

Empirical Research on the Impact and Awareness of climate Change on the Security in the Republic of Macedonia

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Abstract

This paper presents an ambitious attempt to measure the impact and awareness of climate change and to confirm some significant assumptions presented in several hypothetical views. The paper has a theoretical approach in the first part, articulated through the analysis of existing scientific and technical literature that takes interest in the issues related to climate change and its impact. In addition, the empirical analysis is based on evidence of several hypotheses by applying statistical methods of examinees from Macedonia. Specifically are proven the following hypotheses: Climate change is affecting the health and safety status of the population; Climate change has impact on agriculture; The consequences of climate change in the next century will mostly affect poverty and the spread of diseases; The automobile traffic has the greatest impact on the creation and release of glass gases in the atmosphere; NGOs, government institutions and academic staff contribute to greater participation in the management and mitigation of climate change and the melting of the Arctic in the future may cause political confrontations due to the desire to control the Arctic region. The validation and verification of the survey research is supported by the implementation of the chi-square statistical tests that uses the software package for statistical analysis SPSS.

Keywords: Climate change; National security; Geopolitical trends; Health security; Statistical analysis

Introduction

The complexity of the questions that arise from the challenges that create climate changes leaves profound reflection upon the theoretical problems that are related with them. Suggestions are becoming more and more urgent for getting practical solutions for the current transformations of the structure of the modern societies. In scientific and political circles, as well as the media and other segments of the society, prevail "live" discussions about the climate changes for the migration, refugees, the consequences upon the environment, agriculture, etc. The opinions and notions about the activities that arise out of this kind of discussions are not always that convincing. The countries' reaction is still insufficient over this kind of challenges putting the weight on dealing with the dangers or risks that are generated from the military factor, terrorism and other asymmetrical threats upon the security. In the future, the challenges that target the environment would take serious place on the list of threats that destabilize the global safety, and that would generate serious implications upon the national security of the countries. In all areas and levels, managing the environment is simultaneously complex and very important process. As a result of the increased demographic growth and the major pressure upon the environment, the actualizations of the climate changes, pandemics, diseases and natural catastrophes also produce the emergence of extreme rigorous conditions upon mankind. However, all abovementioned relations i.e., reasons, consequences and trends could not be analyzed as data that can serve to make relevant, satisfactory decisions for taking proper measures as far as they stand on a level of doubt, presumption or hypothesis. They need to be scientifically confirmed and also proven,

which an exceptionally complex task is. Simultaneously, the following task that comes afterwards is actually their representation into logical, comprehensible, concise and usable form. Therefore, the actualization of the issue about climate changes through indicators is exactly an ambitious attempt – to be fabricated a report, an image of the condition of a man, one of the endangered species to be presented with as many quantitative data gained through scientifically established measures or analyses that lead and refer to the sources, causes, consequences and the trends of degradation and severity of the consequences upon the environment and mankind.

This article represents an ambitious attempt to measure the influence of the climate changes and to confirm some significant assumptions stated through several hypothetical views. The empirical analysis is based upon proving of the following hypothesis: 1. The climate changes have an impact on health security and the condition of the population. 2. Climate changes have an impact on agriculture. 3. Consequences from the climate changes in the following century will most likely have an impact on poverty and spreading of diseases. Automobile traffic has the biggest impact for creating, releasing and emitting greenhouse gases into the atmosphere. 5. Non-governmental organizations, state institutions and the academic staff contribute for bigger participation in dealing with and alleviating the climate changes. 6. In the near future, the melting of the Arctic can cause political confrontations as a result of the wishes for controlling the Arctic region. A research has been made on 120 respondents in the Republic of Macedonia with a questionnaire that served to measure the attitudes towards the significance of the climate changes. Data analyses are made with a software package for statistical data processing SPSS

(Statistical Program for Social Sciences) using hi-square (quadrant) tests. From the results of the tests we can clearly realize that the key remarks of this research are scientifically justified.

One hundred and twenty people from Macedonia were questioned for the sake of this research i.e., members of the Former Federation of the Republic of Macedonia, Agency for investigating the development of agriculture in Republic of Macedonia, as well as the students from the Institute for security, defense and peace at the University Ss "Cyril and Methodius" in Skopje.

