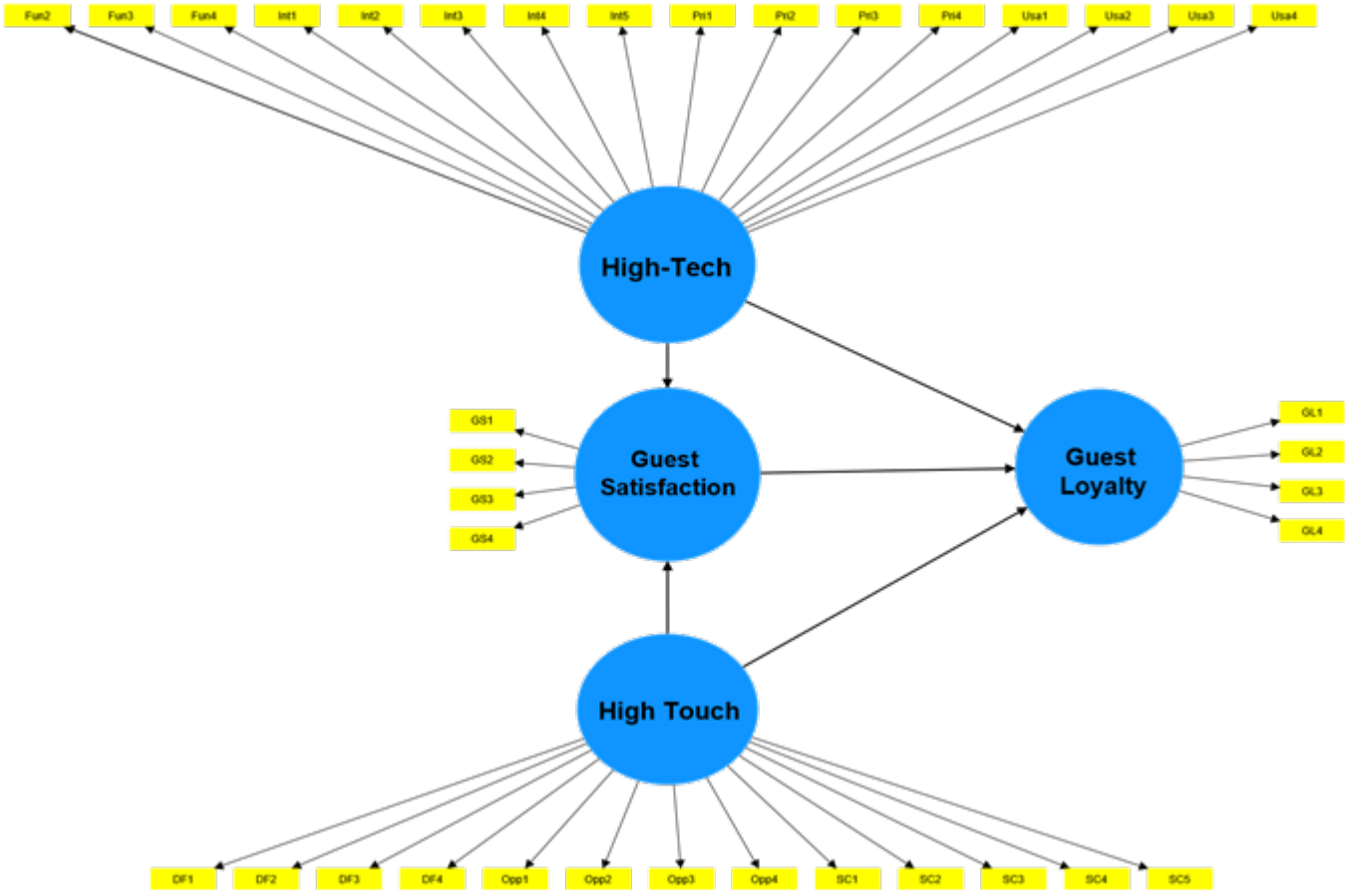
3.2. Structural Equation Modeling Analysis

The PLS-SEM technique is a statistical method used to estimate complex models that involve many constructs, latent variables, and structural paths. It is a causal-predictive analytic strategy emphasizing prediction rather than explanation (Hair et al., 2019). Wong (2013) and Zhang et al. (2021) argue that from an industry perspective, conducting PLS-SEM research can provide valuable insights into the relationships between variables of interest. This knowledge is essential for effectively allocating resources in a manner that optimally benefits the organization's customers.

3.2.1. Measurement Model Assessment

The measurement model, the initial stage of the PLS-SEM investigation, employs exploratory factor analysis (EFA) to identify the connections and discrepancies among items and assess their alignment with the underlying constructs (Hair Jr, Howard & Nitzl, 2020). The Initial Measurement Model (Figure 5) incorporated two approaches, High-Tech and High-Touch, for the construction process.

