A Study on the Influence of Technology Products Introduced Into Green Hotels

Chih-Hung Pai, School of Hospitality Management, Zhejiang Yuexiu University, China*
https://orcid.org/0000-0002-7025-2356
Yunfeng Shang, School of Hospitality Management, Zhejiang Yuexiu University, China
Long Wang, School of International Business, Zhejiang Yuexiu University, China
Yin Zhang, School of Tourism, Ningbo City College of Vocational Technology, China

ABSTRACT

Green hotels have become the inevitable trend of the hotel industry development under the background of sustainable development. The questionnaire of this study was modified from the scale of the literature, and the survey was conducted by means of convenience sampling. The respondents were the consumers who had stayed in hotels in the past two years. A total of 566 questionnaires were distributed, and 491 valid questionnaires were collected. The effective recovery rate was 86.7%. The results show that technology products of different learning types have significant influence on tourists’ acceptance, and the technostress has significant differences on the acceptance of type of technology products. However, hotel types have no significant impact on technology learning products and tourist acceptance. This study expects to provide the analysis results for the reference of green hotel industry development in order to improve the practical benefits of hotel technology product investment.

KEYWORDS

Green Hotel Type, Hotel Technology Learning Products, Sustainable Development, Technostress, Tourists’ Acceptance

INTRODUCTION

For the past few years in China, a lot of attention has been paid to green industrial policy in both theoretical and practical terms, but the empirical research on the evaluation of the effectiveness of green industrial policy remains in its infancy, having not reached any consensus on its availability. The green industry development can tackle the bottleneck of resources and environmental protection, provide guidance for industrial transformation and upgrading, and promote the construction of ecological civilization in China (Zhang et al., 2021). In the case of Taiwan, the output of the service sector has a very significant impact on its economy. According to the data of 2021 from the Accounting and Statistics, Executive Yuan, the service sector in Taiwan accounted for 62.04% of its GDP, and the employed population in the service sector has reached 6.847 million people, accounting for 59.7% of the total employed population. Various data show...
that the service sector is responsible for the largest portion of the business activity in Taiwan. Under the social atmosphere where service quality is being increasingly valued, the hospitality industry, as a leader in the service sector, is more committed to green industry development and the improvement and promotion of service quality. Massive economic opportunities, quite fierce competition, and differentiated service advantages trigger the change of service providers towards innovative business models. What’s more, innovative business usually drives the adoption and introduction of new technologies, which is also one of the ways for service providers to maintain their competitiveness. However, the application of technology products by the service sector is more than just a tool to improve internal operation procedures and efficiency; rather, it focuses on the provision of convenience and optimized service functions and attaches importance to the process of consumer participation and the transformation of consumption experience, so that the application of technology products can lead to better benefits.

In recent years, more and more hotels have been introducing technology to help improve the convenience, rapidity, and environmental sustainability for consumers in equipment use. By whether learning is required, various technology products of learning and non-learning types introduced by hotels result in differences in guests’ preference. This question is worth probing into and is one of the motivations of this study. Guests of different types of hotels have remarkably different demands for the services provided by the hotels. Those of business hotels have always been oriented to functionality and efficiency, while those of leisure vacation hotels have been oriented to relaxation, enjoyment, stress relief, and reluctance to get involved in work. It is also worth discussing whether the various interactions produced by introducing technology products of different learning types into business hotels and leisure vacation hotels may lead to different effects on guests’ preference. Nevertheless, the technological equipment, whether of learning or non-learning type, meets the above conditions. Before introducing a technology system, it is necessary to make an overall plan, so as to avoid the products that fail to meet customers’ needs or waste operating costs. This is the second motivation of this study. As is revealed in many research, people with high levels of technostress have stronger curiosity and thirst for knowledge than those with low levels of technostress and require more patient guidance and encouragement when trying and mastering new things. Once they fail to cope with high-tech products for the first time, they are likely to lose interest and reject other such products in the future. Therefore, we will probe into whether guests with high or low levels of technostress due to their job attributes have an interactive effect on their acceptance of technology products of different learning types introduced in the hotels. This is the third motivation of this study.

According to the collected relevant data and previous literature, we found that the introduction of technology products into the hotel industry may affect customers due to many factors. Among those factors, customers’ levels of work-related technostress and the hotel types they choose turned out to have greater notable and significant impacts over many other variables (Kumar et al., 2022; Xu et al., 2017). Based on the above background and motivations, this study focuses on technology products of different learning types introduced into hotels and aims at investigating the difference in guests’ acceptance of technology products of different learning types introduced into business hotels and leisure vacation hotels based on their different levels of technostress. This study will therefore satisfy the following research objectives:

- To investigate customers’ preference and use intention related to the introduction of learning or non-learning technology products.
- To discuss the difference in the degree of guests’ acceptance after different learning or non-learning technology products interact with business or leisure vacation hotels.
- To probe into guests’ acceptance corresponding to the interaction between different learning or non-learning technology products and guests’ levels of technostress due to their job attribute.
LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

According to previous research, as guests attach more and more importance to environmental protection (Choi et al., 2015; Lee & Cheng, 2018; Shang et al., 2023) – and to whether the hotel pursues green awareness in accommodation management – they have developed obviously growing demand for green hotels (Yadegaridehkordi et al., 2021). Therefore, the hotels adopting green practices or sustainable strategies are also increasing in number (Salem et al., 2022). The green hotel can be defined as “an environmentally friendly lodging facility committed to green practices, such as saving of water, energy and solid waste, recycle and reuse of durable services including litter boxes and towels, etc. to protect the planet we live in” (Han et al., 2009; Kim & Han, 2010). Hoteliers are adapting to a consequent “green trend” by attaching more eco-friendly attributes to guest services and developing their business more towards “green hotels” (Verma & Chandra, 2016). In addition, the development of more green practices can improve guests’ loyalty to green hotels (Martínez, 2015; Martínez et al., 2017; Wang et al., 2018; Merlia et al., 2019).