Theoretical Approaches Regarding Climate Changes

Now-a-days, under these conditions, climate changes are mostly regarded as a threat upon mankind rather than as a threat on specific and limited human collectivity as countries and nations. When we generally speak about climate changes as a security problem, a question arises in terms of what is being represented as a referent object for climate protection. If we look back at the conditions in the beginning of the 90s in the previous century, that are related to the climate regime which has been developing in the context of the Convention for climate changes at the UN since 1992, it will be noticed that it has been created as a response to the public and scientific concern who dates back from the 80s in the past century. Climate changes are viewed as a "degree of a natural change", degree which could be initiated from different parameters, amongst which are the temperature, the amount of rainfall, the frequency and intensity of extreme weather occurrences (events) etc. Hence, a question has been asked to what degree of climate changes could the eco-systems and the social activities arise, before the condition becomes threatening? According to Pielke there are two general strategies that serve as an answer to the climate changes. It is about a strategy for alleviating and accommodation [1].

This research from today's perspective of apprehension from the conditions about the climate changes will constitute the mosaic of the numerous contemplations and researches for this subject which are in direction of raising the reason of the dangers that come out of the climate changes and the alertness in term of creating and practicing measures and activities in direction to what nowadays is called "climate security".

Climate changes cause different effects on the population. The most exponent problem surely is the health condition. There are numerous works that treat this kind of discourse and also large number of countries has adopted proper legal and normative acts that treat the phenomenon - climate change. More and more decisions are drawn on global levels that treat the relations between the climate changes and health. Such are "The declaration for the climate changes and health" carried out and signed in 2016, "the Minister's declaration of health, environment and climate changes" also from 2016 which is a product from the 22nd session of the Conference of the Parties to the UN Framework Convention on Climate Change (UNFCCC COP 22) in Marrakech on 15 of September 2015. Next is "The Declaration from Doha for climate, health and welfare" from 2012, as well as "the Declaration of Delhi for health and climate changes", adopted on the 60-th General congress of the World's medicine association in 2009. A "National strategy for adaptation in the health sector" has been reached as an answer to the world's trends related with health and climate changes in the Republic of Macedonia.

Special and scientific literature is more focused on research which is related with health and climate changes in the context of global ruling.

There to, a new complex is apostrophed on mutually connected challenges which affect health and capacities on the global ruling for realistic and timely answer. There at the global ecological determinants are specifically highlighted in comparison with the more familiar socio-economic determinants [2].

Climate changes manifested through the process of warming on large scales will influence many aspects of human's life, because they will make changes on the temperature and rainfall, growth of the sea level and the changes in the distribution of fresh water. Among many of the effects that will be made out of these conditions, surely the productivity of agriculture will be affected. Numerous scientific studies which served as a reference literature in this research are already pointing on such consequences in agriculture. An interesting research for climate changes and agriculture are making Anita Wreford, Dominic Moran and Neil Adger in their report for "Climate changes and agriculture influences, adaptations and alleviating" published by the Organization for economic collaboration and development (OECD). In this report, concretely are analyzed the projected influences of the climate changes in the agricultural sector, the solution for these influences through the strategies for adaptation and alleviation [3].

It is worth to mention that the developing countries, especially the poorest, are very dependent from agriculture, which is the climate's most sensitive from all the sectors in the economy and they suffer from inappropriate health and public services followed with low quality. Thirdly, their low income and vulnerability make the adaptation of climate changes especially difficult [4].

Republic of Macedonia made a "National strategy for agriculture and rural development 2017-2013". Also, according to the third national plan for climate changes, negative impacts on agriculture in the Republic of Macedonia are increasing. The agricultural sector as a whole, especially the smaller farms, is expected to be exposed on extended heat waves, more serious droughts and floods. Climate changes in 2007/2008 and 2011/2012 with long and dry periods together with the heat waves have led to significant losses in the production.

Poverty and spreading of diseases are also a serious problem as a consequence from the climate changes. Poverty is closely related with agriculture activities. Decreased yielding and income on agriculture will increase poverty and will decrease the capability of households to invest for better future, forcing them to use the humble savings only to survive. On a national level, climate changes will decrease incomes and will increase spending needs exacerbating the public finances.

The concept of tenable development, climate changes and poverty represent urgent themes who demand stakes related to countries, regions and communities. Hence, there are numerous scientific and expert works which articulate the dynamic relation between the two possibly central global concerns: poverty and climate changes [5].

