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Rating Tourists' Interest in Tourism-Tailored Climate and Environmental Products

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Abstract
The scientific literature comprises a relatively large palette of studies focusing on tourist preferences regarding the weather and climate at the destination. However, the findings do not allow for establishing a hierarchy of climate and environmental features of interest for tourism based on destination type (urban/rural/mountain/seaside), but mainly to list them. We aim to identify some characteristics of a potential climate service targeting tourists by addressing in particular three aspects: 1. which are the weather, climate and/or environmental features most commonly marked as of interest in the general case of 'any destination type' and for the particular case of rural destinations; 2. which are the delivery and presentation forms of greatest interest; 3. how willing would be the tourists to pay for such a service. To this end, we used a questionnaire with five closed questions regarding these aspects, disseminated in Romania and Italy. The results confirm some expectations based on scientific literature and highlight the user interest in information encompassing several climates and/or environmental aspects, preferably in one single product. The results may be valuable for developing and providing effective tourism-oriented climate and environmental products and contribute to a better user uptake of such products and services.

Key Words: climate, environment, air quality, tourism, rural tourism.

JEL Classification: Q500, Z300

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1. Introduction

The relationship between climate and tourism is well acknowledged by scientific literature, built on objective indicators (e.g. sectoral data like tourist overnights, incoming/outgoing number of tourists, etc.) and subjective information (e.g., tourists' motivation).

Although there is a relatively large palette of studies focusing on the tourist preferences on the weather, climate and even environmental (CEnv) conditions at the destination, the findings do not allow to establish a hierarchy of CEnv features of interest for tourism based on destination type

(urban/rural/mountain/seaside), but merely to identify them. In fact, little climate and environmental information customized for tourism is easily accessible to tourists (e.g., Gomez-Martin et al., 2017). In a more general approach, (Hewitson et al., 2017) show that climate information websites implicitly assume that the users have high expert skills (e.g., in accessing, processing, and interpreting various data types and formats) and their efficacy is limited, among others, by little or non-efficient guidance and by the multitude of complementary data or information, making them quite 'closed' for the common user. Regarding the limited availability and accessibility of usable customized information for tourism in particular, several aspects may be considered as possible explanations, for example, tourists' satisfaction with the current products and less interest for other new ones, availability, costs, efficiency in providing and delivering of new products and services to tourists, etc. At the same time, climate product providers may also lack a deeper understanding of the specific requirements and interests of the tourists for specific cases (e.g., destination types, activities) which leads to lesser attention to this market segment. Furthermore, the possible different understanding of the term 'climate service' from both provider and user may contribute to the low uptake of this type of service (Perrels et al., 2020).

According to (WMO, 2013), 'A climate service is a decision aid derived from climate information that assists individuals and organizations in society to make improved ex-ante decision-making'. It is, however emphasized that climate services -at least in the form usually used - require in general an 'intermediary translation' from the scientific data/form (e.g., time series of measurements, satellite observations, climate change projections etc.) to usable information (e.g., how many days in a month presented more than 10l/m2 of precipitation in the last years). In this line, assembling CEnv products in an easy-to-access and to-use form and making them available for the usual tourists may be considered as a step toward developing a climate service targeting tourists.

The development of such a climate service faces a range of issues needing a deeper knowledge on multiple aspects regarding the products to be included (e.g., what products, at what temporal and spatial scale, based on which period), communication of these products (e.g., text description, maps, graphics), delivery form (how can the users access them?), costs (e.g., associated with data acquisition, developing and providing the products; opportunities for commercial exploitation). Equally important is the targeted 'market' segment, namely the characteristics of the final users (tourists) (e.g., what type of destinations are preferred; which are the preferred climate characteristics during vacation; influence of knowledge on climate at destination on selecting travel period and/or destination). The studies regarding the development of climates services for tourism investigate similar aspects, but with attention to stakeholders needs or considering as end-users the (local) authorities and investors in tourism (e.g., Martinez et al., 2022; Mahon et al., 2021; Swart et al., 2021). An overview of climates services providers in Europe (independent of the targeted socio-economic sector) is provided by (Cortekar et al., 2020) and it highlights that the main targets of climate services are public decision-makers, followed by researchers, general public and industry. Considering the end-users as being the tourists (and not/not only decision-makers, local authorities etc.), there are very few studies documenting their 'specifications' (interest, needs) of the climate service targeting them (e.g., Boqué Ciurana and Aguilar, 2021). The preferences of tourists for CEnv information to be included in a climate service in relation to the destination type (urban/rural/mountain/seaside) and targeting the tourists are practically not documented in available literature.