To attract customers during the Covid-19 pandemic, hotels need to implement strategies for reducing risks and focus on increasing safety awareness and reducing customers’ anxiety. Therefore, implementing various innovative technology products to reduce the direct interaction between guests and hotel staff and improving the cleanliness of the hotel can be effective strategies to reduce the health risks of hotel customers. In fact, many international chained-brand hotels have already adopted technology products to maintain social distancing. Hotels such as Marriott, Hilton, and Hyatt have all adopted technology products that can reduce the interaction between their staff and customers, such as mobile check-in systems, kiosk check-in machines, and robot cleaning systems. They also have started to use advanced cleaning technology products for better disinfection, such as electrostatic sprayers, ultraviolet-light technology, etc. These strategies of introducing technology products are crucial for hotels to reduce customers’ health concerns and to prevent health risks (Shin & Kang, 2020).

The change in technology products is remarkably faster than the traditional ways of informing consumers through media or institutions, and the pace of technological change is even more unpredictable. Thus, while continuously introducing the latest technology products, hotels should keep up with these changes as much as possible (Sun & Lawa, 2019). Nevertheless, studies also showed that the introduction of digital technology products to old residences and other cultural heritages weakened the feeling of unforgettable traveling and hospitality experience on the contrary (Elsshaer et al., 2022). In the case of the hospitality industry, however, it is indicated that the introduction of new hotel technology products can greatly help reduce the discomfort of hotel staff, and that effective and successful hotel technology products are quite achievable. Technological innovation is one of the most important considerations to differentiate a hotel from its competitors in the 21st century (Bilgihan et al., 2016). These technologies are not only used to serve hotel guests and demonstrate the hotel’s competitive advantages, but they’re also used internally for hotel staff training and other purposes. The research of Oezen and Katlav (2023) focuses on the customer satisfaction with the hotel when technology products and services are provided during their stay. It is found that the adoption of technology products in the hotel industry plays a positive role in improving customer satisfaction. Technological innovation is the main means for the entire hotel industry to refine their customer experience, so it is critical to figure out the key factors that affect consumers’ acceptance of technological innovation in hotels. The survey results revealed that customers’ attitudes towards technology may greatly affect booking intention (Cheng & Guo, 2021). Zhong et al. (2021) probed into customers’ recognition and acceptance of hotel service robots to promote the promotion of technology. Customers’ attitude, usefulness, and perceived value are found to be the greatest influencing factors on robot acceptance. They notably differ in the influence of gender, educational background, and whether they have used hotel robots.

Technology provides considerable support for hotel staff in finishing their daily work and contributes to the smooth daily operation of the hotel on the whole. The performance of the staff,
however, is reflected in the service quality of the hotel, and is greatly dependent on their effectiveness in using hotel technology products. The staff’s technological background, personal technological experience, personality (Walczuch et al., 2007), and cultural values (Srite & Karahanna, 2006) may all affect their effectiveness of using technology products. Their attitudes towards technology have been taken as a criterion to measure the effective use of technology in the hospitality industry. On the one hand, technological changes are obviously positive in bringing greater benefits to hotel customers, but on the other hand, for business owners who run hotels, it is indeed stressful and initially negative in terms of economic income to keep learning new business practices and developing innovative means to win customers’ trust. To avoid any potential negative impact on their morale and productivity, the management must also make sure that their staff are confident and comfortable with the new services involving technological products. To sum up, it has already been a trend to introduce technology products into the hospitality industry.

This study first defines the types of technology products introduced in hotels, that is, learning type and non-learning type; secondly, it defines the types of the subject hotels, that is, business type and leisure vacation type. We continue to investigate the relationship of interaction between technology products of different types and hotel types. Then, we propose the definition of technostress and take guests’ different levels of technostress due to their job attributes as the interference variable, which allows us to discuss whether different levels of technostress may interact with different types of technology products introduced in hotels.

**Hotel Technology Learning Products**

To consume a commodity, we must first learn how to use it. The time, energy, and expenses that must be paid to the learning before consuming a certain product are collectively referred to as learning costs. When using the technology products introduced in hotels, we must first learn how to use them, the rules of application, and some other relevant knowledge. These expenses are the learning costs of technology application. The use or consumption of almost every product requires a certain amount of learning fees. For different products, the learning costs required are also different. Even for the same type of products, the learning costs required will vary depending on their different structures and functions. Generally, the cost is higher for learning and using more knowledge-intensive technology products. Therefore, if the technology product introduced into hotels requires learning, the consumers’ acceptance will certainly be far less than that of the non-learning technology product. This study hereby proposes the following hypothesis:

**H1**: The non-learning technology products introduced into hotels are better accepted than the learning technology products.

