DIGITAL TRAVEL PLANNING DURING THE FIRST COVID-19 PANDEMIC CRISIS

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Abstract:

Information and Communication Technologies (ICT) have generated added value in accessing tourism-related information through apps, Quick Response codes (QR), and Near Field Communication (NFC). Digital technologies form the backbone of modern tourism, influencing how travellers search for destinations, compare prices, book trips and access real-time information, thereby transforming the entire travel experience. First Covid-19 pandemic crisis accelerated, significantly, the adoption of ICT in the tourism industry, turning them from useful additions into necessities for safety and efficiency. Digital literacy facilitates the participation of older adults in smart tourism, yet persistent gaps may hinder social inclusion. The present study surveyed 250 Portuguese tourists aged 60+ who were approached in Algarve (June–September 2020) using a structured questionnaire on socioeconomic profiles and communication technologies. The developed methods included descriptive statistics and chi-square tests. Most respondents reported regular Internet usage, however, adoption of QR and NFC technologies was comparatively low and exhibited a significant decline with increasing age and disability. Online trip planning was achieved by 29.8% of the participants, mainly for accommodation-related purposes. These findings underscore that age, education, and disability are more salient than gender. The recommendation is for targeted intensive training and hybrid human-digital options to foster inclusive smart tourism.

Keywords: Digital literacy; senior tourism; Algarve; contactless technology; elderly people; digital travel planning.

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PLANIFICACIÓN DIGITAL DE VIAJES DURANTE LA PRIMERA CRISIS DE LA PANDEMIA DE COVID-19

Resumen:

Las tecnologías de la información y la comunicación (tic) han generado un valor añadido en el acceso a la información relacionada con el turismo a través de aplicaciones, códigos qr (quick response) y la comunicación de campo cercano (nfc). Las tecnologías digitales constituyen la columna vertebral del turismo moderno e influyen en la forma en que los viajeros buscan destinos, comparan precios, reservan viajes y acceden a información en tiempo real, transformando así toda la experiencia de viaje. La primera crisis de la pandemia de la covid-19 aceleró de manera significativa la adopción de las tic en el sector turístico, convirtiéndolas de simples complementos útiles en elementos imprescindibles para la seguridad y la eficiencia. La alfabetización digital facilita la participación de las personas mayores en el turismo inteligente; sin embargo, las brechas persistentes pueden obstaculizar la inclusión social. El presente estudio encuestó a 250 turistas portugueses mayores de 60 años a los que se abordó en el algarve (junio-septiembre de 2020) mediante un cuestionario estructurado sobre perfiles socioeconómicos y tecnologías de la comunicación. Los métodos utilizados incluyeron estadísticas descriptivas y pruebas de chi-cuadrado. La mayoría de los encuestados declaró utilizar internet de forma habitual; sin embargo, la adopción de las tecnologías qr y nfc fue comparativamente baja y mostró un descenso significativo al aumentar la edad y la discapacidad. El 29,8 % de los participantes planificó su viaje en línea, principalmente con fines relacionados con el alojamiento. Estos resultados ponen de relieve que la edad, el nivel educativo y la discapacidad son factores más relevantes que el género. Se recomienda impartir formación intensiva específica y ofrecer opciones híbridas que combinen lo humano con lo digital para fomentar un turismo inteligente e inclusivo.

Palabras clave: Alfabetización digital; turismo para personas mayores; Algarve; tecnología sin contacto; personas mayores; planificación digital de viajes.

1. INTRODUCTION

Digital technologies form the backbone of modern tourism, influencing how travelers search for destinations, compare prices, book trips, navigate unfamiliar areas, and access real-time information, thereby transforming the entire travel experience (Xiang & Fesenmaier, 2017; Buhalis & Law, 2008). Meanwhile, Europe's populations are aging rapidly, and seniors now make up a larger proportion of both locals and visitors in places like Portugal's sunny Algarve coast (Gameiro et al., 2019). For these older travelers, mastering digital tools is crucial as they facilitate trip planning, enable access to essential services, and support independence during travel. When considering social sustainability, digital literacy is not just a technical skill, it's what enables older individuals to participate in tourism on an equal bases (Domínguez et al., 2015; World Health Organization, 2021).

1.1 What Digital Literacy Means Today

Current research indicates that digital literacy for seniors extends beyond basic skills, encompassing the ability to navigate the internet, search for information, engage in digital communication, conduct online transactions, and protect themselves from online scams (Hunsaker & Hargittai, 2018; Oh et al., 2022). Not everyone possesses these skills equally, they are often scarcer among the very old, those with less education, rural residents, or individuals with limited financial resources (Friemel, 2016; Seifert et al., 2021). Many surveys miss the mark for older adults, as they downplay real struggles with things like creating content or dodging online risks (Oh et al., 2022). All this contributes to a persistent digital gap tied to age, leaving seniors excluded from both technology and society (Pedell et al., 2021).