In this context, we address in an exploratory study the following research question: which are the main elements of a climate service targeting tourists in terms of content elements, presentation, delivery form and willingness to pay such that to insure a good user uptake (e.g., 30-50% of the targeted market segment). To this end, we used a questionnaire with five closed questions addressing these features, disseminated in Romania and Italy. The findings allow a deeper insight on the aspects investigated, which may improve the offer of CEnv products and service tailored for tourists and facilitate the use of latest scientific findings in everyday life.

2. Literature review

2.1 Use of climate-related indices in tourism studies

The climate information is used in the literature relevant for tourism sector mainly in the form of indices – of general use (e.g., monthly averages and extremes of meteorological parameters) or more specific like bio-meteorological indices - UTCI (Universal Thermal Climate Index; Bröde et al. 2012, PET (Physiological Equivalent Temperature; Matzarakis et al., 1999) and tourism-specific indices as for example HCI (Holiday Climate Index; Scott et al., 2016), TCI (Tourism Climate Index; Mieczkowski, 1985) or CIT (Climate Index for Tourism; de Freitas et al., 2008). The degree of its use by the tourism actors is quite difficult to assess; the information is freely available from a variety of sources, but in many cases its format requires specific knowledge and tools and thus is not really usable by the tourism actors. It is used, in turn, in the scientific research as for example to document climate attractivity for tourism (e.g., Wang et al., 2022; Lashaki et al., 2022; Fitchett et al., 2017; Mihăilă et al., 2019).

The bio-meteorological indices are also employed in studies on the relation between climate or climate change and tourism (e.g. Rodríguez-Algeciras et al., 2020; Matzarakis, 2006). Climate-based indices more specific for tourism are also used to investigate the climate change impact on tourism, as for example Tourism Climate Index (TCI) (Aygün Oğur and Baycan, 2022; Carrillo et al., 2022), Holiday Climate Index (HCI) for urban and beach locations (Demiroglu et al., 2020; Yu et al., 2021), Urban Climate Comfort Index (UCCI; Kapetanakis et al., 2022), Climate-Tourism-Information-Scheme (CTIS) (Abed and Matzarakis, 2018). The impact on specific tourism activities like mountain /ski tourism (Steiger et al., 2017; Demiroglu et al., 2020a ; Reynard, 2020) or beach tourism (Carrilo et al., 2022; El-Masry et al., 2022) is also investigated with the use of climate-based indices. Research also focuses on developing new tourism-oriented indices like Camping Climate Index (Ma et al., 2020), the data-driven weather index for beach parks tourism (Matthews et al., 2021) or Ski Climate Index (Demiroglu et al., 2021).

2.2 Tourists' preferences for CEnv information in different destination types

Tourists' preferences for the climate and environmental features of certain types of destinations have been investigated in the framework of several studies, highlighting weather and climate features of interest for the tourist. For example, studies focusing on urban areas (e.g., Chen et al., 2017; McKercher et al., 2015; Falk, 2015; Machete et al., 2014; Falk, 2011) suggest that weather characteristics are of less importance for tourists, although more pronounced weather events like hot days (Kim et al., 2017) or heavy or prolonged rain (Dubois et al., 2016) may affect the tourist satisfaction. Also, for urban areas, poor air quality may decrease tourism demand (Ma et al., 2022; Robaina et al., 2020). On the contrary, for rural destinations, weather is a more important determinant of tourist's behavior and air temperature and sunshine duration are of importance for tourists in these destinations (Falk, 2015); also, during warm season, increasing of high (extreme) temperature may have a negative impact on tourist inflow, especially for domestic tourism as shown by (Cai et al., 2011) for the case of Tuscany. Landscape is another environmental feature important for rural areas (Santoro et al., 2020; Randelli et al., 2014; Stetic, 2012; Soare et al., 2010) where 'high diverse and highly structured landscapes' (including high diversity of crops) are preferred (Häfner et al., 2018, p.846) and water scenes are sensed as an element of 'tranquility' (Wartmann and Mackaness, 2020);' nature-based' activities are important in rural areas (e.g., hiking (Bencivenga et al., 2017)). For mountain destinations, the range of activities is quite diverse and characterized by diverse tourist preferences with regard to weather and climate features, as shown by the literature. For example, for hiking activities, temperature, wind, cloudiness and precipitation are all of interest (Martínez-Ibarra et al., 2019); for ski tourism, snow depth (Falk and