**The Relationship Between Technology Products of Different Types Introduced in Hotels and Hotel Types**

In theory, business hotels may have stronger demands for introducing technology products than leisure vacation hotels. The technology products are divided into learning or non-learning types today. Technology products of learning type require higher capability of perceiving and dealing with technology, which may result in users’ mistakes in trying them, and the consequent frustration or fear of equipment failure due to wrong operation. Under the psychological pressure of preventing wrong operation, users may develop a mentality of resisting the use of such products. Since the hospitality industry is a people-oriented, labor-intensive service industry, while the technology industry is technology-intensive, during the process of introducing technology products this difference in nature between them may easily lead to a gap in concept between hoteliers and professional technology suppliers. Professional product manufacturers tend to recommend the best and most advanced technology content to hoteliers, which may not best fit the hotel’s needs. In particular, due to their
negligence of the difference in management types or natures of hotels, the introduction of technology products often costs a great amount of money but does not necessarily bring the best use or revenue benefits. Therefore, when deciding on the introduction of technology products, hotel owners must first make overall planning and evaluation from various dimensions to make the best choice of products for their hotels.

They must decide on the type of technology products for their needs based on the market positioning of their hotels. In this study, we discuss two types of hotels, that is, business and leisure vacation. Hotels of the latter type emphasize the surrounding scenery, entertainment facilities, and services, so their demand for technology products should be lower. Especially, the acceptance of technology products that require additional time to learn should be lower than that of non-learning technology products. However, hotels of the former type are just the opposite. Because business hotels are located in urban areas, they mainly receive guests on business trips and international tourists who are more in pursuit of efficiency and functionality, thus having higher demand for technology products. In addition, business hotel guests are more experienced in coping with technology products, so they are more willing to try learning technology products, and their acceptance of this type should be higher than that of non-learning type. Based on the above discussion, we hereby propose the second hypothesis:

H2: Technology products of different learning types may interact with hotel types in the acceptance of technology products.
H2-1: In business hotels, the acceptance of learning technology products is higher than that of non-learning technology products.
H2-2: In leisure vacation hotels, the acceptance of non-learning technology products is higher than that of learning technology products.

The Relationship Between Technostress and Hotel Technology Products

Craig Brod (1984) defined technostress as a “modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner.” Weil and Rosen (1997) further extended the definition of technostress as any negative impact on attitudes, thoughts, behaviors, or body physiology that is caused either directly or indirectly by technology. The term technostress was coined by clinical psychologist Craig Brod in 1984 to describe a modern disease of failure to cope with information and communication technologies in sound ways. Work-related stress is regarded as causing a series of problems in health and quality of life with far-reaching influences (Tennant, 2001). With the expansion and popularization of information and communication technologies, it also becomes the cause to greater personal technology pressure (Ayyagari et al., 2011). However, science and technology under rapid development has become an indispensable part of people’s life, and various technology devices are used even for entertainment and interpersonal communication. That is to say, technology has penetrated every corner of people’s lives, so that technostress, which is at first the pressure of not adapting to the new computer technology, has turned into the pressure of feeling intruded due to indulgence in technology or the excessive convenience of communication technology (Ayyagari et al., 2011). The generation of technostress mentality is a response to the real existence or expected threat of technology products. The degree of perception and use of technology may also affect the level of technostress. Most respondents agree that changes in technology have an impact on personal stress. Although information technology brings us convenience, it also forces people’s lives to be confined in this rapidly changing technological environment, thus bringing technostress.

The pressure from technology leads people to investigate the causing factors of technostress. The technology acceptance model is therefore created accordingly. Fred D. Davis (1989) proposed the Technology Acceptance Model (TAM), which is based on the Theory of Reasoned Action and is used to represent the impact from external variables on people’s in-ternal beliefs, attitudes, and
behavioral intentions. This model hypothesizes that the external factors affect users’ acceptance of new technologies through two key mediating variables, that is, perceived usefulness and perceived ease of use, and beliefs affect attitudes, which may further affect behavioral intentions, and then the actual use (Davis, 1989). Based on the above literature, we hereby establish the third hypothesis:

**H3:** Technology products of different learning types interact with guests’ work-related technostress on technology acceptance.

**H3-1:** Those who are under high levels of work-related technostress have higher acceptance of non-learning technology products than learning technology products.

**H3-2:** Those who are under low levels of work-related technostress have the same acceptance of non-learning and learning technology products.

Based on our review and sorting of literatures, this study adopts the technology products of different learning types introduced into hotels as independent variables, guests’ acceptance consisting of preference and use intention as dependent variables, and hotel types and guests’ levels of work-related technostress as interference variables, in order to explore the correlation between these variables. For this study, we established a theoretical model to investigate the factors that affect guests’ acceptance of technology products introduced in hotels, which is presented in Figure 1 (see Appendix).

**METHODODOLOGY**

**Research Objects and Sampling Methods**

This study is to probe into the relationship between technology products of different learning types introduced in hotels, hotel types, and guests’ work-related technostress. Since hotel types and technostress are interference variables, the respondents may provide varied answers due to hotel types. So, for the sampling, we first asked the respondents whether they had stayed in a Chinese or foreign hotel in the past two years, and what type of hotel they had stayed in most recently. Then, the respondents continued to answer their preference and use intention of different technology products according to hotel types they stayed in. A questionnaire survey method was adopted in this study, with questionnaires distributed (1) directly to consumers/guests in various hotels and (2) online. The questionnaire was carried out this way based on the consideration of time, manpower, and cost. In addition, we distributed online questionnaires to increase the number of samples by taking advantage of the convenience of online questionnaire sampling and the high data recovery rate to improve the recovery rate of samples. We have distributed a total of 566 questionnaires in the above-mentioned ways.

