

## Climate change and ski industry in Pamporovo resort, Bulgaria: An exploratory study on the tourists' perceptions

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### Abstract

Studying stakeholder perceptions regarding climate change and their influence on the future development of ski resorts is both important and challenging. Tourists are one of the key stakeholder groups to be taken into account, since understanding their perceptions and reactions to the impacts of climate change is essential to anticipate potential geographic and seasonal shifts in tourism demand, as well as the decline or increase of specific tourism markets. Such studies have been undertaken in different countries but so far not in Bulgaria. In an attempt to fill the gap, this paper presents the results of an exploratory survey among visitors to one of the major Bulgarian ski resorts that was carried out in March 2018. The study results reveal a high level of acceptance of climate change threats worldwide and a moderate denial of the same threats at a local scale. A large proportion of respondents even now substitute the resort with another one and the majority of them see the future of Pamporovo as a four-season destination. The study outcomes are paralleled with results known from previous studies in other countries. Considering the exploratory study limitations, conclusions are drawn regarding the need for further research and methodology refinement.

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## Introduction

Climate change is widely accepted as one of the most serious global threats, influencing all spheres of human life. The tourism industry, and most of all ski tourism, is among those sectors where in recent years changes have been first seen, and can be easily observed (Steiger, 2011; Steiger *et al.*, 2017). The established ski resorts are nowadays fighting not only with international competition and increased customer demands, but also with a whole range of climate induced obstacles such as the late arrival of snow, insufficient natural snow cover, higher temperatures, and shorter winter seasons, with ski areas at lower altitudes considered to be the most threatened in the short term (Yang & Wan, 2010; Bürki *et al.*, 2003).

Climate change is expected to have serious social consequences, since for many ski tourism-dependent communities economic alternatives are limited (Steiger *et al.*, 2017). In this context, evaluation of the perceptions of stakeholders is of key importance, as this is the first step in an adaptation process, which ideally, would decrease vulnerability of the destination, increase the readiness to capitalize on new opportunities and, in the end, guarantee an on-going resilient sustainable development process. Tourists are one of the key stakeholder groups to be taken into account, since understanding their perceptions and reactions to the impacts of climate change is essential to anticipate potential geographic and seasonal shifts in tourism demand, as well as the decline or increase of specific tourism markets (Jopp *et al.*, 2010; Gössling *et al.*, 2012).

Although Bulgaria is ranked 26<sup>th</sup> world-wide in terms of skier visits for 2014 (Steiger *et al.*, 2017) and the estimated annual number of skier visits is roughly 1.2 million (Vanat, 2018), the only research found in the reviewed English-language literature about the vulnerability of the country's ski industry to climate change is in the sphere of physical impact and vulnerability (Demiroglu, 2016), while no research regarding social views and opinions, as well as behavioural response to climate change, has been performed in the country. In an attempt to fill this gap regarding

demand-side perceptions, the current paper discusses the results of an exploratory survey conducted in 2018 among visitors to one of the major Bulgarian ski resorts. The study aims to reveal the opinions of tourists on a number of issues related to climate change and its possible implications on tourist behaviour and on the present and future tourism development of the ski resort of Pamporovo. Based on the results obtained and their analysis, conclusions are drawn on the demand-side expectations and reactions towards anticipated climatic and socially-induced processes in the local ski tourism industry.

## Literature review

The ski industry has been the first and most studied aspect of climate change impact on tourism, with mountain sport tourism classified as one of the high-risk sectors (Scott *et al.*, 2012). Bicknell & McManus (2006, p. 387) described it as 'the canary in the coalmine' making an analogy with the time when miners used to carry them underground so as to receive an early warning of the presence of dangerous gases. As a result of the projected temperature increase of 1.4 to 5.8°C by 2100, global warming will have its greatest impact on land, in the northern hemisphere, and in winter, thus hitting most significantly the locations and season of mountain winter tourism (Bürki *et al.*, 2003). Based on a climatic data review, Wolfsegger (2005) concludes that the future ski season might not be sufficiently long in many low altitude resorts in the Alps and these regions will lose attractiveness due to lack of natural snow. It is a prevailing opinion among climate change researchers that in the short term there would be two different types of ski resorts – the high altitude ones, being the winners, and the low altitude ones, the losers in the market (Wolfsegger, 2005; Steiger & Abegg, 2013). Bürki *et al.* (2003) predict that ski resorts at lower altitudes will withdraw from the market sooner or later because of the lack of snow, while ski areas higher than 2000 m will experience greater demand prompting a future expansion, thus pressuring the ecologically sensitive high mountain environment. Such ideas are supported in a number of reports published by respected international organizations (OECD, 2006; EEA, 2012, 2016). Overall, conditions for ski tourism

in Europe are expected to worsen owing to reduced snow reliability, particularly at low altitudes and in the presence of limited adaptation options. On the other hand, traditional winter sport areas may become more attractive for tourist activities in summer (European Environment Agency, 2016). The expectations for the winter tourist season in Bulgaria are that it will be substantially shorter; in places at lower altitude it may disappear entirely due to a temperature increase in the country, a liquid precipitation increase, the higher altitude of the permanent snowline, and an earlier snow thaw (Vodenska, 2016).

An impressive number of studies have been published regarding the perception of climate change effects on ski tourism over the past decade, with the more recent being published for Australia, New Zealand, Austria and Switzerland (Wyss *et al.*, 2014). Yet, such perceptions have been significantly less addressed compared to the technical capacity, economic feasibility and environmental limitations (Hopkins, 2014). Steiger *et al.* (2017, p. 15) even declare this area 'an under-researched dimension' of climate change and tourism research that is geographically concentrated in Australia, the United States, Switzerland, Canada and Austria.

Individual climate change perceptions must be taken into account, together with the structural aspects of destination management, in order to assess the vulnerabilities of tourism destinations, and to strengthen the resilience of local tourism systems. It is important to understand how climate change impacts are perceived by tourism stakeholders in a specific geographical context and what influence these perceived impacts will have on the patterns of cooperation among the various actors along the supply chain (Wyss *et al.*, 2014). Wolfsegger (2005) stresses that perceptions are important because they can either lead to misconceptions and mal-adaptations, thus increasing the costs of climate change, or result in exaggerated measures, with both extremes having negative consequences. Yet, a distinction should be made between the mental picture of climate change and real physical change (Bürki, 2000, cited in Wolfsegger, 2005) as well as between the

opinions of scientists, lay people and decision makers (Wolfsegger, 2005).

Climate change is a difficult issue when it comes to perception and adaptation, as uncertainties about future impacts make anticipated adaptation decisions irrational *per se*, and subjectivity is extremely high (Wolfsegger, 2005). Trawöger (2014) discovers that most stakeholders simply do not perceive climate change as a real threat, in many cases not even as a risk to their business or regions – their awareness seeming to be mainly limited to the general issue on a global level, without understanding its potential business sector or regional consequences. Therefore, as people expect changes to occur in the future and at a distance, general concerns about climate change have to be translated into local personal-related worries. Such worries are often associated with the immediate personal experience of winter weather. On the other hand, knowledge about climate change as a global phenomenon does not automatically lead to action on a local / regional level.

Tourists are one of the key stakeholder groups to be taken into account, since the final decision as to whether to travel or not to a destination, belongs to the visitors (Jopp *et al.*, 2010). Understanding tourist perceptions and reactions to the impacts of climate change is essential to anticipate potential geographic and seasonal shifts in tourism demand, as well as the decline or increase of specific tourism markets (Gössling *et al.*, 2012). Yang & Wan (2010) quote results from surveys in Switzerland among skiers and snowboarders according to which 83 % of the respondents believe that climate change could threaten ski tourism, and a similar survey in Slovenia has shown that 64 % of the surveyed tourists consider climate change could harm skiing in Slovenia. Examples selected from Steiger (2011) also generally show a very high level of awareness of the potential impacts of climate change on ski tourism (König, 1998; Bürki, 2000; Unbehau *et al.*, 2008; Luthe, 2009).

In a literature review on climate change and ski tourism, Steiger *et al.* (2017) summarize the main trends in research into tourists' perceptions and behavioural response, starting

with the understanding that tourist adaptation can include: 1) pre-trip decisions (destination change or trip delay), 2) reactions to weather and snow conditions during the ski holiday (switch to snow-independent activities), and 3) long-term changes in patterns of tourist behaviour as a “consequence of repeated experiences with unacceptable quantity of open skiing terrain and/or quality of snow” (Steiger *et al.*, 2017, p. 15). Tourists have the largest adaptive capacity of elements within the tourism system because of their flexibility to substitute the place, timing and type of holiday, even at very short notice. Dawson *et al.* (2013) claim that more attention should be paid to understanding the potential behavioural adaptations to the recreational alpine ski sector – that it is no longer enough to model change solely based on climatic and geographic thresholds. The impact that climate change has on the demand side of the ski sector will play a significant role in determining the net vulnerability and sustainability of ski tourism in general. This statement can be visualized by the theory of recreation substitution (Iso-Ahola, 1986, quoted in Dawson *et al.*, 2013), according to which, when individuals are no longer able to participate in an activity, they may substitute it with another (activity substitution), change the timing / intensity with which they participate (temporal substitution) or alter the location of practice (spatial substitution). Spatial substitution is identified as the most frequent behaviour, temporal substitution is the second most frequent, while activity substitutions are normally only chosen by a small section of the skiers (Steiger *et al.*, 2017).