1.2 How It Plays Out in Travel

Tourism studies highlight how these digital literacy gaps manifest during travel, such as difficulties in using online booking systems, navigating digital maps, or accessing digital travel guides. Work on smart tourism and older traveler's movement finds they do use the web and phones, but they use the web and phones more carefully and pickily than younger crowds (Neuhofer et al., 2015). In the Algarve, Vieira et al. (2022) surveyed seniors at Faro Airport, finding that 97.5% used the Internet, however, daily habits dropped off with age, increased with more education (over 12 years), and dipped for those with disabilities. Only 18.2% tried QR codes (Quick Response codes), and just 11.5% used NFC (Near Field Communication), hinting at a wariness of new tech. Ribeiro et al. (2022) discovered that most older visitors planned Algarve getaways online, particularly flights and accommodations, but this trend dropped off sharply as age increased or education decreased. This aligns with broader trends: solid digital knowledge enhances trip enjoyment and repeat visits through apps like maps but leaves the less tech-savvy further behind (Song et al., 2021).

1.3 Post-Pandemic Shifts

The rapid adoption of contactless technology during and after the COVID-19 pandemic has exacerbated challenges for seniors, who often struggle with using QR code menus, app-based ticketing, and contactless payment systems. Seniors struggle with QR menus, app tickets, and tap-to-pay at cafes, buses, or clinics (Talbot & Briggs, 2022; Song et al., 2021). Europe is pushing back with plans like the Digital Compass and Digital Decade, it aims for 80% of adults to have basic skills by 2030 and envisions tourism for everyone alongside smart cities that don't leave anyone out digitally (European Commission, 2023; Seifert et al., 2021). Experts on age-friendly cities say that digital setups need to blend smoothly with real-world spots and social environments to help seniors, including those with disabilities (Marston et al., 2020; van Hoof et al., 2021). From this perspective, self-determination theory helps explain why design matters: digital environments are more effective when they support user's basic psychological needs for autonomy, competence, and relatedness. A good digital design does not merely make a system usable, it can help users feel capable, self-directed, and socially connected, thereby encouraging engagement and participation. By contrast, poorly designed interfaces may create frustration, reduce perceived control, and limit meaningful interaction, undermining motivation and access to digital spaces (Ryan & Deci, 2017; Peters et al., 2018).

1.4 Where Research Falls Short

Even with all this work accumulating, key pieces are missing. Algarve studies on older tourists mostly focus on international visitors at the airport (Vieira et al., 2022; Ribeiro et al., 2022). We hear relatively little about Portuguese seniors encountering each other on city streets, or how their backgrounds and mobility issues interact with their everyday digital habits, such as scanning QR codes, using NFC, or planning trips online. Plus, past research often splits digital skills from travel planning, leaving an incomplete picture in one group. Filling these gaps is crucial for developing smart local tourism plans and community efforts that keep ageing active and open in spots like Portugal.

1.5 This Study's Angle

This work explores digital literacy for Portuguese seniors' tourists in Algarve, covering their backgrounds, mobility limits, web habits, QR/NFC use, and online trip prep. Based on surveys, done at the Faro´s airport, from 250 people aged 60 and above, it addresses three questions: (1) What shapes their sociodemographic and disability profiles? (2) What is the story with their Internet use, QR/NFC adoption, and online planning? (3) Do significant differences emerge by age group, education, or disability? Focusing on local seniors in a top tourism area fills gaps from foreign visitor studies and contributes to discussions on digital access, smart travel, and sustainability as societies age.

1.6 Core Goals

The study has three main objectives: (1) to sketch the sociodemographic and disability makeup of Portuguese seniors' tourists visiting Algarve towns, (2) to map their Internet patterns, QR/NFC habits, and online trip planning, (3) to examine whether these digital markers shift significantly by age, education, or disabilities."

2. MATERIALS AND METHODS

For the literature review, Artificial Intelligence was utilized via various tools such as version 5.2 of ChatGPT (OpenAI) and Gemini 2.5 Flash (Google), which were extensively used in April and May 2026; these were used in conjunction for this purpose, with each offering different levels of depth and scope in the searches carried out.

Data were collected via structured questionnaire administered to Portuguese tourists aged 60 and older, following the United Nations definition of older persons (UNHCR, 2021). The instrument comprised two sections: the first gathered socioeconomic and mobility information including gender, age group, education level, employment status, country and type of residence, disability status affecting mobility and use of technical aids, the second addressed communication and information technology use, covering Internet frequency, devices, QR code usage, NFC technology, transport applications and online trip planning services. Respondents were approached in the Algarve cities during summer 2020, yielding 250 complete responses. Due to low frequency of participants over 80, these were recorded into the 75+ group. Data was entered into IBM SPSS v.29 for analysis. Descriptive statistics characterized the sample, while chi-square tests of independence assessed associations between digital literacy indicators and socio-demographic variables (gender, age, education, disability). Where expected cell counts fell below five, Monte Carlo simulation was applied for variables with more than two categories, or Fisher's exact test for 2×2 tables. Statistical significance was set at $\alpha=0.05$.

3. RESULTS

3.1. Sample Characterization.

As can be seen in table 1, 49.0% are male and 50.6% are female, 46.2% are in the age group 60-64, 24.5% in the age group 65-69. 14,5% and 14.9% in the age groups 70-74 and 75 or more, respectively. In terms of the level of education 28.1% Elementary or basic, 20.1% Secondary, 17.3% Medium or professional and 34.5% Superior. Regarding the country of residence 96.0% of the respondents reside in Portugal, 1.6% reside in France, 0.8% in Switzerland or in Brazil and 0.4% reside in Germany or in the United Kingdom. In terms of disabilities, 15,6% answered yes, with motor disability being the one on the top with 69,2%.