Lin, 2021; Becken, 2010) as well as air temperature and wind chill are of relevant interest for the tourists (Shih et al., 2009). In the case of beach/seaside destinations, air temperature (Dumitrescu et al., 2021; Atzori et al., 2018), sunshine duration (R.-Toubes et al., 2020; Atzori et al., 2018), lack of precipitation and at most low wind (Georgopoulou et al., 2019) are among the weather/climate features preferred by tourists. Furthermore, (Iamkovaia et al., 2020) showed that the sea surface temperature (SST), water turbidity/visibility, wave heights may be environmental features of interest in relation to tourism, along with air temperature and humidity.

It should be noted that most studies imply/refer to 'basic' atmospheric parameters (e.g. temperature, wind, precipitation) and less often the information regards integrated aspects of weather, climate and/or environment. The latter studies usually describe the development of new climate indices for tourism (e.g. de Freitas et al., 2008; Scott et al., 2016; Rutty et al., 2020).

2.3 Climate services for tourism

There is an increasing interest in development and dissemination of climate services. As shown by (Cortekar et al., 2020) 'According to the definition of climate services given in 'the Roadmap' (cf. European Commission, 2015) climate services are considered as "(…) the transformation of climate-related data — together with other relevant information — into customised products (…)". For the tourism sector, the literature provides insights on the needs of users of such services (e.g., Bruno Soares et al., 2018) or on the design/co-creation methodologies (e.g., Font Barnet et al., 2021; Mathews et al., 2020). An overview of climate services market in Austria, including those for tourism, is described by (Damm et al., 2020). Articles on more specific climate services for tourism are not numerous, but examples are the paper of (Boqué Ciurana and Aguilar, 2021), introducing a climate service for surf or (Eggeling et al., 2022) on the 'ClimApp' tool providing personalized thermal stress information which may also be relevant for tourism purposes. Apart from the scientific literature documenting climate services for tourism, there are available a number of applications- in the form of websites, dedicated web platforms or on mobile phones - providing CEnv data relevant/usable for touristic purposes. Most such applications focus on well-defined subjects like touristic attractions, as for example those targeting Tuscany in Italy (http://www.tourismintuscany.it/smartphone-apps) or Dolj county in Romania (available through Google Play), CEnv data for certain destination types (e.g. SeaStatus for Constanta region in Romania, also available through Google Play), forecast of pollen concentration level (https://meteopollen.com). Another examples of web platform providing more CEnv data for tourists are 'Climate Area' targeting Rome, Italy (https://climate-fit.soprintendenzaspecialeroma.it/area/ClimateArea) or 'nowCOAST" application provided by NOAA (US), targeting (and limited to) US territory. A more comprehensive source of CEnv data for tourism purposes is provided by Copernicus Climate Service through 'European Tourism' service (https://climate.copernicus.eu/european-tourism) which includes several datasets of climate indices relevant for tourism. However, the use of this data requires specific knowledge and tools for reading, processing and interpreting the data (e.g., for climate change related purposes), its usability thus focusing more on the scientific community.

3. Methods

We adopt an exploratory approach aiming to provide an answer to the following research question: what are the main elements of a climate service targeting (usual) tourists, such that to insure a good user uptake (e.g., 30-50% of the targeted market segment)?

To this end, we design and apply a survey regarding the tourist preferences on climate and environmental (CEnv) features at destination. The survey was used to gain knowledge on and quantify, from the tourists' point of view, three main aspects: (a) CEnv conditions preferences related to tourism and in particular to rural tourism; (b) preferences for the delivery method and form; (c) the interest for tourism-tailored CEnv information expressed in financial terms (e.g. how much would be willing to pay for it).