Periodical fluctuations, as well as the seasonal and yearly climate variable, cause appearance of many infective diseases. The characteristics of geographical distribution and seasonal variations of many infective diseases are a key proof for the relation between time and climate. Many scientific studies point to the fact that temperature, rainfall and humidity have an impact on many diseases and that is why they can potentially make an impact on time and the intensity of the appearance of different epidemics. However, spreading of the diseases is also dependent on factors such as sewerages and public services for

health, population density and demographic characteristics, changes in using of the land and travel destinations [6].

Automobile industry is a remarkably significant sector which has a noticeable contribution in the production of CO₂. Nowadays orientation of the massive automobile producers is on the direction of finding a way to reduce the production of carbon dioxide through innovative solutions. These solutions refer to the hybrid technologies, gas-electronic and diesel-electronic engines which produce less exhaust gases or a complete transition towards electrification on the machinery of the automobiles i.e., producing automobiles which would use hydrogen as operative fuel and would only emit aquatic steam as exhaust fumes. In that context, alternative operative fuels such as the liquid oil gas should be mentioned which has an advantage regarding the emissions of carbon dioxide over the gas engines but not over diesel engines. Methanol also has a specific useful value but is not widely used because of its own corrosiveness and toxicity [7].

Raising the awareness of climate changes and the consequences emerging out of those changes is a serious issue and needs a special attention to be devoted on it. In that context, non-governmental organizations, state institutions and academic establishment have their own place in the process of alleviating and dealing with the consequences that emerge from the climate changes. Especially, the place that belongs to the non-governmental organizations should be noted which can have diverse character. Namely, their role in the domain of the climate changes is in the process of monitoring and implementation of international agreements and also in the process of organizing and development of projects and their significance in the presentation and education of the civil society. This way positioned, with clear and concrete obligations, mission non-governmental organizations are respected from the international organizations as well as the national governments. Larger parts of the agencies at UN collaborate with the non-governmental organizations and that is why they play a serious role in the numerous conventions for the environment [8].

In relation with the impact of climate changes on the geopolitical discourse, an issue is imposed whether the climate changes and its identified consequences impact upon the changes in geopolitical perceptions of the contemporary geopolitics. Taking the impact into account of the changes on the environment upon geopolitical discourses there has to be made a demarcation between two different problems that are mutually and closely related: first of all, the problem with the access to the natural resources as raw materials and energetic sources and secondly, the problem with the impact of the changes on the environment upon the reduction of the space for living and arable land, rising sea levels, the intensity and frequency of the natural catastrophes, such as storms, droughts and floods. There is an enormous scientific and reference literature on this subjects from numerous authors like: Homer-Dixon, Kaplan, Dalby and similar.

Homer-Dixon investigates the link between the scarcities of the environment (for example, the limitations of the basic resources that can be produced from the environment) with the violence. Homer-Dixon considered that the modern realistic perspective which many times is used to understand the security problems is inappropriate in identifying and explaining the relations between the changes in the environment and the conflict. The impact of the climate changes and dangers for the environment is very significant factor that influences upon startling a conflict, and sometimes it is just an insignificant

impact which is not directly responsible, but could amplify the impact on the political and economic factors. The indigent countries would be much more sensitive on the climate changes and degradation of the environment than the rich countries and also firstly would have to deal with the conflicts that are related with the consequences from the climate changes and degradation of the environment: reducing the agriculture production, economic regress, compulsory migration and perturbation of the normal and legitimate sociable relations [9].

Kaplan's work *"The Coming Anarchy: Shattering the Dreams of the Post-Cold War"* was the first real specimen of work that contributed in the development of a "defensive" geopolitical discourse that is related with the threats who could emerge from the degradation of the environment and climate changes which are closely related with the increasing of the population in lowly developed countries over the world. Kaplan utters a clear tendency to understand the environment and the challenges which could probably lead to a future extermination of the environment and climate changes that exist as a threat upon the national security [10].

Dalby emphasizes the relation among the environment and safety and anticipates the fact about theories for the impact of the climate changes upon global security and continues to use the contemporary discourse on securitization in connection with the critical debates for security [11].

An interesting geopolitical issue is the Arctic and the melting of the arctic ice. Regarding this issue numerous literatures were consulted, starting from the medium image for the climate changes and the Arctic [12], to the possible confrontations among the states for control of the Arctic ice cap and the presumably future navigable routes which could emerge as a result of the climate changes in that part of the world [13].