Table 1. Socio-demographic profile (N=250)

Variable	***Category***	***n***	***%***
Gender (n=249)	Male	122	49.0%
	Female	126	50.6%
	Other	1	0.4%
Age group (n=249)	60 to 64 years	115	46.2%
	65 to 69 years	61	24.5%
	70 to 74 years	36	14.5%
	75 years or more	37	14.9%
Level of education (n=249)	Elementary or basic	70	28.1%
	Secondary	50	20.1%
	Medium or professional	43	17.3%
	Superior	86	34.5%
Do you have any disabilities that affect your mobility? (n=250)	Yes	39	15,6%
	No	211	84,4%
Type of disabilities (n=39)	Motor	27	69,2%
	Visual	9	23,1%
	Deafness	3	7,6%
	Intellectual	0	0,0%

Source: Created by the authors

3.2. Internet Use Profile.

Frequent daily Internet users and non-users were equally distributed by gender (50.0% each). However, age patterns diverged sharply: among daily users, 83.1% were aged 60–69, whereas among non-users, 42.1% were 75+. This confirms that Internet engagement declines substantially with advancing age [Table 2].

Table 2. Profile of frequent internet users and non-users

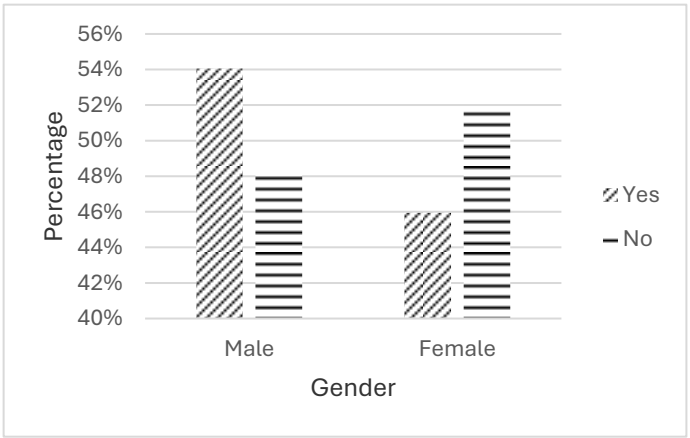
		use the internet in your daily lives	
Variable	**Category**	No	Yes, almost daily
Gender	Male	50.0%	50.0%
	Female	50.0%	50.0%
Group age	60 to 64 years	35.1%	51.9%
	64 to 69 years	12.3%	31.2%
	70 to 74 years	10.5%	12.3%
	75 years or more	42.1%	4.5%

Source: Created by the authors

3.3. QR Code Use

Analysing the data regarding the use of the QR application, 14.9% (37) of the respondents use it, of whom 54.1% (20) are men and 45.9% (17) are women. It can also be seen that 54.1% (20) are in the age group 60 to 64 years, 27.0% (10) in the age group 64 to 69 years, 13.5% (5) in the age group 70 to 75 years and 5.4% in the age group 75 or older. And yet that 2.7% (1) have disabilities that affect his movement and 97.3% (36) doesn't have. [Figure 1, 2 & 3].

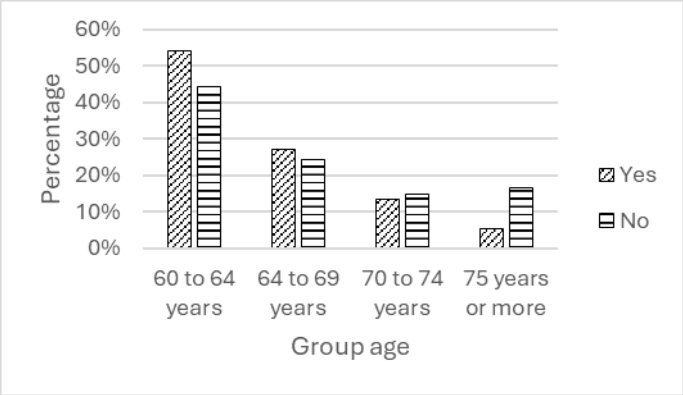
Figure 1. Use of the QR (Quick Response) multimedia application by gender



Bar chart titled "Use of the QR (Quick Response) multimedia application by gender," showing that 54% of males reported using the application and 48% did not, while 46% of females reported using it and 52% did not.

Source: Created by the authors

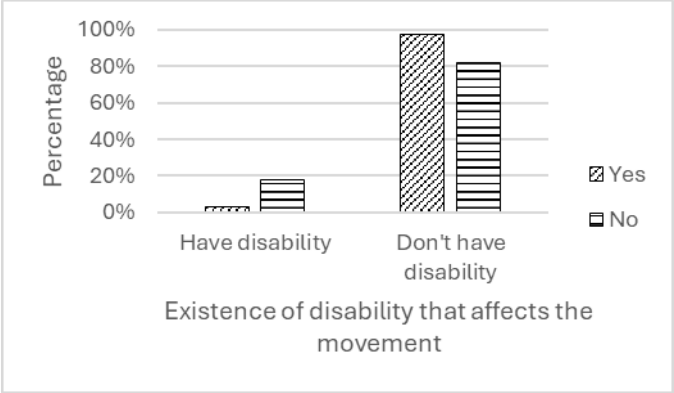
Figure 2. Use of the QR (Quick Response) multimedia application by group age



Bar chart titled "Use of the QR (Quick Response) multimedia application by group age," showing that use decreases with age: approximately 54% of people aged 60–64, 27% aged 64–69, 13% aged 70–74, and 5% aged 75 or older reported using the application. The corresponding percentages who did not use it were approximately 45%, 24%, 15%, and 17%.