3.1 Study design and population

The survey was conducted during November 2021- January 2022, online. Eligible participants were adults (≥18 years old). The survey was available in English, Italian and Romanian languages and it was disseminated through e-mails to hotels, travel agencies and local authorities (for a total of 125 contacts) and through social media (Facebook groups) targeting mainly people associated with the University of Craiova, Romania and Ca'Foscari University of Venice, Italy (e.g., students, academic and non-academic staff). The tourism stakeholders (hotels etc.) contacted were assimilated, in the context of the objectives of the study, as tourists, thus the answer received would be considered as representing the tourist' view (i.e., the preferences of the particular person answering the survey) and not the tourism company view.

3.2 Data Collection

The survey included 5 questions; four questions involve a five-fold Likert-type items, while one is a multiple-choice question. The survey did not collect/require any kind of personal/identification data thus segmentation of respondents based on traits that may influence their preferences (e.g., age, residence, family or economic status etc.) cannot be performed.

The questions of the survey focused on the following aspects:

- Ranking of CEnv features for vacation planning (time and destination)
- Ranking of CEnv features for a pleasant vacation in a rural destination
- Preferred delivery form
- Preferred presentation form
- Financial attractiveness of CEnv information

The answer to any of the first 2 questions allowed to quantify the tourist interest by allocating a mark from 1=not at all important to 5= very important to each CEnv feature included. Similarly, the next two questions include pre-defined options for which the respondents' interest could be marked from 1 to 5. For the last question, aiming to financial attractiveness of CEnv information, the answer consists of 5 pre-defined options (*A monthly subscription; A quarterly subscription; An annual subscription; Single payment for a package with more information and options; I would not pay for this type of information*).

A total of 127 answers were received for the survey, of which 116 are in Romanian, 5 are in English and 6 are in Italian. As no personal data was collected, it is not possible to establish with certainty the provenience country of respondents to English and Italian versions of the questionnaire. Therefore, all answers are included and treated equally in the analysis.

3.3 Statistic analysis

The answers were analyzed using descriptive statistical methods (median, mode, frequencies) as considered more suitable in the association with the Likert-type items used (Boone and Boone, 2012; Guerra et al., 2016). This approach is used in exploratory research (e.g. Zhou et al., 2022; Baumüller, 2018; Songyi et al., 2018) and it is employed in different scientific domains for aspects investigated with

the use of Likert-type items, as for example in tourism (Bieda et al., 2021; Lőrincz et al., 2020), environmental management (Pacana and Ulewicz, 2017), economic aspects (Huszka et al., 2022; Bartosik-Purgat, 2018), education (Zhou et al., 2022; Qian et al., 2019), health (da Cunha-Martins et al., 2021). A similar approach is used by (Boqué Ciurana and Aguilar, 2021) to identify the characteristics of a climate service oriented towards surfers and surfing companies.

In the analysis of the survey presented in this study, for the first four questions the attention focuses on answers receiving marks 4 and 5, thus indicated to be 'important' and 'very important' for the respondents. This particular choice of analysis is based on the practical implications derived from the results, namely the selection of most' attractive' CEnv features (compared to others) in a climate service targeting the tourists such that to increase the user uptake. The answers to the multiple-choice question are analyzed in terms of frequencies of each proposed choice. The sample size is appropriate for the type of questionnaire selected (i.e., based mainly on Likert-type items) (e.g., Guerra et al., 2016; Lund, 2021). In order to estimate the representativeness of the sample size used in the study, we approximated the targeted population as being around 1 3500 000 (i.e., approximative number of tourist arrivals in 2019 in accommodation units in Romania, according to National Institute of Statistics www.insse.ro, table TUR104A in TEMPO database) considering an average response rate of 44% (e.g. Wu et al., 2022) and requiring a confidence level of 95%, with a margin of error of 10%. In this conditions, the sample size provided by the answers to the survey is representative.

4. Results

The first question of the survey aimed on ranking of CEnv features for vacation planning (time and destination) and it read:' Depending on the type of destination, several weather and environment features may contribute to a pleasant vacation. Please rate how important might be the following types of information for you in deciding the time of the year and the destination for leisure trips (1=not at all important; 5= very important)'.

The question included 13 simple and derived CEnv features; from these, 5 features (i.e., thermal comfort, air quality, weather for outdoor activity, frostbite risk, pulmonary stress) integrate several climate and/or environmental parameters. The CEnv characteristics considered are presented in Table 1 in the order gave by the tourist/respondents ranking (number of answers allocating mark 4 and 5 to each of the features); the median and the mode of values allocated by respondents for each item are also presented.

