

## Does the Generational Cohort Influence the Effects of Sustainability-Oriented Service Innovation?

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### Abstract

In recent years, the tourism sector has undergone a transformation in its business model due to changes in societal mentality, with a growing concern for social and environmental well-being, and the digitization of services, particularly affecting hotels. For this reason, this paper examines the effects that innovative and sustainable practices have jointly on hotel guests. Specifically, sustainability-oriented service innovation in tourist satisfaction and loyalty is examined. This analysis aims to examine the impact of the generational cohort on these relationships. For this, an empirical study of a quantitative nature was carried out in 2020 on a sample of 302 guests from Spanish hotels. The analysis of the results was carried out using the Principal Component Analysis (PCA) technique to study the dimensional structure of the constructs included in the proposed model, and, using the PLS-SEM technique, we examined the proposed relationships. The results show that innovation and sustainability drive customer satisfaction and loyalty in hotel accommodations. Likewise, significant differences are observed regarding the impact of the generational cohort on the links tested.

**Key Words:** sustainability-oriented service innovation, satisfaction, loyalty, centennials, millennials, generation X, hotels

**JEL Classification:** M31, L83

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### 1. Introduction

In response to growing societal concern for environmental and social well-being, the tourism and hospitality industry is undergoing a profound transformation. Hotels, in particular, face increasing pressure to adopt environmentally friendly practices and to rethink their service offerings through the lens of sustainability (Watanabe et al., 2020; Wikhamn, 2019). Yet, adopting sustainable practices is not straightforward; hotels often encounter challenges such as cost constraints, operational complexity, guest resistance to change, and limited internal capabilities to design or implement sustainable innovations (Horng et al., 2017; López-Gamero et al., 2022).

Amid this complexity, Sustainability-Oriented Service Innovation (SOSI) has emerged as a novel and promising concept that integrates sustainability and innovation within service design and delivery (Calabrese et al., 2018a). Unlike traditional approaches that treat sustainability and innovation separately, SOSI adopts a holistic framework, recognizing their synergies as a distinct source of long-term value and competitive advantage, especially in service-intensive industries like hospitality. However, while this integrated approach has been conceptually discussed (Calabrese et al., 2021), empirical evidence—particularly in the hotel sector—remains scarce and underdeveloped (Gaudig et al., 2021; McCrory et al., 2022). In this sense, because the whole is different from its constituent parts (Stoyanov, 2022), the literature calls for research to progress in the study of innovation and sustainability from a holistic approach (Calabrese et al., 2021). Despite this call, the works that point in this direction are, to date, scarce and, for the most part, of a conceptual and exploratory nature (Gaudig et al., 2021; McCrory et al., 2022).

This study responds to this gap by examining how SOSI influences two key behavioral outcomes in hospitality: guest satisfaction and loyalty. Moreover, we investigate how generational differences condition these relationships, since various studies point to significant differences in consumer behaviour that are dependent on the generational cohort (Ahn & Lee, 2019; Shams et al., 2020). This is particularly relevant as younger consumers (i.e. Millennials and Centennials) demonstrate stronger environmental awareness and digital fluency, but may differ in their willingness to support sustainable initiatives depending on factors like price sensitivity or service experience expectations (Corbisiero & Ruspini, 2018; El Demerdash, 2019).

Therefore, to respond to this existing gap, this paper pursues a dual objective: (1) to assess the effects of SOSI on guest satisfaction and loyalty, and (2) to evaluate whether and how these effects vary by generational cohort. Through the development of a context-specific SOSI measurement scale and empirical testing in Spanish hotels, this research provides novel insights to the literature as well as practical guidance for managers seeking to align sustainability and innovation strategies with the preferences of diverse consumer segments.

In order to respond to the proposed objectives, this study is structured as follows: after this introduction, the theoretical framework and the formulation of the hypothesis of this research are developed. Subsequently, the working methodology is presented, followed by an examination of the results obtained in the empirical study. Finally, the conclusions are presented, both theoretical and practical, and the main limitations of this study are formulated, which can be taken as future lines of research.

## 2. Theoretical framework

### 2.1 Sustainability-oriented service innovation (SOSI)

The conceptualisation of the term “Sustainability-Oriented Service Innovation (SOSI)” arose from the need to be able to clearly identify a research area focused exclusively on the analysis of the links between service innovation and sustainability (Calabrese et al., 2018a). Specifically, Calabrese et al. (2018b) define this construct as “*a new field of research focused explicitly on both service innovation and sustainability, and characterised by a holistic approach to innovation, involving various factors and stakeholders*” (p. 283). This new perspective implies the modification of elements linked to innovation from a sustainable approach, with the economic, social, and environmental perspectives as the base pillars on which it is sustained.