Yang & Wan (2010) quote a survey from Australian ski resorts carried out in 1998 revealing that in the case of little natural snow 25 % of skiers would continue to ski, 31% would still ski in Australia but less frequently, 38% would travel to other destinations and 6% would no longer ski at all. Similar results have been achieved by Bürki (2000) in the Alps, finding that the most vulnerable ski resorts in the lower regions of the Alps would have to deal with a significant decrease of younger guests, day visitors and novice skiers, which are exactly their target groups. A study among U.S. skiers conducted by Dawson *et al.* (2011)

showed that highly involved skiers were more likely to change their skiing behaviour as a result of poor snow conditions than were less involved individuals. The explanation is that for experts this activity is really important and they have the specialized knowledge to perceive factors of climate change. On the other hand, Steiger *et al.* (2017) cited König (1998), whose research on Australian skiers demonstrates that beginners are more likely to quit skiing than intermediate or expert skiers, who are more likely to ski overseas. Ruddy *et al.* (2015) find that expert skiers more often choose spatial substitution than respondents with lower skills while beginner skiers are more likely to stop skiing, and that temporal substitution is a preferred option for skiers between 50 and 64 years of age. Steiger (2011) predicts that as climate change will increase the frequency and the occurrence probability of extreme events like snow-poor winters, tourists will gain experience with these kinds of seasons and they are very likely to change their behaviour concerning the time and the destination.

Tourist opinions about supply side adaptation strategies can also be investigated. For the industry, the most common adaptations include snowmaking and amalgamation of resorts, i.e. maintaining ski tourism, non-snow related activities in winter and the development of year-round tourism, often involving considerable investment of resources by industry and government (Morrison & Pickering, 2013; Bicknell & McManus, 2006). Rodriguez *et al.* (2018) add a few more supply-side adaptation strategies: nocturnal skiing, protection and conservation of the snow pack, public and private economic assistance and management solutions, as well as redefinition of the local economic model. However, it is difficult to determine to what extent these strategies are driven by climate change or by other factors (Trawöger, 2014).

A generally accepted paradigm is that snowmaking can reduce the vulnerability of low altitude ski resorts (Scott, 2005; Wolfsegger, 2005; Steiger & Abegg, 2013; Hill *et al.*, 2010). The limitations of snowmaking as an adaptation tool are connected with the high usage of input resources, water and energy, and lack of appropriate low air temperatures (Steiger &

Abegg, 2013). Taking into account all its limitations and obstacles, Steiger & Mayer (2008) conclude that snowmaking can still be classified as a significant short to medium-term adaptation strategy, not only for high-altitude resorts but also for financially strong year-round destinations at lower elevations. However, artificial snow is not highly appreciated by skiers, though it seems to be accepted as a necessity, rather than simply a positive attribute of a ski destination (Unbenhaun *et al.*, 2008). Skiing skill level, type of skiing (on/off piste), age, worldviews and social norms are some of the reasons behind the different views on snowmaking (Hopkins, 2014).

Diversification is the other most popular adaptation mechanism discussed in literature that is seen as being able to limit sensitivity. Developing off-ski activities (hiking trails, pathways, cultural events) in ski resorts may be more effective insurance for the future than investing in artificial snowmaking, can limit sensitivity to economic and other crisis, and may be a part of a broader sustainability strategy (Dubois & Ceron, 2006). Some of these newer strategies are the use of health and spa facilities, cultural events, and an enhanced service offer to substitute for skiing activities (Unbenhaun *et al.*, 2008). For instance, since the beginning of the 1990s, diversification of tourist services in ski resorts is a problem repeatedly raised in France by various actors and has been presented as an imperative to address problems such as lack of snow, holiday schedules and changing customer expectations (Paget *et al.*, 2010). Diversification as a result of a climate change response can even be included into a broader risk management policy for the tourism sector as it limits sensitivity to other crises as well (Dubois & Ceron, 2006). It is possible, though, that this strategy may lead to significant challenges due to limited resource capacity or may prove to be not so unique or attractive (Kajan & Saarinen, 2013).

All year tourism may be considered the primary potential adaptation strategy, particularly for lower altitude resorts (Morrison & Pickering, 2013). The shift to year-round tourism has become more dominant in forward planning,

with a summer focus for new business opportunities and the acknowledgment of the benefit for the many local people who work at the ski resort, creating year round employment opportunities and reducing their livelihood reliance on the reliability of snow (Hopkins & Maclean, 2014). Together with snowmaking, all season is seen by resort CEOs in Australia as very important for the future viability of the industry and removing the industry's dependence on winter tourism and snow, thus assuring the viability of their investments and leading towards future sustainability (Bicknell & McManus, 2006). The main limitations of this strategy are that development of summer tourism long-term planning and investments would bring competition with summer destinations and that summer activities (biking, horse riding) might also bring their own environmental problems.

To complete the picture, it should be noted that Scott *et al.* (2012) identify three notable limitations in tourist surveys on the topic: 1) how are climate change scenarios presented to tourists; 2) how individuals have responded to marginal snow conditions in the past so as to compare whether a behavioural change should be expected in the future; 3) what is the difference between the stated behavioural responses among key market segments and those that showed significant difference in behavioural adaptation. The authors argue that the concepts of substitution, specialization and destination loyalty should be explored in depth in order to enhance climate induced behaviour change understanding (Scott *et al.*, 2012).

Overall, demand reactions are extremely difficult to predict and cannot be generalized for broader tourist populations due to the following complexities and uncertainties regarding tourists' perceptions of climate change (Gössling *et al.*, 2012):

- ✓ Perceptions vary depending on holiday type and role
- ✓ Perceptions change with age, culture and other socio-demographic variables
- ✓ There is variation in individual preferences, values and personalities
- ✓ Perceptions evolve over travel careers and with degree of specialization

- ✓ Perceptions are comparative
- ✓ There are differences between Ex-situ and In-situ perceptions
- ✓ Tourist perceptions are highly influenced by media
- ✓ Single events can have wide-ranging consequences for perceptions
- ✓ Perceptions are complex, adaptive and hierarchical
- ✓ Perceptions are context-dependent
- ✓ The accuracy of climate variables and resources is insufficiently understood
- ✓ The adaptive capacity of tourists is insufficiently understood
- ✓ Short-term versus longer-term change in travel behaviour is unclear
- ✓ Public perceptions of climate change can be ill-informed and highly polarized.

Based on the above review of a considerable number of publications it could be concluded that studying and understanding tourist perceptions is an important, though not a sole element of scientific research and decision-making processes when it comes to climate change, mountain tourism and ski resorts adaptation. It is a rather complicated topic that has been studied in different regions of the

world but not in Bulgaria. It is difficult to compare various study results directly as different approaches to research questions have been applied. Yet, drawing some parallels is possible and useful.

### Methodology

In the current study, the methodology used to identify the perceptions of tourists was based on the case study approach, while necessary data was obtained by applying the survey method because of its chief advantage of being able to collect a lot of information in a relatively short period of time (Finn *et al.*, 2000).

### The case study area

Case study selection is an important aspect of research and the best examples are those either representing an extreme situation or polar types in multiple cases (Eisenhardt, 1989). The ski resort of Pamporovo was chosen as an extreme example since its ski area lies at the lowest altitude (1,400-1,930 m) among the three most popular ski resorts in Bulgaria (Fig. 1). In contrast to the other two leading resorts of Borovets and Bansko, due to the specific terrain of the Rhodope Mountain, the Pamporovo Resort does not have the



**Figure 1. Bulgarian major ski resorts**

Source: [https://commons.wikimedia.org/wiki/File:Bulgaria-geographic\\_map-en.svg](https://commons.wikimedia.org/wiki/File:Bulgaria-geographic_map-en.svg)

option to "climb up" the mountain in search of more reliable snow, as the highest peaks are already a part of the ski zone.

The Pamporovo Resort lies in the southern part of the country, near the Greek border, at an average altitude of 1,650 m, primarily in a coniferous forest setting. Founded in 1933 as a mountain resort when the first pensions and holiday rest homes were built, during the Socialist period it was transformed into one of the biggest ski resorts in Bulgaria, aiming primarily to attract foreign tourists. After the socio-political changes in 1989, its development has been influenced by the mass construction of hotels and holiday apartment buildings.

Famous as one of the sunniest mountain resorts in the country, with the annual number of sunny days estimated at 240, a total of 110 stationary artificial snow cannons have been installed to service the 37 km of ski pistes, (PamporovoMe.com, 2015). According to official tourism statistics, in 2017 the accommodation capacity of Pamporovo accounted for 5,331 bed places in 52 establishments; the resort was visited by 130,395 tourists (21,550 of them foreigners), and the accommodation revenue was 7.9 million Euros (NSI, 2018). Statistical data also indicate that half of the visitors come during the months of January, February and March; the number of visitors also increases in July and August, but hardly reaches even half of the monthly occupancy rates during the winter months (NSI, 2018).