Source: Created by the authors

Figure 3. Use of the QR (Quick Response) multimedia application by person with disability or without disability



Bar chart titled "Use of the QR (Quick Response) multimedia application by person with or without disability," comparing QR application use among people with and without a disability affecting movement. Among people with a disability, approximately 3% answered "Yes" and 18% answered "No." Among people without a disability, approximately 97% answered "Yes" and 82% answered "No."

Source: Created by the authors

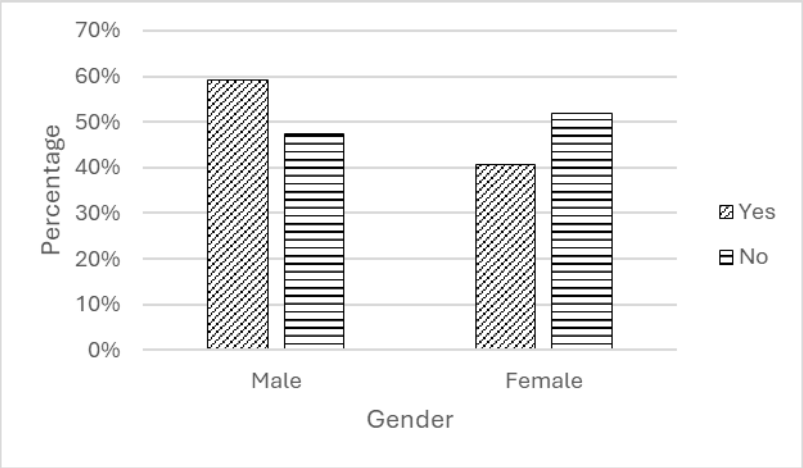
The results show that there is no statistically significant difference between men and women regarding de use of the QR application [χ^2 (1; n=247) =0.447, p=0.504], also there are no statistically significant difference between the group ages [χ^2 (3; n=248) =3.392, p=0.339]. Nevertheless, there are statistically significant difference between the respondents with and without disability [χ^2 (1; n=249) =5.526, p=0.019], suggesting that people without disability are more likely to use the QR code application.

3.4. NFC Technology Use

Analysing the data regarding the use of the NFC technology application, 10.8% (27) of the respondents use it, of whom 59.3% (16) are men and 40.7% (11) are women. It can also be seen

that 55.6% (15) are in the age group 60 to 64 years, 29.6% (8) in the age group 64 to 69 years, 11.1% (3) in the age group 70 to 75 years and 3.7% in the age group 75 or older. The data also reveal that those who use NFC technology 100.0% (27) have no disability. [Figures 4, 5 & 6].

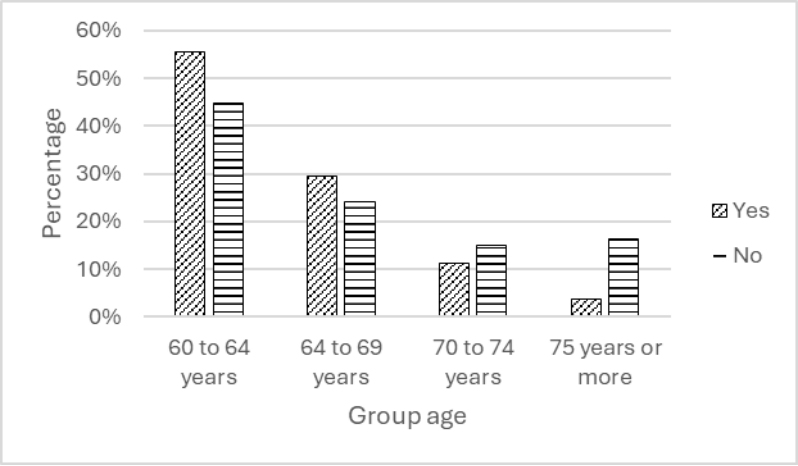
Figure 4. The use of NFC (Near Field Communication) technology by gender



Bar chart titled "The use of NFC (Near Field Communication) technology by gender," showing that approximately 59% of males reported using NFC technology and 48% reported not using it. Among females, approximately 41% reported using NFC technology and 52% reported not using it.

