

Sustainability, Tourism and Digitalization. The City Smart Approach in Las Palmas de Gran Canaria (Canary Islands)

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Abstract. To achieve the environmental and socio-economic sustainability goals set by the 2030 Agenda, tourist destinations, particularly those that have already reached maturity, have taken steps to change their development model in the short and long term. In this context, the smartness approach can help local governments to implement smart growth projects to improve, even in a sustainable way, the use of places by tourists and, also, to optimize the residents' quality of life.

This is even more true in this historical moment characterized by the covid-19 health emergency which imposed compliance with various rules, one of which is social distancing. Thus, it is fundamental that the territories are transformed into smart spaces where the innovative aspect is the basis for efficiently offering resources and services.

Starting from these considerations, the aim of the paper is to highlight the role of Information and Communication Technologies (ICT) on the island of Gran Canaria (Canary Islands). The Island and in particular the city of Las Palmas de Gran Canaria have been working for a long time to promote knowledge and valorization of the territory through greater use of new technologies and applications, for example, for smartphones and tablets. The city, to meet the "new" demands of the post-covid era, has refined, and activated new tools to enhance the tourism experience.

Keywords: Smart tourism · Sustainability · Innovation · Las Palmas de Gran Canaria

1 Introduction

The Year 2020 will be remembered as the year of the most important health, economic and social crisis of modern times[1]. The Covid-19 pandemic brought the world system to its knees and the tourism sector was one of the economic sectors most affected. The

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travel world has been put on "stand-by" due to health restrictions that have affected each country. According to data from the World Tourism Organization in 2020 [1] international arrivals have decreased by 74% compared to the previous year due to social distancing, restrictions, and general insecurity, which means on the one hand discourage departures, but on the other motivate and transform the needs of future tourist demand. There are several studies [2–5] which show that there is a need to travel in search of regenerative and rebalancing activities in contact with nature. Therefore, vacations are characterized by sustainability and alternative experiences to know and learn the identity aspects of the host destination. In this context there are different realities that move with more determination and efficiency to offer "new and alternative" forms of tourism that can meet both the needs of future tourists and the facilities to achieve the Agenda 2030 sustainable goals.

The constant search for tools that can improve the level of sustainability has inevitably led the many tourism realities make a real transition to an intelligent model in where technological innovations play the main role in the organization of structured and efficient spaces. These new ways of innovations are linked and interactive spaces that help to be able to compete in a highly globalized sector such as tourism [6].

The need to create "cohesive" spaces starts when the smart concept is applied to different spaces. In particular, the requirement to make spaces more accessible and integrated, starts in urban contexts, where the role of Information Communication Technologies (ICTs) has been key to activate different projects of development and sustainable growth. We talk about Smart Cities as intelligent places whose main purpose is not only to improve the quality of life of its dwellers but also on the environment, transport, governance, and social life. In other words, tourism must benefit from the positive effects of innovation [7–10].

The smartness approach has not limited to the urban sphere but has also affected other realities such as Smart Villages, Smart Tourism Destinations (STDs) and Smart Islands [11–15]. In these spaces, the tourism sector deserves more attention for smart responses to be found to also satisfy the needs of tourists and to organize a structured offer of resources and services [16, 17].

The concept of "smart tourism" is therefore now an integral part of the "new" travel experience: apps for smartphones and tablets, social networks, and blogs, specifically dedicated to transport bookings, accommodations, and other commodities and services. These tools motivate the modern tourist to experience the places of the vacation independently [11, 18, 19].

2 Objectives and Methodology

The purpose of this paper is to understand the importance of the use of new technologies and how they can help tourist destinations to design new resources and services for tourism, in order to improve the competitiveness and image of the territories. The first part of the work begins with a short review of the literature on the concept of smartness, starting from urban contexts. The second part is, instead, dedicated to the case study of Gran Canaria, an important island of the Canary Islands, and specifically of the capital city of Las Palmas de Gran Canaria, which has been carrying out innovative initiatives and projects to improve its tourist areas for the longest time.

