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The Influence of Changing Socioeconomic Conditions in Europe on the Prioritisation of Risks in Travel Behaviour: A Case Study

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Abstract: Pandemics, political instability, social conflict and unrest, the economic crisis resulting from changes in energy supply contracts, terrorism, and civil and international wars exert a negative impact on the lives of millions of people. These events undermine economic and social stability, and they affect travel behaviour (TB). Understanding preferences in travel behaviour is essential for designing effective and sustainable transport systems. Agenda 2030 (the global sustainable development strategy) assigns a central role to mobility and transport in sustainable development and its components: economic, social, and environmental. Relevant research is scarce, which is why potential threats, including changes in socioeconomic factors that affect TB in functional urban areas (FUAs), should be identified and prioritised. The main aim of this study was to determine changes in the prioritisation of threats to TB resulting from the socioeconomic consequences of the COVID-19 pandemic and the energy crisis in Europe. The study involved an analysis of the literature, a comprehensive classification of potential threats that could impact TB, as well as an expert survey. The results of these analyses were used to develop a list of 46 factors that were grouped into six categories of key threats: social, economic, legal, infrastructural, technological/SMART, and environmental. The level of significance, similarities, and differences in the prioritisation of threats during the COVID-19 pandemic and the energy crisis after the outbreak of the military conflict in Ukraine (duration and range) were compared across 22 European countries.

Keywords: travel behaviour; threat factors; daily commuting; functional urban areas; passenger transport; socioeconomic crisis; Europe

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1. Introduction

Agenda 2030, a global sustainable development strategy, assigns a central role to mobility and transport in sustainable development, encompassing economic, social, and environmental aspects [1]. Goal 11 of Agenda 2030 focuses on making cities and human settlements inclusive, safe, resilient, and sustainable. Sub-goal 11.2 aims to provide access to safe, affordable, accessible, and sustainable transport systems for all. This includes improving road safety, particularly by expanding public transport, with special attention to the needs of vulnerable populations, such as women, children, persons with disabilities, and older persons. Goal 10 emphasizes eliminating inequalities by ensuring equal access to transportation means, especially in urban areas. Goal 8 concentrates on promoting sustainable economic growth through the efficient utilization of resources in transport. Goal 9 involves building resilient structures and infrastructure, including sustainable and accessible transport infrastructure, to support economic development goals [2]. It is therefore important to identify which threats may affect the balance of travel behaviour in the transport system and destabilise its oriented development.

Understanding preferences in travel behaviour is crucial for designing effective and sustainable transport systems [1]. Travel behaviour (TB) is defined as a set of realised practices in response to the availability of transportation resources and a supportive context for enabling travel [3]. Considerable research has been conducted on TB despite the fact that this field of research gained in popularity only in the 1980s [4]. Research on TB generally explores daily commuting patterns in functional urban areas (FUAs), and focuses mostly on atomised transport, namely the smallest load unit that can be effectively transported (individuals or groups of passengers: cars and micromobility) [5], as well as massified public transport (buses, trams, trolleybuses, metro systems) [6,7]. Most existing studies focus on selected age and social groups (children, students, women, seniors, families with children, etc.) and a limited set of TB (public transport, private car use, or other means of transport), in particular discrete TB [4]. Many researchers focus on the utility of various transport modes to explain the differences in TB across countries [8]. These fragmentary data are then used to formulate partial conclusions about groups of factors that influence specific TB, including socioeconomic factors, demographic factors, spatial development patterns, transport and land use policies or cultural factors. In most cases, the identified factors and their impact on TB are validated at the local/domestic level [9] or in groups of selected countries [8]. Research has demonstrated that commuters tend to: (1) maximise the utility value of travel to reach various destinations, (2) minimise the time and cost of travel to reach these destinations [10], and (3) travel safety and comfort are important considerations [11,12]. Research studies conducted during the COVID-19 pandemic revealed that travel safety and comfort is increasingly likely to affect TB [13–15]. Factors that influence human health and safety can induce significant changes to existing modes of social life, including TB. A preliminary analysis of the literature and observations made by international experts in recent months [16,17] revealed an increase in the number of travel-related threats. The COVID-19 pandemic and the ensuing economic disruptions in Europe (which were also triggered by changes to energy supply contracts) are only some of the emerging threats that affect daily commuting. The crisis caused by the COVID-19 pandemic influenced many areas of social, economic, and political life. Global leaders were forced to implement strict protective measures to curtail the spread of the SARS-CoV-2 virus, which affected all modes of transport. The introduced restrictions and lifestyle changes significantly decreased the demand for transport services, and public transport schemes had to be remodelled. Recommendations concerning the use of public transport during the COVID-19 pandemic differed around the world. The British Department for Transport recommended that residents avoid public transport whenever possible and chose alternative means of transport [18]. Other countries introduced limits on public transport capacity and required all passengers to wear masks [18]. According to research, the popularity of two-wheeled vehicles (kick scooters, bicycles, motor scooters) increased during the pandemic [19]. The pandemic induced profound changes in passenger traffic, mobility patterns, and TB.

Daily commuting patterns, public mobility, TB, and activities (remote work) changed during the COVID-19 pandemic [15]. Research has shown that mobility patterns are generally resistant to change under normal conditions [15,20–23] but not during a prolonged pandemic. The implemented restrictions forced many people to revise their habits and priorities, which led to considerable changes in daily activity levels [15]. During the pandemic, people commuting to work became gradually accustomed to alternative means of transport.

