

# Analysis of barriers to adaptation to climate change

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**Abstract:** Climate change is causing disasters such as floods, whirlwinds, storms, drought, or other extreme weather events that have not yet occurred in certain areas of the world or have not occurred to such an extent and intensity as it is happening now or is predicted in the foreseeable future. Government and, in particular, crisis management system should reflect these facts in order to prepare itself and the population on such events. People should also be interested in preparing for and adapting to these changes and related crisis events. The aim of the article is to examine preparedness of the population in the Slovak Republic and, in particular, to analyse the barriers to climate change adaptation of the population. For the analysis are used the questionnaire survey results on this topic. The initial results indicate the influence of the population by various barriers and factors.

**Keywords:** CLIMATE CHANGE, ADAPTATION, PREPAREDNESS, CRISIS MANAGEMENT, CRISIS EVENTS, QUESTIONNAIRE SURVEY

## 1. Introduction

Crisis phenomena and weather extremes are currently on the rise in frequency and also severity of impacts, as recognised in the assessment reports of the Intergovernmental Panel on Climate Change. The main cause is climate change, which will become more and more extreme. The current situation therefore requires a prompt response and a change in attitudes to the issue, especially from the perspective of the state, but also the population itself. As the reaction to this global negative trend a various strategies and frameworks (Hyogo Framework (2005), EU Strategy (2013), Sendai Framework (2015), Agenda 2030: Sustainable Development Goals (2015), Paris Agreement (2016)) [1-5] have been adopted, which are intended to provide a basic framework for the implementation of climate change risk reduction strategies. In connection to this frameworks a number of national adaptation policies and plans have been developed [6].

The degree of possible manifestation of the mentioned changes and risks varies regionally, but the trend of negative changes is global. The unfavorable consequences of climate change in terms of the occurrence of crisis phenomena and weather extremes are also confirmed by the Slovak Hydrometeorological Institute in its forecasts for the Slovak Republic (SR) and other sources (e.g. statistics of the Ministry of Interior, Statistical Office of the SR). The forecasts relate mainly to an increase in the number of summer and tropical days and heat waves; frequent heavier torrential rains and more intense storms, which are associated with a more uneven distribution of precipitation totals throughout the year and may lead to a reduction in soil moisture and, consequently, periods of drought; in the SR there will be more frequent very strong storms, during which storms and tornadoes may occur and more frequent occurrence of lightning local floods in various parts of the SR can be expected [7, 8]. From the public's point of view, there are several ways to adapt to these changes and better prepare for the impacts of the abovementioned disasters and extremes, but the implementation in practice is quite weak.

Despite considerable international and national effort, adaptation to climate change still encounters various problems and barriers to adaptation actions still persist, whether at the national, local, institutional or individual level [6, 9, 10]. Moreover, climate risks affect different groups of the population differently, with vulnerable groups most affected. Therefore, at the individual level, problems and barriers in the area of adaptation to climate change are deepening. The goal of this article is to identify what the adaptation barriers are in the conditions of the SR and how are perceived by the public. Focus of this study is on the individual level of adaptation. In order to know how we can deal with identified barriers in the conditions of the SR a further research is assumed.

## 2. Rationale - Barriers of Adaptation to Climate Change

There are several criteria how to categorize the adaptation barriers. They can be perceived at national, local, institutional, project, as well as individual levels, and others. The different case studies and theoretical works have produced a large list of commonly reported barriers [11-16]. Commonly most used barriers categories in the local context are: institutional, attitudinal, financial and political [17]. Other authors identify 7 barrier categories (adopted from [18]): (1) conflicting timescales, (2) substantive, strategic and institutional uncertainty, (3) institutional crowdedness and institutional void, (4) institutional fragmentation, (5) lack of awareness and communication, (6) motives and willingness to act, and (7) lack of resources.

At the individual level, there are also many articles and studies that are dealing with adaptation barriers. There are often connected to the research in the selected country and therefore, there can be seen differences between results. The study by Lorenzoni et al. (in UK) identified several groups of barriers [19]:

### Lack of knowledge

Although information is mostly available (about the causes, consequences, potential solutions, adaptation options, etc.), the rate of its transformation into knowledge or into use / into practice is relatively low, for various reasons, including [19]:

- Lack of knowledge about where to find information.
- Lack of desire to seek information.
- Perceived information over-load.
- Confusion about conflicting information or partial evidence.
- Perceived lack of locally-relevant information, for example about impacts or solutions.
- Format of information is not accessible to non-experts.
- Source of information is not credible or trustworthy, particularly the mass media.
- Confusion about links between environmental issues and their respective solutions.
- Information conflicts with values or experience and is therefore ignored.