The results show that, independent of destination, thermal comfort is the most important CEnv feature for tourists; it is expected that periods with pronounced thermal stress -either due to cold or heat- would be less considered by the tourists as appropriate for their vacation. However, it is possible that this consequence might be avoided in a certain degree by diversifying the options for indoor activities during daytime periods with pronounced thermal discomfort. Furthermore, these results suggest that information on thermal comfort at climatic scale – describing the climate at the destination – might be of great interest for tourists if available during the process of planning and/or selecting their time and destination for vacation.

With a similar degree of interest for tourists, air quality (AQ) is a CEnv feature important for about 75% of the respondents to the survey. This is in line with the conclusions of (Eusebio et al., 2020) which shows, based on 26 papers identified in Scopus database as examining the impact of AQ on tourism demand that air quality 'tends to have a positive influence on tourism demand, with decreases in AQ leading to decreases in tourism flows or to a lower likelihood of visiting certain destinations'.

Table 1. **Analysis of CEnv features receiving marks 4 (important) and 5 (very important), based on 127 answers to the survey, with regard to planning the vacation (time of the year, destination).**

No	Climate and environmental feature	Median	Mode	Frequency of answers marked with 4 and 5
1	Thermal comfort/discomfort	5	5	75.59
2	Air Quality	5	5	74.80
3	Clarity of the sea water	4	5	69.29
4	Average Sea Surface Temperature	4	5	68.50
5	Presence of green vegetation in the surrounding of the touristic destination	4	5	67.72
6	Monthly number of days with weather appropriate for outdoor activities	4	5	66.14
7	Sunburn risk	4	5	62.20
8	Frostbite risk	4	5	61.42
9	Pulmonary stress	4	5	59.84
10	Snow cover	4	4	54.33
11	Average depth of snow layer	3	3	44.09
12	Pollen concentration level	3	3	39.37
13	Season start for flowering of certain species of trees	3	3	36.22

Source: own elaboration.

Other CEnv features of interest for tourists, although much more specific for a certain type of destination (i.e., seaside) are the clarity of the sea water (for 69.29 % of the respondents) followed closely by the average sea surface temperature (SST) (important for 68.5% of the respondents). While information on SST is available during warm season in the form of forecast (e.g., in Romania it is disseminated by National Meteorological Administration) or for the current conditions (e.g. in Italy http://www.meteoam.it/prodotti_grafici/temperaturaMare) such information at climatic scale is less easy to find, especially in relation to a specific seaside destination. Furthermore, information on the clarity of sea water is currently not available on regular basis and/or for the regular tourist. The information relating to 'bathing water quality' is somehow more accessible but it usually regards the biological characteristics of bathing water (https://www.eea.europa.eu/themes/water/europes-seas-and-coasts/assessments/state-of-bathing-water). In this context, providing information on SST and water clarity for seaside destinations would be a step forward in answering to tourists interest for CEnv characteristics and in the same time making scientific data available for the usual user.

From the CEnv features included in the survey, other 6 characteristics are considered important by more than 50% of the respondents. From these, only two may be available on regular basis, usually in the form of forecast:

- sunburn risk. This information is based on the forecasted UV index and it in some cases it is accompanied by health advices (e.g. https://www.sunsmart.com.au/); in Romania it is provided by National Meteorological Administration as a map at national level, not being associated with health information (impact , advices etc.).
- frostbite risk – the information is based on Wind Chill Temperature Index (https://www.canada.ca/en/environment-climate-change/services/weather-health/wind-chill-cold-weather/wind-chill-index.html#X-201501151120261). In Romania it is disseminated as diagnose

information every hour, during the cold season, for each location where meteorological observations are performed, expressed as absolute value with no other type of implications (e.g. impact, risk etc.) associated.

The other four CEnv characteristics considered important by more than 50% of the respondents to the survey (i.e. 'Presence of green vegetation in the surrounding of the touristic destination', 'Monthly number of days with weather appropriate for outdoor activities', 'Pulmonary stress', 'Snow cover') are not available on regular basis neither in forecast, Near Real Time or climatic regime. Nevertheless, the answers to the survey indicate this information as of interest for a quite large category of users/tourists and by providing them at climatic scale, a gap in the CEnv information for tourist would be filled. Finally, the CEnv features of interest for only a small part of the respondents (between 44 and 36%) on the more general question on planning the vacation time and destination are 'Average depth of snow layer', 'Pollen concentration level' and the 'Season start for flowering of certain species of trees'.