#### *The survey design and distribution*

The survey was based on non-probability convenience sampling which is widely used in tourism research, especially when it comes to visitor surveys in which randomness is difficult if not impossible to obtain. This is the case as it is not possible to construct a sampling frame for visitors to a site or resort a priori, and only those visitors who are available to the interviewer at a given moment are likely to be included (Finn *et al.*, 2000). Research findings with such sampling are difficult to evaluate in a broader (population) context but still may reveal interesting insights, and enable some tentative conclusions.

The questionnaire was designed to find out both qualitative and quantitative data on tourists' behaviour and their opinions regarding climate change and related ski tourism issues, as well as the appropriate adaptation strategies for the ski resort of Pamporovo. The questionnaire design aimed to minimize bias through standardization of questions, and also make it easy to fill in and be non-time-consuming, as the survey was to be conducted mainly on the ground in Pamporovo. Therefore, close-ended questions were preferred. Additionally, space for free answers was provided to some of the questions in order to obtain qualitative information on perceptions in the form of nuances of feelings and beliefs.

The survey was built upon a thorough literature review of all previously studied climate-related perspectives of skiers' behaviour. Even though impossible to get a complete understanding of all issues in a single study, the fact that there is a lack of any recorded information of this kind for Bulgaria, stimulated a wide range of topics to be included in the survey. The self-completion questionnaire contained nineteen questions that aimed to examine the respondents': (1) perceptions regarding Pamporovo Resort, climate change threats, and the main supply-side adaptation options; (2) tourist behaviour patterns and possible behavioural response to future climatic conditions; (3) demographic profile.

The first question searched for the reasons why tourists chose Pamporovo as a skiing destination, while the second question was aimed at finding which climate change issues were considered already present in the resort. Next, the extent to which climate change was perceived as a threat had to be identified on three levels - global, regional (South-East Europe, including Bulgaria) and local (Pamporovo Resort). Besides revealing the general view of tourists about the researched area, these questions aimed to test on a local level the already existing theories that once potential climate change threats become close to the individual, there is a sense of denial (Trawöger, 2014). One question attempted to reveal the relative vulnerability (Hopkins *et al.*, 2012) of Pamporovo compared to the other two major Bulgarian ski resorts. Furthermore, in

order to research the respondents' attitude to different supply-side adaptation strategies the survey involved specific questions dedicated to three main options identified in the literature review - artificial snow production, diversification of services offered, and the conversion of a resort to an all-year destination (Bicknell & McManus, 2006; Wolfsegger, 2005).

Tourist behaviour patterns were studied through a set of questions concerning the respondents' travel and ski participation habits – how often and where else they went skiing and snowboarding (either in Bulgaria or another country) as well as if they had visited the Pamporovo region in other seasons. These questions are related to the demand-side climate change adaptation and reveal the travel profile of the studied customers, particularly the substitutional habits they have already had, i.e. which of the other alternatives tourists had already chosen instead of going for their winter holiday to Pamporovo. Possible behavioural responses to future climatic conditions were searched for in a separate question in terms of both an alternative activity and another geographical location (Steiger, 2011; Gössling *et al.*, 2012).

Finally, a section at the end collected information on nationality, age, gender and level of skiing, to be employed in the survey description and in cross tabulations. The latter was considered important, since skiing experience usually defines different reactions towards climate change effects – previous research has demonstrated that there are significant differences in the travel choices between beginners and experts when the snow and weather conditions are marginal, with experts being more likely to substitute both place and activity (Dawson *et al.*, 2011).

All nineteen questions in the survey were close-ended, eight of them giving an option for free comments, in order to get nuanced beliefs and understandings as well as a bigger range of potential answers. Five questions were multiple-choice types with more than one answer possible. Two questions used a 5-point Likert scale – one encompassed a set of statements regarding climate change threat

and artificial snow production with which respondents had to indicate a degree of agreement or disagreement, while the other sought to find out to what extent the presence of suitable snow and climatic conditions was a personally decisive factor when choosing a winter holiday. The questionnaire layout is attached in Annex 1.

The survey of tourists was carried out in March 2018. As part of a PhD student study it was performed by only one researcher on the ground in Pamporovo for four days around the public holiday of March 3<sup>rd</sup> and also distributed to ski wardrobes and ski schools for clients to fill out by the end of March. The fieldwork took place in the area of the main ski lifts and in nearby cafes and restaurants where tourists were most concentrated and easy to reach. Considering the restricted budget and limited time period of the survey, the respondents were asked to fill in the questionnaire themselves as that was a faster method compared to face-to-face interviews. Additionally, a small fraction of surveys were filled ex-situ within the same period (March 2018) by fellow skiers, who went skiing at Pamporovo in the winter of 2018. A limitation in terms of timing that should be taken in consideration is that due to subjective reasons the survey was carried out at the end of the winter season 2018. Moreover, most of the questionnaires were completed on the ground during the public holidays around the National Day of Bulgaria, when the resort was mainly full with domestic tourists. No particular weather or snow abnormalities were recorded at that time as to influence the survey results.

The number of distributed questionnaires was 200 and a total of 126 valid surveys were collected, thus indicating a response rate of 63%. Only 14 questionnaires (11%) were filled by foreign tourists. The small size of the sample and the low share of visitors from abroad definitely influenced the survey results, and represent the major limitation of the study. Therefore, though being indicative, collected data should be treated with caution, which is a main feature of the exploratory research design. However, as the purpose of the study was to gather descriptive information about general perceptions regarding climate change



and its impacts on ski tourism and tourist behaviour and preferences, the sample size did not need to be as large as if a greater degree of precision was needed (Finn *et al.*, 2000; Cochrane *et al.*, 2014).

*The sample structure: respondents' demographic profile and trip characteristics*

The profile of respondents presented in Table 1 reveals that only 11.11% of the survey participants came from abroad (UK and Ireland) while Bulgarian tourists composed 88.89% of the sample. Such a proportion corresponds with the official data provided by the National Statistical Institute of Bulgaria, according to which, at the time of the survey (March 2018), the share of foreign vs. domestic visitors to Pamporovo Resort was 15%:85% (NSI, 2018). All age groups were represented in the sample with the highest relative proportion being 31-40 years old, followed by 41-50 years and 21-30 years old. The number of respondents from the lowest and the highest age groups (<20 years and > 60 years) was limited to 2 each, which made it necessary to

reduce the number of age categories from six to four: below 30 years (19.35%); 31-40 years (41.13%); 41-50 years; above 50 years (12.10%). Respondents were almost equally split by gender, with a slight predominance of men over women (53.17% vs. 46.83%). Skiing or snowboarding was the primary aim of the visit for 54.76% of the respondents. In terms of skiing abilities, the sample was dominated by beginners (46.03%) and experienced skiers (40.48%) while only 13.49% of the respondents defined themselves as experts. The majority of respondents were not frequent ski travelers (61.60%) but those who often go skiing were also represented (38.40%).

*Data processing and analysis*

All close-ended questions were coded and subjected to descriptive data analysis using SPSS software, thus forming the core of the research findings. Additionally, free comments were grouped and integrated in the text.

Considering the non-probability sample of the survey and the nature of questions, most of the

**Table 1.** Demographic profile and trip characteristics of the sample (n=126)

Variables	Categories	Frequency	Valid Percent
Nationality	Bulgaria	112	88.89
	Great Britain	10	7.94
	Republic of Ireland	4	3.17
Age	< 20 years	2	1.61
	21-30 years	22	17.74
	31-40 years	51	41.13
	41-50 years	34	27.42
	51-60 years	13	10.48
	> 60 years	2	1.61
Gender	Male	67	53.17
	Female	59	46.83
Main purpose of the visit to Pamporovo	Skiing and snowboarding	69	54.76
	Walking and hiking	24	19.05
	Relaxation and entertainment	27	21.43
	Visiting cultural and sporting events	5	3.97
	Other	1	0.79
Skiing level	Expert	17	13.49
	Advanced	51	40.48
	Beginner	58	46.03
Frequent ski travelers	No	77	61.60
	Yes	48	38.40

data has been put through bivariate analysis comprising cross tabulations and measures of association. The strength of association between selected pairs of categorical variables was measured by Cramer's V, being a useful and simple coefficient applicable to cross-tabulations involving variables with more than two categories. In regards to multiple-response sets, the chi-square test of independence was used to find a relationship between variables. In both cases, approximate significance of results was calculated at the 0.05 level.

As for the differences in the means derived from the 5-point Likert scale questions, the non-parametric tests of Mann-Whitney and Kruskal-Wallis were run in order to test the statistical significance of results at the 0.05 level. They were preferred as appropriate over more precise parametric tests such as t-tests or ANOVA, since the survey data did not fulfil the assumptions of a random sample, normal distribution and equal population variances.