### Uncertainty and scepticism

Uncertainty and scepticism are mainly related to the perception of the reliability of evidence on climate change and the existence of conflicting evidence on climate change. These facts then cause problems for the population to know what is really happening.

### Distrust in information sources

This barrier is related to media coverage and especially exaggeration and sensationalism by the media, which often have conflicting arguments regarding the effects of climate change. This

barrier is related to the previous one (Uncertainty and scepticism), but focuses more on the bias of the media that people encounter.

#### Externalising responsibility and blame

The given barrier characterizes the shifting of responsibility to another entity (mostly industry or some specific state or group of states). The individual leaves the proactivity in the area of adaptation and mitigation measures to these entities, as they blame them for climate change.

#### Technology will save us

People accept change that seems inevitable, while not being afraid of its consequences, because technology can cope with these effects.

#### Distant threat

The possible impacts of climate change (the more serious ones) are currently too unimaginable and distant that people cannot imagine them and therefore do not prepare for them. Other things are more important. Includes: Attention to more immediate priorities, e.g. family and finances, other (local) environmental issues.

#### Reluctance to change lifestyles

The threat of a reduction in the standard of living, which may be associated with a loss of comfort and increased costs (monetary and time) are the barrier of adaptation.

#### Fatalism

For some people the evidence suggests that it's too late to do anything or that we can't do anything.

#### "Drop in the ocean" feeling

Perception of climate change as a global problem and individual helplessness in trying to mitigate or adapt to it.

To a large extent, similar barriers, with different names, are also reported by González-Hernández et al. in their study [10]. They identified seven main barriers:

- **everyday life** – similar as "Reluctance to change lifestyles" but it is more focused on difficulty to change our habits and comfortable life related to using technology.
- **awareness of climate change** – refer to the climate change knowledge and adaptation knowledge,
- **lack of perceived locus of control** – very similar understand as "fatalism" in combination with "drop in the ocean" barrier,
- **physical limitations of the dwelling** – this barrier is connected to the ownership, construction and space limitation to make a change,
- **social** – people feel a discontent and frustration when other people in their community did not take measures to prevent or adapt to climate change,
- **regulatory** – the lack of initiatives related to climate change at the local government level affect common population,
- **economic** – a lack of economic resources is a major barrier to implementing climate change adaptation measures.

### 3. Methodology

The authors utilized the following methods for fulfilling the stated goal:

- analysis of the current state of reported barriers to climate change adaptation,
- questionnaire survey conducted on a sample of students of Faculty of Security Engineering – University of Žilina focusing on perception of the selected barriers to climate change adaptation. The questionnaire was distributed to randomly selected respondents and students of Faculty of Security Engineering in electronic form. For the purpose of this paper only students' responses are investigated.

## 4. Results and Discussion

### Questionnaire survey

A questionnaire survey was conducted in September and October 2022. A structured questionnaire was used, based on various sources [e.g. 19] and supplemented with questions and formulations that the authors considered appropriate with regard to the subject of the research. The questionnaire was distributed to the students of University of Žilina in electronic form. Number of participants was 248 (n). General information about the participants in the survey are summarized in the following table (Table 1).

**Table 1:** General information about survey participants

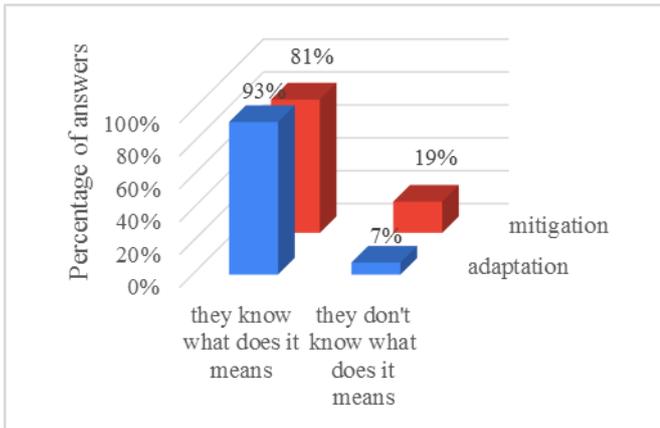
General information		Share [%]
Gender	Male	63,31
	Female	36,69
Living type	In flats	31,45
	In houses	68,55
Living place	Rural	64,92
	Urban	35,08
Monthly household income	0 - 1000€	11,69
	1001 - 2000€	43,55
	2001 - 3000€	29,03
	3001 - 4000€	10,08
	more than 4000€	5,65