Figure 5: **Initial Measurement Model**



Note: Fun – Functionalization; Int – Intelligentization; Pri – Privacy; Usa – Usability; SC - Special care; Opp - Opportunely; DF - Deep-friendless; GS - Guest satisfaction; GL - Guest loyalty

3.2.2. Outer (Indicator) Loadings

Reliability evaluation, as described by Hair et al. (2014), involves evaluating the level of consistency among concept indicators and their ability to quantify the same item. While a loading value of 0.5 is acceptable, manifest variables with a loading value less than 0.5 should be removed (Götz et al., 2009; Memon & Rahman, 2014; Wetzels et al., 2009). Subsequently, Table 5 enumerates entries that are below 0.5 and have been removed. As indicated in Table 5, all constructs were loaded separately into the appropriate latent variables, with loadings ranging from 0.601 to 0.875, to measure their respective factors. Figure 6 displays the moderation model together with the outer loading scores.

Table 5: **Improvement of Fit in Measurement Model**

Modified Measurement Model (Deletion of Item)	
Item	**Reason**
Int4 - the advanced technology equipment in the hotel is automatic enough SC2 - I believe the hotel staff's service can deepen my favorable impression. Fitness Indexes *p* = .000; Int4 = 0.371; SC2 = 0.420.	The outer loading is considered important in forming the formative construct when it is ≥ 0.50 and statistically significant (Hair, Howard & Nitzl, 2020).

3.2.3. Internal Consistency Reliability

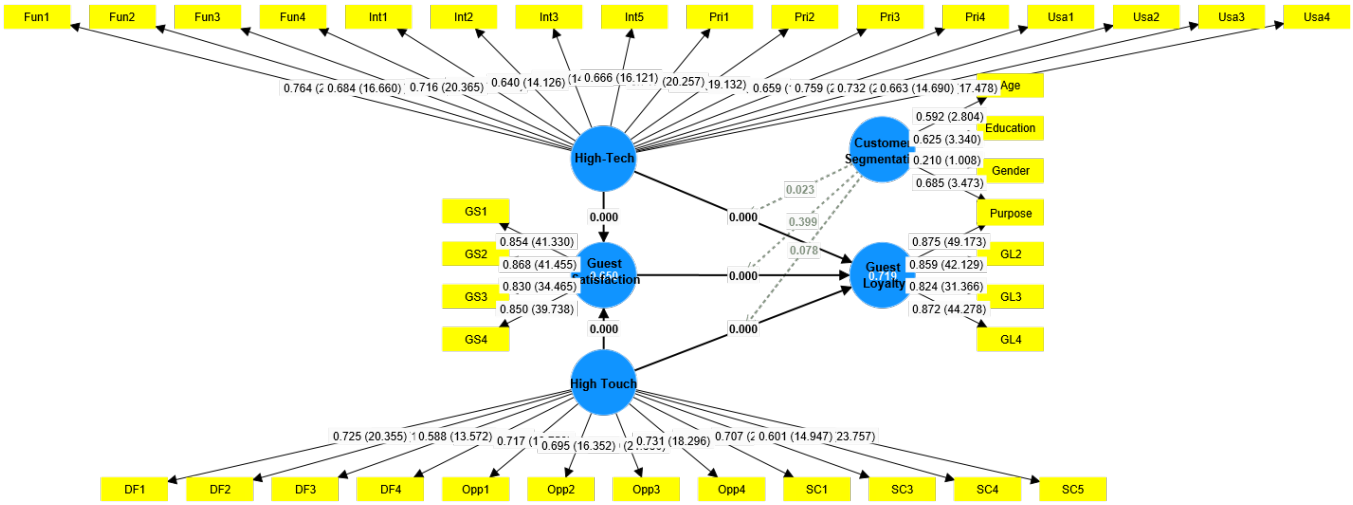
Measuring internal consistency using composite reliability is the second step in assessing the measurement model. Composite reliability values are analyzed differently from Cronbach's alpha, which is considered more accurate and provides higher values (Hair et al., 2019). According to Table 6, this study demonstrated that the composite dependability values for the four constructs range from .873 to .926, beyond the acceptable threshold of .70. The internal consistency of the items in each construct is sufficient for this investigation, as indicated by the values of Cronbach's alpha and composite reliability.

