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RESEARCH ON INNOVATIVE TECHNOLOGICAL APPLICATIONS AFFECTING PEOPLE WITH DISABILITIES IN GREEK HOTEL INDUSTRY

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ABSTRACT
This paper aims to explore the views of disabled people on the degree of utilization of innovative technological applications for customers with disabilities at Greek hotels, non-random sampling being the methodological framework used in the research process. Results of relevant analysis lead to a main conclusion: physically disabled people consider that there is a low degree of sufficiency in relation to the use of innovative technological applications at Greek hotels and in particular their rooms division. Indeed, it was found that there is a low frequency of use and request of innovative technological applications by people with disabilities in hotels across Greece. Moreover, the existence of specific technological innovations was identified as an important criterion for their revisit intention to a hotel.

Keywords: New Technologies, Innovation, People with Disabilities, Hotel, Hospitality Services

JEL Classification: L83, O30

Introduction

Technology is rapidly evolving in terms of advancement and development of products and applications which focus on a fastest, easiest and more efficient daily routine of hotel businesses and disabled consumers. New equipment and innovations facilitate services provided to guests with disabilities, enhancing their travel experience on the one hand, and opening up new avenues for exploring possibilities and functions on the other hand, touching on aspects of the future. In the light of these developments, hotels need to improve their business intelligence and smooth operation, and to meet the requirements and "wishes" of visitors with disabilities. To achieve these goals, hotels must find the right balance between technological innovations and the human factor.

The expanded use of Information and Communication Technologies (ICTs) and their applications has enabled people with disabilities to autonomously search for tourist destinations and plan their holidays. It has also enabled hotels to connect and have direct contact with their disabled customers at every point and step of their stay.

Undoubtedly, the participation of disabled people in tourism activities presupposes that a series of accessible infrastructures guarantee their safe and comfortable stay at a location. The degree of their accessibility determines their travel behavior and the improvement of their experience but also their overall tourist activity once they reach a destination. Obviously, accessibility is not only associated with suitable infrastructures but also a range of services that enable disabled guests to operate independently in an environment (Mizamtsi et al. 2012). Therefore, accessibility for people with disabilities at hotels refers both to their physical and their digital access to hospitality services.

In international literature, research on tourism for people with disabilities focuses mainly on accessibility and travel behavior issues. In regard to accessibility issues, relevant studies examine internet access to information resources (e.g. Williams et al. 2007; Theocharis 2020), constraints to tourism activities (e.g. Daniels et al. 2005; Popiel 2016; Kaganek et al. 2017; McKercher and Darcy 2018), and the overall barriers faced by disabled guests (e.g. Yfantidou et al. 2017). In regard to travel behavior issues, relevant studies analyze the requirements and motivations of people with disabilities (e.g. Darcy 2002; Son 2010; Mammon 2013; Kim and Lehto 2013), assess behaviors of tourists with disabilities (e.g. Burnett and Baker 2001; Daruwalla and Darcy 2005; Kalargyrou et al. 2018), and evaluate information resources concerning hotel accommodation (e.g. Darcy 2010; Wee and

Sanmargaraja 2016) and hospitality services in given tourist destinations (e.g. Ozturk et al. 2008; Grady and Ohlin 2009; Stathoglou 2017; Kiriya 2020).

This paper aims to explore the views of disabled people on the degree of utilization of innovative technological applications for customers with disabilities at five-star (5*), four-star (4*) and three-star (3*) hotels across Greece.

To achieve this purpose, we first examine what are the information resources for people with disabilities regarding facilities offered by hotels they have already visited, what is the degree of adequacy of provided innovative technological applications in various hotel divisions, and what are the selection criteria of hotels in relation to innovative technological applications for people with disabilities. We then examine which innovative technological applications are most commonly used by disabled guests and which of these are most sought after in hotels, how important is the quality-price ratio in selecting a hotel with innovative technological applications for people with disabilities, and finally how important is the criterion of the existence of innovative technological applications for people with disabilities for their revisit intention to a hotel.

Methodological Framework

Unable to use a sampling frame due to lack of access to an official registry of persons with disabilities, the methodological framework employed in this research is non-random sampling.