Although inferential statistics that calculate the significance of results, i.e. whether or not they can be generalised to the population, should be applied to random samples only, this rule is frequently violated in tourism research where estimates are made from non-probability samples (Finn *et al.*, 2000). In this particular study, inferential statistics were used as a rough benchmark for the quality of the survey results signifying the extent to which generalizations and conclusions could be made on their basis.

**Results**

***Tourists' perceptions on climate change***

*General views on climate change*

Tourists were asked if they considered climate change to be a world-wide threat. Given a scale from 1 to 5, with 5 being 'completely agree' and 1 – 'totally disagree', the final result from all the questionnaires scored a general mark of 4.4 - a result which indicates a very high level of acceptance of global climate

**Table 2.** *Perceptions of climate change being manifested at global, regional and local scale - level of respondents' agreement on a 5-grade scale*

		Climate change is a serious global problem			Climate change affects South-eastern Europe, including Bulgaria			Climate change represents a serious threat to snow sports in Pamporovo		
		Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
<b>Total</b>		<b>4.4</b>	<b>1.04</b>		<b>4.1</b>	<b>1.21</b>		<b>3.8</b>	<b>1.08</b>	
Importance of the weather conditions	Not important	3.2	2.05		2.8	1.79		3.2	1.79	
	Limited importance	3.7	1.41		3.6	1.33		4.2	0.83	
	Neutral	4.0	0.93	0.038*	3.4	1.06	0.009*	3.4	0.98	0.513
	Rather important	4.5	0.97		4.3	1.08		3.8	0.97	
	Very important	4.6	0.80		4.3	1.18		3.8	1.11	
Frequent travelers	No	4.4	1.06	0.880	4.2	1.18	0.225	3.8	1.06	0.389
	Yes	4.4	1.04		3.9	1.26		3.7	1.10	
Skiing level	Expert	4.8	0.97		4.4	1.33		4.4	1.17	
	Advanced	4.3	1.08	0.055	4.0	1.23	0.199	3.6	1.06	0.019*
	Beginner	4.3	1.02		4.1	1.16		3.7	1.01	
Nationality	Bulgarian	4.4	1.07	0.262	4.1	1.24	0.735	3.7	1.07	0.383
	Foreigner	4.2	0.89		4.1	0.95		4.0	1.11	
Age	<30 years	4.2	0.85		4.0	1.06		3.7	0.96	
	31- 40 years	4.4	1.03	0.150	4.2	1.25	0.157	3.7	1.18	0.902
	41 – 50 years	4.2	1.33		3.8	1.36		3.7	1.10	
	>50 years	4.9	0.36		4.6	0.67		4.0	0.95	
Gender	Male	4.4	1.07	0.394	4.1	1.26	0.982	4.0	1.08	0.012*
	Female	4.3	1.02		4.1	1.17		3.5	1.02	

Note: \* means significantly different (p<0.05) as measured by the tests of Mann-Whitney and Kruskal-Wallis

change phenomena. However, there was a sense of denial once the issue of climate change started becoming a more local threat. The level of agreement decreased to 4.1 once tourists were asked if climate change is a problem for South East Europe, including Bulgaria, and down to 3.8 when it came to the region of Pamporovo (Table 2). No considerable differences were observed regarding this trend between the sub-groups in the survey, though some variations did exist.

The breakdowns of scores as well as the results of statistical tests of difference (Table 2) reveal that perceptions concerning climate change issues at global and regional levels are associated with the perceived importance of weather conditions when choosing a winter holiday, while scores specifically regarding the Pamporovo Resort are affected by the skiing level and gender. Respondents, who gave higher importance to weather conditions, also gave higher scores for the issue of climate change being manifested at a global and regional level. No statistically significant differences among age categories were found, although respondents of the 50+ age group seemed to be more sensitive than younger

ones to climate change issues at all levels. There were also no significant differences in terms of the frequency of travel for skiing and nationality. Though not generalizable to the study population, the latter may indicate a general level of acceptance, probably due to the broad international coverage about the subject of climate change.

#### *Perceptions of climate change problems regarding the resort of Pamporovo*

Asked to identify current problems Pamporovo might face in connection with climate change, the majority of respondents were split between either confessing a shorter winter season or denying any climate-related issues at all, depending mainly on the extent to which Pamporovo resort was perceived as threatened by climate change (Table 3).

The shorter winter season, as perceived by tourists, indicates serious competitive problems for the resort, given the fact that this is one of the key indicators for economic and marketing resilience in relation to climate. The next climate related issue identified by 32.37% of the respondents was "higher temperatures". This indicator correlates with the one for "bad

**Table 3.** *Perceptions of climate-induced problems applying to Pamporovo Resort – share of valid cases by selected subgroups of respondents (column %)*

	Total	Extent to which Pamporovo Resort is threatened by climatic changes				Frequent ski travelers		Skiing level		
		More than others	Less than others	Similar to others	Undecided	No	Yes	Expert	Advanced	Beginner
A shorter winter season	<b>36.13</b>	62.96	25.00	33.33	20.69	29.58	44.68	47.06	31.91	36.36
None of the mentioned	<b>36.13</b>	7.41	50.00	40.74	51.72	45.07	23.40	35.29	29.79	41.82
Higher temperatures	<b>32.77</b>	51.85	12.50	31.48	20.69	30.99	36.17	35.29	34.04	30.91
Lack of real snow	<b>26.05</b>	48.15	0.00	20.37	24.14	23.94	29.79	5.88	23.40	34.55
Bad condition of snow	<b>16.81</b>	29.63	12.50	12.96	13.79	14.08	21.28	11.76	25.53	10.91
Unseasonal weather	<b>8.40</b>	11.11	0.00	11.11	3.45	5.63	12.77	11.76	10.64	5.45
N of valid cases	119	27	8	54	30	71	47	17	47	55
Chi-square				50.755					12.281	14.242
df				18					6	12
p-value				0.000 <sup>a,*c</sup>					0.056	0.286 <sup>a</sup>

Notes: A multiple response question - the sum of column percentages exceeds 100%

\* The Chi-square statistic is significant at the 0.05 level

a. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

c. The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid.

condition of snow”, as in warmer weather, snow on the pistes is either heavy and soft, or icy, which spoils the quality of skiing experience and even the holiday as a whole. Higher temperatures might also be a problem for the production of artificial snow, which according to current technology requires low temperatures for its production (Damm *et al.*, 2014). Ten tourists only, or 8.40% of all respondents, pointed out unseasonal weather as an issue.

With no considerable differences, all subgroups of the survey participants expressed a neutral opinion on the question whether the production of artificial snow in Pamporovo would

successfully compensate for climate fluctuations. Survey results indicate a slightly lower level of agreement with such an adaptation strategy in general than if particularly applied in the case of Pamporovo – 2.7 vs. 3.1 (Table 4).

The unclear position of the respondents on this question may be connected with the demonstrated uncertainty about the effect of climatic changes on the region, compared to the generally more accepted world-wide threat in regions and landscapes that are either typical examples or too distant to be worried about. Tourists’ opinions on both statements

**Table 4.** *Perceptions regarding artificial snow production - level of respondents’ agreement on a 5-grade scale (means)*

	Total	Importance of weather conditions					Frequent travelers		Skiing level		Nationality		Gender		
		Not important	Limited importance	Neutral opinion	Rather important	Very important	No	Yes	Expert	Advanced	Beginner	Bulgarian	Foreigner	Male	Female
Artificial snow production should be a primary method for counteracting climate change in ski tourism.	2.7	3.3	2.3	2.3	2.7	2.7	2.6	2.7	2.8	2.6	2.7	2.6	3.0	2.6	2.7
Test statistic				3.572			1,728.000			0.645		820.000		1,768.500	
p-value				0.467			0.445			0.724		0.354		0.590	
The production of artificial snow in Pamporovo would successfully compensate for climate fluctuations.	3.1	3.4	3.6	2.4	2.9	3.3	3.2	2.9	3.1	3.3	2.9	3.1	3.1	2.8	3.4
Test statistic				7.833			1,464.500			3.323		717.500		2,269.000	
p-value				0.098			0.234			0.190		0.878		0.004*	

Note: \* results significantly different ( $p < 0.05$ ) as measured by the tests of Mann-Whitney and Kruskal-Wallis

**Table 5.** *Levels of agreement with the statements associated with general attitudes to artificial snow production*

		Artificial snow production should be a primary method for counteracting climate change in ski tourism					The production of artificial snow in Pamporovo would successfully compensate for climatic fluctuations				
		Mean	SD	Test statistic	df	p-value	Mean	SD	Test statistic	df	p-value
Are you in favour of artificial snow production?	Yes (36.89%)	3.00	1.18				3.43	1.04			
	No (24.59%)	2.00	1.27	11.004	2	0.004*	2.64	1.34	9.464	2	0.009*
	Undecided (38.52%)	2.76	1.25				3.02	0.89			

Note: \* indicates means significantly different ( $p < 0.05$ ) as measured by the Kruskal-Wallis test

are also associated with the split attitudes to the production of artificial snow in general, and such a connection was confirmed as statistically significant (Table 5).