Table 6: **Reflective Measurement Model Results**

Constructs	Latent Variable	Items	Outer Loadings	Composite reliability (CR)[b]	Cronbach's alpha/rho_A[c]	(AVE)[d]
High-Tech	Intelligentization	Int1	0.614	0.826	0.824	0.656
		Int2	0.640			
		Int3	0.636			
		Int5	0.666			
	Functionalization	Fun1	0.764	0.858	0.855	0.697
		Fun2	0.684			
		Fun3	0.653			
		Fun4	0.716			
	Privacy	Pri1	0.717	0.822	0.82	0.649
		Pri2	0.716			
		Pri3	0.693			
		Pri4	0.659			
	Usability	Usa1	0.759	0.871	0.868	0.717
		Usa2	0.732			
		Usa3	0.663			
		Usa4	0.704			

Constructs	Latent Variable	Items	Outer Loadings	Composite reliability (CR)[b]	Cronbach's alpha/rho_A[c]	(AVE)[d]
High Touch	Special care	SC1	0.615	0.836	0.83	0.661
		SC3	0.601			
		SC4	0.707			
		SC5	0.743			
	Opportunely	Opp1	0.717	0.852	0.849	0.688
		Opp2	0.695			
		Opp3	0.740			
		Opp4	0.731			
	Deep-friendless	DF1	0.725	0.814	0.807	0.635
		DF2	0.720			
		DF3	0.588			
		DF4	0.674			
Guest Satisfaction		GS1	0.854	0.873	0.873	0.724
		GS2	0.868			
		GS3	0.830			
		GS4	0.850			
Guest Loyalty		GL1	0.875	0.882	0.88	0.735
		GL2	0.859			
		GL3	0.824			
		GL4	0.872			

Figure 6: **Measurement Model**



Note: Fun – Functionalization; Int – Intelligentization; Pri – Privacy; Usa – Usability; SC - Special care; Opp - Opportunely; DF - Deep-friendless; GS - Guest satisfaction; GL - Guest loyalty.

3.2.4. Convergent Validity

The convergent validity of each AVE value notion was calculated to evaluate its accuracy (Table 7). All the measurements varied between 0.635 and 0.735, above the threshold of 0.5. Therefore, all sub-dimensions have exceeded the recommended threshold of 0.5 and successfully captured significant variability and satisfactory convergence (Fornell & Larcker, 1981; Hair et al., 2014). This indicates that the measurement model used to collect visitor data was sufficiently reliable and that each construct, on average, can account for more than 50% of the variation in its measuring items.

Table 7: **Convergent Validity**

Constructs	Latent Variable	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
High-Tech	Intelligentization	.824	0.826	0.884	0.656
	Functionalization	.855	0.858	0.902	0.697
	Privacy	.820	0.822	0.881	0.649
	Usability	.868	0.871	0.910	0.717
High Touch	Special care	.830	0.836	0.886	0.661
	Opportunely	.849	0.852	0.898	0.688
	Deep-friendly	.807	0.814	0.874	0.635
Guest Satisfaction		.873	0.873	0.913	0.724
Guest Loyalty		.880	0.882	0.917	0.735

3.2.5. Discriminant Validity

Fornell and Larcker (1981) propose that the standard metric for an Average Variance Extracted (AVE) contract should be equivalent to the square of the inter-construct correlation or a measure of shared variance. The results shown in Table 8 indicate that the average variance extracted (AVE) for each construct is less than or equal to the squared inter-construct correlation. Research studies commonly use the diagonal to represent the square root of the mean of hidden variables. The variable in question represents the maximum value recorded in a specific column or row. The observed values meet the criteria set by Fornell and Larcker in their influential work published in 1981, as they lie within the range of 0.858 to 0.797.

Table 8: **Results of Discriminant Validity based on Fornell-Larcker's Criterion**

Constructs/ Variable Int		High-Tech			High Touch				
		Fun	Pri	Usa	SC	Opp	DF	GS	GL
High-Tech	Int	0.810							
	Fun	0.602	0.835						
	Pri	0.569	0.661	0.806					
	Usa	0.526	0.573	0.668	0.846				
High Touch	SC	0.504	0.489	0.516	0.504	0.813			
	Opp	0.515	0.526	0.585	0.670	0.596	0.829		
	DF	0.465	0.498	0.543	0.603	0.559	0.598	0.797	
GS		0.574	0.614	0.640	0.679	0.600	0.643	0.704	0.851
GL		0.586	0.618	0.653	0.690	0.587	0.658	0.669	0.778	0.858

Note: The diagonal is the square root of the AVE of the latent variables and indicates the highest in any column or row. Fun – Functionalization; Int – Intelligentization; Pri – Privacy; Usa – Usability; SC - Special care; Opp - Opportunely; DF - Deep-friendly; GS - Guest satisfaction; GL - Guest loyalty.

3.2.6. Heterotrait-Monotrait Ratio of Correlations (HTMT)

In all simulations, the heterotrait-monotrait ratio (HTMT) was employed to achieve optimal levels of specificity and sensitivity. Based on the findings of multiple experts (Ronkko & Cho, 2022; Sarstedt et al., 2022), discriminant validity is established when the HTMT value falls below a certain threshold. However, there is ongoing discussion on the specific cutoff value for HTMT, with some suggesting it should be at least 0.9. This study sets a threshold of 0.9 to determine the discriminant validity. The results are presented in Table 9.