The socioeconomic crisis resulting from a shift in the global geopolitical balance undermined the stability of the fuel industry, the automotive sector, and the spare parts market in Europe [24]. Geopolitical conflicts exert a negative impact on all areas of social life, both in countries that are embroiled in military conflict and in the neighbouring states, as demonstrated by studies of military conflict in other regions of the world [25–27]. They have a disrupting impact on the neighbouring economies [28,29], although this effect tends to be short-lived.

However, the economic slowdown, high inflation, disruptions in trade and investment are not the only consequences of geopolitical conflict. These processes also contribute to migration and changes in the social structure of neighbouring countries. A sudden inflow of migrants poses a significant burden on the central budget (welfare, infrastructure development) of countries that receive war refugees [30–32]. The rapid population increase resulting from immigration affects the labour market, education, healthcare, and the availability of housing, and it can also prompt changes in the organisation of transport and choice modes of transport for daily commutes in FUAs. These problems remain insufficiently researched, which is why the potential threats, including the risk of socioeconomic conflict, which affect TB in functional urban areas (FUAs), whose residents actively use public transport systems, should be identified and prioritised. FUAs are subregions that have emerged from the strong impact that cities have on their surroundings, with temporary transformation processes in land use, settlement, labour markets and, above all, the population [33].

In Europe, at a certain point, the new threats affecting TB overlapped. Before the COVID-19 pandemic was brought fully under control, a political conflict in Eastern Europe emerged as a new and unexpected threat to economic stability.

The extent to which both threats affect the prioritisation of TB risks in European countries should be urgently examined. The main aim of this study was to determine changes to the prioritisation of TB threats resulting from the socioeconomic consequences of the COVID-19 pandemic and the energy crisis in Europe, based on the results of an expert survey. Potential threats affecting TB were identified, classified, and ranked. This is a pioneering study, and the proposed approach has never been applied in research. The study is innovative because (1) the threat factors influencing TB were comprehensively identified and classified; and (2) the level of significance, similarities, and differences in the prioritisation of TB threats were identified and compared across European countries during the COVID-19 pandemic and the energy crisis. The study covered the European continent. The following research hypotheses were formulated: (1) the COVID-19 pandemic increased the demand for private transport, whereas the energy crisis prompted commuters to rely on shared and public transport to cut costs; (2) social threats were predominant during the COVID-19 pandemic, whereas economic threats came to the forefront during the energy crisis.

A questionnaire survey involving experts was conducted in 22 European countries in two stages, six months apart. The multidimensional comparison of expert opinions on the types of threats affecting TB generated valuable information about the most popular means of transport in FUAs during the socioeconomic crisis caused by the COVID-19 pandemic and the geopolitical conflict in Eastern Europe. The results were used to rank the identified threat factors in countries with different levels of economic growth and different political systems. The present findings can facilitate the development of effective crisis management strategies.

2. Overview of the Existing Literature

2.1. Commuter Transport in Functional Urban Areas (FUAs)

Different modes of commuter transport were identified and classified, based on a review of the literature [5], to select the threats that influence TB in FUAs. According to the typology proposed by [5] passenger transport can be atomised (one to several passengers) or massified (large numbers of passengers). Atomised transport includes active transport, such as muscle-powered means of transport (bicycles, scooters, kayaks, boats, and skis), micromobility vehicles that are partly or fully electrified, have low speeds and are light in weight (electric scooters, electric bikes, and electric mopeds), as well as cars, vans, and minibuses. The remaining modes of transport are classified as massified transport, including minibuses that carry more than 10 passengers, buses, trolleybuses, trams, metro systems, and urban rail transit. In Figure 1, the identified modes of commuter transport in FUAs were divided based on the energy source (combustion-based, electric, muscle-

powered) and ownership (private/public, including commercial). This classification is essential to identify the threats that are specific to each mode of transport in FUAs.

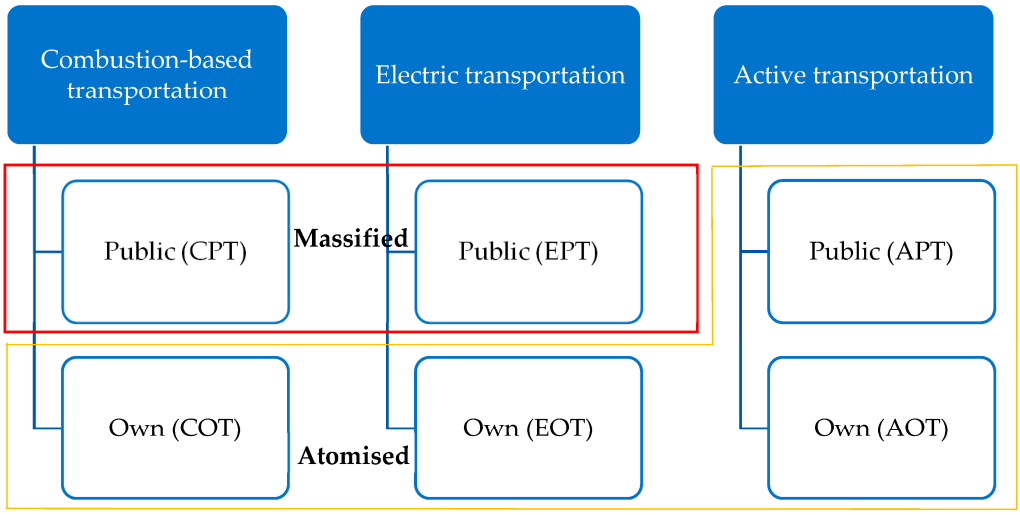


Figure 1. Structure of passenger transport in FUAs. Source: own elaboration.