**Research Tools**

The questionnaire used in this study is a structured questionnaire, consisting of four parts: The first part is the preference scale of technology products; the second part is the scale of use intention of technology products; the third part is the technostress scale; and the fourth part is personal basic information and accommodation characteristics. The content of the questionnaire is summarized as follows.

After collecting appropriate scales through literature review, we compiled a suitable preliminary questionnaire for this study based on captured relevant items. Then, we invited academic experts and hospitality industry executives to analyze the validity of the questionnaire and revised the questionnaire according to the problems, shortcomings, and suggestions put forward by them. The questionnaire refined in the second stage of revision was reconfirmed with relevant scholars and experts, question by question, and the items that were too academic-specific, inappropriately used, and vague in meaning were re-touched and revised to make the text of the questionnaire more acceptable to the correspondents.
We explored the technology products of different learning types based on the literature. We have listed five technology products and added functionality and operation instructions to measure customers’ preferences and use intention. During the research, these materials were provided to five experts or scholars in the hotel industry to check the appropriateness of the content and were finally adopted after deletion, modification, or addition. We probed into the content of technology products of different learning types based on literatures, listed five technology products, and added descriptions of function and operation to measure guests’ preference and use intention. The aforementioned five learning and five non-learning technology products are summarized in the Appendix. In this study, the items related to the introduction of technology products in hotels are preference and use intention, which are measured on five-point Likert scales from “very dislike” to “very like,” and from “strongly disagree” to “strongly agree.”

According to the above literature review, the technostress scale in this study is based on the questionnaire of Lee et al. (2014), whose items are taken from the technostress scale of Tarafdar et al. (2007) and Ragu-Nathan et al. (2008). The revised technostress scale is measured on a five-point Likert scale from “strongly disagree” to “strongly agree.” The higher the score, the greater the stress. Based on the median, it was divided into two groups, high and low levels, to find out the differences in the acceptance of different types of technology products.

RESULTS

In this section, the data obtained from the research are analyzed and discussed. A total of 566 questionnaires were distributed and 491 of them are valid after excluding the invalid, recording an effective recovery rate of 86.7%. The questionnaires were distributed in the following two ways: (1) The physical questionnaires were distributed in hotels. A total of 5 valid physical questionnaires were distributed and recovered. The recovery rate of valid physical questionnaires is 100%. (2) The online questionnaires were distributed via social media. A total of 561 online questionnaires were distributed and 486 valid online questionnaires were recovered, recording an effective online recovery rate of 86.6%. Relevant statistical analysis has been carried out. Among the 491 valid questionnaires of this study, there are 187 male respondents, accounting for 38.1% of the total; and there are 304 female respondents, accounting for 61.9% of the total. The female to male ratio is 1.6:1. In terms of marital status, the respondents are mostly married, with a total of 298 people, accounting for 60.7%. A total of 193 people is unmarried, accounting for the rest 39.3%. In terms of age, the age group of 41-50 has the most respondents, a total of 216 people, accounting for 44.0%. In terms of educational background, the junior college and undergraduate group is the largest, with a total of 315 people, accounting for 64.2%. In terms of occupation, the business or service sector has the most respondents, a total of 235 people, accounting for 47.9%.

Among the 491 valid questionnaires of this study, there are 245 people who stayed in leisure vacation hotels, accounting for 49.9% of the total, and 246 people who stayed in business hotels, accounting for 50.1% of the total. Among them, 246 people are respondents of items belonging to non-learning technology products, accounting for 50.1% of the total, and 245 people are respondents of items belonging to learning technology products, accounting for 49.9% of the total. The proportions of the two are roughly the same. The overall reliability or Cronbach’s alpha of this questionnaire is 0.819>0.7, indicating a good internal consistency of the scale, meeting the above standards. The reliability of each dimension scale is listed as follows: The reliability of “preference for non-learning technology products” is 0.707>0.7, the reliability of “use intention for non-learning technology products” is 0.705>0.7, the reliability of “preference for learning technology products” is 0.769>0.7, the reliability of “use intention for learning technology products” is 0.760>0.7, and the reliability of “technostress” is 0.899>0.7. It can be seen that the reliability analysis results of this study are above the standard value either as a whole or in each dimension, indicating a feasible internal consistency.
The Correlation Between Technology Products of Different Learning Types in Hotels and Guests’ Acceptance

This study probes into the relationship between technology products introduced by hotels and guests’ acceptance and compares the difference in guests’ acceptance of different types of technology products. An independent sample t-test was adopted to verify the impact of technology products of different learning types on guests’ acceptance. For the mean test, the preference t=4.730, p=0.000<0.05, and the use intention t=4.435, p=0.000<0.05, both indicating difference in guests’ acceptance of technology products of different learning types. We deduced that the acceptance of non-learning technology products should be higher than that of learning technology products and found from the results that the mean of non-learning technology products was higher than that of learning technology products, and there were significant statistical differences. Hypothesis 1(H1) is thus true.

The results of H1 are shown in Figure 2 (see Appendix). The mean preference for non-learning technology products introduced in hotels is 19.3, compared with 17.95 for learning technology products; and the mean use intention for non-learning technology products introduced in hotels is 19.66, compared with 18.42 for learning technology products. It is clearly shown that the non-learning technology products have a higher degree of acceptance than learning technology products.