Calabrese et al. (2018a) point out that this construction of the SOSI concept does not completely replace or merge the fields encompassed by Sustainability-Oriented Innovation (SOI), Service Innovation (SI) and Product-Service System (PSS), but rather highlights the importance of the

contribution of these approaches to the development of this area of study. In this sense, its analysis can become an independent research stream in various sectors and approached from different perspectives.

## 2.2 Generational cohorts

The literature defines a generation as “*a cohort of people born within a similar span of time (15 years at the upper end), who share a comparable age and life stage and who were shaped by a particular span of time (events, trends, and developments)*” (McCrindle, 2014, p. 1). Generation X is the group made up of people who were born approximately between the years 1964 and 1980, children of the so-called Baby Boomers (Kotler & Keller, 2012). Members of Generation X are more willing to pay a higher amount if they obtain added value by doing so. This type of consumer is pragmatic, self-sufficient, and independent, and perceives security as an essential factor when purchasing a product or service (Ahn et al., 2019). For its part, Generation Y members have been considered as distinctive and dominant consumers whose behaviour, preferences, and decisions are of paramount importance for the progress of the service sector, especially tourism, and more specifically for hotel companies (El Demerdash, 2019). Millennials are committed to decisions that can affect the environment and they also have extensive knowledge in the use of technology. However, despite their awareness of environmental issues, Generation Y is not willing to pay a premium price for more sustainable products. Finally, Centennials, also known as Generation Z (Williams & Page, 2011), are characterised as the consumers of the future, so it is vitally important to know their purchasing behaviours online and offline in order to facilitate an organisation’s decision-making process (Yarimoglu, 2017).

The services literature shows that consumer behaviour can vary depending on the generational cohort to which they belong (Shams et al., 2020; Bordian et al, 2022). In this sense, given the significant effect that innovation and sustainability have on the survival and growth of companies, the identification of the distinctive characteristics of Generation X, Millennials, and Centennials regarding these two variables is essential for decision-making in organisations. In relation to sustainability, some authors point out that the members who belong to these generational cohorts are especially aware of these issues. However, Millennials show greater reluctance towards sustainable practices if they have to pay a higher price for a service (El Demerdash, 2019). For their part, Centennials have grown up with the rise of digital tools and, therefore, this type of consumer may be more demanding when assessing the technological changes made by companies (Corbisiero & Ruspini, 2018).

## 3. Research hypotheses and proposed model

One of the main objectives of this work focuses on the analysis of the effects of SOSI on the variables that have traditionally been considered of paramount importance in service companies, as is the case of hotels. One of the constructs that has aroused the greatest interest is satisfaction. The interest on examining the relationship between SOSI and satisfaction is based on three reasons. Firstly, guest satisfaction is a key source of competitive advantage in the hospitality industry (Wikhamn, 2019). Secondly, there is an increasing interest in the literature on SOSI (Shin & Perdue, 2022). Last, consumers are increasingly demanding services committed to environmental protection and social justice (Kaufman et al., 2021; McCrory et al., 2022).

Wikhamn (2019) highlights the importance of investigating guest satisfaction as it is a reasonable indicator of the non-financial performance of this type of company. In addition, it has been pointed out that it is essential to compare the effect of innovation and sustainability on satisfaction in the same model.

On the other hand, analysing the interconnections between innovation and sustainability, Horng et al. (2017) state the need for current hotel management to be approached from this dual

perspective. Coining the term resulting from these synergies as “sustainable innovation”, the authors point out its positive effect both for the employees of the organisations and for the hotel guests. Along these lines, their research proposes innovation as a fundamental determinant in the development of the environmental marketing strategy carried out by hotels.

In light of all the above, we propose the first hypothesis of this research:

**H1:** *SOSI has a positive effect on guest satisfaction with a hotel.*

Similarly, loyalty is another of the variables that has attracted the most attention in the tourism sector and has been assumed as a strategic element that contributes to the growth of companies. However, few studies have examined the effect of the joint relationship between innovation and sustainability on this construct. In general, the effects of sustainability and innovation on loyalty have been analysed as independent elements (Tiwari & Thakur, 2021) and, on many occasions, in separate research models (Kim et al., 2017). In contrast, recent studies do show the need to investigate innovation and sustainability in the hospitality industry from a global perspective (Martin-Rios et al., 2021), since the unique structure of this sector requires a distinctive approach to innovation, where people and environment occupy a relevant position.