Then the students were asked to express their level of agreement or disagreement (from 1 – I completely disagree to 5 – I completely agree) to selected statements which are related to the common barriers reported in another studies:

- I don't have enough knowledge about climate change and its effects
- I don't know how to adapt, I don't know any concrete measures
- It is financially difficult for me to adapt (some measures are beyond my means)
- I don't want to limit myself in my lifestyle
- I am addicted to technology and its use
- Other issues are more important to me at the moment (I have other priorities)
- I'm just not interested in this topic at all

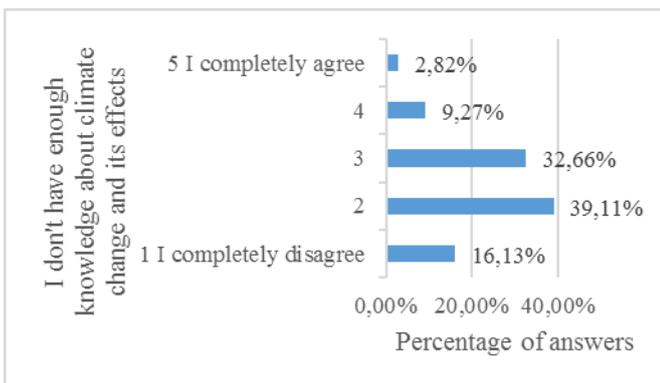
### Knowledge

First of all, the knowledge of the students about meaning of terms "adaptation" and "mitigation" was examined as it was important for proper understanding of following questions in the questionnaire survey. 93% of students know what does the adaption to the climate change means (Fig. 1). It's a little worse with understanding of mitigation meaning – only 81% know what does the climate change mitigation means (Fig. 1). For those who had trouble understanding the meaning of these important terms (as well as others), the following section of the survey explained this terminology and the underlying context.



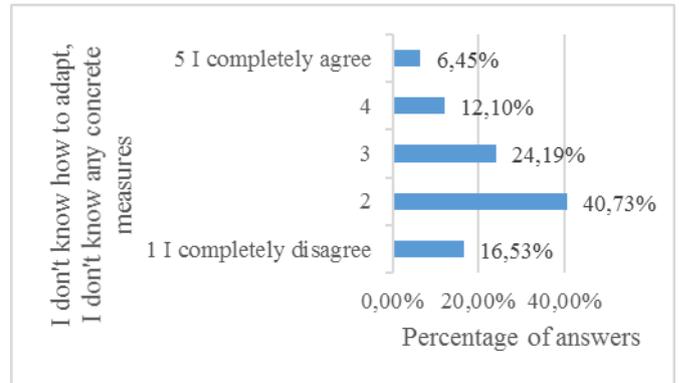
**Fig. 1** Percentage share of knowledge of adaptation and mitigation meaning

In the section of knowledge exploration, we have also explored if students have enough knowledge about climate change and its effects. This tells us a lot about the potential of young people to have a reason at all and to understand the reasons why it is necessary to start implementing certain adaptation measures. Only 12% of respondents state that they have no knowledge or only very weak knowledge about climate change and its impacts (Fig. 2 values 4 and 5). About 55% of students have enough knowledge or almost enough knowledge about the topic (Fig. 2 values 1 and 2) and about 33% is in the middle so they are also group that need to enhance they level of knowledge about climate change. In order to enhance the overall climate change knowledge level a proper information strategy should be prepared and implemented.