3 Related Works

There are several negatives perceived and endured by residents due to an excessive tourist presence [20]. This phenomenon is particularly felt in urban areas and, specifically, in those cities that serve as tourist hubs whose attractiveness takes on national and international characteristics. Hence the emergence of smart city paradigm´s as a solution to overcome the above dichotomy and to ensure that both tourists and dwellers can together benefit from the same urban spaces [10]. In fact, the evolution of information technology and telecommunications has allowed the administration of multiple information related to different places and to assure, contemporarily, the attractiveness of their tourist elements. In this way, the cultural needs of an ever increasing number of travelers are better satisfied, driven to move in an experiential and not exclusively recreational perspective, where, thanks to the computer-mediated reality, perception can be followed by reflection to ensure that the experience itself is remembered in time. In this sense, in this perspective it should be interpreted the 2018 biannual project of the European Commission "European Capital of Smart Tourism - ECoST" with which the EU wanted to reward European cities that were committed with admirable ideas and practices to become smart tourist destinations. Accessibility, sustainability, digitization and integral use of their cultural heritage and creative capacities were to be the operational commitments of these capitals [21, 22].

Digital technologies are constantly and rapidly evolving, hence the need to activate punctual and constant monitoring to acquire useful information to measure the level and quality of digitization of tourism places: first and foremost, of the most complex and heterogeneous urban functionality destinations, to keep their attractiveness high in terms of competitiveness and efficiency [23]. Thus, smart cities become prescriptive examples for current urban spaces, and it is no coincidence that the indicators of their smartness level, which are highlighted on four basic guidelines (sustainability, resilience, accessibility, and inclusivity), need careful checks related to their efficacy to better support the sustainability goal under the European Strategy 2020 [24, 25]. In this sense if urban smartness is high, the more city users (permanent and temporary) will enter symbiosis with the city. Using, analyzing, and organizing what is shared on social media (from tweeter to facebook) as a measure of the urban sensing becomes a real means to meet the needs of residents and visitors: this geo-referenced information allows the construction of dynamic maps to describe and synthesize the use of the city. Those who use the city, including visitors, are not only consumers of information, but also, they are become producers of the same information and contribute (consciously or unconsciously) to the development of the Internet of Things and to the evolutionary transition from the "smart city" to the "sentient city". Specifically, mobile devices together with ITC and the network contribute significantly to improve the position and the possibility of displacement of tourists and to enhance urban resources: smart map, sensing location and augmented reality stand out for these purposes [26–28].

In the instance of island territories, the resources invested in information technology are significant because as a tourist destination, and not only that, but they also had to compete at an international level and propose, at the same time, models of sustainable living for both guests and hosts [29]. In the European context, this smart approach leads to consider islands as exemplary places: laboratories where innovative projects can be

tested [30, 31]. Among all of them, we would like to mention the European Project Smart Islands that since 2015 involves several island realities such as the island of Majorca in Spain, Yeu in France, Favignana in Italy, Kythnos in Greece, Saaremaa in Estonia, and Samsø in Denmark that have committed to adopt smart solutions to improve development and growth also in a touristic perspective [32].

The enhancement of digitized facilities and infrastructures has been found to be useful and strategic, even with the spread of COVID-19 for the aforementioned spread of the use of the same, and to overcome the obligation of "stay at home" in favor of a "staycation" thanks to the proliferation and consequent spread of offline cultural activities and the creation of intelligent tourism products that are realized in "augmented reality" (AR) and "virtual reality" (VR) [10]. Consequently, e-tourism, in view of the damage caused to the tourism industry by the current pandemic, seems to have to represent itself the challenge existing between current models and to evaluate critically its ontological and gnoseological conceptions through a transformative study related to its own temporality, reflexivity, equity, transparency, multiplicity and creativity [33]. New challenges, therefore, require the search for a juxtaposition of short to medium term, and long-term perspectives in tourism governance.

The COVID-19 pandemic and its consequent impact on mobility (contraction and/or optimization), not least in terms of tourism [34], has certainly led to a growing awareness of the importance of digital use within the limits of the presence of digital divide situations both in its cognitive and infrastructural dimensions. Cities, those that are already smart, are likely to obtain from this pandemic situation significant improvements in their cyberspace in terms of sustainability and attractiveness [35].