Source: Created by the authors

Figure 5. The use of NFC (Near Field Communication) technology by group age

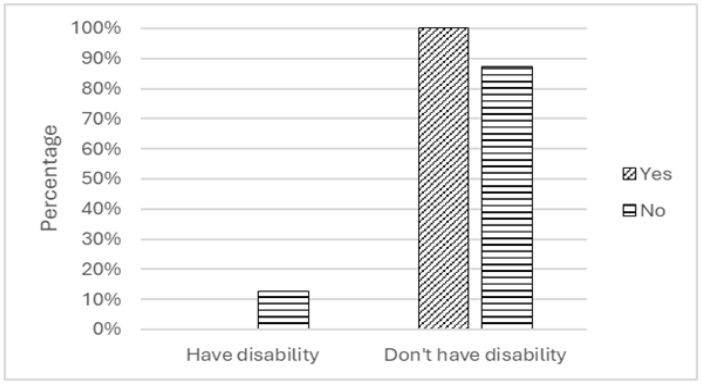


Bar chart titled "The use of NFC (Near Field Communication) technology by group age," showing that NFC use decreases with age. Approximately 55% of people aged 60–64, 30% aged 64–69, 11% aged 70–74, and 3% aged 75 or older reported using NFC technology. The corresponding percentages who did not use it were approximately 45%, 24%, 15%, and 17%.

Source: Created by the authors

In this case the results show that there is no statistically significant difference between men and women regarding de use of the NFC technology [χ^2 (1;n=247) =1.280, p=0.258], also there are no statistically significant difference between the group ages [χ^2 (3;n=248) =3.715,p=0.294]. Nevertheless, there are statistically significant differences between the respondents with and without disability [χ^2 (1; n=249) =5.595, p=0.018], suggesting that people without disability are more likely to use the NFC technology.

Figure 6. The use of NFC (Near Field Communication) technology by person with disability or without disability



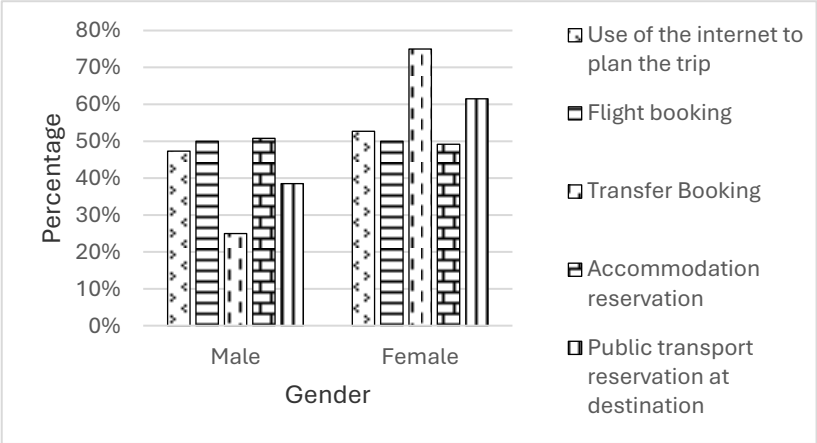
Bar chart titled "The use of NFC (Near Field Communication) technology by person with a disability or without disability," comparing NFC use among people with and without a movement-affecting disability. Among people with a disability, 0% reported using NFC and approximately 13% reported not using it. Among people without a disability, 100% reported using NFC and approximately 87% reported not using it

Source: Created by the authors

3.5. Use Use of the internet to plan the trip by gender

Concerning the use of the internet to plan the trip 29.8% (74) of the respondents use it, 7.3% (62) use it to book accommodation, 25.4% (18) to book flight, 16.9% (12) to book public transport at destination and 5.6% (4) to book transfer. Analysing the data considering the male respondents, 47.3% (35) use the internet to plan the trip, 91.4% (32) use it to book accommodation, 25.7% (9) to book flight, 14.3% (5) to book public transport at destination and 2.9% (1) to book transfer. Analysing the data considering the female respondents, 52.7% (38) use the internet to plan the trip, 81.6% (31) use it to book accommodation, 23.7% (9) to book flight, 21.1% (8) to book public transport at destination and 7.9% (3) to book transfer.

Figure 7. Use of the internet to plan trips by gender



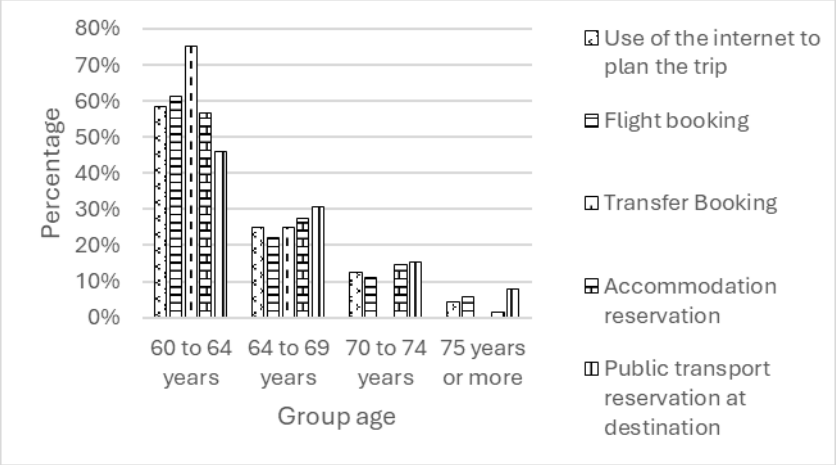
Grouped bar chart titled "Use of the internet to plan trips by gender," comparing males and females across five activities. Among males, approximately 47% used the internet to plan the trip, 50% for flight booking, 25% for transfer booking, 51% for accommodation reservations, and 39% for public-transport reservations at the destination. Among females, the corresponding percentages were approximately 53%, 50%, 75%, 49%, and 62%.