**Fig. 2** Percentage share of knowledge level about climate change and its effects

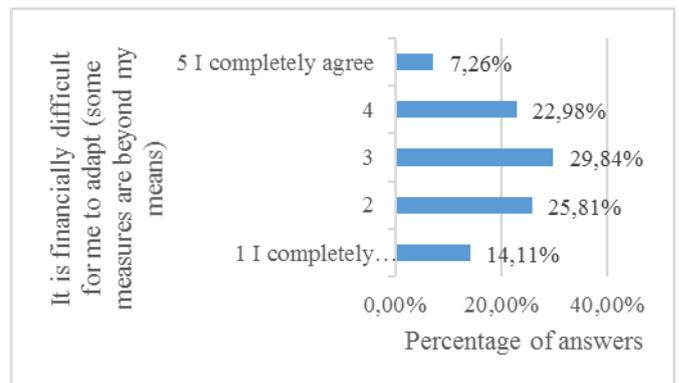
As the rest of the survey focused primarily on adaptation measures and barriers to their implementation, it was important to examine the knowledge of adaptation measures and the possibilities of how to adapt at the individual or household level. About 57% of respondents are aware of adaptation options and measures (Fig. 3). The rest have average (24,19%), below average or no knowledge at all (18,55%). The results are not very optimistic, but not alarming either. However, additional research revealed that only 26% of respondents agreed or rather agreed with the statement that "I have implemented several adaptation measures in my home or life".



**Fig. 3** Percentage share of knowledge level about the adaptation options and about concrete measures

**Financial barriers**

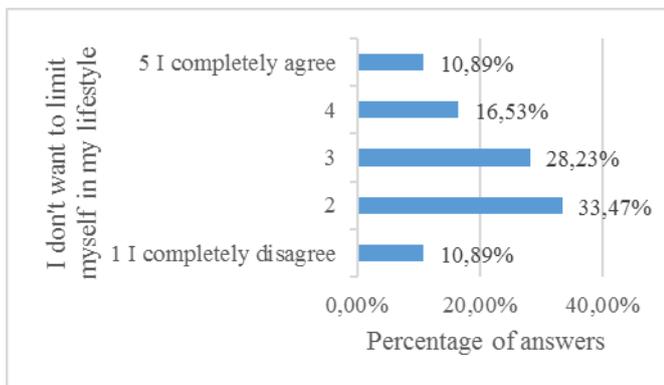
A common problem that often occurs in connection with the implementation of adaptation measures is their financial burden. There are several measures that are relatively effective and do not require any or only a minimal investment, and therefore even less solvent households can contribute to the fight against the effects of climate change. Of course, there are also those that require investment, and this obviously affected the results of the survey. 7,26% of respondents completely agree or rather agree (22,98%) that it is financially difficult for them to adapt (Fig. 4). It is connect to the fact (see general information about respondents in Table 1) that the income of the households is rather low.



**Fig. 4** Expression of different degrees of financial difficulty of adaptation

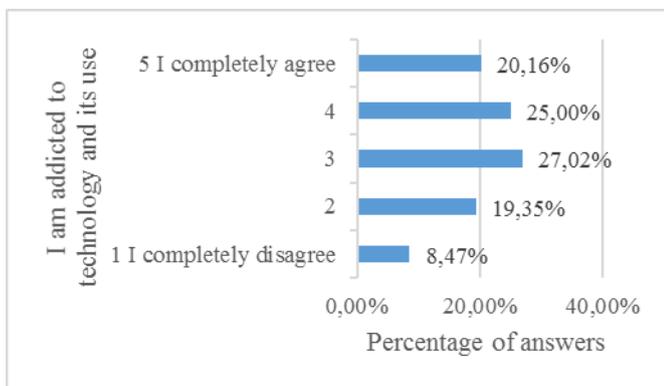
**Standard of living**

According to the results of the survey, the biggest barrier to adaptation to climate change among young people is a low willingness to change their way of life or their priorities (Fig. 5). The high-end and consumptive way of life associated with the use of modern technologies offers many new and interesting possibilities for all age groups, but it also forces large industrial giants, clothing, food and other industries to increase production. This cycle can be slowed down by lower consumption, modesty, or a total change in the consumer way of life. This seems to be the most difficult for young people, while practically all of us can do it.