2.2. Threats Influencing TB

A total of 63 research studies published in the last 30 years (when the first research was carried out on the threats that influence TB and other aspects of public life) were reviewed with the use of Scopus, the Web of Science Core Collection, and Google Scholar browsers based on the following keywords: TB, passenger transport and transport threats. A total of 46 factors were identified, based on a review of articles focusing on the threats that influence TB in the context of atomised and massified transport in FUAs (Table 1). Due to the large number of potential threats and to improve data cohesion, some factors were grouped based on shared criteria (e.g., ticket price is high/tickets are difficult to buy—as a single threat resulting from the availability of public transport tickets). Data were integrated based on the results of the reviewed studies and the following criteria: low quality/barriers; changes in service frequency/delays; services partially or completely unavailable/social exclusion; commuting time/prolonged commuting time; temporary or chronic problems/deterioration.

Table 1. List of factors that influence TB in FUAs.

No.	Factor/Criterion	References
1	1A—Job loss, change of employment, change in working hours, remote work, retirement	[34–36]
2	1B—Changes in the family environment: new partner, separation, children that have to be transported, etc.	[34,36]
3	1C—New place of residence (changes in commuting distance and route)	[34,37–39]
4	1D—Health problems/decline in emotional well-being, injuries	[40,41]
5	1E—Crowding in public transport (bus, tram)	[42–45]
6	1F—Negative image of public transport	[42–45]
7	1G—Epidemic risk (risk of COVID-19 infection)	[46–49]
8	1H—Annoying behaviour of other passengers	[50–54]
9	1I—Safety issues in public transport (risk of terrorist attack)	[50,55,56]
10	1J—Low travel comfort	[57]
11	2A—High cost of spare parts, vehicle maintenance, and repair services	[58]
12	2B—Ticket price is high/tickets are difficult to buy	[59–61]
13	2C—Parking fees/fees for driving into the city centre	[62–66]
14	2D—Lower service frequency (such as bus lines), changes in public transport timetables	[67]
15	2E—Increase in fuel/electricity prices	[68,69]
16	2F—Problems in the market of transport services (strikes, bankruptcies)	[70,71]
17	2G—Interrupted supply of fuel or electricity	[72]
18	3A—Loss of driver's license or passenger transport license	[34]
19	3B—Downtown area is closed to traffic	[62–66]
20	3C—Driving restrictions on rental cars (restricted driving area, zones where parking is not allowed)	[73]
21	3D—Speed limits	[74]
22	3E—Urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre)	[75–78]
23	3F—Introduction or expansion of paid parking zones in the city	[79,80]

Table 1. *Cont.*

No.	Factor/Criterion	References
24	4A—Prolonged construction and modernisation of roads, bike paths, etc.	[81]
25	4B—Traffic congestion (caused by the existing transport network, e.g., the only access road in a given direction)	[82–85]
26	4C—Traffic bottlenecks and unsafe junctions	[86]
27	4D—Poor roadway design and construction errors	[87]
28	4E—Absence or decreased availability of parking spaces	[62–66]
29	4F—Decrease in the number of public transport stops	[88]
30	4G—Lack of transit hubs	[89]
31	4H—Prolonged travel time	[90]
32	4I—Poor condition of infrastructure	[91]
33	4J—Inadequate road signage	[92–94]
34	5A—Deterioration in public transport punctuality	[67]
35	5B—No charging stations for electric vehicles	[95–97]
36	5C—Unavailability of travel planning applications and systems	[98]
37	5D—Errors in the traffic management system	[99]
38	5E—Dependence on the Internet and GSM access	[100,101]
39	5F—Old public transport fleet (longer commuting time)	[102,103]
40	5G—Vehicle failure	[104]
41	6A—Environmental pollution (caused by failures that lead to chemical or biological contamination)	[105]
42	6B—Adverse weather conditions (snow, rain, low temperature, slippery surfaces, wind, etc.)	[106–108]
43	6C—Poor air quality (resulting from human activity, such as smog)	[88,109,110]
44	6D—Difficult terrain (large slopes) and natural barriers (rivers and water bodies without bridges or ferry services)	[111,112]
45	6E—Natural disasters (hurricane, earthquake, flood, tornado, etc.)	[113,114]
46	6F—Noise	[115]

Source: own elaboration.

3. Materials and Methods

3.1. Methods

The study involved a literature analysis to identify potential threats that affect TB in FUAs, and an expert survey to determine the significance of potential TB threats. Empirical data were collected with the use of qualitative (list of potential TB threats and categories of threats) and quantitative methods (significance of potential TB threats) to achieve the main research aim and specific objectives, and to validate the research hypotheses: (1) the COVID-19 pandemic increased the demand for private transport, whereas the energy crisis prompted commuters to rely on shared and public transport to cut costs; (2) social threats were predominant during the COVID-19 pandemic, whereas economic threats came to the forefront during the energy crisis. The study was conducted in several planned stages with the use of geographic methods and analytical tools (Statistica PL v. 13, StatSoft Polska; QGIS v. 3.22.1; ArcGIS Pro v. 2.9.2—complex cartograms). In the first stage, the domestic and international literature was reviewed to identify all threats that influence TB in cities and suburban areas. A full list of potential threats was developed, and every identified threat, even if incidental, was placed on the list. In the next stage, the identified factors were classified and grouped into 6 categories. The resulting list of factors was used to design an online survey questionnaire. The survey was addressed to experts in the fields of transport, spatial planning, urban development, and public administration in all European countries. The results of the survey were processed to determine the impact of different threats on TB in FUAs during the COVID-19 pandemic when social restrictions were imposed to curtail the global health crisis (October 2012) and five months after the outbreak of the geopolitical conflict (July 2022) which undermined the economic stability of Europe (Section 4.2).