Regarding the links between sustainability and loyalty in the context of hotel companies, Kim et al. (2017) confirmed the positive impact that the ecological practices developed by hotels trigger in the guests' intention to repeat the visit. In relation to the links between innovation and loyalty in the tourism sector, Lemy et al. (2019) point out that innovation can allow the hotel industry to go beyond offering good service and focus on the development of a value-added proposition whose purpose is to increase customer loyalty.

After examining the effect of sustainability and innovation on guest loyalty, and assuming that this effect will be greater if the first two variables are considered as a single construct, we posit:

**H2:** *SOSI has a positive effect on guest loyalty to the hotel.*

Regarding the link between satisfaction and loyalty, several studies have analysed this relationship in hotel guests (Al-Msallam, 2020), demonstrating that increasing the level of customer satisfaction can lead to greater repurchase (Issock et al., 2019) and revisit intentions (Wang et al., 2018). Furthermore, in a context where hotel companies that make use of Artificial Intelligence (AI) in their daily activity prevail, Prentice et al. (2020) observe that guests with higher levels of satisfaction are more willing to consider a repeat visit to the same establishment.

In accordance with the previous evidence, we propose the third hypothesis of this study:

**H3:** *Guest satisfaction has a positive effect on loyalty towards an establishment.*

Understanding the relationship between consumer perceptions and consumer behavior can be crucial to broaden the knowledge about how certain companies can act in order to modify some of the decisions that people make (Nikolić et al. 2022). Younger consumers, including Centennials, show greater concern and respect for the environment and society compared to the generations that preceded them. They not only take into account environmental aspects when making decisions about private consumption, but also value other aspects related to the labour conditions of workers or the type of collaboration that companies enter into with socially responsible organisations (Webb et al., 2008). El Demerdash, (2019) points out that, although Millennials are characterised by a notable level of environmental awareness, they do not commit to the ecological practices of hotels if this entails an increase in the price of the service.

In addition, it is to be expected that younger consumers may be more demanding than Millennials with regard to innovative practices developed by companies. Centennials have made use of Information and Communication Technologies (ICT) from an early age, so they are up to date in the use of innovative products and services (Corbisiero & Ruspini, 2018), which could be a differentiating element between generations that organisations should take into consideration. In addition, Papadopoulou et al. (2022) state that Millennials and Generation X have developed strong values in terms of sustainability and, furthermore, they want these values to be reflected in their purchasing

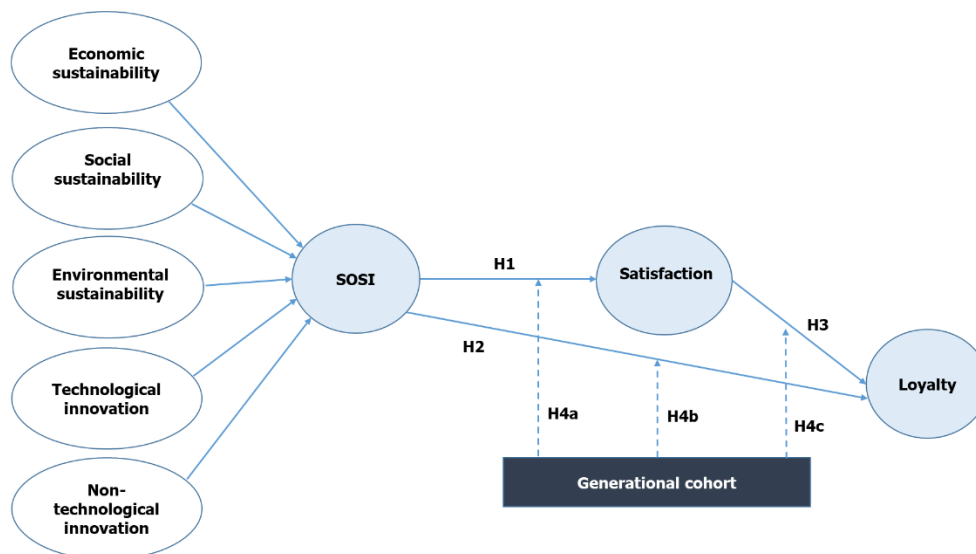
decisions. The authors add that a large part of Millennials does not buy brands that are not respectful of the environment, while the sample of Generation X consumers is more divided in this regard.