4 The Territorial Context

The island of Gran Canaria is one of seven islands - El Hierro, La Palma, La Gomera, Tenerife, Fuerteventura, Lanzarote and six islets as Alegranza, Graciosa (with Ley 1/2018 reforming the Estatuto de Autonomía de Canarias the status of this *islote* was changed to *isla*), Montaña Clara, Roque del Este, Roque del Oeste, and Lobos - that compose the Canary Islands Archipelago (Autonomous Community of Spain) [36–39]. Gran Canaria's population is 851,231 in 2019 [40], which is distributed among 21 municipalities. Of these, the most populated are Las Palmas de Gran Canaria with 377,650 inhabitants, Telde with 102,005 inh. and Santa Lucia de Tirajana with 53,542 inh. Las Palmas de Gran Canaria was founded in 1478 and it is also the capital of the Island located on the north-eastern coast. In addition to being one of the most populated urban realities of the Island and the Archipelago, it also occupies the ninth place in the ranking of the Mainland with a population density of 3,755 inh./km^2. Due to the warm climate, the favorable geographical position of the archipelago, the wide range of beaches and the peculiar morphology of the territory, the image of the island is mainly linked to the combination of sun and sea and consequently its tourist offer has been structured to meet the needs of sun&beach tourists. The territory also offers other attractions related to nature and culture that allow the local government to diversify the product "leisure" and activate interesting strategies of local sustainable development [41–45]. The tourists who visited Gran Canaria in 2019 were 4,189,013 and most of them, mainly from Northern European countries, preferred accommodation in hotels (74.6%).

The tourists' motivation for spending their vacations on the island is mainly linked to relaxation (59.3%), and the activities carried out include hours spent on the beach (71.6%), in the swimming pool (56.5%), walking (67.0%) or visiting by themselves the numerous attractions of the island (42.5%). However, it is interesting to note that almost all travelers (92.4%) make use of internet connection (personal or free wifi) to consult thematic maps (60.3%) and information on the destination (43.9%), share images and videos (53.9%), download applications of tourist interest (6.5%) [46].

In this island tourism landscape, Las Palmas de Gran Canaria is the main urban destination and there were 442,845 tourists who chose to stay overnight in the city (2019) for an average presence of 3.19 days [47]. The urban space is also visited annually by a regular flow of cruise passengers (723,655 in 2019) [48]. These tourists move around attracted by the many urban resources: from Las Canteras beach to Santa Catalina Park, from Casa de Colón to Mercado de Vegueta for example.

Since a long time, the Cabildo de Gran Canaria has focused its attention on the drawing up of strategies for the tourist development of the territory to make the Island a leading smart tourist destination in the world. The "Estrategia Integral de Turismo de Gran Canaria (EITGC)" is therefore the current strategic document that aims to combine different aspects: the tourism product management and its promotion, the sustainable development, the public policies, and competitiveness. To ensure that the territory can aspire to the title of smart destination, all actors must be involved in the creation of innovative networks capable of boosting sustainable and competitive tourism [49].

As it has underlined before, the pandemic has caused a huge impact on Gran Canaria due to its dependence of tourism as a main source of income. However, this new situation has been used as an opportunity to diversify the traditional model into a technological destination. Apart from the structural initiatives that Gran Canaria has made from 2016–2020, the administration has decided to take advantage of this new pandemic scenery through the project "SMARTDEST" that improves intelligence of space collaboration with the implementation of Information Technology Solution and Communications to involve an Intelligent Tourist Destination [50]. This project is divided into various initiatives to be carried out within, among others objectives, transform Gran Canaria into a Smart Tourist Destinations (DTI), understanding DTI as an innovative tourist destination, consolidated on an technological infrastructure cutting-edge, which guarantees the sustainable development of the tourist territory, accessible to all and facilitates the integration of the visitor with the environment and their experience in the destination, while improving the quality of life of the residents.

Consequently, one of the main positive impacts that this new initiative has on the territory is that the numbers of national and international workers who want to work remotely from the island is considerably increasing. Gran Canaria offers them the opportunity to share projects and then plan activities that would like to do after work, offering the possibility to combine work with pleasure.