The Impact on Guests’ Acceptance From the Interaction Between Technology Products of Different Learning Types in Hotels and Hotel Types

In this study, we discussed the interference of hotel types on technology products of different learning types in hotels and guests’ acceptance. That is, we compared the degree of difference in guests’ acceptance of technology products of different learning types introduced in leisure vacation and business hotels. We adopted a two-way ANOVA in the General Linear Model to examine the effect of technology products of different learning types and hotel types on guests’ acceptance. In the two-way ANOVA, it was found that the preference for technology products of different learning types in hotels had no interaction with the added hotel types (p=0.563>0.05), neither did the use intention (p=0.444>0.05), that is, no significant difference is noted between the two factors. Then, we continued to analyze the impact of hotel types on the acceptance of different technology products separately.

Since there is no significant difference in the impact of technology products of different learning types and hotel types on guests’ acceptance, the further analysis is to compare differences in guests’ acceptance of learning or non-learning technology products in leisure vacation and business hotels. Statistics show that in leisure vacation hotels, the preference is p=0.000<0.05, and the use intention is p=0.000<0.05, indicating that in leisure vacation hotels, there are differences in the acceptance of technology products of different learning types introduced in hotels; in business hotels, the preference is p=0.004<0.05, and the use intention is p=0.016<0.05, indicating that in business hotels, there are also significant differences in the acceptance of technology products of different learning types introduced in hotels. The final mean test demonstrated that no matter if it is a leisure vacation hotel or a business hotel, the mean acceptance of non-learning technology products is higher than that of learning technology products. Therefore, H2-1 of this study is false, and although H2-2 shows significance, it is not caused by the interference of hotel types, which means that there is no interaction between technology products of different learning types and hotel types in terms of the acceptance. Hence, H2 does not hold.

The Impact of the Two-way Interaction Between Technology Products of Different Learning Types in Hotels and Technostress on Guests’ Acceptance

In this study, we discussed the interference of technostress on technology products of different learning types in hotels and guests’ acceptance. That is, we compared the degree of difference in guests’ acceptance of technology products of different learning types under high or low levels of technostress. We adopted a two-way ANOVA in the General Linear Model to examine the effect of
technology products of different learning types and technostress on guests’ acceptance. The results are listed in Tables 1 and 2 (see Appendix).

In the two-way ANOVA, it was found that the preference for technology products of different learning types in hotels had interaction with the added technostress ($p=0.010<0.05$), so did the use intention ($p=0.016<0.05$), that is, significant differences are noted between the two factors. So, it is necessary to further verify whether H3-1 and H3-2 are true. Since there are significant differences in the impact of technology products of different learning types and hotel types on guests’ acceptance, it is necessary to further verify whether the interaction of H3-1 and H3-2 is in line with the hypothesis, that is, the difference in the acceptance of those with high levels of technostress for technology products of non-learning or learning type introduced in hotels, and the difference in the acceptance of those with low levels of technostress for technology products of non-learning or learning type introduced in hotels. In the case of those with high levels of technostress, the preference is $p=0.000<0.05$, and the use intention is $p=0.000<0.05$, indicating differences in the acceptance of those with high levels of technostress for technology products of non-learning or learning type introduced in hotels; in the case of those with low levels of technostress, the preference is $p=0.128>0.05$, and the use intention is $p=0.130>0.05$, indicating no significant difference in the acceptance of those with low levels of technostress for technology products of non-learning or learning type introduced in hotels. Thus, the H3-2 is true. Finally, we verified whether H3-1 is true through a mean test. For those with high levels of technostress, the mean acceptance of non-learning technology products is higher than that of learning technology products. Therefore, H3-1 of this study is true. The search results are concluded in Table 1 and Table 2, which indicate that customers’ high work-related technostress have an impact on their acceptance of technology products of learning type introduced in hotels. In comparison, for customers under low work-related technostress, there is no significant difference in their acceptance of technology products of learning type introduced in hotels.

The results, presented in Figures 3 and 4 in the Appendix, show the impact of the two-way interaction between technology products of different learning types in hotels and technostress on guests’ acceptance. For those who are under high levels of technostress, the mean preference for non-learning technology products is 18.73, and the mean use intention is 19.02, which is higher than the mean preference (16.73) and the mean use intention (17.18) for learning technology products. For those who are under low levels of technostress, the mean preference for non-learning technology products is 19.97, and the mean use intention is 20.42, marking little difference from the mean preference (19.38) and the mean use intention (19.86) for learning technology products. Figure 3 shows that the average preference of guests with high technostress for introducing non-learning and learning technology products into hotels is 18.73 and 16.73, respectively; the average use intention of guests with low technostress for introducing non-learning and learning technology products is 19.97 and 19.38, respectively. The two sets of data differ in number, but the small difference between the numbers may be due to the fact that the respondents of the questionnaire are all Chinese, who tend to give less polarized answers in life under the influence of the culture.

**DISCUSSION**

Based on the above testing, we summarized the statistical analysis of each hypothesis testing in Table 3 (see Appendix) in this section and will list the results of each hypothesis testing one by one and discuss and explain whether each hypothesis is true or false.

Hypothesis 1 of this study holds that guests’ acceptance of non-learning technology products introduced in hotels should be higher than that of learning technology products. According to the testing of this study, it indeed exerts a significant impact on guests’ preference and use intention whether the technology products in the hotel must be learned before use, or whether they can be directly interacted and used without learning. For non-learning technology products, the mean preference is
19.3 and the mean use intention is 19.66, compared with 17.95 and 18.42 for learning technology products. The statistical results showed that the technology products without the need for learning operating steps are better accepted. This conclusion follows the same direction as the inference of this study. The reason for the establishment of this hypothesis is that the ten technology products adopted in this study are all obvious in requiring learning or not. It can be seen from the statistical table of the number of nights that the correspondents stay that those staying for 1-2 nights are the most, accounting for 82.3% of the total. Therefore, guests may consider whether they should spend time and energy in learning the technology products in the hotel for just 1-2 days of stay, which is also inferred as an important reason why the acceptance of learning technology products is lower than that of non-learning technology products.