Based on these considerations, it is expected that the synergies that emanate from innovative and sustainable practices exert a greater influence in the case of younger consumers compared to Generation X and Millennials and, with this in mind, we state the final hypothesis:

**H4:** *The generational cohort plays a moderating role in the SOSI-Satisfaction-Loyalty chain of relationships, and these relationships are stronger for Centennials compared to Millennials and Generation X.*

Figure 1 presents the research model and the hypotheses.

**Figure 1.** Proposed research model



Source: authors

## 4. Methodology

To achieve the proposed objective, we employed quantitative research using an ad hoc structured questionnaire. The questionnaire includes various scales validated in the literature whose items have been adapted to the context of the hotel guest. In this sense, guest satisfaction is measured using the scales of Nettet et al. (2011) and Gelbrich (2011), whereas loyalty is measured adapting the indicators of Kim and Kim (2005). Regarding the development of the SOSI scale, a process was carried out following the eight methodological phases that the literature recommends in any process of scale development and validation in marketing (DeVellis, 1991; Cantó et al., 2021). After defining the domain of the construct, i.e., carrying out the conceptual delimitation of SOSI, in a second stage, a list of items was generated from the literature review. In particular, items are adapted from Xu & Gursoy (2015), Wu et al. (2006) and Oke & Idiagbon-Oke (2010). Then, once the way to measure the proposed scale was determined (7-point Likert scale), the fourth stage was the revision and validation of the items that made up the measurement instrument by academics and professionals from the hospitality sector with extensive experience in issues related to sustainability and innovation. Subsequently, the measurement instrument was tested in order to detect any deficiency, confirming the understanding of all the indicators that made up the measurement instrument, a total of 21 items. Last, the data collection phase and subsequent validation of the measurement instrument were undertaken. Finally, questions to collect respondents' classification data are included in the questionnaire.



The data collection process was carried out through a consumer panel in October 2020, applying quotas by age and region where the hotel was located. The overall response rate was 70%.

For our study, we consider as representatives of Generation X the respondents born between 1965 and 1980, according to the criteria of various authors (Campbell et al., 2015). Members of Generation Y or Millennials are those respondents born between 1981 and 1993, as defined by Schultz et al. (2012), and Centennials or Generation Z are the respondents who were born after the year 1994, as proposed by Ortega et al. (2016). Specifically, there are 134 valid questionnaires answered by respondents belonging to Generation X, 108 from Generation Y or Millennials, and 60 from Generation Z or Centennials. 43% of respondents are men and 57% women. The main motivation for the trip is leisure (92.7%), compared to business trips (6.6%), and other travel reasons (0.7%).

## 5. Results

In order to achieve the proposed objective, first, an exploratory analysis is carried out through the Principal Component Analysis (PCA) technique to study the dimensional structure of the constructs included in the proposed model. Specifically, a PCA with Varimax rotation was carried out to delimit the existence of the SOSI factorial structure. After eliminating one item for not reaching the minimum value of 0.55 in some of its factor loadings, the application of this statistical technique to our data was supported by various criteria (determinant: 1.40E-010; KMO: 0.929; Bartlett's test of sphericity significance: 0.000).

The results show the existence of five well-differentiated factors, which we have called: “technological innovation” (related to the degree of advancement of ICT), “non-technological innovation”, and the three dimensions of sustainability put forward by the Triple Bottom Line (economic, social, and environmental sustainability). The five factors together explain 83.62% of the total variance.

Second, using the PLS-SEM technique and calculating a PLS algorithm, we obtained the results for the confirmatory factor analysis presented in Table 1. We eliminated the loyalty indicators L4 and L5, since their loadings are lower than 0.6, as suggested by Bagozzi & Yi (1988).

**Table 1.** Measurement instrument of the structural model: Reliability and convergent validity

Factor	Item	Loading	$\alpha$	CR	AVE
Economic sustainability	SOSI1. The importance it attaches to the rate of revenue growth	0.938*	0.902	0.939	0.836
	SOSI2. Be concerned about costs	0.888*			
	SOSI3. Be concerned about market share growth rate	0.917*			
Social sustainability	SOSI4. Be concerned about the well-being of your employees	0.905*	0.908	0.936	0.784
	SOSI5. Be concerned about the well-being of your clients/guests	0.877*			
	SOSI6. Be concerned about the welfare of the local community	0.900*			
	SOSI7. Be concerned about the well-being of your suppliers	0.859*			
Environmental sustainability	SOSI8. Buy environmentally sustainable products	0.886*	0.946	0.956	0.755
	SOSI9. To manage its services in an	0.900*			