The sample size was estimated based on Cochran's (1963) formula (I). However, its correction to a known population number (N) was not applied due to lack of reliable registration of their population number.

$$n_0 = \frac{z^2 pq}{e^2} \qquad \text{(I)}$$

Where,
n_o = the sample size;
z = 1.96 the selected value of desired confidence level;
p = 0.5 the variability at 50%
q = 1 – 0.5 = 0.5 confidence interval of proportion;
e = 0.07 margin of error.

In terms of the sample size of persons with disabilities, as access to this population data was extremely difficult, it was chosen to expand the confidence interval from

0.05 to 0.07, which poses limitations to the present study. Applying Cochran's (1963) formula as cited in Bartlett et al. (2001), the sample size was calculated as follows:

$$n_o = \frac{z^2\,pq}{e^2} = \frac{(1{,}96)^2\,(0{,}5)\,(0{,}5)}{(0{,}07)^2} = \frac{(3{,}8416)\,(0{,}5)\,(0{,}5)}{(0{,}07)^2} = \frac{0{,}9604}{0{,}0049} = 196$$

Thus, the final sample size is 196 persons with disabilities. The survey period extends from 19th December 2019 to 11th March 2020. The questionnaire's reliability is very good ($\alpha \geq 0.9$) according to Cronbach's Alpha index.

Research Findings

By processing statistical data collected through the methodological framework of non-random sampling, descriptive statistics and inferential statistics were used to estimate the relevant indices and parameters, from which the following summary results were obtained:

- Absolute and relative frequencies of respondents with disabilities by gender are shown in Table 1.

Table 1: Absolute and relative frequencies of respondents with disabilities by gender

Gender	F	%F
Male	113	52.07%
Female	104	47.93%
Total	217	100.0%

A total of 217 people with disabilities participated in the research, of which 113 or 52.07% were men and 104 or 47.93% were women.

- In regard to the structure of the sample, absolute and relative frequencies of respondents with disabilities by age are shown in Table 2.

Table 2: Absolute and relative frequencies of respondents with disabilities by age

Age	F	%F
18 to 25 years old	14	6.5%
26 to 35 years old	35	16.1%
36 to 45 years old	61	28.1%
46 to 55 years old	59	27.2%
56 to 65 years old	25	11.5%
66 years old and older	23	10.6%
Total	217	100.0%

People with disabilities aged 18 to 25 represent 6.5% of the sample, 26 to 35 represent 16.1%, 36 to 45 represent 28.1%, 46 to 55 represent 27.2%, 56 to 65 represent 11.5%, and those aged 66 and over represent 10.6% of the sample.

- Absolute and relative frequencies of respondents with disabilities per level of studies are shown in Table 3.

Table 3: Absolute and relative frequencies of respondents with disabilities by education level

Education Level	F	%F
Primary or secondary education graduate	108	49.8%
Tertiary education graduate	75	34.6%
Master's degree or doctorate holder	29	13.4%
Other	5	2.2%
Total	217	100.0%

In terms of education level of the participants in the research, graduates of primary or secondary (Gymnasium or Lyceum) schools hold the largest percentage, with 49.8%, followed by graduates of universities or advanced technological educational institutes with 34.6% and master's degree or doctorate holders with 13.4%, while 2.2% represents another level of studies (e.g. post-secondary

education). The above data reveal a satisfactory education level of people with disabilities. Depending on their age as recorded in the sample, we can assume that their knowledge of digital technology and in general the use of new technologies in their daily lives is at a satisfactory level.

- Absolute and relative frequencies of respondents with disabilities per disability category are shown in Table 4.

Table 4: Absolute and relative frequencies of respondents with disabilities per disability category

Disability Category	F	%F
Mobility impairment	139	64.1%
Sensory impairment	54	24.9%
Other disabilities	24	11.0%
Total	217	100.0%

People with motor disabilities hold the largest percentage, with 64.1%, followed by people with sensory impairments with 24.9%, and finally 11% represents other disabilities (e.g. intellectual/cognitive disability, mental disability, etc.).

- Absolute and relative frequencies of respondents with disabilities according to their participation or non-participation in a disability organization are shown in Table 5.

Table 5: Absolute and relative frequencies of respondents with disabilities as members of a disability organization

Disability Organization Member	F	%F
Yes	147	67.7%
No	70	32.3%
Total	217	100.0%

Members of a disability organization reached 67.7% of the sample, while the remaining 32.3% were not collectively active.

- Absolute and relative frequencies of respondents with disabilities as guests of higher-class hotels are shown in Table 6.