Results and Discussion

Analysis and testing hypotheses

Data analyses and testing of the hypothesis from the empirical research are practiced by using the statistical program (SPSS) (Statistical Program for Social Sciences). Moreover, graphical methods, schemes and diagrams, creation of tables and data calculations are used, which makes an accent on the clarity in presenting the results. The relevance of the approach in research and analysis, concluding aspects and suggestions are substantiated by using a spacious literature from domestic and foreign sources (Tables 1 - 6).

Special hypothesis X₁

Climate changes impact the health status on the population

Calculated value of $\chi^2=77.716$

When the risk of error is 0.05% and the number of degrees of freedom $df=6$, the theoretical (critical) value of the test is $\chi^2(0.05;36) = 43.77$

Because, $(\chi^2 = 77.176) > (\chi^2 = 43.77)$ the hypothesis is accepted, and we can conclude that the climate changes have an impact on the health status of the population. It is confirmed with the fact that the defining risk of mistake is $1-\alpha$, i.e., 0.05 is bigger than the value of the realized level of risk for mistake (error), which is $p=0.000$.

ZS * KP Cross-tabulation									
Variables		KP							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
ZS	I do not agree	0.0	0.2	0.2	0.5	0.4	0.4	0.4	2.0
	Disagree	0.1	0.5	0.6	1.6	1.5	1.3	1.4	7.0
	Mainly disagree	0.1	1.1	1.4	3.4	3.1	2.9	3.0	15.0
	Neutral	0.2	1.8	2.2	5.4	5.0	4.6	4.8	24.0
	Mainly agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	I agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	Totally agree	0.3	2.3	2.8	6.8	6.3	5.8	6.0	30.0
Total		1.0	9.0	11.0	27.0	25.0	23.0	24.0	120.0

Table 1a: Empirical and theoretical frequencies of the variables: health status (in rows) and climate changes (in columns) – count.

ZS * KP Cross-tabulation									
Variables		KP							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
ZS	I do not agree	0.0	0.2	0.2	0.5	0.4	0.4	0.4	2.0
	Disagree	0.1	0.5	0.6	1.6	1.5	1.3	1.4	7.0
	Mainly disagree	0.1	1.1	1.4	3.4	3.1	2.9	3.0	15.0
	Neutral	0.2	1.8	2.2	5.4	5.0	4.6	4.8	24.0
	Mainly agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	I agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	Totally agree	0.3	2.3	2.8	6.8	6.3	5.8	6.0	30.0
Total		1.0	9.0	11.0	27.0	25.0	23.0	24.0	120.0

Table 1b: Empirical and theoretical frequencies of the variables: health status (in rows) and climate changes (in columns) – Expected count.

Case Summary Processing						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
ZS * KP	120	100.0%	0	0.0%	120	100.0%

Table 1c: Grouped data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	77.176a	36	0.000

Likelihood Ratio	76.103	36	0.000
Linear-by-Linear Association	41.086	1	0.000
N of valid cases	120		
a: 43 cells (87.8%) have expected count less than 5. The minimum expected count is 0.02			

Table 1d: Results from the χ^2 - test.

Special hypothesis X₂

Climate changes impact on agriculture

Calculated value of $\chi^2 = 70.023$

When the risk of error is 0.05% and the number of degrees of freedom df=6, the theoretical (critical) value of the test is $\chi^2(0.05;36) = 43.77$

Because $(\chi^2 = 70.023) > (\chi^2 = 43.77)$ the hypothesis is accepted, and it could be confirmed that climate changes have an impact on agriculture. It is confirmed with the fact that the defining risk of mistake is $1-\alpha$, i.e., 0.05 is bigger than the value of the realized level of risk for mistake (error), which is $p=0.000$.

ZEM * KP Cross-tabulation									
Variables		KP							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
ZEM	I do not agree		1		2				3
	Disagree		2		1	2	1		6
	Mainly disagree		4	2	6	2	1	1	16
	Neutral			5	7	4		2	18
	Mainly agree		1	2	9	6	8	3	29
	I agree		1	1	2	6	7	9	26
	Totally agree	1		1		5	6	9	22
Total		1	9	11	27	25	23	24	120

Table 2a: Empirical and theoretical frequencies on variables agriculture (in rows) and climate changes (in columns) - Count.