	environmentally sustainable way				
	SOSI10. That controls the use of products so that they are not wasted	0.878*			
	SOSI11. That prolongs the life of the products	0.824*			
	SOSI12. Have a recycling program in place	0.864*			
	SOSI13. That controls the contamination generated by the hotel	0.858*			
	SOSI14. That uses environmental management systems	0.870*			
Technological innovation	SOSI15. This hotel invests in technology (ICT)	0.917*	0.953	0.966	0.876
	SOSI16. The ICT of this hotel are the most advanced	0.950*			
	SOSI17. Relative to our competitors, the ICT of this hotel are more advanced	0.945*			
	SOSI18. It takes into account the opinion of customers to coordinate and develop ICT in order to improve the service and better meet their needs	0.931*			
Non-technological innovation	SOSI19. The hotel innovates in order to reduce or eliminate problems with clients	0.949*	0.949	0.967	0.907
	SOSI20. The hotel innovates so that its relationships with clients are close and personal	0.955*			
	SOSI21. Thanks to the hotel's innovations, the relationship with customers is good	0.953*			
Satisfaction	SAT1. En general, mi nivel de satisfacción con este hotel ha sido elevado	0.941*	0.965	0.973	0.877
	SAT2.Taking into account the expectations about this type of hotel, I am satisfied with my experience	0.931*			
	SAT3. I would be pleased to visit this hotel.	0.948*			
	SAT4. I think it's great that this hotel exists	0.919*			
	SAT5. Being in this hotel has been pleasant	0.944*			
Loyalty	L1. I regularly visit this hotel	0.840*	0.888	0.923	0.749
	L2. I intend to visit this hotel again	0.871*			
	L3. I usually use this hotel as my first choice compared to other hotels	0.899*			
	L4 I would not switch to another hotel the next time	0.851*			
Parameter estimates of the formative second-order constructs					
1st Level Factor	2nd Level Factor	Weights	FIV		
SOSI	Economic sustainability	0.200*	1.727		
	Social sustainability	0.203*	2.102		
	Environmental sustainability	0.385*	2.313		
	Technological innovation	0.300*	3.728		
	Non-technological innovation	0.237*	3.608		

Source: own data collection

CR= Composite Reliability, AVE= Average Variance Extracted

\* Statistically significant  $\alpha$ ,  $p < 0.01$

The results obtained from Cronbach's  $\alpha$  are satisfactory, widely exceeding 0.7, the minimum required (Churchill, 1979; Nunnally & Bernstein, 1994), and ranging between values of 0.8 and 0.9, recommended values for more advanced stages of the research (Nunnally & Bernstein, 1994). The composite reliability analysis far exceeds the required minimum of 0.7 (Chin, 1998). In addition, all the constructs of the structural model obtain Average Variance Extracted (AVE) values greater than 0.5, which implies that each construct explains at least 50% of the variance of the assigned indicators (Fornell & Larcker, 1981). In conclusion, these results allow us to confirm the reliability and convergent validity of the structural model measurement instrument.

Regarding discriminant validity, the square root of the average variance extracted (AVE), which appears on the diagonal of the matrix in Table 2, is higher than the estimated correlation between the factors, which appears below the diagonal, in all cases, thereby corroborating discriminant validity (Fornell & Larcker, 1981). Additionally, discriminant validity is ratified through cross-loadings (Chin, 1998), as the loadings of each indicator with its corresponding latent variable are greater than those with other dependent variables. Finally, the discriminant validity is confirmed by the value of the HTMT ratio, being lower than 0.9 in all cases (Henseler et al., 2015).

**Table 2.** Measurement instrument: Discriminant validity (Fornell-Larcker and HT/MT criteria)

	1	2	3	4	5	6	7
1. Economic sustainability	<b>0.915</b>	0.426	0.560	0.561	0.548	0.456	0.512
2. Social sustainability	0.387	<b>0.886</b>	0.751	0.168	0.294	0.485	0.182
3. Environmental sustainability	0.517	0.692	<b>0.869</b>	0.335	0.337	0.380	0.281
4. Technological innovation	0.522	0.154	0.319	<b>0.936</b>	0.877	0.442	0.681
5. Non-technological innovation	0.507	0.275	0.320	0.833	<b>0.952</b>	0.556	0.608
6. Satisfaction	0.427	0.454	0.366	0.425	0.533	<b>0.937</b>	0.557
7. Loyalty	0.460	0.157	0.261	0.626	0.560	0.525	<b>0.866</b>

Source: own data collection

Notes: Diagonal values in italic are square roots of AVE, and values below the diagonal are correlations between variables. Values above the diagonal are heterotrait-monotrait (HTMT) ratios.