Table 9: **Heterotrait-Monotrait Ratio of Correlations (HTMT) Results**

Constructs/Variable		High-Tech				High Touch				
Int		Fun	Pri	Usa	SC	Opp	DF	GS	GL	
High-Tech	Int	1								
	Fun	0.718	1							
	Pri	0.692	0.785	1						
	Usa	0.622	0.663	0.788	1					
High Touch	SC	0.607	0.573	0.617	0.583	1				
	Opp	0.617	0.617	0.702	0.780	0.697	1			
	DF	0.568	0.599	0.660	0.720	0.672	0.721	1		
GS		0.676	0.709	0.753	0.779	0.679	0.746	0.836	1	
GL		0.686	0.712	0.767	0.787	0.686	0.762	0.792	0.886	1

Note: Fun – Functionalization; Int – Intelligentization; Pri – Privacy; Usa – Usability; SC - Special care; Opp - Opportunely; DF - Deep-friendly; GS - Guest satisfaction; GL - Guest loyalty.

3.3. The Structural Model Assessment

Hair et al. (2020) state that the structural model is evaluated once measurement models fulfill all necessary conditions. Table 10 presents the fundamental principles used to evaluate the structural measuring model. Additional details regarding the research findings and a comprehensive explanation of each criterion will be supplied.

Table 10: **Criteria for Assessing Structural Models**

Validity	Criterion	Guidelines
Lateral Collinearity	Inner Variance Inflator Factor (VIF)	Values of VIF ≤5.0 (Hair et al., 2020)
Path Coefficients	Path Coefficient (β)	*p*-value <0.01 *t*-value >2.33 (one-tailed) (Hair et al., 2014)
R^2 of endogenous (dependent) latent variable	Coefficient of Determination	Values of 0.67, 0.33, and 0.19 are considered substantial, moderate, and weak, respectively (Chin, 1998).
Effect size f^2	Effect size to R^2	Effect sizes of 0.02, 0.15, and 0.35 are weak, medium, and large, respectively (Chin, 1998).
Prediction relevance Q^2	The effect size of Q^2	Effect sizes of 0.02, 0.15, and 0.35 are weak, medium, and large, respectively (Chin, 1998).

Source: Hair et al. (2014, 2020), Chin (1998)

3.3.1. Collinearity

Hair et al. (2019) argue that assessing collinearity is like evaluating formative measurement methods. However, in partial regression, the VIF values are calculated based on the latent variable scores of the predictor constructs. They claim that inner VIF values larger than 5 suggest probable collinearity issues. Researchers have established that VIF levels should be close to or below 5. Table 11 presents the collinearity results, namely the VIF values. The results shown in Table 11 demonstrate no significant evidence of multicollinearity, as the VIF values for the structural model range from 2.346 to 2.917. Bias collinearity does not occur when the independent variables in a model do not show correlation across different dimensions. There is no correlation between the dimensions of the independent variable and the constructs of the dependent variable and mediating variable.

3.3.2. Path Confidence (β)

From Table 12, the result of the proposed hypothesis (H1) analysis indicates that there is a significant relationship between 'High-Tech' and Guest Loyalty ($\beta = 0.301^{***}$, $t = 4.441$, $p < .001$). Moreover, the following hypothesis (H2) is tested to confirm

the relationship between the 'High Touch' and guest loyalty. This study has confirmed that the proposed hypothesis H3 is supported (β = 0.261***, t = 4.428, p < .001). The subsequent studies concern the correlations between 'High-Tech' and guest pleasure. The purpose of hypothesis H4 is to validate the significant impact of 'High-Tech' on visitor satisfaction (β = 0.413***, t = 7.454, p < .001). Therefore, the H4 theory is backed by supernatural intervention. However, this analysis discovered a significant positive correlation between 'High Touch' and visitor satisfaction (β = 0.447***, t = 8.224, p < .001). Therefore, this study provides evidence for the postulated hypothesis of H5. Hypothesis H5 is examined by analyzing the correlation between visitor satisfaction and guest loyalty. The findings in Table 12 support hypothesis H5, indicating a statistically significant positive link (β = 0.354***, t = 5.079, p < .001) at a 99% confidence level.

Table 11: **Inner VIF Values**

	Guest loyalty	Guest satisfaction	High Touch	High-Tech
Guest loyalty				
Guest satisfaction	2.857			
High Touch	2.917	2.346		
High-Tech	2.832	2.346		

Table 12: **Path Confidence (β)**

Hypothesis	**Relationship**	β	***t*-values**	***p*-values**	**Decision**
H_1	High-Tech → Guest loyalty	0.301***	4.441	.000	Significant
H_2	High Touch → Guest loyalty	0.261***	4.428	.000	Significant
H_3	High-Tech → Guest satisfaction	0.413***	7.454	.000	Significant
H_4	High Touch → Guest satisfaction	0.447***	8.224	.000	Significant
H_5	Guest satisfaction → Guest loyalty	0.354***	5.079	.000	Significant