The significance of the identified threats was ranked based on the number of answers given by the respondents (Z_i) and the weights assigned to each threat category. Weights (W_{Kj}) were calculated for each threat category based on the number of times a given category (K_j) was indicated by the experts.

$$W_{Kj} = \frac{K_j}{\sum_{j=1}^{m} K_j} \quad (1)$$

The significance of the identified threats was ranked by multiplying weights by the number of specific answers:

$$Rank_i = \sum_{i=1}^{n} W_{Kj} \times Z_i \quad (2)$$

where:

W_{Kj} is the weight of a given category of threat;

Z_i is the number of times a given threat was identified.

The results were arranged in a descending order and divided into 4 classes (Table 2) based on the following criteria: low threat—Ri > Rav + s; moderate threat—Rav + s > –i > Rav; relatively high threat—Rav > Ri > Rav − s; and high threat—Rav − s > Ri [116].

Table 2. Classification criteria.

Class	Classification Criterion	Priority
I	$wi \leq med_2(wi)$	Low
II	$med_2(wi) < wi \leq med(wi)$	Moderate
III	$med(wi) < wi \leq med_1(wi)$	Relatively high
IV	$wi \geq med_1(wi)$	High

where: med(wi)—median, med1(wi), med2(wi)—intermediate values. Source: [117]

3.2. Study Area

The study covered the entire European continent, but a sufficient number of answers was obtained from 22 countries, which were selected for detailed analyses (Figure 2). The European continent has an area of 10.5 million km^2, and is divided into 47 countries. According to the United Nations Development Programme (UNDP), in particular the Human Development Report 2019 (United Nations, 2019) and the Inequality-adjusted Human Development Index (IHDI), most European states are developed and highly developed countries, excluding Moldova, Albania, Macedonia, and Bosnia and Herzegovina which are characterized by moderate levels of economic growth. The highest levels of economic growth are noted in Central and Northern Europe. In 2020, the average GDP per capita was USD 34,424 in the Eurozone [118] and USD 30,997 in the entire EU. The lowest GDP per capita was reported in Southeastern Europe, i.e., in Ukraine, Moldova, Kosovo, and Albania, which are not EU members, where it was below USD 5000 (Table 3).

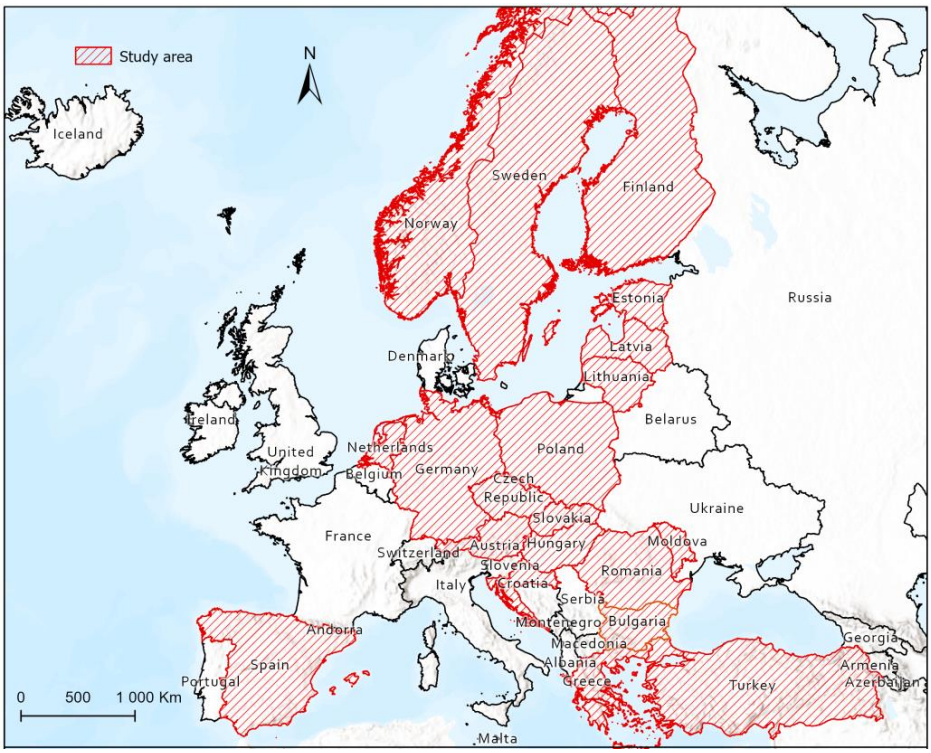


Figure 2. Study area. Source: own elaboration.

Table 3. Basic geographic and economic indicators of the selected European countries.