Since we consider SOSI as a second-order construct made up of different dimensions related to the sustainability and innovation of the hotel establishment, based on guest perceptions, as formative elements, we analyse their weights. Since the variance inflation factor (VIF) for the dimensions of the second-order constructs is lower than 5 (Table 1), the absence of collinearity is confirmed, following the criteria of Diamantopoulos & Winklhofer (2001).

Once the psychometric properties of the model measurement instrument have been verified, the structural model is estimated. A complete bootstrapping was carried out with 5000 subsamples using SmartPLS (Ringle, 2015). The results obtained through the PLS-SEM analysis allow us to support all the relationships proposed in the causal model. Regarding the hypotheses between SOSI and its consequents, its positive relationship with guest satisfaction ( $\beta_1 = 0.570$ ,  $p < 0.01$ , H1) and loyalty towards the hotel ( $\beta_2 = 0.355$ ,  $p < 0.01$ , H2) have been confirmed. These results are aligned with those studies revealing that the implementation of sustainable and innovative actions in the daily activity of organizations can have a positive impact on the perception of consumers towards this type of company. Specifically, innovative and sustainable initiatives can increase guest satisfaction (Wikhamn, 2019) and loyalty towards this type of accommodation (Kim et al., 2017). In addition, we find support for the hypothesis that links customer satisfaction with loyalty to the accommodation ( $\beta_2 = 0.335$ ,  $p < 0.01$ , H3), in the line of Prentice et al. (2020).

Additionally, in accordance with Hypothesis 4, we expect to find significant differences in the strength of relationships between constructs based on the guest's generational cohort. In order to test



these hypotheses, a multigroup analysis (PLS-MGA) is carried out. Previously, measurement invariance is examined through the MICOM procedure, which requires three steps to test configuration and compound invariance, as well as equality of means and variances for the variables analysed (Henseler et al., 2016). Once we confirm the invariance for these constructs, we proceed to perform the PLS-MGA multigroup analysis. Based on the results shown in Table 3, the positive influence of SOSI on guest satisfaction and loyalty is supported for the three generational cohorts analysed, while the relationship between satisfaction and loyalty is only statistically significant for Generation X ( $p < 0.01$ ) and for Generation Y ( $p < 0.10$ ). These findings provide support to those works that warn of the difficulty of retaining the younger generations of consumers (Corbisiero & Ruspini, 2018). The level of sensitivity of the youngest group of guests towards issues related to sustainability and their high level of connection with new technologies, make their perception of sustainable and innovative practices greater than that of previous generations (Papadopoulou et al., 2022).

**Table 3.** Results of the multigroup analysis for the generational cohort

Causal relationship	Standardized beta			p-value MGA Henseler		
	Gen.X	Gen.Y	Gen.Z	X-Y	X-Z	Y-Z
H4a: SOSI → Satisfaction	0.472**	0.541**	0.713**	0.768	0.991	0.954
H4b: SOSI → Loyalty	0.326**	0.460**	0.382**	0.864	0.623	0.326
H4c: Satisfaction → Loyalty	0.449**	0.226*	0.266	0.074	0.169	0.590

Source: own data collection

Statistically significant a, \*  $p < 0.1$ ; \*\*  $p < 0.01$ .

P-values in bold are statistically significant ( $p < 0.05$ )

Regarding the differences between the coefficients, as can be seen from Table 3, the influence of SOSI on satisfaction is significantly stronger among Centennials compared to the other two age groups, since values greater than 0.95 indicate that the group 3 bootstrapping results are significantly higher than those of groups 1 and 2. This result supports the moderating role of the generational cohort in the relationship between SOSI and guest satisfaction with the hotel, in line with the works that assert the importance that younger generations attach to technological innovations and sustainability (Corbisiero & Ruspini, 2018). Possibly, the explanation for these results is aligned with those contributions that show the change in the mentality of the new generations, who are more sensitive towards social issues and more concerned about the environment.