ZEM * KP Cross-tabulation									
Variables		KP							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
ZEM	I do not agree	0.0	0.2	0.3	0.7	0.6	0.6	0.6	3.0
	Disagree	0.1	0.5	0.6	1.4	1.3	1.2	1.2	6.0
	Mainly disagree	0.1	1.2	1.5	3.6	3.3	3.1	3.2	16.0
	Neutral	0.2	1.3	1.7	4.1	3.8	3.5	3.6	18.0
	Mainly agree	0.2	2.2	2.7	6.5	6.0	5.6	5.8	29.0
	I agree	0.2	2.0	2.4	5.9	5.4	5.0	5.2	26.0
	Totally agree	0.2	1.7	2.0	4.9	4.6	4.2	4.4	22.0

Total		1.0	9.0	11.0	27.0	25.0	23.0	24.0	120.0
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Table 2b: Empirical and theoretical frequencies on variables agriculture (in rows) and climate changes (in columns) – Expected count.

Case Summary Processing						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
ZEM * KP	120	100.0%	0	0.0%	120	100.0%

Table 2c: Grouped data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	70.023 ^a	36	0.001
Likelihood Ratio	74.950	36	0.000
Linear-by-Linear Association	28.300	1	0.000
N of valid cases	120		

a: 42 cells (85.7%) have expected count less than 5. The minimum expected count is 0.03

Table 2d: Results from χ^2 - test.

Special hypothesis X₃

Consequences from the climate changes in the next century will mostly have an impact on poverty and spreading diseases.

Calculated value of $\chi^2 = 80.298$

When the risk of error is 0,05% and the number of degrees of freedom df = 6, the theoretical (critical) value of the test is $\chi^2 (0.05;36)$

Because ($\chi^2 = 80.298$) > ($\chi^2 = 43.77$) the hypothesis is accepted, and it could be confirmed that climate changes have an impact on poverty and spreading diseases. It is confirmed with the fact that the defining risk of mistake is 1- α , i.e., 0.05 is bigger than the value of the realized level of risk for mistake (error), which is p=0.000.

ZEM * KP Cross-tabulation									
Variables		KP							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
ZEM	I do not agree		1		2				3
	Disagree		2		1	2	1		6
	Mainly disagree		4	2	6	2	1	1	16
	Neutral			5	7	4		2	18
	Mainly agree		1	2	9	6	8	3	29
	I agree		1	1	2	6	7	9	26
	Totally agree	1		1		5	6	9	22
Total		1	9	11	27	25	23	24	120

Table 3a: Empirical and theoretical frequencies on variables: poverty and spreading diseases (in rows) and climate changes (in columns) - Count.

ZS * KP Cross-tabulation									
Variables		KP							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
ZEM	I do not agree	0.0	0.2	0.2	0.5	0.4	0.4	0.4	2.0
	Disagree	0.1	0.5	0.6	1.6	1.5	1.3	1.4	7.0
	Mainly disagree	0.1	1.1	1.4	3.4	3.1	2.9	3.0	15.0
	Neutral	0.2	1.8	2.2	5.4	5.0	4.6	4.8	24.0
	Mainly agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	I agree	0.2	1.6	1.9	4.7	4.4	4.0	4.2	21.0
	Totally agree	0.3	2.3	2.8	6.8	6.3	5.8	6.0	30.0
Total		1.0	9.0	11.0	27.0	25.0	23.0	24.0	120.0

Table 3b: Empirical and theoretical frequencies on variables: poverty and spreading diseases (in rows) and climate changes (in columns) – Expected count.

Case Summary Processing						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
SIB * KP	120	100.0%	0	0.0%	120	100.0%

Table 3c: Grouped data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	80.298 ^a	36	0.000
Likelihood Ratio	85.214	36	0.000
Linear-by-Linear Association	41.493	1	0.000
N of valid cases	120		

a: 43 cells (87.8%) have expected count less than 5. The minimum expected count is 0.02

Table 3d: Results from χ^2 - test.

Special hypothesis X₄

Automobile traffic has the biggest impact in making and releasing of greenhouse gases into the atmosphere.

The calculated value of ($\chi^2 = 128.728$)

When the risk of error is 0.05% and the number of degrees of freedom $df=6$, then the theoretical (critical) value of the test is $\chi^2 (0.05;0.36) = 43.77$

Because the hypothesis ($\chi^2 = 77.176$) > ($\chi^2 = 43.77$) is widely accepted, we can conclude that the automobile traffic has the biggest influence on the formation and the emission of the greenhouse gasses

into the atmosphere. This is also confirmed by the fact that the definite risk of error is $1-\alpha$, or in other words is 0.05 bigger than the value of the accomplished level of risk of error, which is $p=0.000$.