Asked to rate how much Pamporovo is threatened by climate change compared to the other major ski resorts in Bulgaria, the majority of tourists answered that the threat was as much as for the others (44.80%). Nearly a quarter saw it as more in danger or were undecided, while just 6.40% of all the survey participants considered the resort was more protected against potential climate change (Table 6). In general, these results demonstrate how difficult it is for lay people to judge the effects of climate change, especially in the future. In the case of Pamporovo, they give a comparatively moderate assurance regarding the relative vulnerability of the resort.

Cramer's V values reveal rather weak association between the perceptions how much Pamporovo Resort is threatened and most of the variables indicating tourist behaviour patterns (Table 6). Although not statistically significant, study results show that both the more dedicated skiers (42.55%) as well as those who do not travel often with the purpose of skiing (46.75%) are convinced that the threat for Pamporovo is similar to the other Bulgarian resorts. It is ranked higher by 27.66% of the regular skiers and 19.48% by those who ski or snowboard rarely. Those who often go skiing and those who travel to other countries for skiing were similar in their estimation, i.e. a tentative conclusion can be made that Pamporovo Resort is threatened either more or at the same level, but definitely not less than its competitors on the Bulgarian ski market. On the other hand, a stronger and statistically

**Table 6.** Perceptions regarding how much Pamporovo Resort is threatened by climate change compared to other major ski resorts in Bulgaria – share of respondents by selected subgroups (row %) and Cramer's V measures of association

		Extent to which Pamporovo Resort is threatened by climatic change				N of valid cases = 100%	Cramer's V	p-value
		More than others	Less than others	Similar to others	Undecided			
<b>Total</b>		<b>23.20</b>	<b>6.40</b>	<b>44.80</b>	<b>25.60</b>	125		
Frequent ski travelers	No	19.48	5.19	46.75	28.57	77	0.129	0.556
	Yes	27.66	8.51	42.55	21.28	47		
Skiing in other countries	No	20.00	7.06	45.88	27.06	85	0.108	0.703
	Yes	29.73	5.41	40.54	24.32	37		
Skiing in other BG resorts	No	16.98	5.66	45.28	32.08	53	0.163	0.359
	Yes	27.94	7.35	44.12	20.59	68		
Skiing level	Expert	29.41	11.76	41.18	17.65	17	0.145	0.514
	Advanced	28.00	2.00	46.00	24.00	50		
	Beginner	17.24	8.62	44.83	29.31	58		
Nationality	Bulgarian	24.32	7.21	48.65	19.82	111	0.377	0.000*
	Foreigner	14.29	0.00	14.29	71.43	14		
Main purpose of the visit	Skiing & snowboarding	27.94	2.94	36.76	32.35	67	0.295	0.001*
	Walking & hiking	8.33	4.17	54.17	33.33	24		
	Relax & entertainment	29.63	11.11	51.85	7.41	27		
	Visiting cultural & sporting events	0.00	20.00	80.00	0.00	5		
	Other	0.00	100.00	0.00	0.00	1		

Note: \* indicates a significant relationship between the variables ( $p < 0.05$ ) as measured by Cramer's V

significant association was revealed between perceived threat and the respondents' nationality and the main purpose of their visit. The greatest majority of foreigners answered with "undecided" to this question while most of domestic respondents saw it threatened similar to others or more in danger. Survey participants, whose main purpose for visiting was skiing and snowboarding, demonstrated a bit higher concern (27.94%) while 1/3 of them were undecided. The majority of those coming to Pamporovo for other activities perceived it as equally threatened.

### ***Tourists' perceptions regarding climate change adaptation strategies***

#### ***Demand-side adaptation strategies***

In academic literature the question of how tourists will react towards unsuitable weather and ski conditions is of key importance in attempts to predict the customers' adaptation strategies. In the current survey, a number of multiple response choices were offered to tourists in the event of insufficient snow for skiing and snowboarding (Table 7).

The majority of respondents (45.97%) would go to ski in another country, with the preferred options according to the free answers being Austria, Italy and France. Cross tabulation of the answers confirms the assumption that the geographical substitution is highly dependent on skiing abilities – from the experts subgroup 76.47% travel to other countries to ski; the advanced skiers subgroup is almost split equally, while only 32.76% of the beginners would chose this alternative. Logically, skiing abroad was chosen by the highest share of tourists whose main reason for coming to Pamporovo was for skiing and snowboarding (56.72%).

Surprisingly, the second most popular answer was 'another mountain activity' which was selected by 42.74% of the respondents. It could be connected to the rising popularity of other activities such as snowshoeing, sledging, ski touring, which can still be practiced when there is snow that is not ideal for skiing or snowboarding on piste. This is a new demand trend which could successfully compensate for

**Table 7.** Preferred choices if there was not sufficient snow for skiing and snowboarding in Pamporovo Resort – share of valid cases by selected subgroups of respondents (column %)

	Skiing level				Main purpose of the visit				Extent to which Pamporovo is threatened by climatic change			
	Total	Expert	Advanced	Beginner	Skiing & snowboarding	Walking & hiking	Relax & entertainment	Visiting cultural & sporting events	More than others	Less than others	Similar to others	Undecided
Ski holiday in another country	<b>45.97</b>	76.47	51.02	32.76	56.72	29.17	33.33	40.00	48.28	50.00	39.29	54.84
Another mountain activity	<b>42.74</b>	52.94	32.65	48.28	29.85	66.67	44.44	80.00	34.48	62.50	48.21	35.48
Another higher-lying resort in BG	<b>15.32</b>	29.41	22.45	5.17	19.40	4.17	14.81	20.00	24.14	0.00	17.86	6.45
Another non-mountain destination	<b>13.71</b>	5.88	6.12	22.41	10.45	4.17	33.33	0.00	27.59	25.00	7.14	9.68
Still the Pamporovo Resort	<b>5.65</b>	5.88	6.12	5.17	4.48	16.67	0.00	0.00	0.00	0.00	7.14	9.68
N of valid cases	124	17	49	58	67	24	27	5	29	8	56	31
Chi-square				30.583				46.441				22.328
df				10				20				15
p-value				0.001*				0.001*				0.099

Notes: A multiple response question - the sum of column percentages exceeds 100%

\* The Chi-square statistic is significant at the 0.05 level

poor snow conditions and clearly demonstrates the need for diversification of the products on offer in Pamporovo and in the mountain resorts in general.

Only 15.32% of the respondents chose going to ski at another higher-lying resort in Bulgaria as an alternative. Analyzing by subgroups, this answer was chosen by 29.41% of the experts and 22.45% of the advanced skiers but by only 5.17% of the beginners. Such a result could be linked to the prevailing opinion of the majority of tourists that all major Bulgarian ski resorts are to a similar extent under the threat of climate change, so they do not expect that the conditions for winter sports would be significantly better or worse.

A non-mountain destination would be chosen by 13.71% of the respondents if weather and snow conditions were not good enough, and the share of such answers was similar among those who considered the Pamporovo resort as either more or less threatened by the climate changes compared to other Bulgarian ski resorts. Considering the level of skiing and the main purpose of the visit, it was more strongly preferred by beginner skiers and those coming for relaxation and entertainment.

Only a very small part of the respondents would still come to Pamporovo, despite unsuitable weather conditions (5.65%). There did not seem to be any connection with skiing abilities, as they were equally split between subgroups. A relatively higher share of such intentions was observed only among tourists for whom the main purpose of their visit was walking and hiking (16.67%), as well as among those who were undecided in terms of how much Pamporovo is threatened by climate

*Supply-side adaptation as seen by tourists*  
It is interesting to analyze the tourists' perceptions and views about the current adaptation strategies that are offered in the resort by the tourism business, the main one indisputably being the production of artificial snow. As discussed above, the opinion whether the production of artificial snow currently manages to compensate for those days with unfavorable ski conditions was neither positive nor negative among all sub groups of the survey participants (Table 4). Furthermore, 38.52% of the respondents were undecided on the question whether they support artificial snow production in general. One reason for this might be the technical practicalities which are not familiar to ordinary visitors, as well as the inability to judge between the pros and cons of the two main rationales behind its supporters and deniers. For the supporters (36.89%) the main reason is the fact that it is impossible to maintain the ski season without artificial snow, while the deniers (24.59%) mainly point out environmental and high resource consumption arguments. Examples of the most illustrative free answers in both cases are presented in Table 8:

From a consumer point of view, artificial snow nowadays is a must, and only 17.91% of those who had come to Pamporovo with the main reason being skiing and snowboarding stated an opinion against it. The percentage of the deniers between the other sub groups, whose main aim was not skiing, was higher - between 25% and 60% (Table 9). Logically, for 55.56% of the deniers weather and climate conditions are less important when choosing their holiday, and those who are undecided pay very little attention to snow and temperatures.