## 6. Discussion and international comparison

The findings of this study confirm that Sustainability-Oriented Service Innovation (SOSI) positively influences guest satisfaction and loyalty. This is consistent with previous research conducted in various international hospitality contexts. For instance, Wikhamn (2019) in Sweden and Kim et al. (2017) in South Korea also reported that eco-innovative hotel practices enhance guest satisfaction and revisit intention. Similarly, Horng et al. (2017) observed in Taiwanese eco-hotels that sustainable innovations improve not only environmental performance but also guest experience and brand perception. These parallels reinforce the idea that SOSI, as a holistic integration of sustainability and innovation, creates value across diverse cultural and geographical contexts.

However, certain divergences are noteworthy. For example, Tiwari & Thakur (2021), in a study conducted in the Indian hospitality sector, found that while sustainability positively affected loyalty, the role of innovation was not as significant unless perceived directly by guests. This contrasts with our

findings, where both technological and non-technological innovation were key dimensions of SOSI that significantly impacted satisfaction. This difference could be due to varying levels of guest exposure to innovation across markets or different expectations shaped by the levels of socio-economic development and digital maturity.

Regarding generational differences, our results suggest that Centennials exhibit stronger sensitivity to SOSI practices than Millennials and Generation X, particularly in terms of satisfaction. This aligns with studies such as Llopis-Amorós et al. (2019), which point to younger generations' greater environmental consciousness and higher expectations for innovation in service delivery. In contrast, Nikolić et al. (2022), using data from Serbia, found that while Generation Z values sustainability, this does not always translate into behavioral loyalty, echoing our finding of a weaker satisfaction-loyalty link among Centennials. Additionally, Wang et al. (2018), in the context of green hotels in China, found that Millennials were significantly influenced by a hotel's green image in forming word-of-mouth intentions, though their price sensitivity sometimes mitigated their loyalty—a dynamic similarly observed in our study. This suggests that while attitudes toward sustainability are increasingly positive in global terms, behavioral intentions still vary depending on factors such as price tolerance, cultural values, or brand trust.

## 7. Conclusions

This paper focuses on analysing, on the one hand, the effect of sustainable and innovative practices on customer satisfaction and loyalty, and on the other, the moderating role of the generational cohort in this chain of relationships. To do this, the synergies between sustainability and innovation are contemplated, based on the idea that the whole is greater than the sum (Stoyanov, 2022), according to the perspective of SOSI, considering the perceptions of tourists towards the practices implemented by hotel companies. In this sense, the results support the SOSI-Satisfaction-Loyalty chain. However, some differences are also contemplated in terms of the intensity of the relationships between these constructs, which allows us to extract a set of implications both at a theoretical and practical level.

### 7.1 Theoretical implications

To respond to the main objective of this research, that is, to analyze the effect of SOSI on satisfaction and loyalty, firstly, an ad hoc scale is developed for the hospitality industry. Following the process of scale development and validation proposed by DeVellis (1991), we have obtained a SOSI scale that gathers the five dimensions. The SOSI scale proposed in this study and its application to a specific case responds to the calls in the literature with the aim of developing and testing a construct that, from a holistic view, would allow analyzing the joint effects of sustainability and innovation in several industries (Calabrese et al., 2018a).

Secondly, this work confirms the positive and significant relationship that SOSI exerts on relevant variables in the tourism sector, such as guest satisfaction and loyalty to hotel companies. This research continues the line of those works that indicate that innovation and sustainability are elements that boost satisfaction (Wikhamn, 2019) and guest loyalty (Kim et al., 2017; Wikhamn, 2019). However, this work goes one step further, considering innovation and sustainability from a holistic approach, as suggested by Calabrese et al. (2021), analysing these relationships in a single model. Therefore, the perception that consumers have about the treatment of employees by hotel companies, the use of products by these organisations that respect the environment, or the investment focused on improving their relationships with guests, are some actions that can lead to increased customer satisfaction and loyalty.

Thirdly, this work also confirms the positive and significant link between guest satisfaction and return visits to the establishment. In this sense, it is vital that hotels develop a customer-oriented strategy whose main objective is based on creating an enjoyable experience for the guest. As noted above, this can be achieved by acting on the main elements that make up the SOSI. However, it is important to point out that these results vary depending on the generational group analysed. Specifically, the satisfaction-loyalty relationship in Centennials is insignificant, thus reflecting the difficulty for this type of company when it comes to retaining the younger consumer group.