Table 6: Absolute and relative frequencies of respondents with disabilities as guests of higher-class hotels

Hotel Ratings	F	%F
5 stars	66	30.5%
4 stars	106	48.8%
3 stars	45	20.7%
Total	217	100.0%

In terms of higher-class hotels where people with disabilities of the sample have stayed to date, four-star hotels hold the largest percentage, with 48.8%, followed by five-star hotels with 30.5% and three-star hotels with 20.7%. It appears that a very large percentage of people with disabilities choose higher-class hotels, which implies higher quality services and a higher cost of accommodation.

- Absolute and relative frequencies of information resources for respondents with disabilities about facilities provided by higher-class hotels they had visited are shown in Table 7.

Table 7: Absolute and relative frequencies of information resources for respondents with disabilities about facilities provided by higher-class hotels they had visited

Information Resources	F	%F
Internet	125	57.6%
Travel agency	35	16.1%
Friends and acquaintances	53	24.4%
Other	4	1.9%
Total	217	100.0%

In terms of information resources for people with disabilities concerning facilities offered by higher-class hotels they had visited, the Internet holds the largest percentage, with 57.6%, followed by friends/acquaintances with 24.4%, travel agencies with 16.1% and other sources with 1.9% (e.g. direct contact with a hotel).

- In regard to coverage of needs of people with disabilities through the use of innovative technological applications at hotels, the degree of sufficiency of provided technological innovations in various hotel divisions was examined. Specifically, 51.6% represents the reception, 46.1% the booking process, 26.7% common areas, 24.8% the floors division, and finally a percentage of 24.8% other hotel divisions. Low response rates are likely to be associated with hotel categories and capacity, as well as with each person's disability category.
- In regard to hotel selection criteria in relation to technological innovations for people with disabilities, it was found that the key criteria were the ease of movement in all areas and divisions of a hotel by the disabled at 94.9%, the existence of rooms for people with disabilities at 93.5%, the ease of the booking process for people with disabilities at 92.1%, the specialized and experienced staff at the service of people with disabilities at 92.1%, the social impact and awareness of the hotel towards people with disabilities at 77.9%, and the immediate and easy access to hospitals and treatment centers by people with disabilities at 75.2%. Therefore, people with disabilities agree that the above criteria for selecting hotels are an essential factor in choosing a hotel in relation to its innovative technological applications and services provided to this

particular type of customers. It was also established that the criteria on the basis of which people with disabilities select a hotel in relation to its innovative technological applications and services provided to this type of customers are an element influenced by the category of disability of respondents, as well as the hotel ratings.

- Regarding responses of people with disabilities to which innovative technological applications they consider to be commonly used in hotels, it was found that a digital room booking app at 73.7% and elevators with Braille signage and deaf notification systems at 25.8% are the most commonly used. Findings regarding other innovative technological applications represent low percentages (<25%), a fact that reflects their limited use by people with disabilities but also the relatively recent appearance of some in the Greek market. Moreover, it was found that the use of innovative technological applications by guests with disabilities is an element influenced by the category of hotels. The greater number of innovative applications used in five-star hotels was considered expected given that the quantity and quality of services provided are proportionally higher than in other hotel categories, especially three-star hotels. Also, a difference was found between educational attainments of people with disabilities (between secondary education graduates and higher education graduates), as well as between disability categories in terms of the frequency of innovative technological applications used by disabled guests at hotels. This finding is reasonable if we consider that a) educational attainments are directly related to their education level and generally their familiarity with new technologies, and b) disability categories determine each person's requirements and, thus, their fulfillment through the use of innovative technological applications at hotels.
- Regarding responses of people with disabilities to which innovative technological applications they are looking for as hotel customers, a digital room booking app represents 80.6%, a digital ordering app inside hotels 50.2%, an e-concierge app 45.2%, an online taxi booking app 44.7%, self-service points upon check-in and check-out 43.8%, and a digital app upon arrival of the customer at a hotel (check-in application for mobile phones and tablets) 40.6%. Those were the services most sought after. Furthermore, it was found that the request of innovative technological applications in a hotel by people with disabilities is an element influenced by both the hotel category and its capacity. The large difference that arose, especially between five-star and three-star hotels, was relatively expected considering the variations in the quantity and quality of services provided per hotel category. Also, the large number of requested innovative applications in hotels with more than 100 rooms is reasonable if we consider the size and diversity of their clientele and the standards that exist to

meet the needs of this type of customers. Additionally, it was found that the frequency of innovative technological applications sought after by these customers is an element influenced by the age and educational profile of respondents.