Notes: 99% confidence interval p-value<.000***; 95% confidence interval p-value<.050**

3.3.3. Coefficient of Determination (R^2)

The coefficient of determination, commonly referred to as R^2 values, is a subsequent analysis in evaluating the structural model, indicating the model's predictive capability. The explanatory power of a model is directly proportional to the R^2 values, which range from 0 to 1. The bootstrapping technique in the present investigation produced 5000 samples, as shown in Table 13. Table 13 explains how combining high-tech and high-touch factors might account for 70.4% of visitor loyalty. The model also suggests that combining advanced technology and personalized human interaction may account for 65% of the variation in guest satisfaction. Both demonstrate a moderate level of predictive capability.

Table 13: **Coefficient of determination (R^2)**

Endogenous Construct	**R-Square**	**R-Square Adjusted**
Guest loyalty	0.704	0.700
Guest satisfaction	0.650	0.647

3.3.4. The Effect Size (f^2)

Cohen's (f^2) can be employed to compute the effect size, which is the extent to which the independent variable influences the dependent variable (Hair et al., 2014). According to the thumb rule, a value of 0.02 represents a small amount, a value of 0.15 represents a moderate amount and a value of 0.35 represents a significant amount (Purwanto, 2021). Based on the research conducted by Hair et al. (2019), if the f^2 values are below 0.002, the adjustments made did not have any impact. The analysis findings for effect size (f^2) are presented in Table 14. Table 14 reveals that the 'High-Tech' category exhibits a moderate effect size, driven by guest satisfaction ($f^2 = 0.207$). Meanwhile, alterations in the 'High Touch' aspect have a moderate impact on visitor satisfaction ($f^2 = 0.244$), which is slightly more significant than the impact of 'High-Tech.' However, the variables 'High-Tech,' 'High Touch,' and 'visitor contentment' have a relatively small effect on visitor loyalty, as indicated by the dependent variable ($f^2 = 0.108$; $f^2 = 0.079$; $f^2 = 0.148$).

Table 14: **Effect Size of the Research Model - f^2**

	f^2 (Guest satisfaction)	**Effect Size**	f^2 (Guest Loyalty)	**Effect Size**
High-Tech	0.207	Medium	0.108	Small
High Touch	0.244	Medium	0.079	Small
Guest satisfaction			0.148	Small

Notes: f^2values of 0.02 = small; 0.15 = medium; and 0.35 = large.

3.3.5. Predictive Relevance (Q^2)

The predictive significance of the independent variables in the model was evaluated using the Q2 test of predictive relevance. Exogenous structures can have minimal, medium, or significant prognostic accuracy for constructions based on their values. Specifically, if the value exceeds 0, it is considered minimal accuracy. If the value is more critical than 0.25, it is regarded as medium accuracy. Moreover, if the value is more significant than 0.5, it is considered considerable accuracy (Henseler et al., 2016). Table 15 offers a comprehensive explanation of the Q2 indexes. Both Q2 results accurately predict visitor happiness and guest loyalty, with an omission distance of 0.7. The study's Q2 score of 0.508 indicates a noteworthy predictive ability regarding visitor loyalty. Meanwhile, the guest satisfaction score of 0.46 indicated the presence of a somewhat predictive model. The predictive significance of the route model for the endogenous construct appears to be satisfactory, as indicated by both Q2 values exceeding the threshold limit of zero. The routing model utilized in this study effectively measures the links between 'High-Tech,' 'High Touch,' visitor happiness, and guest loyalty, leading to a conclusive result.

Table 15: Q^2 **Values-Predictive Relevance**

Endogenous Construct	**Q^2**	**Prediction power**
Guest loyalty	0.51	Strong
Guest satisfaction	0.46	Moderate

3.4. The Mediating Variable Analysis

The core element of social science and business research is the mediating variable, a specific instance of an indirect impact. This phenomenon is sometimes called "vital theory development" (Memon et al., 2019; Ramayah et al., 2018). Furthermore, Abu-Bader and Jones (2021) assert that a mediator is a factor that links the independent variable and the dependent variable, elucidating either the entire or partial connection between a predictor and an outcome. Figure 7 depicts the model in this study, including the mediating variable of guest satisfaction. The level of mediation was determined based on the recommendation of Hari et al. (2014) to use variance accounted for (VAF) as a measure. VAF helps assess the extent to which a variable mediates, whether or partially. This research subsequently employed this methodology to examine the mediating influence. To determine the type of mediating variable, it is considered that there is no mediation when the VAF value is below 20%. If the VAF value falls between 20% and 80%, it is classified as partial mediation. Conversely, complete mediation is defined as exceeding 80%. Here is the VAF formula. The formula for VAF (Variance Accounted For) is calculated by dividing the Indirect Effect by the sum of the Direct Effect and Indirect Effect. The bootstrapping technique is employed to ascertain the influence between variables, including the mediating variable, and the route coefficient will elucidate this link. The hypothesis is determined to be either accepted or rejected by evaluating the t-statistical value. The hypothesis is accepted if the t-value exceeds 1.96 and the significance (p-value) is below 0.05. The report displaying the outcome of the path coefficient is presented in Table 16. The t-statistic and p-values of the hypotheses mentioned are valid. The mediation analysis results of guest satisfaction on the relationship between 'High-Tech' and 'High Touch' and guest loyalty are presented in Table 17. The results indicate that guest satisfaction acts as a partial mediator, with a variance accounted for (VAF) of 32.66% and 37.71%. This mediation occurs between 20% and 80% (Table 17).