**Fig. 5** Expression of different degrees of willingness of students to limit themselves in lifestyle

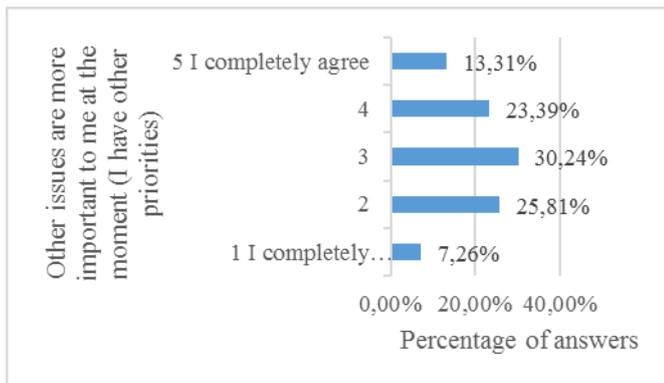
Lifestyle is closely connected with the use of new technologies, which can limit us in the application of adaptive measures. In the conducted survey, this dependence is confirmed by almost half of the respondents (Fig. 6). However, this fact can also be seen as an opportunity to change, because many innovative and technological elements can help fight the manifestations of climate change. At the very least, it is possible to distribute information in a more targeted manner, and to use modern technological communication channels to strengthen the information base regarding climate change.



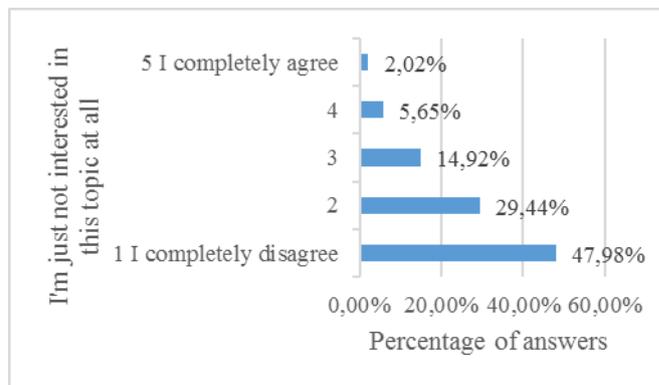
**Fig. 6** Expression of different level of dependence on technology

#### Interest

We live in a hectic time and people are busy both professionally and personally. Students also try to make extra money and gain experience, they are engaged in various leisure activities, so it is quite common that they have different priorities and interests. In connection with the perception of the consequences of climate change as a distant future, it is then obvious that question of climate change is not included among the main priorities of the individual (Fig. 7). As a result, he/she does not show any interest in the issue (Fig. 8) and does not try to find ways to adapt to the changing situation or to change something in his/her life.



**Fig. 7** Expression of different degree of agreement in the statement "Other issues are more important to me at the moment"



**Fig. 8** Expression of different degree of agreement in the statement "I'm just not interested in this topic at all"

#### 4. Conclusion

Based on the questionnaire results can be stated that students in the SR perceive similar barriers of adaptation to climate change as it was reported in previous studies, while the biggest barrier appears to be reluctance to change or modify their lifestyle. The results for individual barriers are not clear-cut, and a significant part of the students is able and willing to take adaptive measures and be an active player in the fight against climate change. A certain part of students feels only small barriers or perceives them as average, but surmountable. It is on the examples of young people's active work that it is possible to build future activities and support even those people who do not want to get involved with the issue or people who need to be initiated in their activism from the outside.

In the Slovak Republic, strategic decisions were made in the direction of strengthening adaptation efforts to climatic changes (Climate Change Adaptation Strategy) and action plans for the implementation of these strategic decisions were also adopted. Most of the measures of these action plans are of a national, regional or local nature. The position of the individual is solved by his support (e.g. financial) of his activities aimed e.g. at reducing the energy consumption of his home. The issue of supporting public awareness of climate change and involvement in adaptation activities is only partially addressed.

In order to reduce the impact of climate change on the population and social and economic system it is necessary to focus on vulnerable areas and vulnerable elements of society. This can be achieved by supporting the adaptation process of the general public and with the support of competent and interested entities, their cooperation and appropriate communication with the public. A support for the adaptation process is expected through improving the availability of information, supporting the distribution of this information and its communication, and generally raising public awareness of the possible impacts of climate change. In connection with the results of the survey, it can be seen that young people's knowledge of climate change is acceptable and it is possible to build on it in the future. Our effort in further research is to more deeply examine the perception of these barriers in society and also examine the perception of support from the state for the individual.

#### Acknowledgements

Publication of this paper was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic – VEGA No. 1/0459/21: „Proposal of adaptation measures to reduce the risks arising from climate change in terms of the occurrence of the disasters and the extreme weather events.“

Publication of this paper was supported by the Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic – VEGA No. 1/0628/22: “The security research in municipalities with emphasis on the citizens' quality of life”.

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