Source: Created by the authors

3.6. Use of the internet to plan the trip by age group

Analysing the data considering age group respondents, 58.3% (42) between 60 to 64 years used the internet to plan the trip, 83.3% (35) use it to book accommodation, 26.2% (11) to book flight, 14.3% (6) to book public transport at destination and 7.1% (3) to book transfer. In the age group between 65 to 69 years 25.0% (17) used the internet to plan the trip, 94.4% (17) used it to book accommodation, 22.2% (4) to book flight, 22.2% (4) to book public transport at destination, 5.6% (1) to book transfer. For the age group between 70 to 74 years 12.5% (9) used the internet to plan the trip, 100.0% (9) use it to book accommodation, 22.2% (2) to book flight and to book public transport at destination. Finally for the age group over 75 years 4.2% (3) used the internet to plan the trip, 33.3% (1) use it to book accommodation, 33,3% (1) to book flight. 33,3% (1) To book public transport at destination.

Figure 7. Use of the internet to plan the trip by group age



Grouped bar chart titled "Use of the internet to plan the trip by group age," comparing five activities across four age groups: using the internet to plan the trip, flight booking, transfer booking, accommodation reservation, and public-transport reservation at the destination. For ages 60–64, the values are approximately 58%, 61%, 75%, 56%, and 46%, respectively. For ages 64–69, they are approximately 24%, 22%, 25%, 27%, and 31%. For ages 70–74, they are approximately 12%, 5%, 10%, 15%, and 15%. For people aged 75 or older, they are approximately 4%, 6%, 0%, 4%, and 7%.

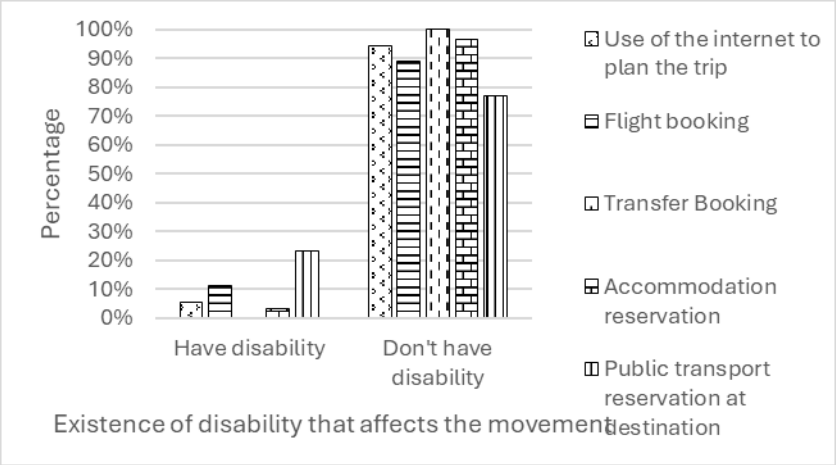
Source: Created by the authors

In this case the results show that there are statistically significant differences between the group age regarding the use of the internet to plan the trip [χ^2 (3; n=248) =12.856, p=0.005] and in the use of the internet for make accommodation reservation [χ^2 (3; n=249) =11.921, p=0.008], in both cases the data suggest that de respondents in the 60-64 group age are more likely to use the internet. Nevertheless, there are no statistically significant differences between the group age regarding of the use of the internet to booking a flight [χ^2 (3; n=249) =2.258, p=0.528], booking a transfer [χ^2 (3; n=249) =1.923, p=0.707] and reserve public transport at destination [χ^2 (3; n=249) =0.702, p=0.866].

3.7. Use of the internet to plan the trip by existence of disability that affects the movement

Analysing the data considering the existence of disability that affects the movement, 5,5% (4) used the internet to plan the trip, 50.0% (2) use it to book accommodation, 50.0% (2) to book flight, 75.0% (0) to book public transport at destination and no one set to book transfer.

Figure 8. Use of the internet to plan the trip by person with disability or without disability



Grouped bar chart titled "Use of the internet to plan the trip by person with disability or without disability," comparing five trip-planning activities. Among people with a movement-affecting disability, approximately 5% used the internet to plan the trip, 11% booked flights online, 0% booked transfers, 3% reserved accommodation, and 22% reserved public transport at the destination. Among people without a disability, the corresponding percentages were approximately 95%, 89%, 100%, 97%, and 77%.