**Table 8.** Selected free answers to the question 'Are you in favour of artificial snow production?'

Yes, why?	<ul style="list-style-type: none"> <li>*it allows skiing when there is not sufficient snow</li> <li>*it gives independence from the other conditions</li> <li>*otherwise, there is no chance of skiing most of the days</li> <li>*it helps enlarge the ski season</li> <li>*because I do not know another alternative</li> </ul>
No, why?	<ul style="list-style-type: none"> <li>*I prefer real snow</li> <li>*artificial snow is of bad quality and it is bad for the environment</li> <li>*it wastes a lot of resources so that can't be justified</li> <li>*chemicals are used that stay in nature afterwards</li> <li>*if there isn't enough snow, the place is simply not supposed to be a ski resort</li> </ul>

**Table 9.** 'Are you in favour of artificial snow production?' – Share of valid cases by selected subgroups of respondents (row %) and Cramer's V measures of association

		Are you in favour of artificial snow production?				Cramer's V	p-value
		Yes	No	Undecided	N of valid cases = 100%		
<b>Total</b>		<b>36.89</b>	<b>24.59</b>	<b>38.52</b>	<b>122</b>		
Main purpose of the visit	Skiing & snowboarding	38.81	17.91	43.28	67	0.215	0.187
	Walking & hiking	29.17	25.00	45.83	24		
	Relax & entertainment	44.00	36.00	20.00	25		
	Visiting cultural & sporting events	20.00	60.00	20.00	5		
	Other	0.00	0.00	100.00	1		
Importance of snow / weather conditions	Not important	22.22	55.56	22.22	6	0.188	0.398
	Limited importance	14.29	14.29	71.43	9		
	Neutral opinion	39.22	23.53	37.25	7		
	Rather important	39.13	21.74	39.13	51		
	Very important	36.13	25.21	38.66	46		
Frequent ski travelers	No	33.78	27.03	39.19	74	0.093	0.593
	Yes	42.55	21.28	36.17	47		
Skiing abroad	No	31.71	24.39	43.90	82	0.169	0.185
	Yes	45.95	27.03	27.03	37		
Skiing in other Bulgarian resorts	No	34.00	28.00	38.00	50	0.075	0.717
	Yes	39.71	22.06	38.24	68		
Skiing level	Expert	25.00	31.25	43.75	16	0.153	0.224
	Advanced	48.00	16.00	36.00	50		
	Beginner	30.36	30.36	39.29	56		
Nationality	Bulgarian	37.96	25.93	36.11	108	0.140	0.301
	Foreigner	28.57	14.29	57.14	14		
Age	< 30 years	26.09	13.04	60.87	21	0.194	0.170
	31-40 years	45.83	20.83	33.33	48		
	41-50 years	35.29	35.29	29.41	34		
	> 50 years	33.33	26.67	40.00	2		
Gender	Male	35.38	33.85	30.77	65	0.241	0.029*
	Female	38.60	14.04	47.37	57		

Note: \* indicates a significant relationship between the variables ( $p < 0.05$ ) as measured by Cramer's V

Those who regularly travel for skiing and snowboarding (both in Bulgaria and abroad) are among the strongest supporters of the production of artificial snow. It has already become a norm in ski resorts nowadays and regular skiers are accustomed to its existence on pistes, either as a support for a longer season when used as a solid base or as a guarantee of snow in snow-scarce periods. Interestingly, only 25.00% of expert skiers are

in favour of artificial snow. There are several possible explanations for this – they are much more pretentious towards snow conditions based on their experience; based on their higher mountain expertise, they are more likely to switch piste skiing to another mountain activity, i.e. off-piste skiing or ski touring; they are more environmentally cautious and aware of the potential risks. Although split in their opinions domestic tourists were rather in favour



of artificial snow production (37.96%), while the majority of foreigners were undecided (57.14%). The age segments that were least in favour of artificial snow production were young people less than 30 years old. Only 14.04% of women were strongly against artificial snow production, while deniers among men accounted for 33.85%.

However, the above presented results should be considered with caution, as the Cramer's V measures of association reveal a rather weak connection between the respondents' answers to the question and their profile and behavioural patterns. A relatively stronger relationship between the variables is observed in terms of the main purpose of visit, age and gender, while statistically significant results refer to gender only.

When asked about the recommended changes in the resort of Pamporovo to improve offerings for tourists during the winter season, only 8.87% of the survey participants shared the

opinion that there was a need to increase the production of artificial snow, whilst 20.97% required that more pistes and lifts should be constructed. For just 2.42% of the respondents nothing needed changing in the tourist offering of the resort (Table 10). On the other hand, the most desired change in the tourist supply was the addition of a variety of new winter products and attractions such as snowshoeing, cross-country skiing, ski touring, etc. (59.68%), closely followed by the need for more opportunities for local cultural and natural experiences (58.87%).

Statistically significant differences between subgroups were found in regards to the respondents' frequency of ski travels, nationality and age, though the majority within all subgroups demanded either adding new winter activities or creating more opportunities for cultural and natural experiences, or both of these options (Table 10). On the other hand, frequent skiers, foreigners and young tourists below 30 years of age gave relatively higher

**Table 10.** Recommended changes to improve the Pamporovo offering during the winter season – share of valid cases by selected subgroups of respondents (column %)

Recommend changes to improve Pamporovo's offering during the winter season	Total	Frequent ski travelers		Nationality		Age group			
		No	Yes	Bulgarians	Foreigners	< 30 years	31-40 years	41-50 years	> 50 years
Add new winter products and attractions (snowshoeing, cross country skiing, ski touring)	<b>59.68</b>	65.79	48.94	60.91	42.86	54.17	54.00	66.67	73.33
Create opportunities for traditional local cultural and natural experiences	<b>58.87</b>	61.84	57.45	58.18	71.43	70.83	66.00	51.52	33.33
Make more pistes and lifts	<b>20.97</b>	10.53	36.17	20.00	28.57	37.50	20.00	18.18	6.67
Other suggestions	<b>18.55</b>	14.47	25.53	20.00	7.14	12.50	24.00	21.21	6.67
Increase the production of artificial snow	<b>8.87</b>	2.63	19.15	10.00	0.00	8.33	12.00	6.06	6.67
There is nothing to change	<b>2.42</b>	2.63	2.13	0.91	14.29	0.00	0.00	0.00	20.00
N of valid cases	124	76	47	110	14	24	50	33	15
Chi-square		27.542		15.436		41.996			
df		6		6		18			
p-value		0.000 <sup>a,*</sup>		0.017 <sup>a,b,*</sup>		0.001 <sup>a,b,*</sup>			

Notes: A multiple response question - the sum of column percentages exceeds 100%

\*. The Chi-square statistic is significant at the 0.05 level.

a. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

b. The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid.

support to the construction of more pistes and lifts. Increased production of artificial snow received somewhat stronger support (19.15%) from frequent skiers only.

Generally, the demonstrated interest in a wide range of tourism products by all subgroups of respondents is a clear indicator that skiing cannot be the only activity in a modern mountain resort, and the needs of tourists nowadays are highly diverse in terms of experiences and attractions. Such expectations entail a significant change in the current tourist offering of Pamporovo – from only a pure ski and snowboard resort, to a place offering a product that meets the new requirements in terms of new exciting activities and non-piste related winter sports. Furthermore, the need for authentic local experiences is nowadays a requirement not only for specialized tourism markets but is also becoming the new norm even in mass tourism. These options seem also to be the logical choice for each ski resort as a reaction to the threat of climate change, against requirements to intensify artificial snow production. Obviously, although a must, there

comes a limit when the artificial snow-based adaptation strategy can no longer be applied without diversifying the product. Another conclusion that can be drawn from the demand side requirements is that climate change should be considered a threat only in combination with other market driven requirements and trends, and adaptation measures should comply with a long list of other factors.

A list of attraction alternatives was offered to the respondents to choose from, and all of them received considerable approval with the most popular being winter walking tours, spa and wellness, and snowshoeing. Statistically significant results refer to the respondents' frequency of ski travels, skiing level, nationality, age group and gender (Table 11).