The part of the survey targeting rural destinations read as follows:' In particular, if you would go in vacation in a rural destination, how important would be the following climate and scenery-related aspects at the destination as contributors to an enjoyable time off (1= not at all important; 5=very important).' The question contained a number of 10 CEnv features (Table 2), six of them also present in the previous question. The results show that the feature presenting interest for the largest part of the respondents (almost 80%) in the case of a rural destination is the 'overall weather fit for outdoor activities'. While in the general context of any type of destination this feature was of interest for about 66% of the respondents, in the case of rural destinations it becomes practically the most interesting aspect of weather, climate and environment at destination. Also, thermal comfort is considered important by almost 71% of the respondents. At the opposite end, snow depth and pollen concentration level are of interest for only 44% and 35% respectively of the respondents, similar to 'any destination' question. For other two CEnv features present in both questions – snow cover and cold sensation due to wind and/or humidity – a similar percent of the respondents (around 53%) considered it important.

Table 2. **Analysis of CEnv features receiving marks 4 (important) and 5 (very important), based on 127 answers to the survey, with regard to a pleasant vacation in a rural destination**.

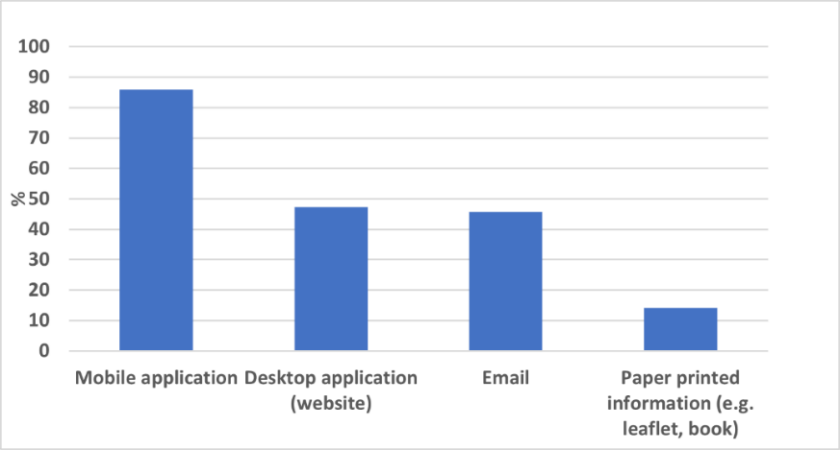
No	Climate and environmental feature	Median	Mode	Frequency of answers marked with 4 and 5
1	Overall weather fit for outdoor activities	4	5	79.53
2	Thermal comfort	4	5	70.87
3	Precipitation amount	4	5	69.29
4	Cold sensation due to wind and/or humidity	4	5	68.50
5	Presence/absence of precipitation	4	5	66.93
6	Maximum air temperature	4	5	62.20
7	Snow cover	4	3	53.54
8	Sunshine duration	4	3	51.18
9	Snow depth	3	3	44.88
10	Pollen concentration level	3	3	35.43

Source: own elaboration.

The results regarding atmospheric parameters better known from weather forecast (presence/absence of precipitation, precipitation amount, maximum temperature) or from literature (sunshine duration) as being important highlight the tourist interest for these features, as they all were

marked as 'important' or 'very important' by more than 50% of the respondents. Among these, precipitation amount was of interest for most of the respondents (69%), while the sunshine duration for the least of them (51%). Nevertheless, the results suggest possible products to be developed and disseminated for rural areas, such that to answer better to the tourist preferences with regard to weather, climate and environmental information.