The H2 mainly copes with the interference effect of hotel types on technology products of different learning types and guests’ acceptance. In this study, hotels are divided into leisure vacation hotels and business hotels, to infer the correlation of different hotel types with technology products of different learning types and guests’ acceptance. We hypothesized that the acceptance of learning technology products introduced in business hotels should be higher than that of non-learning technology products. In leisure vacation hotels, on the contrary, the acceptance of non-learning technology products introduced should be higher than that of learning technology products. However, we discovered that after adding the interference variable of hotel types, guests’ acceptance of technology products of different learning types did not demonstrate a significant difference, that is, the technology products of different learning types did not interact with hotel types. Hence H2 is verified false.

Hypothesis 3 mainly probes into the interference effect of technostress on technology products of different learning types and guests’ acceptance. In this study, technostress is divided into high levels and low levels, to infer the impact of different levels of technostress on technology products of different learning types and guests’ acceptance. Our H3-1 predicts that those guests who are under high levels of technostress have a higher acceptance of non-learning technology products introduced in hotels than learning technology products. We found out that there were significant differences between technostress and guests’ acceptance of technology products of different learning types. Then, we continued to test whether the acceptance of technology products of different learning types is also significantly different for those who are under high levels of technostress. It turned out that those with high levels of technostress reached a mean preference of 18.73 and a mean use intention of 19.02 for non-learning technology products, which are higher than the numbers of 16.73 and 17.18 for learning technology products. Hence, H3-1 holds. The inference is true because those who are under high levels of technostress are prone to fear and escape from technology products. If the technology products provided by the hotel can bring entertainment or practical effects without learning, they will still prefer to use the products despite their high levels of technostress; on the contrary, if it takes time and energy to learn how to operate an unfamiliar technology product in the hotel, they will certainly feel more reluctant. Thus, for those under high levels of technostress, the acceptance of non-learning technology products is higher than that of learning technology products.

H3-2 infers those guests with low levels of technostress have no significant difference in acceptance of non-learning and learning technology products introduced in hotels. We found out that there were significant differences between technostress and guests’ acceptance of technology products of different learning types. Then, we continued to test whether the acceptance of technology products of different learning types is also significantly different for those who are under low levels of technostress. It turned out that those with low levels of technostress reached a mean preference of 19.97 and a mean use intention of 20.42 for non-learning technology products, marking little difference from the numbers of 19.38 and 19.86 for learning technology products. H3-2 is therefore true. The reason is that people with low levels of technostress are more familiar with the operation mode of technology products and have a high interest in new technology products, so even though the new technology products in hotels require certain learning, they may easily grasp and start to use them. For the non-learning technology products that can be communicated without learning, they
may easily want to try them. They have positive preferences for both types of technology products, so there is no significant difference in the acceptance of technology products of different learning types for those with low levels of technostress.

CONCLUSION AND SUGGESTIONS

In less promising environmental conditions, enterprises may better cater to the trend of environmental protection by improving their green development behaviors (Li et al., 2022). The customers’ sustainable consumption behaviors affect the sustainable development of society, and their environmental protection behaviors create economic benefits for society and ensure the sustainable development of the environment. Green economy and strategy have become an important part of today’s hospitality industry (Chung, 2020). To coordinate the relationship between economic development and ecological environment protection, the concept of green development has been developed (Zhou et al., 2020). Countries like China, the United Kingdom, and Japan positively promote green development to realize comprehensive green transformation and development of economy and society. At present, green development has been adopted by many industries including construction and finance, and has become a global consensus (Wang et al., 2021). In the context of economic globalization, it is urgently required for enterprises to practice green and low-carbon development and realize green transformation. In the following parts, we will draw conclusions, provide practical suggestions, and explain the limitations of this study.

Conclusion

1. The impact of hotel technology products on guests’ acceptance.

In terms of the correlation between hotel technology products and guests’ acceptance, we found that technology products of different learning types had a significant impact on guests’ acceptance, that is, compared with learning technology products, the non-learning technology products introduced in hotels had higher preference and use intention of guests, or their acceptance is higher. This finding supports the hypothesis of this study.

2. Interference effect of hotel types.

Data analysis of the research shows that technology products of different learning types have no significant impact on guests’ acceptance of leisure vacation hotels or business hotels. Research shows that technology products can significantly affect the overall satisfaction of hotel guests. The varieties and types of technology products are considered to be important factors in guests’ hotel selection and return visit intention (Cobanoglu et al., 2011), and these views also comply with the basic hypothesis of this paper. Business and leisure travelers attach different importance to the role of technology products and may choose hotels accordingly (Millar et al., 2012). It is generally believed that business travelers have their unique characteristics and demands for technology compared with leisure travelers, for business travelers may pursue higher work efficiency during travel, which often depends on proximity and availability of technologies (Dunn & Tucker, 2013). However, the conclusion of this research reveals that technology products of different learning types have no significant impact on the acceptance of guests of both business and leisure vacation hotels. The first possible reason why the testing result goes against the hypothesis is that hotel types that guests stay in does not necessarily match their purpose of stay, which confused their identification of the hotel types, so that they were unable to tell the difference between leisure vacation hotels and business hotels. Therefore, the hypothesis cannot be tested. The second reason is that the technology products
discussed in this study are oriented to bringing entertainment, convenience, and practical use to life instead of for business use. So, even if the respondents are guests of business hotels, they may still answer based on their own preference, excluding the interference from different hotel types. These reasons account for the result of no significant difference in the acceptance of technology products of different learning types in different types of hotels.