Winter walking would be practiced by the greatest majority of respondents in all subgroups, with the exception of foreign and youngest tourists. Spa and wellness services would attract 2/3 of females, more than 1/2 of beginner skiers and of those who are not

**Table 11.** *Alternative activities that would be of interest if offered in Pamporovo – share of valid cases by selected subgroups of respondents (column %)*

	Total	Frequent ski traveler		Skiing level			Nationality		Age group				Gender	
		No	Yes	Expert	Advanced	Beginner	Bulgarians	Foreigners	< 30 years	31-40 years	41-50 years	> 50 years	Male	Female
Winter walking	<b>53.23</b>	50.00	57.45	70.59	54.00	47.37	58.56	7.69	37.50	66.00	50.00	50.00	47.69	59.32
Spa & wellness	<b>46.77</b>	56.58	31.91	29.41	46.00	52.63	46.85	46.15	41.67	54.00	44.12	42.86	30.77	64.41
Snowshoeing	<b>39.52</b>	35.53	46.81	52.94	34.00	40.35	42.34	15.38	37.50	42.00	47.06	7.14	46.15	32.20
Sledging	<b>34.68</b>	31.58	40.43	47.06	28.00	36.84	30.63	69.23	58.33	40.00	14.71	28.57	41.54	27.12
Ice skating	<b>32.26</b>	34.21	29.79	41.18	28.00	33.33	29.73	53.85	41.67	30.00	38.24	7.14	24.62	40.68
Visits to sporting & cultural events	<b>29.84</b>	30.26	27.66	23.53	24.00	36.84	30.63	23.08	29.17	38.00	20.59	28.57	26.15	33.90
Ski touring	<b>25.81</b>	13.16	46.81	58.82	38.00	5.26	27.03	15.38	37.50	30.00	17.65	14.29	24.62	27.12
Cross-country skiing	<b>19.35</b>	11.84	31.91	35.29	22.00	12.28	17.12	38.46	33.33	18.00	14.71	14.29	13.85	25.42
N of valid cases	124	76	47	17	50	57	111	13	24	50	34	14	65	59
Chi-square		35.167		44.381			30.924		43.726				28.388	
df		8		16			8		24				8	
p-value		0.000*		0.000*			0.000 <sup>a</sup> *		0.008*				0.000*	

Notes: A multiple response question - the sum of column percentages exceeds 100%

\*. The Chi-square statistic is significant at the 0.05 level.

a. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

frequent ski travelers as well as more than 40% of advanced skiers, both domestic and foreign tourists, and all age groups. Snowshoeing would be preferred by a considerable share (>40%) of frequent ski travelers, expert skiers, males and tourists of 31-50 years of age while sledging and ice skating would be a desired option for the majority of foreign tourists and youngest customers. Organized sporting and cultural events would attract 20% - 40% of the respondents in all subgroups but most of all the 31-40 years age group, beginner skiers and female tourists. Ski touring would be a preferred option for frequent ski travelers, expert and advanced skiers as well as younger tourists while cross-country skiing would attract mainly expert skiers and a considerable share of foreigners.

Regarding the overall vision for the future development of Pamporovo, strongest support was given to the idea that it should be converted into an all-year resort – 68.80% of the respondents (Table 12). Less than 1/5 of the survey participants stated that Pamporovo should be a ski resort with a strong summer season as well, while just 12.00% shared the

opinion that ski tourism should be the main focus in its future development. Answers to this question were relatively higher associated with the respondents' main purpose of visit and frequency of ski travels, while relationships with other studied categories appeared weaker and not statistically significant.

Even tourists coming to Pamporovo primarily for skiing and snowboarding, gave the strongest support to the year-round vision of the resort's future development (55.88%), while just 19.12% of them considered it should mainly be a winter resort focused on ski tourism. The perceptions of frequent skiers were quite similar, while those who were not so keen on skiing were almost 80% in favour of the all-year development oriented towards nature and traditions, with only 7.89% seeing the future of Pamporovo focused mainly on ski tourism.

It is not a big surprise that the year-round alternative was relatively less supported by those tourists who thought that more pistes and lifts should be made in Pamporovo as well as by those who considered the production of

**Table 12.** Supported overall vision for the future development of Pamporovo - % of respondents by selected subgroups (column %)

	Total	Main purpose of the visit					Frequent ski traveler		Skiing level			Gender	
		Skiing & snowboarding	Walking & hiking	Relax & entertainment	Visiting cultural & sporting events	Other	No	Yes	Expert	Advanced	Beginner	Males	Females
An all year round resort orientated to nature & traditions, offering varied tourist attractions	<b>68.80</b>	55.88	87.50	88.89	40.00	100.0	77.63	56.25	64.71	56.00	81.03	61.19	77.59
A ski resort with high occupancy also during the summer	<b>17.60</b>	25.00	8.33	7.41	20.00	0.00	11.84	25.00	17.65	24.00	12.07	20.90	13.79
Mainly a winter resort focused on ski tourism	<b>12.00</b>	19.12	0.00	0.00	40.00	0.00	7.89	18.75	17.65	18.00	5.17	14.93	8.62
Other	<b>1.60</b>	0.00	4.17	3.70	0.00	0.00	2.63	0.00	0.00	2.00	1.72	2.99	0.00
N of valid cases = 100%	125	68	24	27	5	1	76	48	17	50	58	67	58
Cramer's V				0.261			0.271		0.192			0.197	
Approx. p-value				0.012*			0.028*		0.163			0.182	

Note: \* indicates a significant relationship between the variables ( $p < 0.05$ ) as measured by Cramer's V

artificial snow should be increased (Table 13). Yet, the year-round vision prevailed even within these subgroups (42.31% and 36.36% respectively), though other options were also rather popular among them.

## Discussion

The survey results have demonstrated a high level of acceptance about the threat of climate change worldwide, which is not surprising (Unbehaun *et al.*, 2008). This phenomenon in its physical and social dimension has been in the public domain for many years now and tourists are well informed about the issue, without any significant differences between age, gender, level of skiing. However, the local features of the potential threats climate change could bring seem to be rather unclear. This result is valid for all sub groups of the studied visitors to the Pamporovo ski resort, apart from the skiing ability and gender sub groups, with expert skiers (as in Dawson *et al.*, 2011) and men being more convinced of local climate impacts. Logically, a large proportion of tourists completely deny any signs of climate change

during winter in Pamporovo, despite totally agreeing with the world wide threat. The examples identified in the literature review also demonstrate that the more local the potential risk becomes, the more it is denied. Trawoger (2014) summarizes previous research on climate change risks and perceptions that people predominantly expect climate change to occur in the future and to affect geographically distant regions.

Discussing the region of Pamporovo, the following issues have been identified as most frequently occurring: a shorter winter season, higher temperatures and bad snow conditions. These three identified problems play a vital role in the stability of each ski resort (Steiger *et al.*, 2017). The number of operation days during the winter season is connected to the resort's financial stability. Higher temperatures mean that there might be a problem with real snow and, with current technology, the ability to produce artificial snow. The quality of both natural and artificial snow is vital for the satisfaction with the skiing experience.

**Table 13.** Supported overall vision for the future development of Pamporovo – column % within recommended changes in the resort's tourism offering

	Make more pistes and lifts	Increase the production of artificial snow	Add new winter products and attractions	Create opportunities for traditional local cultural & natural experiences	Other suggestions	There is nothing to change
An all year round resort orientated towards nature and traditions	42.31	36.36	68.92	71.23	65.22	66.67
Mainly a winter resort focused on ski tourism	26.92	18.18	9.46	8.22	13.04	33.33
A ski resort with high occupancy also during the summer	30.77	36.36	20.27	20.55	17.39	0.00
Other	0.00	9.09	1.35	0.00	4.35	0.00
N of valid cases = 100%	26	11	74	73	23	3
Chi-square	32.660					
df	18					
p-value	0.018 <sup>a,b,c</sup>					

Notes: \* The Chi-square statistic is significant at the 0.05 level.

b. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.

c. The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid.

Opinions on artificial snow are two-fold. First, it has become the norm nowadays, with all ski resorts strongly relying on it to be able to offer long enough seasons, to guarantee a good snow base on the pistes, or to use it as a complete alternative if the season has a scarce snowfall. Tourists are used to it and they expect it as a requisite snow-free guarantee. The prevailing neutral opinion on artificial snow demonstrates a high degree of uncertainty on the method of its production and its environmental, social and economic impacts. It is clear that although seen as a must-have, artificial snow cannot replace real snow in terms of quality and tourist enjoyment (Unbehaun *et al.*, 2008). The fact that 25% of tourists express negative feelings towards it, and 39% are undecided, clearly indicates that in the long term it cannot fulfill the ever rising customer requirements and cannot be a sole long-term adaptation strategy. Its role is strictly connected to activities on piste and therefore, it should have only a complementary function in the overall adaptation process.

Although Pamporovo is rated by the majority of tourists as being equally (not stronger) threatened by climate change compared to the other two big Bulgarian ski resorts, a comparatively large proportion of skiers plan to substitute it with a ski resort in the Alps. It must be noted though that such intentions are not only associated with climate changes and higher snow reliability, especially in the higher Alpine ski resorts, but also with other factors like the number and length of ski runs, as well as the pricing factor. It is not only a planned and desired alternative for no-snow winters, but already an established trend which threatens a loss of client base for the three major Bulgarian ski resorts.

Clearly, the future of the Pamporovo resort is identified by the tourists' preferences, and this is for the solid diversification of services on offer. It would, to a certain extent, solve the 'snow' problem and is supported by all the ski level groups. Such a trend has been identified for some resorts in the Alps, where rather than relying on technology, stimulating skiing only, the demand is turning towards 'diversification of the use of free time in mountain areas and towards products [...] more adapted to

sustainable development' (Macchiaveli, 2009, p.110).

An extra threat for resorts like Pamporovo, that generally attract the beginners' subgroup, has been revealed in the survey. The fact that novice skiers are more likely to completely stop going to mountains for their winter holiday and to choose a destination away from the mountains instead, has previously been identified in another study by Dawson *et al.* (2011) and confirmed in the Pamporovo survey as well. The loyal segment of tourists, on the other hand, is statistically too small to be used as a stable customer group.