Figure 1. **Frequency of answers marked as 'very important' or 'important' with regard to preferred means for accessing CEnv information**

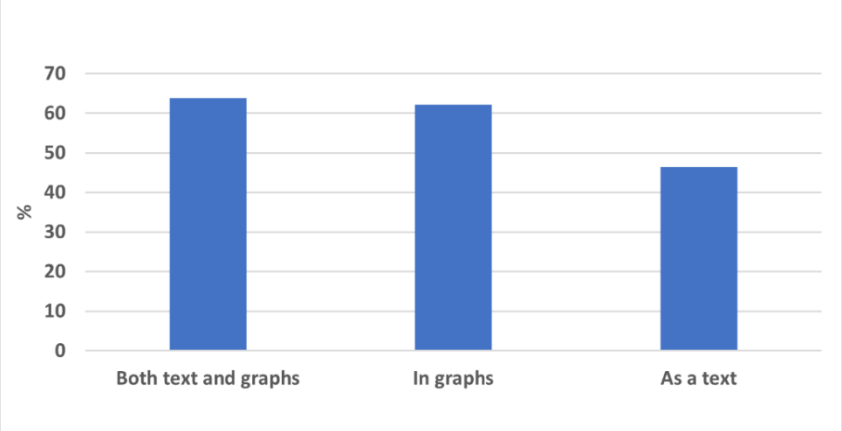


Source: own elaboration.

The survey further accounted for the preferred delivery form of the CEnv information developed, through the use of one question with 4 pre-defined answers, with the following question: 'If climate and environmental information of interest for you would be available, how would you prefer to access them or to be delivered to you? (1=not interested; 5= very interested).'

Most of the respondents (86%) (Figure 1) would prefer to access such information through a mobile application and only 47% through a desktop application (website). Also, about 45% would be interested to receive the information by e-mail and only 14% would be interested by a printed form of delivering the information.

Figure 2. **Frequency of answers marked as 'very important' or 'important' with regard to preferred presentation form of CEnv information**



Source: own elaboration.

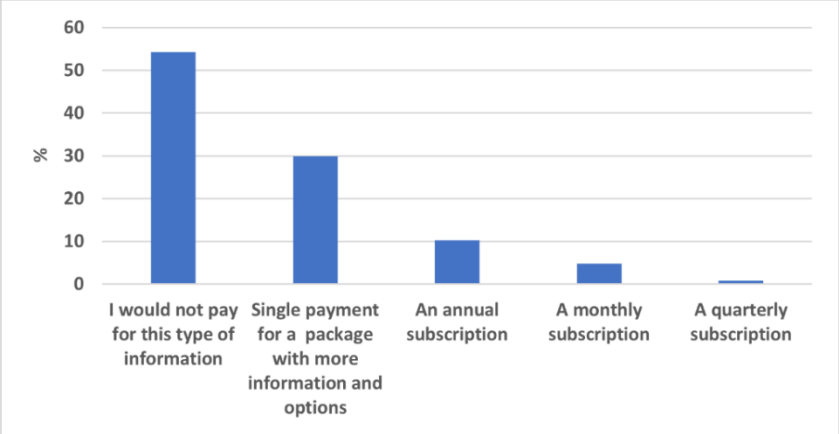
The results are important in the view of a commercial application containing CEnv information, showing that for a successful user uptake, a mobile application is a key ingredient.

The question regarding the preferred presentation form ('Regarding the climate and environmental information of your interest, how would you prefer to be presented (1=not of interest; 5=of great interest)') included three predefined answers (Figure 2). The results show that graphical form, accompanied (64%) or not (62%) by a text description is preferred by the survey respondents, while only about 46% would prefer the information to be presented only as a text.

The last question of the survey ('For such tailored information related to the climate, weather and environment in a certain touristic destination/s, would you agree to pay (please select one option)') aimed to assess if the tourist would pay for tourism-oriented CEnv information and if yes, with what frequency (monthly, every four months, annual, single pay).

The results (Figure 3) show that 54% of respondents would not pay for such information and about 30% of them would agree to a single payment for a broader package.

Figure 3. **Ranking of payment options for CEnv information, expressed as percent of total answers.**



Source: own elaboration.

Thus, the financial attractiveness of tourism-oriented CEnv information seems to be quite low, at least if the package would comprise only CEnv information. Possible solutions might be to include in the package other type of information of interest for the tourists (e.g. on accommodation, food and drink options, on specific touristic activities etc.) but this should be based on a well-oriented and comprehensive 'market analysis'. Another option to assure a good user uptake of such information might be to deliver it in a form of public, freely available application, possibly in association with other specific information (e.g. on hotels and local authorities websites; as part of regions' touristic applications etc.).