- Regarding responses about the importance of the quality-price ratio in choosing a hotel that provides innovative technological applications to disabled guests, it was found that value for money is a hotel selection criterion at 92.1%. Respondents with disabilities agree that the quality-price ratio is an essential factor in choosing a hotel in relation to its innovative technological applications and services offered to this particular type of customers. In this, the demand for a hotel is directly affected by people with disabilities. It was also found that the quality-price ratio in selecting a hotel with innovative technological applications for people with disabilities is an element influenced by their disability category.
- Regarding responses about the importance of the existence of innovative technological applications for people with disabilities for their revisit intention to a hotel, it was found that it is a very important criterion with 91.7%. Respondents with disabilities agree that the existence of innovative technological applications for people with disabilities is a strong criterion for revisiting a hotel. In this, the demand for a hotel is directly affected by people with disabilities. It was also found that the criterion of the existence of innovative technological applications for people with disabilities for their revisit intention to a hotel is an element influenced by the age of respondents, as well as the category of hotels.

Critical Evaluation of Research Findings

Responses of people with disabilities reveal that the reception areas of hotels marginally meet the needs of the specific clients as far as technological innovations are concerned. This finding may be associated with hotel categories and capacity, as well as each person's type of disability. These views are consistent with Borkmann et al. (2016), Theocharis (2016) and Hayes et al. (2017), who argue that the utilization of innovative technological applications in the reception area facilitates operational processes (arrival, departure, etc.) for people with disabilities and increases the benefits of provided quality services to the specific type of customers but also to the rest of the clientele. Therefore, the utilization of such innovative technological applications is a fundamental requirement for any hotel business that seeks to gain a competitive advantage in the tourism industry (Katsoni and Venetsanopoulou 2013; Hall and Williams 2020).

In other hotel departments, and especially floors and rooms divisions, common areas and service departments, the degree of adequacy is quite low. This is another case where the low response rate may be associated with hotel categories and

capacity, and each person's type of disability. Overall, innovative technological applications used in Greek hotels do not seem to meet the needs of people with disabilities, a finding which confirms the necessity for innovation to be subject to feedback (Rothwell 1994). So, it is advisable to: a) continuously and more effectively inform hotel management and staff about the needs of disabled visitors, b) continuously inform hotel management and staff on new technological applications for persons with disabilities, and c) possibly redesign provided products and services in order to more effectively meet the requirements of disabled guests.

The ease of movement for people with disabilities in all areas and parts of a hotel is the main hotel selection criterion in relation to innovative technological applications by these individuals. Obviously, autonomous and safe access to all guest areas of a hotel is one of the key issues that concern people with disabilities when they decide to select accommodation in a tourist destination. This selection criterion is a key reference in many surveys concerning the provision of hospitality services to this type of customers (Kaganek 2017; McKercher and Darcy 2018). It is also a reasonable requirement by people with disabilities in the context of their equal treatment with other guests of a hotel.

Among the other fundamental criteria for selecting accommodation in relation to innovative technological applications for the disabled, it was found that the existence of rooms for disabled guests, the ease of the booking process, the specialized and experienced staff at the service of disabled guests, the social impact and awareness of a hotel towards people with disabilities, and the immediate and easy access to hospitals and treatment centers are essential factors for the selection of a hotel in relation to its innovative technological applications and services provided to this specific type of customers. At the same time, they are consistent with the basic aspirations of the social model of disability (Zisi and Savvakis 2019), where emphasis is placed on "reasonable adjustments" and elimination of barriers that people with disabilities may encounter. Essentially, these findings indirectly reflect the perceptions and expectations of people with disabilities for an autonomous and safe stay in a lodging place. According to Rothwell (1994), gaining knowledge of the needs and market demand of people with disabilities in general is a key element of the broader context of innovation. Also, in addition to the benefits that arise for people with disabilities, the hotel staff is given the opportunity to diversify their existing culture in terms of accessibility and treatment of disabled customers, and enhance their familiarity with the utilization of new technologies (Neuhofer et al. 2015; Pikkemaat and Zehrer 2016; Wikhamn 2018).