3. Interference effect of technostress.

It is found that for the guests under high levels of work-related technostress, the acceptance of non-learning technology products introduced in hotels is higher than that of learning technology products, and for those under low levels of work-related technostress, there is no significant difference in the acceptance of non-learning and learning technology products. That is to say, non-learning technology products may appeal to all consumers, while learning technology products are not suitable for everyone.

Practical Suggestions

In this section, we provide the following practical suggestions for hotel planning based on the research results:

Technology products have become indispensable daily necessities for modern people’s lives. To attract guests, in addition to comfortable facilities and all-round services, the hospitality industry should also provide technological service functions, which are the basic conditions for hotel competition in the future. In the process of introducing technology products into the hotel industry, it is the practitioners’ duty to arouse customers’ interest and reduce their difficulties in use. In particular, it is extremely important to train front-line staff to familiarize themselves with and guide customers on using technology products in hotels. This should be discussed from two aspects: First, the practitioners must treat the introduction of technology products into hotels with a positive mentality and review the appropriate technology products to match the price and attribute positioning of their hotels; second, the staff should cooperate with the company’s training without mental rejection so as to actively guide customers on using technology products, thus making technology products a sharp weapon for improving customer satisfaction.

The hoteliers, however, must also find a balance between the construction cost and the actual benefit. In this study, we found that compared with the technology products that can be directly interacted with, guests show lower preference and use intention for those technology products that need to be learned, although these kinds of products feature excellent functionality and convenience. Take using mobile phones as room keys as an example. It was originally designed to reduce labor costs and provide convenience for guests, but it is quite costly to arrange this function. If guests feel reluctant to use it, the expected benefits will not be achieved. Therefore, hotels should first rule out the myth of pursuing advanced and fashionable technology from their planning, and when evaluating a learning technology product, they should consider its effectiveness and acceptance. It is recommended to gradually introduce it to test consumers’ preference and use intention. Casting from the mobile phone to TV, for example, can be used on a stand-alone basis as a non-systematic technology product. So, some rooms can be arranged with this product at first and be recommended to the guests with this intention during room booking, so as to attract the consumers who are under low levels of technostress and are likely to try technology products, and also to test the acceptance of this technology product.

Though technology products are already a part of modern people’s lives, it is also a big challenge for those under high levels of technostress to operate learning technology products. So, it is suggested to further simplify the operation design, buttons, or process descriptions of technological products to encourage guests to have a try.
Limitations and Future Suggestions

1. Limitations

The function and operation of the technology products are just presented in words and pictures in the questionnaire, which means that the respondents must read the text before answering the questions. Since no video demonstration is provided, it may be hard for guests with dyslexia or those who have never used similar products to fully understand. Therefore, when completing the questionnaire, the respondents would be more or less doubtful about the actual function and operation difficulty of the technology product, which would cause some bias in the experimental results. Due to the many subjective and objective limitations of this study, it is infeasible to extensively distribute physical questionnaires in hotels, so we mainly adopted online questionnaires. But such questionnaires have their own shortcomings. This way, we are unable to guide the respondents to truly feel the situation of hotel accommodation when answering the questions or to promptly explain the meaning of the question to the respondents. Therefore, there may be errors in research.

2. Suggestions for future research.

For future researchers who want to focus on the technology products not yet popularized, the questionnaires of preference or acceptance may be accompanied by videos to briefly demonstrate the function and operation of technology products and to help the respondents better understand, so as to reduce bias in the research findings. This study probes into technology products by the necessity for learning or not and reaches a conclusion that the acceptance of non-learning technology products is higher than that of learning technology products. However, if the perspective is changed to the function of technology products, they can be classified into those for practical use and those for entertainment. It will be a topic worthy of in-depth study to investigate any difference in guests' acceptance based on these two classification methods coupled with different levels of technostress. Therefore, we suggest future researchers carry out comparative studies on different classification methods coupled with different levels of technostress to improve practical availability of hotel planning and design.

DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author.

FUNDING STATEMENT

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CONFLICT OF INTEREST

All authors declare no conflicts of interest.

ETHICAL APPROVAL

This article does not contain any studies with human participants or animals performed by any authors. Informed consent was obtained from all individual participants included in the study.
REFERENCES


APPENDIX

Summary of Technology Products

Learning Technology Products

1. Self-check-in machine:
   a. **Function:** Guests may check in the hotel with this machine instead of over the counter.
   b. **Operation:** Guests follow the instructions on the screen of the self-check-in machine, including scanning their ID cards or passports, and making payment. After the operation, the machine will provide the room number and the room key.

2. Cast from your mobile phone to TV in the hotel room:
   a. **Function:** The music or video in the mobile phone or tablet can be cast to TV and speakers, which means you can play games on TV with your mobile phone or tablet.
   b. **Operation:** The first-time user of this function needs to connect their personal mobile phone or tablet with the wireless streaming cast device in the room according to the operation procedures provided by the hotel.

3. Open the room with your mobile phone:
   a. **Function:** The door can be opened by placing the mobile phone near the electronic lock of the room, which saves the labor of always taking the room key with you.
   b. **Operation:** Guests need to download the application specific to their hotel on their mobile phone, and follow the instructions to handle the reservation-related information. Open the application after arriving at the hotel on the day of check-in, and then they will receive the room number and Bluetooth key. When arriving at the door of the room, turn on the Bluetooth function of the mobile phone first, and then sense for the door lock to open the door.