5. Discussion and Conclusion

The results of the survey allow to estimate a ranking of the CENv features of interest for tourists. The thermal comfort proved to be of interest for most (79%) of the respondents independent of the destination type. Also, air quality was considered of interest for about 76% of the respondents; it is expected that this feature pertains more to the urban areas than for the other destination types. For rural destinations, the number of days with weather fit for outside activities was considered important and very important by almost 80% of the respondents, while for other destination types only 66% of the respondents considered it of interest. The snow cover extent proved to be of less interest than

expected (only for 54%); also, snow depth was considered of interest for only about 44% of the respondents, independent of the destination type. In the case of seaside destinations, the survey reveals that clarity of water and sea surface temperature are important for a large part (about 70%) of the respondents. At the opposite, for any destination type, pollen concentration level and season start of flowering for certain tree species were considered important by a low segment of the respondents.

The survey also highlighted that users would prefer (80 %) to access such information through a mobile phone application and the information should be presented in graphical form and preferably associated with some descriptive text. However, most (54%) of the respondents would not pay for such information and only 30% would agree to one single payment for a broader package.

The results confirm some expectations based on scientific literature (e.g. interest for air quality) and highlight the user interest for information encompassing several CEnv aspects preferably in one product, like the thermal comfort, weather fit for outdoor activities, air quality.

The results allow for a first assessment of the commercial potential of CEnv information customized for tourism and targeting usual tourists. While such information is of interest for the respondents, paying for it is of much less interest. This is in line with the findings of (Visscher et al., 2020) on climate services targeting general users. More research is needed to estimate how the attractivity of a package can be improved based on/ including customized CEnv information to increase the uptake by paying users.

The results support at least a preliminary answer to the research question at the center of the study, showing that the main elements of a climate service targeting the tourist may be characterized as follows: a) the content should include information on thermal comfort, number of days with good weather for outdoor activities, air quality, precipitation amount, cold sensation due to wind and/or humidity, sea water temperature and sea water clarity in the particular case of seaside destinations. These seven products would attract more than 66% of the potential users – at least for the geographical location considered - and would cover all four main types of destinations considered; b) the information should be presented using both graphical and text description; c) the information should be accessible through the mobile phone; d) the service should be freely available, possibly with a 'premium' component available at low price, as the latter option would be attractive for only 30% of the potential users.

It is important to acknowledge the limitations associated with the findings based on the survey. Considering the channels through which the survey was advertised (e.g. student groups, social media etc.), it might be that a significant part of the respondents is young tourists (i.e., students). Consequently, the answers might not be relevant for any/all category of tourists, but they could be skewed toward a certain age/social category etc. Nevertheless, these aspects cannot be addressed in the analysis of the results as they are not known; the survey was fully anonymous, no type of personal data was collected and thus it cannot be assessed the structure of the respondent 'pool' in terms of age, social category, income etc. Furthermore, given the distribution of answers based on the language of the survey, it might be that the results are skewed toward the preference of Romanian tourists (116 answers out of 127 were received for the Romanian version of the survey). However, as discussed previously, this aspect cannot be addressed in a definite manner due to the lack of availability of personal data (e.g., country of provenience of the respondents). Finally, the survey has a quite general approach, not targeting each of the four destination types considered in depth. In building the survey, the trade between the shortness of the survey (and thus a potentially better availability to answer to it) and its attention with regard, for example, to the destination type specificity may have led to less precise information either concerning certain CEnv features (e.g. the importance of information on precipitation amount in planning the time and destination) or to a particular destination type (e.g. urban areas).

Taking into account the results of the survey and their limitations, these findings are still relevant and contribute to optimizing the selection of CEnv products to be developed in the context of

a climate service customized for tourists. Further research will focus on aspects not covered by this exploratory study but of great importance for building a tourist-oriented climate service with good uptake opportunities. Such aspects pertain both to technical aspects as well as to societal impact. In terms of climate-related features, products characteristics should be investigated in order to provide an efficient and trustable service, like spatial and temporal scale, data availability and associated uncertainties depending on those scales, 'translation' of scientific information into the easy-to-understand form, interest/need for additional information like for example health advice related to sunburn risk. Concerning societal impact, an important future research direction will focus on requirements leading to a better user uptake as well as on how tourism investors (e.g., hotels, tourism agencies, and local authorities) may benefit from such a service.

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