Figure 7: **Model with Mediating and Moderating Variables**

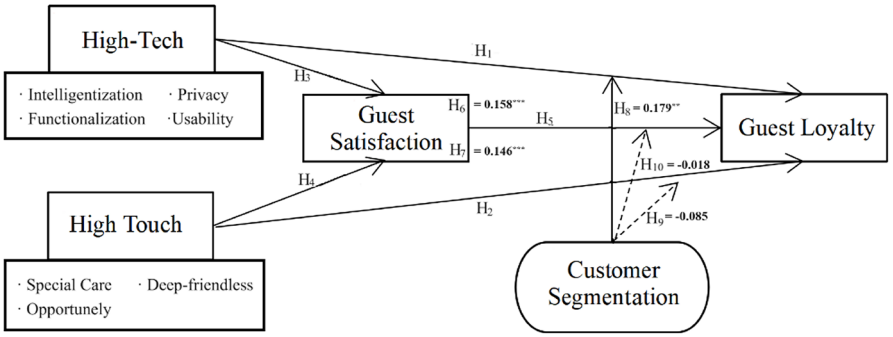


Table 16: **Path Coefficient**

Hypothesis		β	*t*-values	*p*- values	Result
H_1	High-Tech → Guest loyalty	0.301***	4.441	.000	Accepted
H_2	High Touch → Guest loyalty	0.261***	4.428	.000	Accepted
H_3	High-Tech → Guest satisfaction	0.413***	7.454	.000	Accepted
H_4	High Touch → Guest satisfaction	0.447***	8.224	.000	Accepted
H_5	Guest satisfaction → Guest loyalty	0.354***	5.079	.000	Accepted
H_6	High Touch → Guest Satisfaction → Guest Loyalty	0.158***	4.283	.000	Accepted
H_7	High-Tech → Guest Satisfaction → Guest Loyalty	0.146***	3.885	.000	Accepted

Note*:* 99% confidence interval p-value<.000***; 95% confidence interval p-value<.050**

Table 17: **Mediation Analysis**

Independent Variable	Dependent Variable	Mediating Variable	Indirect Effect	Total Effect	VAF (%)	Mediation
High-Tech	Guest Loyalty	Guest Satisfaction	0.146	0.447	32.66%	Partial
High Touch	Guest Loyalty	Guest Satisfaction	0.158	0.419	37.71%	Partial

3.5. The Moderating Effect Analysis

As Henseler and Fassot (2010) and Ramayah et al. (2018) describe, moderating variables are a third variable that influences and alters the relationship between independent and dependent variables. This study extensively elucidated the function of customer segmentation as the moderating variable (Figure 8), which is assumed to have substantial impacts on the correlation between guest satisfaction and loyalty and influence the connection between 'High-Tech' and 'High Touch' about guest satisfaction. An analysis of customer segmentation as the moderating variable has been undertaken, and the results are presented in Table 18. The study discovered that customer segmentation positively moderates the link between high-tech and guest loyalty. This finding is supported by the results presented in Table 18, where H8: β = 0.179**, t = 2.004, p = .023. Nevertheless, the outcome revealed a negative moderating association between high touch and guest loyalty (H9: β = -0.085, t = 1.416, p = .078). Furthermore, the findings further verified that customer segmentation does not moderate the link between guest satisfaction and loyalty (H10: β = -0.018, t = 0.256, p = .399). Both pathways are statistically insignificant, as their p-values exceed the 95% confidence range.