4. Digital housekeeper system:
   a. **Function:** Guests may control the TV, audio, lighting and air conditioner through the graphic buttons on the mobile phone or tablet, that is, they may turn on the air conditioner in the room before returning to the room.
   b. **Operation:** Guests need to download the application specific to their hotel on their mobile phones, and learn to use it according to the operation process.

5. e-Newspapers and e-magazines:
   a. **Function:** Guests may choose the newspapers and magazines they want to read on their mobile phones, tablets or laptops, instead of being limited to only one newspaper or magazine per room.
   b. **Operation:** When using this technology product, guests need to learn how to find the content to read online according to the operation instructions provided by the hotel.

Non-Learning Technology Products

1. Receptionist robots:
   a. **Function:** This robot is capable of greeting guests in the hotel lobby, and chat with guests, sing, and dance to make fun; guests may also speak to them to acquire practical guest information, such as nearby attractions, recommended restaurants, and hotel facilities.
   b. **Operation:** This technology product can be used without learning.

2. Housekeeper robots:
   a. **Function:** This robot provides simple delivery service to deliver small items from the hotel front desk to the guest room, including towels, razor blades, shower caps and other supplies or newspapers. When arriving at the door of the room, the robot will dial the phone in the room to notify the guest of the delivery.
b. **Operation:** This technology product can be used without learning.

3. **Guest room intelligent control system:**
   a. **Function:** Upon sensing the guest into the room, the system may turn on the lighting at the entrance. When the lights are all off at night, it may turn on the night light when sensing the guest getting out of bed. It closes the curtains automatically in case of too strong daylight, and adjusts the air conditioning automatically when the room temperature is too cold or too hot.
   b. **Operation:** This technology product can be used without learning.

4. **Wireless charging device:**
   a. **Function:** Charge the mobile phone by simply placing it on the table bearing the sign of wireless charging.
   b. **Operation:** It can be used without learning.

5. **Voice-controlled smart housekeeping:**
   a. **Function:** Guests may speak to a technology product, to voice control the audio and video entertainment equipment, lighting, air conditioning, and curtains in the room, or consult for various travel information such as nearby attractions, recommended restaurants, and hotel facilities.
   b. **Operation:** This technology product can be used without learning.

### Table 1. The impact of technology products of different learning types and technostress on guests' preference

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Freedom</th>
<th>Mean Square Value</th>
<th>F-Test</th>
<th>Significance</th>
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<tbody>
<tr>
<td>Learning types</td>
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<td>205.341</td>
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</tr>
<tr>
<td>Technostress</td>
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<td>1</td>
<td>463.188</td>
<td>51.713</td>
<td>0.000</td>
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<tr>
<td>Learning types × technostress</td>
<td>60.550</td>
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<td>60.550</td>
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</table>

Note: * p<0.05, ** p<0.01, *** p<0.001.

### Table 2. The impact of technology products of different learning types and technostress on guests' use intention

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Freedom</th>
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Note: * p<0.05, ** p<0.01, *** p<0.001.

### Table 3. Summary of hypothesis testing results

<table>
<thead>
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<th>Testing</th>
</tr>
</thead>
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<tr>
<td>H1: The non-learning technology products introduced into hotels are better accepted than those of learning type.</td>
<td>True</td>
</tr>
<tr>
<td>H2: Technology products of different learning types may interact with hotel types in the acceptance of technology products.</td>
<td>False</td>
</tr>
<tr>
<td>H2-1: In business hotels, the acceptance of learning technology products is higher than that of non-learning technology products.</td>
<td>False</td>
</tr>
<tr>
<td>H2-2: In leisure vacation hotels, the acceptance of non-learning technology products is higher than that of learning technology products.</td>
<td>False</td>
</tr>
<tr>
<td>H3: Technology products of different learning types interact with technostress on technology acceptance.</td>
<td>True</td>
</tr>
<tr>
<td>H3-1: Those who are under high levels of work-related technostress have higher acceptance of non-learning technology products than learning technology products.</td>
<td>True</td>
</tr>
<tr>
<td>H3-2: Those who are under low levels of work-related technostress have the same acceptance of non-learning and learning technology products.</td>
<td>True</td>
</tr>
</tbody>
</table>
Figure 1. The theoretical model

Figure 2. The impact of technology products of different learning types introduced in hotels on guests’ acceptance

Figure 3. The impact of technology products of different learning types and technostress on guests’ preference
Figure 4. The impact of technology products of different learning types and technostress on guests’ use intention

Chih-Hung Pai was born in Keelung, Taiwan, China, in 1965. He received a Ph.D. from Central University of Taiwan. Obtained a double master’s degree in hospitality and civil engineering from Fu Jen Catholic University and Jiaotong University. His research interests mainly include tourism management, cultural heritage and the application of big data analysis in tourism.

Yunfeng Shang was born in Beijing, China, in 1985. He received a Ph.D. from University of Exeter, UK. His research interests mainly include ecotourism, tourism economics and environmental education.

Long Wang was born in Shandong, China, in 1984. He received a Ph.D. from Honam University, Korea. His research interests mainly include Exhibition, Business model, and Innovation Development.

Yin Zhang was born in Henan, China, in 1987. She received a Ph.D. from Lyceum of the Philippines University-Batangas, Philippines. Her research interests mainly include tourism management.