Special hypothesis X₅

The non-governmental organizations, state institutions and the academics, contribute to a greater participation into the management and the moderation of the climate changes.

The calculated value of $\chi^2 = 77.661$

When the risk of error is 0.05% and the number of degrees of freedom $df=6$, then the theoretical (critical) value of the test is $\chi^2(0.05;3,6) = 43.77$

AVT * SG Cross-tabulation									
Variables		SG							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
AVT	I do not agree		3	4	2			1	10
	Disagree	2	3	4	7	4	1		21
	Mainly disagree		3	7	6	3	1		20
	Neutral		1		6	6	2	1	16
	Mainly agree				3	5	7	1	16
	I agree				1	3	14	8	26
	Totally agree						2	9	11
Total		2	10	15	25	21	27	20	120

Table 4a: Empirical and theoretical frequencies on variables: Automobile traffic (in rows) and greenhouse gases into the atmosphere (in columns) - Count.

AVT * SG Cross-tabulation									
Variables		SG							Total
		I don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	Totally agree	
ZS	I do not agree	0.2	0.8	1.3	2.1	1.8	2.3	1.7	10.0
	Disagree	0.4	1.8	2.6	4.4	3.7	4.7	3.5	21.0
	Mainly disagree	0.3	1.7	2.5	4.2	3.5	4.5	3.3	20.0
	Neutral	0.3	1.3	2.0	3.3	2.8	3.6	2.7	16.0
	Mainly agree	0.3	1.3	2.0	3.3	2.8	3.6	2.7	16.0
	I agree	0.4	2.2	3.3	5.4	4.6	5.9	4.3	26.0
	Totally agree	0.2	0.9	1.4	2.3	1.9	2.5	1.8	11.0
Total		2.0	10.0	15.0	25.0	21.0	27.0	20.0	120.0

Table 4b: Empirical and theoretical frequencies on variables: Automobile traffic (in rows) and greenhouse gases into the atmosphere (in columns) - Expected Count.

Case Processing Summary						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
AVT * SG	120	100.0%	0	0.0%	120	100.0%

Table 4c: Grouped data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	128.728 ^a	36	0.000
Likelihood Ratio	131.895	36	0.000
Linear-by-Linear Association	66.696	1	0.000
N of valid cases	120		

a: 47 cells (95.9%) have expected count less than 5. The minimum expected count is 17

Table 4d: The χ^2 test results.

Because the hypothesis ($\chi^2 = 77.176$) > ($\chi^2 = 43.77$) is widely accepted, we can conclude that the non-governmental organizations, state institutions and the academics, contribute to a greater participation into the management and the moderation of the climate changes. It is also confirmed by the fact that the definite risk of error is $1-\alpha$, or in other words is 0.05 bigger than the value of the accomplished level of risk of error, which is $p=00000$.

NDA * KP Cross-tabulation									
Variables		KP							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
NDA	I do not agree	1	3	3	4	1	1		13
	Disagree		1	5	5	5	1	2	19
	Mainly disagree		4	3	8	6	2	1	24
	Neutral		1		6	5	2	3	17
	Mainly agree				3	5	9	5	22
	I agree					2	5	6	13
	Totally agree				1	1	3	7	12
Total		1	9	11	27	25	23	24	120

Table 5a: The empirical and theoretic frequencies of the variables: the non-governmental organizations, the state institutions and the academics (shown in rows) and the climate changes (shown in columns) - Count.

NDA * KP Cross-tabulation									
Variables		SG							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
NDA	I do not agree	0.1	1.0	1.2	2.9	2.7	2.5	2.6	13.0
	Disagree	0.2	1.4	1.7	4.3	4.0	3.6	3.8	19.0
	Mainly disagree	0.2	1.8	2.2	5.4	5.0	4.6	4.8	24.0
	Neutral	0.1	1.3	1.6	3.8	3.5	3.3	3.4	17.0
	Mainly agree	0.2	1.7	2.0	4.9	4.6	4.2	4.4	22.0
	I agree	0.1	1.0	1.2	2.9	2.7	2.5	2.6	13.0
	Totally agree	0.1	0.9	1.1	2.7	2.5	2.3	2.4	12.0

Total		1.0	9.0	11.0	27.0	25.0	23.0	24.0	120
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Table 5b: The empirical and theoretic frequencies of the variables: the non-governmental organizations, the state institutions and the academics (shown in rows) and the climate changes (shown in columns) – Expected Count.