Table 18: **Results of Moderating Effect of Customer Segmentation**

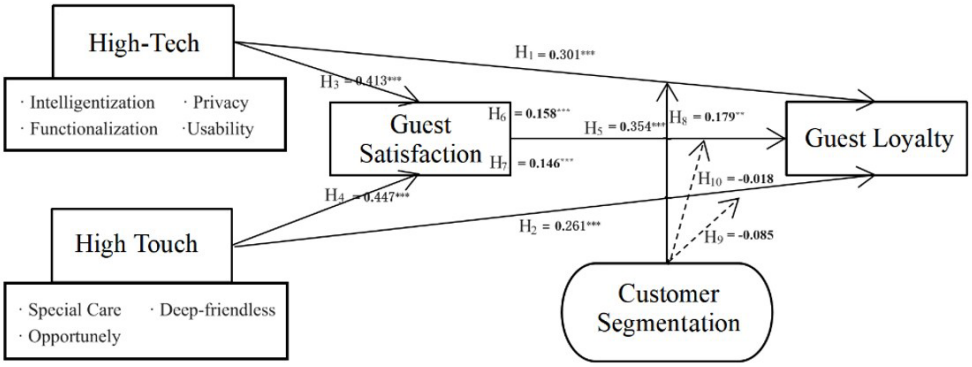
	Hypothesis	β	t-values	p-values	Result
H_8	Customer Segmentation x High-Tech → Guest Loyalty	0.179**	2.004	.023	Significant
H_9	Customer Segmentation x High Touch → Guest Loyalty	-0.085	1.416	.078	Not Significant
H_{10}	Customer Segmentation x Guest Satisfaction → Guest Loyalty	-0.018	0.256	.399	Not Significant

Notes: 95% confidence interval p-value<.050**

3.6. Assessment of Study Hypotheses

Nitzl et al. (2016) conducted a study where they tested a hypothesis using the PLS-SEM structural model. They examined the path coefficient and the significance level (p-value) obtained from the 95% confidence intervals (CI). Based on empirical evidence, the hypotheses testing analysis indicates that all hypotheses are supported except for H9 and H10. These hypotheses suggest that the moderating variable of customer segment (age, gender, education, and travel purpose) does not have a significant relationship with 'High Touch' and guest loyalty and does not positively influence the relationship between guest satisfaction and loyalty. The final model in this investigation is depicted in Figure 9.

Figure 8: **Final Model**



Note. Indicator: → Significant path; → Non-significant path;

4. IMPLICATIONS AND LIMITATIONS

4.1 Academic Implications

Theoretically, this study investigates and examines the high-tech and high-touch factors contributing to guest loyalty. As suggested by Tai et al. (2021), this study confirmed the importance of high-tech, the primary source of service innovation and revolution, for businesses to give their guests unique experiences. On the other hand, this study also validated the importance of high touch in guest service, providing personalized attention and an exceptional emotional bond of warmth and trust between hosts and guests (Hapoienu, 1990; Lashley, 2000; Lu et al., 2020). In other words, this study made substantial contributions to the existing body of knowledge by testing hypotheses and comparing the findings to empirical data from the literature. Based on these, this study employed another two appropriate constructs, High-Tech (intelligentization, privacy, functionalization, and usability) and High Touch (special care, opportunely and deep-friendliness), as the independent variables, which indicate a significant positive effect between guest satisfaction and guest loyalty, but also found additional items (flexibility and empathy) can affect guest loyalty significantly, which made new academic contributions in the hospitality industry.

Moreover, this study provides a new model that contains high-tech innovations that offer operational efficiencies and intelligent services, while high-touch approaches ensure emotional engagement and personalized attention. This can explain how guest loyalty is formed in the upscale hotel segment and provides an avenue for other researchers to explore this area in a different setting. Mojoodi et al. (2013) and Sindwani and Goel (2016) researched self-service, personalized product design, and customer loyalty in banking, highlighting the potential for enhancing tourist loyalty through innovative tourism technology and personalized tour guide customization services. Azis et al. (2020) and Yuan et al. (2021) researched the airline sector. They found that ticketing, self-service information, and high-caring services significantly influence travelers' choice of airline loyalty. Therefore, this study's academic contribution can offer a well-rounded strategy that utilizes both aspects to establish a comprehensive service experience that encourages guest loyalty and satisfaction. This approach could potentially inspire further future research in other tourism and service sectors.

4.2. Practical Implications

In addition to the theoretical implications, this study has some practical implications. From the hotel operator's perspective, this study aligns with the unstoppable technological advancement that will soon become the norm in hospitality as social commerce is considered convenient, time-saving, easy to use, and interactive. The hotel staff can identify areas for improvement and balance automation and human interaction in daily operations. Suggest ways to integrate technology that improves guest experiences while maintaining a personal touch. Moreover, this study also helps hotel owners figure out how high-tech and high-touch services affect guest loyalty. This will save them money, give them more options, make it easier for people to get to their rooms, and save them time (Ivanov & Webster, 2019; Liu & Hung, 2020). Specifically, the rapid development of intelligent and unmanned hotels in China's automation technology recently gained background attention; this study contributes to hotel managers' combination of high-tech efficiency advantages and high-touch personalized advantages simultaneously, leading to a memorable experience and giving the company a competitive edge.