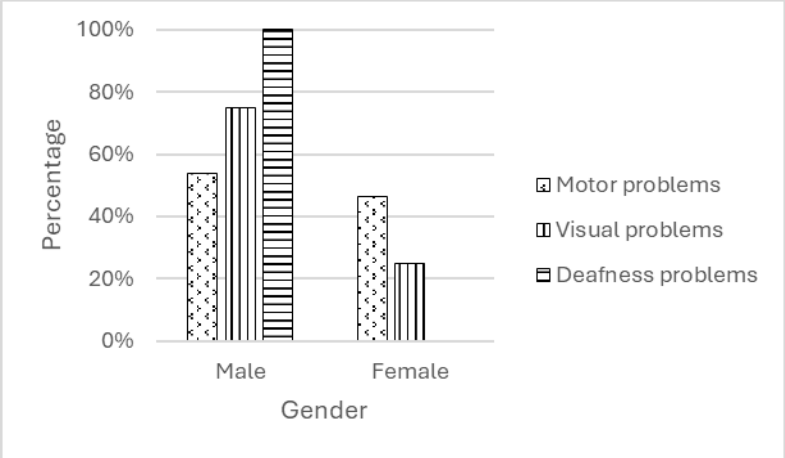
Source: Created by the authors

The results show that there are statistically significant differences between the existence or not of disability that affects the movement regarding the use of the internet to plan the trip [χ^2 (1; n=250) =10.643, p=0.001] and in the use of the internet for make accommodation reservation [χ^2 (1; n=250) =9,876, p=0.002], in both cases the data suggest that de respondents without disability are more likely to use the internet. Nevertheless, there are no statistically significant differences between the existence or not of disability regarding the use of the internet to booking a flight [χ^2 (1; n=250) =0.297, p=0.747], booking a transfer [χ^2 (1; n=250) =0.751, p=1] and reserve public transport at destination [χ^2 (1; n=250) =0.582, p=0.434].

3.8. Disability by Demographics

Analysing the data considering the existence of disability that affects the movement, 57,9% (22) are males and 42,1% (16) are females. Fourteen (53.8%) of the males have motor problems, six (75.0%) have visual problems and three (100%) have deafness problems. Regarding the females 46.2% (12) have motor problems, and two (25.0%) have visual problems. There are no deafness problems within the females.

Figure 9. Use of the internet to plan the trip by gender



Grouped bar chart titled "Use of the internet to plan the trip by gender," comparing the percentages of males and females reporting motor, visual, or deafness problems. Among males, approximately 53% reported motor problems, 75% visual problems, and 100% deafness problems. Among females, approximately 47% reported motor problems, 25% visual problems, and 0% deafness problems.

Source: Created by the authors

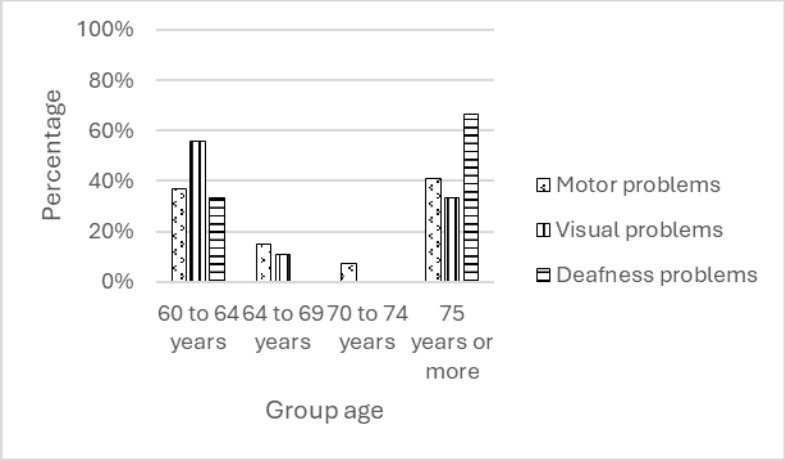
The results show that there are no statistically significant differences between the genders regarding the motor problems and visual problems. [χ^2 (1; n=248) =0.252, p=0.616] and visual problems [χ^2 (1; n=248) =2.203, p=0.167].

3.9 Existence of disability that affects the movement by age group

Analysing the data, considering age group respondents, 37.0% (10) between 60 to 64 years have motor problems, 55.6% (5) have visual problems and 33.3% (1) have deafness problems. In the age group between 65 to 69 years 14.8% (4) have motor problems and 11,1% (1) have visual problems. For the age group between 70 to 74 years 7.4% (2) have motor problems. Finally, for the age group over 75 years 40.7% (27) have motor problems, 33.3% (9) have visual problems and 67.7% (3) have deafness problems.

In this case the results show that there are statistically significant differences between the group ages regarding the motor problems [χ^2 (3; n=249) =16.400, p=0.001], the data suggest that de respondents in the 60-64 group age or with 75 years or more are more likely to have motor problems. There are no statistically significant differences between the group ages regarding the visual problems [χ^2 (3; n=249) =4.355, p=0.226] and deafness problems [χ^2 (3; n=249) =6.776, p=0.129].

Figure 10. Use of the internet to plan trips by age



Grouped bar chart titled "Use of the internet to plan the trip by age," comparing the percentages of people with motor, visual, or deafness problems across four age groups. Among people aged 60–64, approximately 37% reported motor problems, 55% visual problems, and 33% deafness problems. Among those aged 64–69, the corresponding percentages were approximately 15%, 11%, and 0%. Among those aged 70–74, they were approximately 7%, 0%, and 0%. Among people aged 75 or older, there were approximately 41%, 33%, and 66%.