Country	Population in 2021	Population Density Persons/km^2	Total Area in '000 km^2	GDP per Capita | Europe 2021 USD	Average Excess Mortality by Month *
Austria	8,932,664	107.6	83.9	43,611	10.7
Bulgaria	6,916,548	63.4	111.0	8050	26.2
Croatia	4,036,355	72.8	56.6	12,694	14.7
Czech Republic	10,701,777	138.2	78.9	18,984	20.6
Estonia	1,330,068	30.5	45.3	19,736	11.7
Finland	5,533,793	18.2	338.4	44,773	5.0
Germany	83,155,031	235.2	357.6	41,259	7.6
Greece	10,678,632	82.4	131.7	17,436	13.3
Hungary	9,730,772	107.1	93.0	14,328	14.1
Latvia	1,893,223	30.2	64.6	15,488	11.6
Lithuania	2,795,680	44.6	65.3	17,033	15.0
Moldova	3,481,000	122.3	33.9	3250	n/a.
Netherlands	17,475,415	507.3	37.4	46,328	12.3
Norway	5,391,369	17.3	8794.8	75,059	1.5
Poland	37,840,001	123.6	311.9	14,588	23.5
Romania	19,201,662	82.7	238.4	10,830	21.1
Slovakia	5,459,781	112.0	49.0	17,252	23.1
Spain	47,398,695	93.8	506.0	24,935	12.8
Sweden	10,379,295	25.2	447.4	51,621	4.4
Turkey	85,404,000	110.5	783.6	12,035	n/a.

* January 2020–December 2021, Source: own elaboration based on [119].

Most European countries were affected by the pandemic beginning in the first months of 2020. Excess mortality due to COVID-19 differed considerably across European countries [120]. The estimated excess mortality is presented in Figure 3. Estimates of excess deaths are an effective method of evaluating the total burden of the COVID-19 pandemic, including the number of deaths caused directly by the virus, as well as the number deaths that were indirectly associated with COVID-19 (people with other health problems who were unable to receive treatment in regions that were most affected by the pandemic) [121,122].

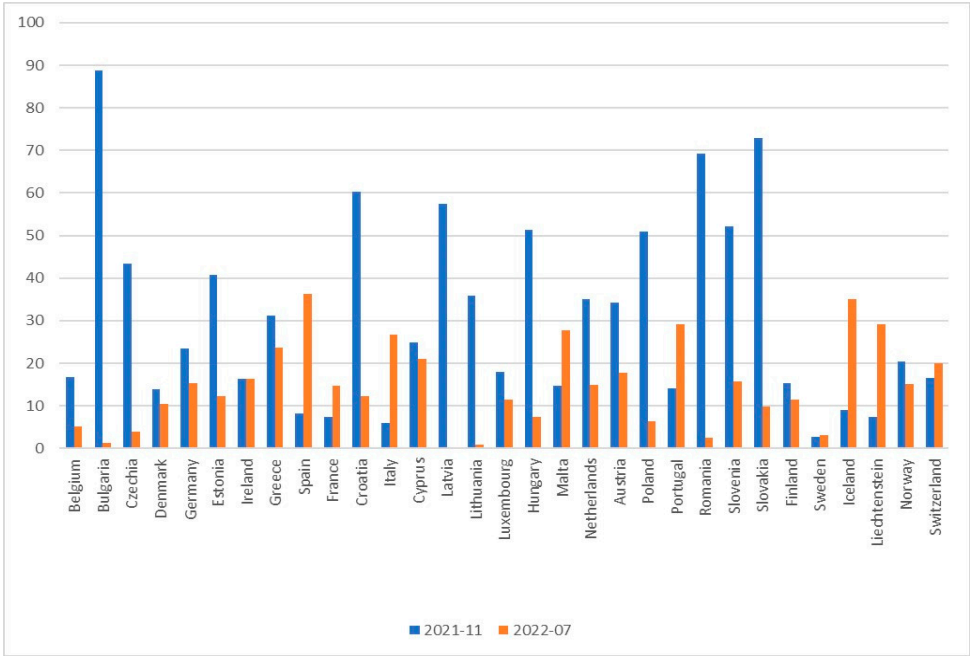


Figure 3. Excess mortality by month during the expert survey. Source: [119].

The outbreak of a geopolitical conflict in Eastern Europe in February 2022, undermined the economic stability of the entire European continent. The crisis has also affected the global economy [24]. The increased risk of geopolitical transformations, in particular changes introduced to energy contracts, weighed adversely on the global economy in 2022 by reducing GDP, boosting inflation, and exacerbating the policy trade-offs facing central banks around the world [123].

The aim of an expert survey was to identify the relationship between the influence of the COVID-19 pandemic on public health, the effects of the geopolitical and economic crisis, and the prioritisation of TB threats in European countries. Scientists who publish research papers in the field of transport were invited to participate in the survey. They were selected based on a review of the leading bibliographic databases and by forwarding requests to universities in all European countries which offer study programs in transport, transport infrastructure, socioeconomic geography, and land management. A total of 543 questionnaires were forwarded, and 250 completed questionnaires were returned.