Case Processing Summary						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
NDA * KP	120	100.0%	0	0.0%	120	100.0%

Table 5c: Classified data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	77.661 ^a	36	0.000
Likelihood Ratio	81.259	36	0.000
Linear-by-Linear Association	46.535	1	0.000
N of valid cases	120		

a: 47 cells (95.9%) have expected count less than 5. The minimum expected count is 10

Table 5d: The χ^2 test results.

Special hypothesis X₆

The melting of the Arctic can lead into political confrontments in the future, in order to control the Arctic region.

The calculated value of $\chi^2 = 146.482$

When the risk of error is 0.05% and the number of degrees of freedom df=6, then the theoretical (critical) value of the test is $\chi^2(0,05;36) = 43.77$

Because the hypothesis ($\chi^2 = 146.482$) > ($\chi^2 = 43.77$) is widely accepted, we can conclude that the melting of the Arctic can lead to political confrontments in the future, in order to control the Arctic region. It is also confirmed by the fact that the definite risk of error is 1- α , or in other words is 0.05 bigger than the value of the accomplished level of risk of error, which is p=0.000.

TA * PK Cross-tabulation									
Variables		KP							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
TA	I do not agree	3							3
	Disagree	10	8	3	1				22
	Mainly disagree	2	5	5	3		1		16
	Neutral	2	6	5	11	2			26
	Mainly agree		3	6	3	2	3	2	19
	I agree		1	1			7	3	15
	Totally agree			1	1	1	7	9	19

Total		17	23	21	19	12	14	14	120
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Table 6a: The empirical and theoretic frequencies of the variables: the melting of the Arctic (shown in rows) and the political confrontments (shown in columns) - Count.

TA * PK Cross-tabulation									
Variables		SG							Total
		I agree	don't agree	Disagree	Mainly disagree	Neutral	Mainly agree	I agree	
TA	I do not agree	0.4	0.6	0.5	0.5	0.3	0.4	0.4	3.0
	Disagree	3.1	4.2	3.9	3.5	2.2	2.6	2.6	22.0
	Mainly disagree	2.3	3.1	2.8	2.5	1.6	1.9	1.9	16.0
	Neutral	3.7	5.0	4.6	4.1	2.6	3.0	3.0	26.0
	Mainly agree	2.7	3.6	3.3	3.0	1.9	2.2	2.2	19.0
	I agree	2.1	2.9	2.6	2.4	1.5	1.8	1.8	15.0
	Totally agree	2.7	3.6	3.3	3.0	1.9	2.2	2.2	19.0
Total		17.0	23.0	21.0	19.0	12.0	14.0	14.0	120.0

Table 6b: The empirical and theoretic frequencies of the variables: the melting of the Arctic (shown in rows) and the political confrontments (shown in columns) - Expected Count.

Case Processing Summary						
Variables	Cases					
	Valid	Missing		Total		Percent
	N	Percent	N	Percent	N	
TA * PK	120	100.0%	0	0.0%	120	100.0%

Table 6c: Classified data for the given variables.

Chi-Square Tests			
Variables	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	146.482 ^a	36	0.000
Likelihood Ratio	139.486	36	0.000
Linear-by-Linear Association	72.529	1	0.000
N of valid cases	120		

a: 49 cells (100.0%) have expected count less than 5. The minimum expected count is 30

Table 6d: The χ^2 test results.

Conclusion

Climate change is a very complex problem which has the potential to influence negatively to all areas of life. The absence of consciousness of their presence and the implications they have, indicate serious security problems. Despite the fact that the scientific community needed some time to accept the reality of the climate changes in the

world, their consequences are evident for a long period of time, and they become more expressed as the time passes by. National security implications of the climate changes include: increased internal and trans-border tension because of the great number of migrations, a conflict caused by the lack of resources, the increased spread of diseases, which will have economic consequences, and the geopolitical

rearrangements for better adjustment – management of the nations to the access of the resources and the spread of diseases. The exporters of oil and natural gas can get a bigger geopolitical importance, while the importers of power/energy will have their geopolitical consequences. All these things can cause an internal geopolitical destabilization in the affected countries.

According to the gained statistic data and conclusions, I can assume that the climate changes are articulated as real for Macedonian people, and I can also notice that there is a great consciousness for possible implications for both, the human security and the survival of the countries, as well as the global security.

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