Source: Created by the authors

4. DISCUSSION

The results portray Portuguese senior tourists as a group with strong basic connectivity but uneven engagement in more advanced digital practices, likely influenced by factors such as age, education, and disability, which affect their access to and comfort with technology. Almost all respondents reported Internet access in daily life, yet only 14.9% used QR codes and 10.8% NFC technology, and just 29.8% used the Internet to plan their trip, mainly for accommodation. These values confirm that simple online activities are widely adopted, while more complex tools remain marginal, particularly among the oldest seniors and those with mobility disabilities, as evidenced by the low usage rates of QR codes and NFC technology. Significant associations between age and both Internet planning and accommodation booking, as well as between disability and QR, NFC, and planning, highlight that digital tourism services are not equally accessible to all seniors.

When contrasted with previous Algarve research on international seniors, similarities such as high Internet penetration and differences like the more pronounced disability gradient in our study emerge. Vieira et al. (2022) also found very high Internet penetration and very low use of QR and NFC among 851 elderly tourists, with age and education exerting strong effects. In our case, it was observed that there was a low adoption of QR/NFC; however, it reveals an even clearer disability gradient: none of the NFC users and only 2.7% of QR users reported mobility disabilities, compared with a smaller gap in Vieira et al. (2022) airport sample. Ribeiro et al. (2022) showed that around 70% of older tourists used the Internet to plan their trips, with flights and accommodation as leading services. In our data, only 29.8% planned online, yet accommodation remained the dominant service, and age patterns were similar, the 60–64 group showed the highest planning rates, while planning fell sharply in the 75+ group. These discrepancies suggest that domestic seniors may rely more heavily on offline channels or family

networks, potentially due to cultural preferences or accessibility issues, while foreign visitors are more dependent on digital resources when traveling abroad.

The demographic gradients observed here, such as age and education level, are consistent with international digital literacy research. Hunsaker and Hargittai (2018) reported that Internet use and online skills decrease markedly after age 70, which aligns with our finding that non-users are concentrated among those aged 75 or older and that younger seniors (60–64) account for most daily users and online planners. Friemel (2016) and Oh et al. (2022) identified education as a key determinant of advanced digital skills; in our sample, higher education is overrepresented and strongly associated with daily Internet use and planning, although the detailed chi-square tests indicate that disability is an additional barrier. The particularly low uptake of QR and NFC among the older Portuguese tourists, that have a disability, echoes work by Seifert et al. (2021), who describe a "double burden" of social and digital exclusion affecting older adults with impairments. Our results suggest that, in a tourism context, this burden translates into reduced use of contactless services that are increasingly embedded in transport and hospitality.

The lack of significant gender differences in most digital indicators also deserves attention, as it may reflect changing societal roles and increased digital literacy among women, suggesting a shift towards gender parity in digital engagement among Portuguese seniors. While some studies report that older women lag men in access or skills (Hargittai and Shafer, 2006; Song et al., 2021), our sample shows near parity in both internet frequency and online trip planning, with men and women using similar services once online. This may reflect cohort effects in Portugal, where younger senior women have benefited from expanded education and labour market participation. However, the disability profile still reveals a gendered pattern: hearing impairments were reported only by men, and visual problems more often by men than women, which may indirectly influence digital engagement. Together, these findings underscore that age, education, and disability are more salient than gender, when influencing digital tourism behaviours among Portuguese seniors.

From a broader perspective, the study reinforces concerns raised in the literature on age-friendly and smart cities: digital infrastructures and services risk reinforcing existing inequalities if they are not co-designed with older and disabled users (Marston et al., 2021; Pedell, et al., 2021; van Hoof et al., 2021). Self-Determination Theory suggests that the limited use of QR/NFC and online planning among older and disabled tourists undermines their feelings of autonomy and competence during travel., particularly as post-COVID contactless systems become ubiquitous (Ryan and Deci, 2017). In practical terms, Algarve destinations should consider offering hybrid solutions (digital plus human support) Future research should build on these findings by combining quantitative surveys with qualitative interviews, focusing on barriers to digital tool adoption and specific design improvements to enhance accessibility for seniors.

5. CONCLUSIONS

This study shows that, among Portuguese senior tourists in the Algarve, digital literacy is high at a basic level, but it is unevenly distributed; older, less educated, and disabled seniors are consistently less likely to use the Internet, QR/NFC technologies, or online trip-planning tools. When compared with previous national and international work, the findings suggest that smart tourism initiatives risk reinforcing existing inequalities unless they are explicitly designed

around the needs and capabilities of the most vulnerable seniors (Vieira et al., 2022; Ribeiro et al., 2022; Seifert et al., 2021).

This study shows that, among Portuguese senior tourists in the Algarve, digital literacy is high at a basic level, but it is unevenly distributed, older, less educated, and disabled seniors are consistently less likely to use the Internet, QR/NFC technologies, or online trip-planning tools. When compared with previous national and international work, the findings suggest that smart tourism initiatives risk reinforcing existing inequalities unless they are explicitly designed around the needs and capabilities of the most vulnerable seniors.

For tourism managers and policymakers, the key implication is that digitalization and accessibility must advance together. Investments in smart infrastructure must match age-friendly design, hybrid digital and non-digital access channels, and targeted training so that older tourists can participate in tourism on equal terms and contribute fully to the social and economic sustainability of destinations like the Algarve. Also, it could be beneficial to create measures for the cooperation of young and older people.

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