3.3. Development of the Questionnaire Survey

The questionnaire comprised 12 questions. The first 6 questions were designed to collect information about the respondents, including their main field of interest, employment in a commercial organisation or a research/educational institution, and professional experience. This part of the questionnaire contained single or multiple choice closed-ended questions. The respondents were asked to indicate their country and city of residence in a descriptive question. In a single choice closed-ended question, they were asked to state the population of the city in which they resided on an interval scale (below 50,000, 50,000–100,000, 100,000–250,000, 250,000–1.5 million, above 1.5 million). In the last profiling question, the respondents described their preferred means of daily transport. The participants were presented with a choice of two means of transport: private (private car, rented car/taxi, motorbike, private e-scooter (electric scooter)/private e-bike (electric bicycle), urban e-scooter/urban e-bike, private bike, urban bike) or public (bus/trolleybus, metro/rail/tram). The following 6 closed-ended questions addressed the threats influencing TB. Each question concerned only one threat category (social, economic, etc.).

1. Choose a maximum of 3 most relevant factors from the group of **social factors** that influence TB and can be identified as threats;
2. Choose a maximum of 3 most relevant factors from the group of **economic factors** that influence TB and can be identified as threats;
3. Choose a maximum of 3 most relevant factors from the group of **legal factors** that influence TB and can be identified as threats;
4. Choose a maximum of 3 most relevant factors from the group **of infrastructural factors** that influence TB and can be identified as threats;
5. Choose a maximum of 3 most relevant factors from the group of **technological/SMART factors** that influence TB and can be identified as threats;
6. Choose a maximum of 3 most relevant factors from the group of **environmental factors** that influence TB and can be identified as threats.

The participants could give a maximum of 3 answers to each question. The questions differed in the number of potential answers, which corresponded to the number of potential threats (Table 4): 10 threats in question 1, 7 threats in question 2, 6 threats in question 3, 10 threats in question 4, 7 threats in question 5, and 6 threats in question 6. In these questions, the experts were asked to identify the threats that influence the entire society rather than individuals. In the last question, the respondents ranked the presented threat categories on a scale of 1 to 6 (1—most important, 6—least important).

Table 4. Classification of potential threats that influence TB in the context of means of transport and walking.

Threat Category	Factor/Criterion	CPT *	COT *	EPT *	EOT *	APT *	AOT *	Walk
Social	1A—Job loss, change of employment, change in working hours, remote work, retirement	■	■	■	■	■	■	■
	1B—Changes in the family environment: new partner, separation, children that have to be transported, etc.	■	■	■	■	■	■	■
	1C—New place of residence (changes in commuting distance and route)	■	■	■	■	■	■	■
	1D—Health problems/decline in emotional well-being, injuries	■	■	■	■	■	■	■
	1E—Crowding in public transport (bus, tram)	■		■				
	1F—Negative image of public transport	■		■				
	1G—Epidemic risk (risk of COVID-19 infection)	■	■	■	■	■	■	■
	1H—Annoying behaviour of other passengers	■		■				
	1I—Safety issues in public transport (risk of terrorist attack)	■		■				
	1J—Low travel comfort	■		■		■		
Economic	2A—High cost of spare parts, vehicle maintenance, and repair services		■		■		■	
	2B—Ticket price is high/tickets are difficult to buy	■		■		■		
	2C—Parking fees/fees for driving into the city centre		■		■		■	
	2D—Lower service frequency (such as bus lines), changes in public transport timetables	■		■				
	2E—Increase in fuel/electricity prices		■		■			
	2F—Problems in the market of transport services (strikes, bankruptcies)	■		■		■		
	2G—Interrupted supply of fuel or electricity	■	■	■	■			
Legal	3A—Loss of driver's license or passenger transport license		■		■	■	■	
	3B—Downtown area is closed to traffic		■		■	■	■	
	3C—Driving restrictions on rental cars (restricted driving area, zones where parking is not allowed)	■		■		■		
	3D—Speed limits	■	■	■	■	■	■	
	3E—Urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre)		■					
	3F—Introduction or expansion of paid parking zones in the city		■		■	■	■	
Infrastructural	4A—Prolonged construction and modernisation of roads, bike paths, etc.	■	■	■	■			
	4B—Traffic congestion (caused by the existing transport network, e.g., the only access road in a given direction)	■	■	■	■			
	4C—Traffic bottlenecks and unsafe junctions	■	■	■	■	■	■	
	4D—Poor roadway design and construction errors		■		■			
	4E—Absence or decreased availability of parking spaces	■		■				
	4F—Decrease in the number of public transport stops	■		■		■		
	4G—Lack of transit hubs	■	■	■	■	■	■	
	4H—Prolonged travel time	■	■	■	■	■	■	
	4I—Poor condition of infrastructure		■		■	■	■	
Technological/SMART	5A—Deterioration in public transport punctuality	■		■				
	5B—No charging stations for electric vehicles			■	■			
	5C—Unavailability of travel planning applications and systems	■	■	■	■	■	■	
	5D—Errors in the traffic management system	■	■	■	■	■	■	
	5E—Dependence on the Internet and GSM access	■	■	■	■	■	■	
	5F—Old public transport fleet (longer commuting time)	■						
	5G—Vehicle failure	■	■	■	■	■	■	
Environmental	6A—Environmental pollution (caused by failures that lead to chemical or biological contamination)			■	■	■	■	■
	6B—Adverse weather conditions (snow, rain, low temperature, slippery surfaces, wind, etc.)			■	■	■	■	■
	6C—Poor air quality (resulting from human activity, such as smog)			■	■	■	■	■
	6D—Difficult terrain (large slopes) and natural barriers (rivers and water bodies without bridges or ferry services)					■	■	■
	6E—Natural disasters (hurricane, earthquake, flood, tornado, etc.)	■	■	■	■	■	■	■
	6F—Noise					■	■	■

* Abbreviations: CPT—combustion-powered public transport, COT—combustion-powered own transport, EPT—electric public transport, EOT—electric own transport, APT—active public transport, AOT—active own transport. ■ presence of the factor. Source: own elaboration.