Diversification and all year tourism are chosen by tourists as the logical alternative that would also compensate for the already observed and potential new changes in climate, with skiing and snowboarding being just a part of a bigger marketing offer. Bourdeau (2009, p. 44) in his analysis of the 'worn-out' model of the established ski tourism calls for the development of four season resorts, relying on the 'four spaces' comprising mountain territories such as resorts, villages, protected areas, market town centres; the 'four activities' – agriculture, crafts-services, recreation, information and communication, and on the 'four economies' – production, public, residential, social. In this context, climate change is seen as 'a catalyst' for deeper structural changes (Bourdeau, 2009) that seem necessary in the case of Pamporovo ski resort, too.

A word of caution should be said about the year-round development of ski resorts, as this will put them in the strong competition with the summer destinations and city break destinations (Macchiaveli, 2009), but in times of an unclear climate future it may be time the mountain resorts return to their original climatic resort functions as summer cooling retreats and capitalize on the opportunities presented by the changing weather.

## Conclusion

The presented survey studied the perception of tourists in a Bulgarian ski resort towards climate change and its importance and influence over future tourism development. The

questionnaire design aimed to research a broad spectrum of themes, since such a survey has not been conducted so far among Bulgarian skiers and snowboarders.

The study results have revealed interesting insights that can be summarized in several aspects. First, they have demonstrated a very high level of acceptance regarding the threat of climate change in its global aspect but identified a split in opinions on the degree of vulnerability of the Bulgarian resorts, including Pamporovo. Second, demand side adaptation strategies have posed serious challenges but also essential guidelines to the future of Pamporovo ski resort - if there are snow scarce years in the winters to come, Bulgarian skiers would: 1) continue to choose the Alps as a substitute, sometimes changing with other Bulgarian resorts; 2) be more willing to participate in other mountain activities, different from traditional skiing and snowboarding on piste; 3) a small proportion of them may even completely stop visiting the mountains in winter. Third, tourists are neutral to the role of artificial snow as an adaptation mechanism and have diametrically opposing views on its usage in general, for environmental, social and economic reasons. Last but not least, the majority of the respondents shared the opinion that the future of the studied ski resort of Pamporovo depends on diversification of the services and activities offered, as well as its conversion into a year-round destination. All the findings correlate with previous research in the area in other countries.

Yet the survey has limitations that have affected the results' reliability and statistical significance. These refer to the use of a non-probability sampling technique (convenience sampling) combined with a small sample size (126 respondents) and a limited period for survey implementation (March 2018), which were determined by a number of objective and subjective factors, mainly paucity of funding for the survey. Therefore, the results are not representative and should be considered as outcomes of an exploratory study, i.e. providing important insights about the tourists' perceptions on climate change and the future of Pamporovo ski resort, but not definite

conclusions regarding the resort's current vulnerability and future adaptation strategies.

Considering the above limitations, future research on climate change adaptation mechanisms among Bulgarian skiers and snowboarders, and those visiting Pamporovo, has to be based on much larger samples and longer periods of investigation. Additionally, it has to be broadened by analyzing past activity or destination substitution in years with recorded low snow falls and higher temperatures. Another useful insight about tourist behaviour will be a study of the degree to which skiers and snowboarders make use of the alternative winter products and services on offer nowadays and the extent to which these can help overcome effects of poor and unsuitable weather conditions. Taking into account the complexities of tourist reactions, an analysis of past and current demand adaptation mechanisms will help to identify the possible direction of future tourist behaviour.

Finally, tourist perceptions should not be absolutized but instead integrated into wider-scope research incorporating other parties involved in tourism development at a destination level. To get an overall picture of the climate change vulnerability of the selected ski resort of Pamporovo, future studies should focus on other stakeholders, particularly representatives of the tourism industry and the local population. The combined results of these would give the basis for the design of a climate changes adaptation strategy on a company management level or at a local destination level. Especially at the local and regional level, such a strategy should be a key part of the overall economic development policy, considering the significant importance of the sector.

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## Annex 1: Questionnaire layout

Dear Madam / Sir,

This survey is conducted within a doctoral dissertation research at the Geography of Tourism Department at Sofia University 'St. Kliment Ohridski'. The ultimate goal of the study is to assess the vulnerability of ski tourism to climate change and the ability of the Pamporovo resort to adapt. The results obtained will be used for identifying sustainable adaptation measures and strategies to combat the negative impacts of climate change. The survey is completely anonymous and the results will only be used for scientific purposes.

### 1. What motivated you to choose Pamporovo for your winter vacation? (> 1 answer possible)

- |  |  |
|--|--|
| <input type="checkbox"/> Attractive price                  | <input type="checkbox"/> Transport connections |
| <input type="checkbox"/> Favourable climate                | <input type="checkbox"/> Beautiful landscape   |
| <input type="checkbox"/> Suitable pistes                   | <input type="checkbox"/> Sufficient snow       |
| <input type="checkbox"/> Comfortable accommodation         | <input type="checkbox"/> Good food             |
| <input type="checkbox"/> Interesting additional activities | <input type="checkbox"/> Other _____           |

### 2. In your opinion, which of the following applies to Pamporovo Resort? (> 1 answer possible)

- |   |  |
|---|--|
| <input type="checkbox"/> A shorter winter season                                  | <input type="checkbox"/> Unseasonal weather  |
| <input type="checkbox"/> Lack of real snow  | <input type="checkbox"/> Higher temperatures |
| <input type="checkbox"/> Bad condition of snow (heavy soft snow or ice on pistes) |  |
| <input type="checkbox"/> None of the above  |  |

### 3. To what extent do you agree with the following statements? (5 – totally agree; 1 – completely disagree)

- |  |           |
|--|-----------|
| 1) Climate change is a serious global problem  | 1 2 3 4 5 |
| 2) Climate change affects South-Eastern Europe, including Bulgaria   | 1 2 3 4 5 |
| 3) Climate change represents a serious threat to snow sports in Pamporovo  | 1 2 3 4 5 |
| 4) Artificial snow production should be a primary method for counteracting climate change in ski tourism.        | 1 2 3 4 5 |
| 5) The production of artificial snow in Pamporovo would successfully compensate for fluctuations in the climate. | 1 2 3 4 5 |

### 4. Are you in favour of artificial snow production?

- Yes, why? \_\_\_\_\_
- No, why? \_\_\_\_\_
- Undecided

### 5. What would you recommend changing in Pamporovo to improve offerings for tourists during the winter season? (more than 1 answer possible)

- There is nothing to change
- Make more pistes and lifts
- Increase the production of artificial snow
- Add new winter products and attractions (snowshoeing, cross country skiing, ski touring, etc.)
- To create opportunities for traditional local cultural and natural experiences
- Other suggestions \_\_\_\_\_

### 6. Have you visited the region of Pamporovo in other seasons?

- Never       Rarely       Often

**7. What should the overall vision be for the future development of Pamporovo resort? (1 answer, please)**

- Mainly a winter resort focused on ski tourism  
 A ski resort with high occupancy also during the summer  
 An all year round resort orientated towards nature and traditions, offering varied tourist attractions  
 Other \_\_\_\_\_

**8. Which of the following alternative activities would be of interest to you if offered here? (more than 1 answer possible)**

- Cross-country skiing  
 Ski touring  
 Sledging  
 Ice skating  
 Winter walking  
 Snowshoeing  
 Spa & wellness  
 Visits to organized sporting and cultural events

**9. In your opinion, to what extent does the Pamporovo resort suffer from the impact of climate change compared to other major ski resorts in Bulgaria?**

- More than others  
 Less than others  
 Similar to others  
 Undecided

**10. If weather forecasts predict lack of snow and high temperatures, I would prefer my winter break to be (more than 1 answer possible):**

- At another higher-lying resort in Bulgaria  
 A ski holiday in another country  
 Another mountain activity  
 At another non-mountain destination  
 Still at Pamporovo because \_\_\_\_\_

**11. What is the main purpose of your visit to Pamporovo? (only 1 answer, please)**

- Skiing & snowboarding  
 Walking and hiking  
 Other \_\_\_\_\_  
 Relaxing recreation and entertainment  
 Visiting cultural and sporting event

**12. To what extent is the presence of suitable snow and climatic conditions a decisive factor for you personally when choosing a winter break?**

- Not important    Slight importance    Neutral    Fairly important    Very important

**13. Do you often travel for skiing and snowboarding?**    No    Yes

**14. Have you gone skiing/snowboarding in other countries?**    No    Yes  
(Where?) \_\_\_\_\_

**15. Have you gone skiing/snowboarding in other BG resorts?**    No    Yes  
(Where?) \_\_\_\_\_

**16. What level of skier are you?**    Expert    Experienced    Beginner

**17. Where are you from?** \_\_\_\_\_

**18. Age:**

- Under 20    20-30    30-40    40-50    50-60    Over 60

**19. Gender:**    Male    Female

**Thank you for your cooperation!**