Finally, the analysis of the moderating effect of the generational cohort allows us to conclude that the impact of sustainable and innovative practices on guest satisfaction is greater in the younger generation (Centennials) compared to Generation X and Millennials. This fact can be justified for two reasons; in the first place, the literature indicates that Generation X places greater value on other elements, such as security, when purchasing a product or service (Ahn et al., 2019) and Millennials are reluctant to pay a higher price merely on the basis of ecological issues. Second, Centennials are more sensitive to environmental and social issues and therefore sustainable innovation initiatives will have a much greater impact on their satisfaction than the same actions will have on other older guests. Thus, the results obtained allow us to progress in the knowledge of the role of demographic segmentation when implementing certain actions in hotels (Shams et al., 2020).

## 7.2 Managerial implications

The results of this research allow us to formulate a series of recommendations for hotel company managers. Firstly, the development of the SOSI concept and its corresponding measurement instrument can be useful to guide decision-making in companies in the hospitality industry. This scale can be used as a management tool to understand the beliefs, perceptions and attitudes of consumers regarding how innovative their hotels are in moving towards sustainable economic, social and environmental practices. The influence that SOSI exerts on guest satisfaction and loyalty confirms that the development of innovative and sustainable actions can change consumers' perceptions. Managers should consider that SOSI is not limited to environmental measures but includes social and economic sustainability, as well as both technological and non-technological innovation. This broad view enables hoteliers to design more holistic strategies that address multiple facets of guest expectations.

The findings suggest that initiatives such as investing in green technologies, promoting staff well-being, enhancing guest personalization through innovation, and communicating these efforts effectively can significantly improve customer satisfaction and loyalty. Special attention should be paid to generational differences: while Centennials value transparency, digital innovation, and environmental responsibility, Generation X may prioritize reliability, safety, and perceived value. Thus, segmentation strategies based on generational cohorts can help tailor communication and service delivery. Specifically, certain actions associated with economic sustainability could include improved labour conditions for workers by extending maternity/paternity leave or sick leave, or the organisation of training courses for employees, provided that guests are made aware of these actions through the appropriate channels in a way that generates a positive perception of the hotels. Additionally, the initiatives implemented in hotels can be oriented towards greater respect for the environment through the installation of energy-efficient technologies, such as low-consumption appliances and heating and cooling systems. Likewise, hotels can also promote healthy and nature-friendly habits among consumers, for example, by installing mechanisms for recharging electric vehicles, renting out bicycles, or organising sports activities.

In relation to innovative practices, hotels could develop techniques that allow them to attract new customers. For example, new accommodations could be created in emblematic places, locating their activities in old churches or museums, to reimagine existing spaces that are not being used and give them a new lease of life. In addition, hotel managers can take advantage of the opportunities

derived from Artificial Intelligence, install a self-check-in process (allowing the user to carry out complete registration and even provide the room key or access in different modalities), or introduce a bad odour neutralisation system that helps improve air quality. All these initiatives could help hotels achieve higher levels of guest satisfaction and encourage the intention of selecting that accommodation for future visits. However, the proposed actions may vary depending on the consumer segment that the hotel establishment is targeting: the more exceptional the measures that are implemented, the more impressed customers will be, especially young people, who are highly demanding in these matters. In contrast, if the implementation of these measures implies an increase in the price of the service, it could be poorly received by Millennials and Generation X.

### 7.3 Limitations and future lines of research

Despite the robustness of the methodology and the relevance of the findings, this study is not without limitations. First, the use of a non-probabilistic sampling procedure and the relatively small size of the Centennial subgroup ( $n=60$ ) may limit the generalizability of the results across generational cohorts. While the minimum recommended size for Partial Least Squares Structural Equation Modeling (PLS-SEM) is met, this uneven distribution may limit the generalizability of results concerning the youngest cohort. Future research would benefit from collecting larger and more balanced samples across generational groups to further validate these findings and enable more robust comparisons. Second, the study is geographically focused on Spanish hotels, which may constrain the applicability of the findings to other cultural or regulatory contexts where perceptions of sustainability and innovation may differ. Additionally, the cross-sectional nature of the data limits the ability to observe changes in guest perceptions over time. Future research could address these limitations by expanding the sample size and applying the proposed model in other countries or regions to explore cross-cultural differences in the perception of Sustainability-Oriented Service Innovation (SOSI). Longitudinal studies would also be valuable to monitor how generational attitudes toward SOSI evolve, especially in response to technological advancements or growing environmental concerns. Furthermore, qualitative research could offer deeper insights into the psychological and emotional mechanisms behind guests' evaluation of sustainable and innovative hotel practices. Finally, exploring the financial and operational barriers which hotels face when implementing SOSI strategies could help bridge the gap between conceptual models and managerial execution.

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