4. Results and Discussion

4.1. Threat Classification in the Context of TB in FUAs

A total of 46 threat factors influencing TB, identified based on a review of the literature, were grouped into 6 key categories: social, economic, legal, infrastructural, technological/SMART, and environmental. A detailed list of threats is presented in Table 4. The types of threats influencing TB were linked with different means of transport. In the literature, some criteria such as changes in socioeconomic status, are presented as both threats that

influence TB, but also as positive factors that drive development. All factors with a dual nature were placed on the list of potential threats that influence TB in FUAs.

The data presented in Table 4 indicate that 33% of the identified threats can influence TB in all means of transport in FUAs. The vast majority of threats (70%) apply to combustion-powered (CPT) and electric public transport (EPT), whereas 60% of the threats concern combustion-powered (COT) and electric own transport (EOT). The percentage of threats applicable to active public transport (APT) and active own transport (AOT) was lower at 63% and 56%, respectively. These results suggest that the identified threats can be most detrimental to public transport.

4.2. Results of the Expert Survey

Not all European countries responded to the invitation to participate in the expert survey, or the response was very modest (less than five experts) to constitute a representative population sample. The survey was conducted in two stages: at the turn of October and November 2021 and in July 2022 (five months after the outbreak of the military conflict in Ukraine).

In both stages, the questionnaire was forwarded to the same group of experts from the same countries (Figure 4). In the first stage, completed questionnaires were returned by 22 countries: Austria, Bulgaria, Croatia, the Czech Republic, Estonia, Finland, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Moldova, Romania, Slovakia, Slovenia, Spain, Sweden, and Turkey. Only three countries did not participate in the second stage of the survey (Italy, Belarus, and Slovenia); therefore, the questionnaires completed by experts from these countries in the first stage of the survey were not included in a comparative analysis. Ultimately, only the questionnaires returned by 22 countries (Table 3) were analysed.

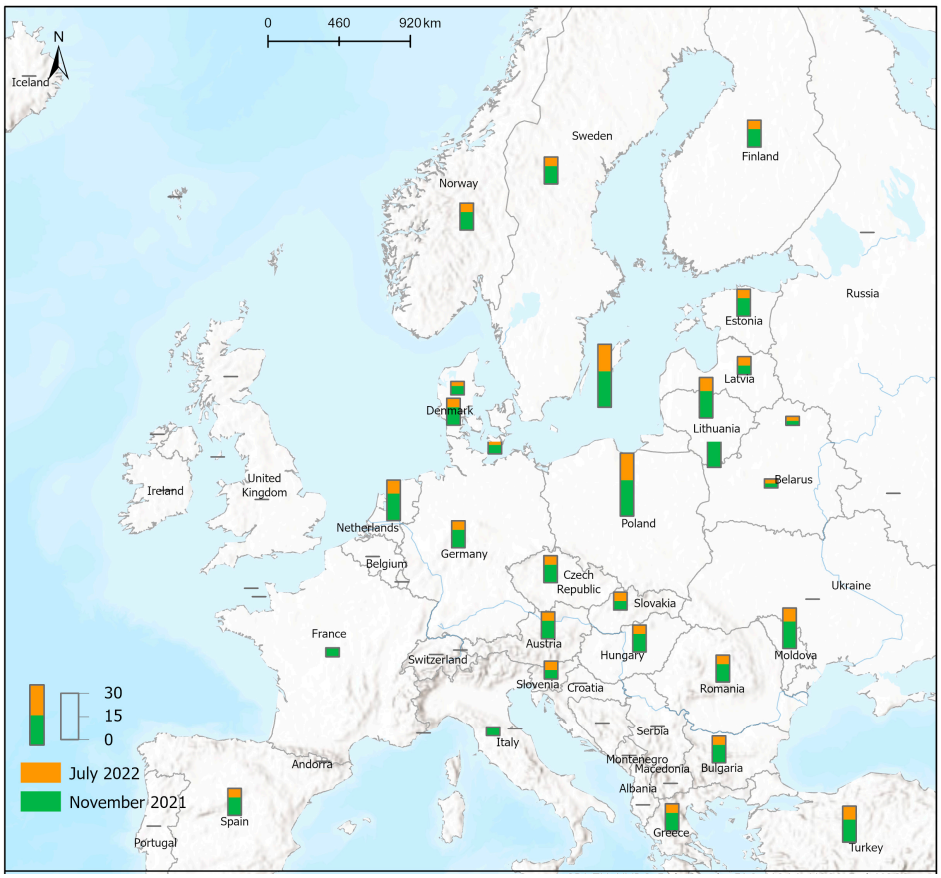
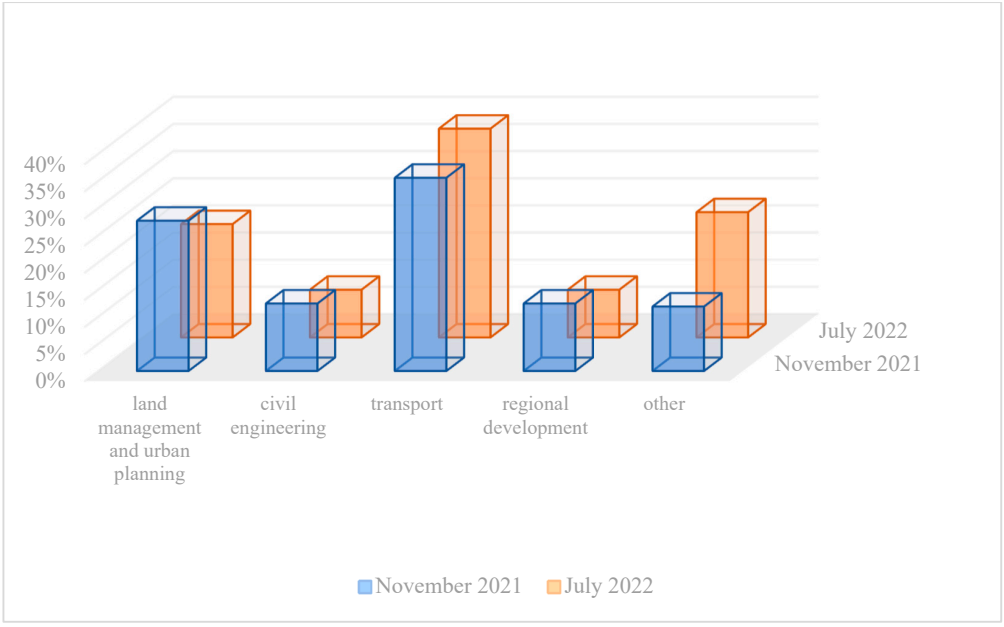