5 The Smart Tourism Projects in the Island's Urban Space: Las Palmas de Gran Canaria

Over the years, a common strategic framework has been consolidated for the incorporation of ICT to the management of the Spanish territory. In this sense, both public administrations and private providers of technological products and services have contributed to the development of this framework, some of them though the policies implementation for the integration of ICT in society, and others, proposing technological solutions that make this possible. In 2000, the summit held by the European Union, based on the Lisbon Strategy, established the line of work of an Information Society for all as one of the conditions to make the European common market the most competitive and dynamic economy in the world. After ten years, the European Union approves the 2010 Program and creates the Advance Plan aimed at the intensive use of ICTs for the improvement of competitiveness and productivity, the promotion of social and regional equality and the improvement of the well-being and quality of life of citizens. In refers to these European projects we mention the "Civitas Destinations" project on sustainable mobility solutions are sought and integrated for the needs of both residents and tourists. The project includes from 2016 the island capital the city of Las Palmas de Gran Canaria together with five other cities as Funchal (Madeira, Portugal), Limassol (Cyprus), La Valetta (Malta), Elba Island (Italy) and Rethymno (Crete, Greece) [51]. However, the municipality of Las Palmas de Gran Canaria had already started actively working to make the city more tech-friendly before 2016 with the "Plan Estratégico de Nuevas Tecnologías y Telecomunicaciones 2012–2014" giving rise to 44 smart projects. Through its line of work LPA_Smart City promotes the use of ICTs in 5 scenarios: a. Mobility, b. Urban services, c. E-Government, d. Tourism and e. Teleworking [52, 53].

a. Mobility

In this context we have to take into account two applications: the LPA Park and LPA Accessible (see Fig. 1). The first is an application for IOS and Android smartphones. It is unique in the Canary Islands due to its characteristics, and it makes easier to obtain the Regulated Parking ticket without having to go to the nearest parking meter or use coins or cash. Since its creation, in September 2013, and until April 2014, more than 100,000 parking operations were managed with the LPA Park application. The second one (LPA accessible) is a mobile application that contains a repository of black spots (not accessible) and white spots (accessible) of Las Palmas de Gran Canaria, in buildings, streets, roads and urban facilities of the capital. It allows you to view possible architectural barriers and receive special alerts, being able to filter into different categories. This tool allows you to automatically send alerts and incidents to family members, users, or the Local Police itself, to report the location if the person suffers an incident or needs assistance. At the same time, it allows building with this information a database owned by the City Council of Las Palmas de Gran Canaria to improve the accessibility of the city.

Another digital initiative we want to mention is one that promotes better accessibility of rururban spaces as well. The City Council of Las Palmas de Gran Canaria promotes public access to broadband Internet in rural areas of the capital through its Wimax network, while expanding its Wi-Fi network, which already has more than 20 areas in



Fig. 1. APPs OF Las Palmas de Gran Canaria. Source: Ayuntamiento de Las Palmas de Gran Canaria, 2010.

the city (see Fig. 2). With this improvement in areas such as Las Mesas and in urban spaces such as Avenida Mesa y López, the aim is to facilitate the use of information technologies both for citizens and tourists and for companies in the municipality. Wifi access is free under the terms set by the National Markets and Competition Commission (CNMC) and is available as a payment method for higher bandwidths.

b. Urban services

In relation to urban services, the LPA Avisa is a service and information tool on the city's facilities, put into operation in February 2013, which allows citizens to report incidents and breakdowns in the capital of Gran Canaria. It is available for devices with IOS and Android operating systems and has undergone different updates. It allows you to photograph the incident and report it to a municipal technician, georeferenced it, add comments to complete a previously reported fault or problem, view the history of notices and, finally, show the degree of satisfaction with the resolution of the incident.

c. E-Government

Through comprehensive tax management, promoted by the Treasury and Heritage Area, all tax and collection procedures raised by the citizen are attended to in a personalized way, in an average period of less than four days. The implanted system also allows a statistical control of the waiting times in which each citizen is attended, allowing to speed up and improve the response almost immediately. Another example is the *Certificados de Residencia* digitalized. The modification of the travel conditions for the Canarias residents, based on the requirement of the Ministry of Development to have the certificate in each of their trips by plane to benefit from the discount on the ticket, triggered the development, by the Las Palmas de Gran Canaria City Council, of a pioneering system for obtaining these certificates online. The implementation took place in September



Fig. 2. Wi-fi city points in Las Palmas de Gran Canaria. *Source*: Ayuntamiento de Las Palmas de Gran Canaria, 2010.