From the guests' perspectives, it is emerging in this study that they have a positive attitude toward high technology and firmly believe it is highly beneficial in their daily lives. Researchers Tai et al. (2021) and Torres and Sipein (2020) examined how customers felt about using new technology-based self-services versus talking to someone. They found that guests will feel more comfortable using high technology in the hospitality industry if the equipment works, is smart enough, and meets their needs. Undisputed, in this modern background, advanced technology applications can achieve specific goals and tasks through flexible adaptation with the staff's deep care and personality service. Thus, this study's high-tech and high-touch service is critical in providing a more personal touch, improving interactions and engagement, building more meaningful connections, and adding value to the whole experience.

Furthermore, the theoretical application of this study carries implications for other industries to consider. Similarly, this study can make practical contributions to the hospitality industry and other similar industries, enabling them to improve personalized services within the context of advanced technology. High-tech in banking, finance, and retailing areas can assist companies in providing customized service that benefits customer experiences and drives business growth (Fan et al., 2022; Mazingue, 2023; Sheth et al., 2022). This, in turn, leads to an increase in positive customer reviews and repurchases, which ultimately benefits the companies themselves.

4.3. Limitations and Recommendations for Future Research

Although the study's aims were met, the study has limitations and makes numerous recommendations for further research. Firstly, a limitation of this study is the use of purpose sampling (a non-probability sampling technique). Although purposeful sampling design is a suitable method often used in exploratory research where the researcher is interested in getting insights rather than making statistical inferences about the entire population, the research is less expensive and quicker to implement compared to probability sampling. In the qualitative process, the samples were hotel senior managers and operators. An in-depth study can provide unique insights. However, there will be a higher risk of bias since not all population members are equally likely to be selected; the only focus will be on the Food & Beverage and Front Office departments of upscale hotels in Shanghai. Similarly, the quantitative part of the study aimed to sample participants from the researcher's WeChat group who had stayed in upmarket hotels in China within the past 12 months. This difference could hinder the generalizability of the research findings to the entire population due to the non-random nature of the sampling method, which limits the ability to make inferences about the broader population.

Secondly, there is a limitation to sample collection. The researcher carried out the qualitative interview sampling process by sending emails and making phone calls to some of the front-line departments of the hotels to inquire about their intention to participate in the next step of data collection. However, the sample collection ignored other hotel executives and operators who had ideas or wanted to join the research, which may also affect the bias of the final data. Also, when the researcher used quantitative questionnaire sampling, they only sent and received questionnaires online through the WeChat group. This was a quick and easy way to get the needed data, but they didn't get information from people who answered the questionnaires offline or through other channels. For example, people who stayed at the same high-end hotels in China but weren't interviewed affected both the sample bias and the reliability of the final data.

The final limitation pertains to the enumeration of high-tech and high-touch factors; the researcher can only identify the relevant influencing factors and demonstrate their relationship with guest loyalty within a limited time and with limited references. However, other factors and sub-items likely remain unexplored and uncovered. For instance, Adeel et al. (2024), Kusa, Suder, and Duda (2023), Mariani and Borghi (2023) did some research recently about the development of sustainable intelligence and pro-environmental behavior in the hotel industry. They found that using robots and environmental concerns are pleasing to customers, and satisfaction levels tend to be higher for technological and innovative hotels. Therefore, the high-tech dimension could also encompass environmentally friendly factors. Still, the current study does not fully cover some other factors due to time constraints and the emergence of relevant arguments later.

In the future, it is crucial to consider the diversity of samples and collect them from various regions and hotel departments to justify and validate the study's purpose entirely. Moreover, different online and offline samples should be included, such as informants from upscale hotels who just checked out; they have a clear memory of the stay experience. Meanwhile, future research should continue exploring the optimal integration of these elements, considering evolving technologies and changing guest preferences. Future studies should investigate additional variables and factors that directly impact guest loyalty, identify aspects within the high-tech and high-touch dimensions, and incorporate the social background into the moderation variable based on the hotel's demographics to create a more comprehensive model.

CONCLUSION

Overall, this study assumed the combination of advanced technology with personalized human interaction substantially impacts the level of satisfaction and loyalty among guests. Integrating advanced technology into luxury hotels, such as incorporating intelligent features, prioritizing privacy, enhancing functionality, and improving usability, can significantly enhance the productivity of basic tasks. Nevertheless, certain intricate activities should continue to depend on the High Touch service, which encompasses meticulous attention, timely assistance, and a profound sense of friendliness. Moreover, visitor satisfaction mediates between high-tech and high-touch service in influencing guest loyalty. Incorporating the client segment as the moderating variable had a significant impact, and this study's distinction, despite its significance, had adverse consequences. It has opened opportunities for future researchers to explore it further, potentially with more innovative ideas and a larger sample size. It is imperative to consider the diversity of samples and gather them from different regions and departments within hotels to thoroughly justify and validate the study's goal in the future. Furthermore, it is recommended that future studies focus on investigating the most practical combination of these components, considering advancing technologies and shifting guest preferences to develop a more all-encompassing model.

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