Having explored which innovative technological applications are most commonly used by disabled hotel guests, the most widespread were digital hotel room booking solutions, elevators with Braille signage and deaf notification systems. These results are consistent with similar findings (Dickinson et al. 2014; Wang et al. 2016). In particular, responses reveal a low frequency of use of innovative technological applications, with the small exception of high-capacity five-star hotels. This clearly leads to the conclusion that the number and quality of innovative technological applications offered to people with disabilities affect the services provided by a hotel.

Having examined which innovative technological applications are most sought after by disabled hotel guests, it was found that the digital room booking app and the digital ordering app in hotel areas are the main services requested by these individuals. In particular, demand for a digital room reservation application by this type of customers is probably due to the fact that they consider it mandatory (especially in higher-class hotels). Also, a reduced time in respective service delivery through automated processes greatly facilitates the specific customers but also increases the proceeds of the other hotel divisions. The particular services clearly relate to digital applications and are directly linked to the use of Information and Communication Technologies (Dickinson et al. 2014; Wang et al. 2016).

Responses reveal that the quality-price ratio is an important criterion for selecting a hotel that offers innovative technological applications to people with disabilities, a finding which is consistent with the respective findings of Chan (2010) and Chaloftis (2017).

Undoubtedly, continuous improvement of the quality-price ratio should concern every hotel systematically, while competitive differentiation should be an ongoing process (Varvaresos 2013; Lagos 2018). Focusing on niche markets such as people with disabilities presupposes their effective approach, while the quality-price ratio can prove to be a significant accommodation selection criterion.

Also, according to findings of this research, the existence of innovative technological applications for people with disabilities is an important criterion for their revisit intention to a hotel, which is consistent with the respective findings of Dimou and Velissariou (2016) and Deros (2018). Undoubtedly, people with disabilities remain loyal to destinations and accommodations that meet the standards for their comfortable and safe hospitality. Maintaining the trust of this type of customers to services provided by a hotel, as well as increasing the promotion of relationship marketing in hotel businesses, is deemed necessary for

obvious reasons. People with disabilities should no longer be taken for granted by hotels, even if they do not yet have a wide variety of alternatives.

Conclusions - Policy Recommendations

Results of relevant analysis lead to a main conclusion: physically disabled people consider that there is a low degree of sufficiency in relation to the use of innovative technological applications at Greek hotels and in particular their rooms division. There is a low frequency of use and request of innovative technological applications by people with disabilities in hotels across Greece. The existence of specific technological innovations was identified as an important criterion for their revisit intention to a hotel. Also, the quality-price ratio was selected as an important criterion for preferring a hotel with innovative technological applications offered to people with disabilities.

Based on the above conclusions, a policy framework may be developed to meet the following recommendations.

Hotels are required to:

- enable digital accessibility of people with disabilities in the context of an overall design of hotel areas;
- adopt innovative technological applications in all hotel departments;
- co-organize targeted actions with digital technology companies and disability organizations to promote new innovative technologies in relation to digital access to tourism services;
- organize in-house seminars for all staff on hospitality and disability (disabled-friendly skills, e.g. knowledge of Braille for the visually impaired), digital accessibility through the use of technological applications, and complaint management;
- adopt measures to encourage repeat customers with disabilities, e.g. double points (bonus nights) on customer loyalty cards; and
- provide special benefits for people with disabilities, without additional financial burden or discounts, as well as special prices for their companions.

Public and private entities are required to:

- create financial incentives endorsed by the State for equipment upgrade programs in hotels via innovative technologies;

- institutionalize mandatory hotel evaluation criteria, especially at five-star, four-star and three-star ratings, regarding specifications of new technologies for people with disabilities;
- ensure that certification bodies supervise and control the quality of services offered to disabled hotel guests;
- promote tourist destinations of the country by focusing on possibilities offered to people with disabilities in terms of physical and digital accessibility; and
- plan and organize training programs on hospitality services for people with disabilities at public and private educational institutions.

The aforementioned policy recommendations may be integrated into a comprehensive program for the utilization of innovative technological applications, to contribute to the improvement of disabled-friendly services through the cooperation of all stakeholders in the tourism industry and the various entities of people with disabilities. The proposed program may also be an opportunity for addressing the current economic and health crisis, diversifying Greece's tourism product, creating new target groups (niche markets), and improving the quality of the overall tourism product.

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