2012, and since then, the number of electronic certificates issued has grown to reach 90% of the total documents issued. Then we want to mention the *Cita Previa* the prior appointment system that allows the City Council to adapt its offer of attention services to the real needs of citizens, while reducing waiting times significantly, until reaching the initially planned objective of not exceeding 10 min at any time of the day.

d. Tourism

The new demands of an increasingly independent and connected tourist before, during and after their vacation has pushed the local government to find efficient solutions to improve mobility and access to the destination for the tourist population as well. In the city of Las Palmas, data is being collected on where and how tourists move to have more information about the areas most visited. There are several useful applications for tourists and the local community to enjoy the city, including LPA Visit and Smart Beach. The first tool contains all the tourist information of the city. The application, available for both iOS (Apple Store) and Android (Google Play,) devices allows offline access to all the contents of the Las Palmas de Gran Canaria tourist portal www.lpavisit.com, with the novelty that they can be consulted without it being essential for the tourist to have a data connection. LPA Visit contains information of interest about all the historical sites of the capital, gastronomic references, accommodation, cultural offer, and the municipal agenda, among other contents, which will be available in a first version in both English and Spanish.

The second tool, instead, aims to quantify the number of people who make use of the surroundings of city's beaches - Playa de Las Canteras, Las Alcaravaneras, La Laja - to assess its environmental, resource and economic impact (see Fig. 3). Also develop a system of indicators to support decision-making in the efficient management of beach infrastructures and the dimensioning of public services intended to serve beach users. It is also intended to be able to predict, in an intelligent way, the allocation of resources according to non-seasonal variables (temperature, events, arrival of cruise ships, etc.). This action, to be carried out on Playa de Las Canteras, involves both a sensorization infrastructure and a technological architecture that allows incorporating new sensors into the software and managing the deployed ones, the development of predictive models and the creation of a management scorecard.



Fig. 3. Capacity status of Las Canteras beach. The Gran Canaria palms. Source: LPA-Mar (last accessed 2021/04/27).

e. Teleworking

In a bid to mitigate the economic fallout of the coronavirus pandemic, the regional government is investing €500,000 in a campaign to lure Spanish and international home-workers to the archipelago for long-term stays. The Ministry of Tourism, Industry and Commerce of the Government of the Canary Islands has designed an action plan that seeks to attract the remote workers in the international market. With many working remotely at the wake of Covid-19 crisis, such travelers have emerged as an important segment in the tourism industry of the Canary Islands (see Fig. 4).

The plan to attract this category of tourists incorporates a series of actions taking advantage of the current situation where teleworking is a trend. In addition, during the first week of November, a few events will be held on the Islands. This is the "Repeople" meeting, the most important event on teleworking in Europe that will take place in Gran Canaria. The event will also coincide with the presence of members of "WIFI Tribe", the world's leading community in coworking and coiling who have chosen Gran Canaria to telecommute for a season (see Fig. 5).

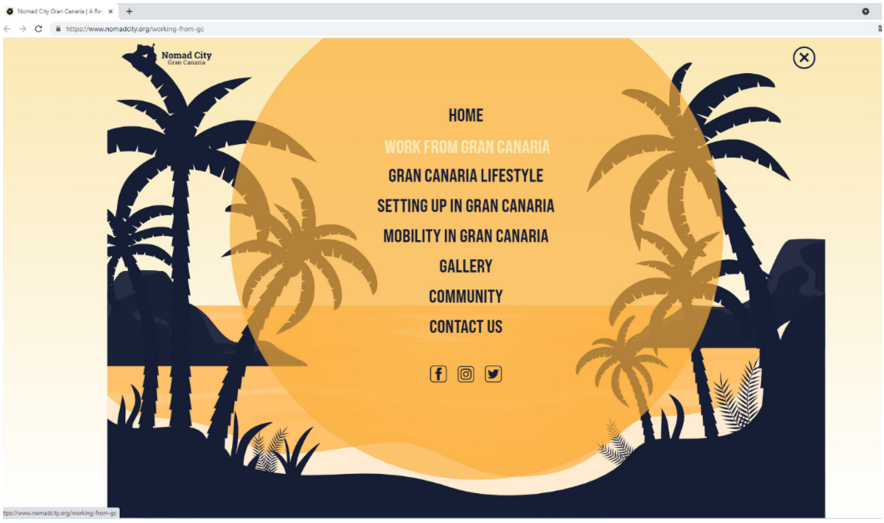


Fig. 4. Teleworking official Gran Canaria website. Source: Nomadcity (last accessed 2021/04/29).

The Canary Islands has the lowest incidence rate in Spain – its 14-day cumulative number of coronavirus cases per 100,000 inhabitants stands at 37, compared to the national average of 236. The region's tourism industry, which has been devastated by the pandemic, was expecting to rebound in time for its winter high season, but these hopes have been dashed by the second home lockdown in England ordered by the government of British Prime Minister Boris Johnson as well as the spike in coronavirus cases in Germany.

In fact, the administration has created an official website to describe the opportunities to telework from Canaria to attract national and international citizens who are teleworking with lockdown in their countries.

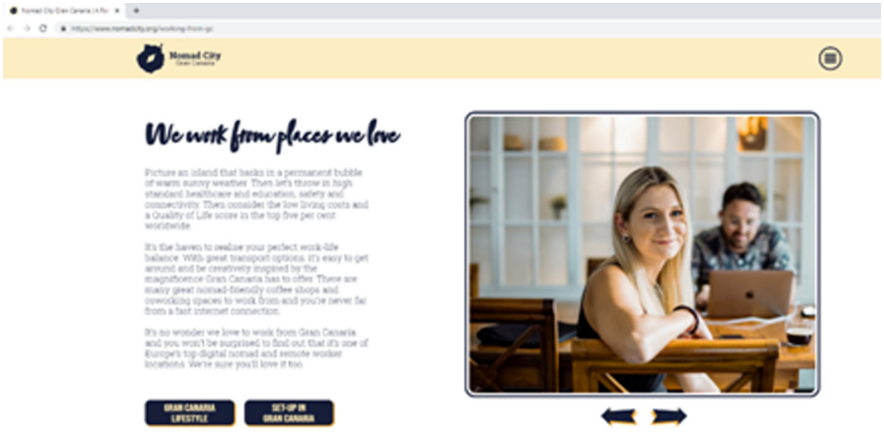


Fig. 5. Section "work from Gran Canaria" of the teleworking official Gran Canaria website. Source: Nomadcity. (last accessed 2021/04/29).

6 Conclusions

The Canary Islands has been characterized from its origins for being a tourist destination of sun and beach. However, some Canarias cities, aware of the advantages offered by the diversification of the tourism industry, have known how to take precedence over market flows and rethink their situation in the face of new tourism practices. Faced with this new scenario, the ICT's have served as support for the transformation process of the capital as a smart destination.

Las Palmas de Gran Canaria is a clear example of having established itself as a full member of the Spanish Network of Smart Cities (RECI) whose main objective is to exchange experiences and work together to develop a sustainable management model and improve the quality of life of citizens.

A smart city is, in general terms, a city that applies technology and innovation to make both its infrastructures and its services more interactive and efficient, as well as so that citizens and visitors can be more aware of them. The road that a city must travel to become a smart city is long, full of small advances that bring it closer to its citizens; a path that is never completed but that makes the city grow with each step. The Smart City Plan for Las Palmas de Gran Canaria demonstrates this situation and involves a substantial reform of the stimulus policies and helps the deployment of smart cities and islands maintained up to now by operating in four areas of action: mobility, urban services, tourism, electronic governance, and teleworking.

This is even more valid at this time of global health emergency. To overcome this crisis, smart tourist cities are looking for measures and strategies for a new tourism cycle. Las Palmas de Gran Canaria draws a roadmap that addresses the post-COVID-19 situation quickly and efficiently through the monitoring of searches carried out on the Internet about the capital and about flight, hotel, or restaurant reservations for define the real interest that exists to travel to the city; as well as the capacity of the places most visited by tourists and residents in order to check their availability.

The aims of these initiatives are to observe, analyze and report in real time the dynamics of search and reservations on the Internet as a working tool to decide the different activation strategies of the urban destination. And, in addition, offer the citizen and/or visitor information about the physical safety distance from public spaces and the possibility to combine work with pleasure.

The two most representative cases are on the one hand, the virtual three-color traffic light located on the tourist beaches of the capital; These will indicate to users if the capacity on the sand is low, medium, or high, and in this way, bathers can know which beaches have more space before accessing them. On the other hand, the change of the accommodation in Las Palmas de Gran Canaria from a tourist accommodation to a teleworking space.

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