Figure 4. Number of respondents. Source: own elaboration.

The majority (87%) of the surveyed experts were employed in research/educational institutions (85% in the first stage of the survey, 93% in the second stage of the survey). The remaining respondents worked in land administration and commercial organisations. Most participants were transport experts (36% in the first stage of the survey, 38% in the second stage of the survey; Figure 5A) and land management and urban planning experts (28% in the first stage of the survey, 21% in the second stage of the survey). A large percentage of the respondents were experts in other fields, including sociology, psychology, land surveying, forestry, finance, environmental protection, and GIS. In the first stage of the survey, most respondents (39%) had more than 20 years of professional experience. In the second stage of the survey, 46% of the participants had 10–20 years of professional experience (Figure 5B).



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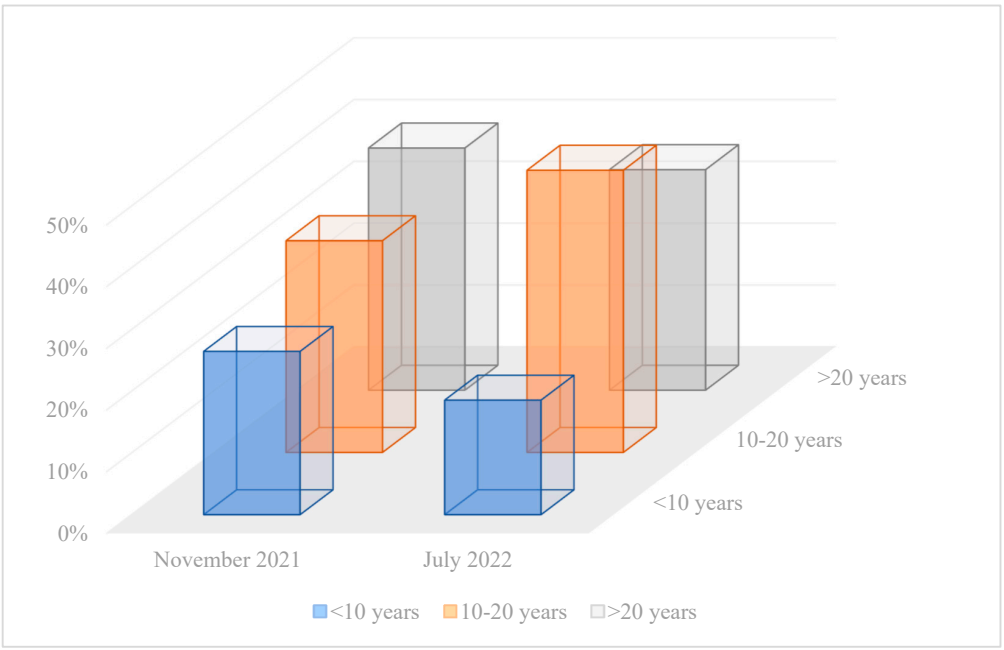

B

Figure 5. Expert Characteristics. (**A**) Distribution of respondents by professional specialty. (**B**) Years of expertise. Source: own elaboration.

Nearly 55% of the surveyed experts resided in large cities with a population of 250,000–1.5 million, and 18% of the respondents inhabited cities with a population above 1.5 million. Respondents residing in cities with a population of 100,000–250,000, 50,000–100,000, and below 50,000 accounted for 14%, 5%, and 9% of the studied population, respectively. These characteristics indicate that the analysed sample was sufficiently representative of the examined population. The number and distribution of the respondents are presented in a cartogram in Figure 5.

Most respondents had a preference for private transport, including cars (36%) and bicycles (21%). A large group of the participants used public transport, including bus/trolleybus (19%) or metro/rail/tram (14%) (Figure 6).

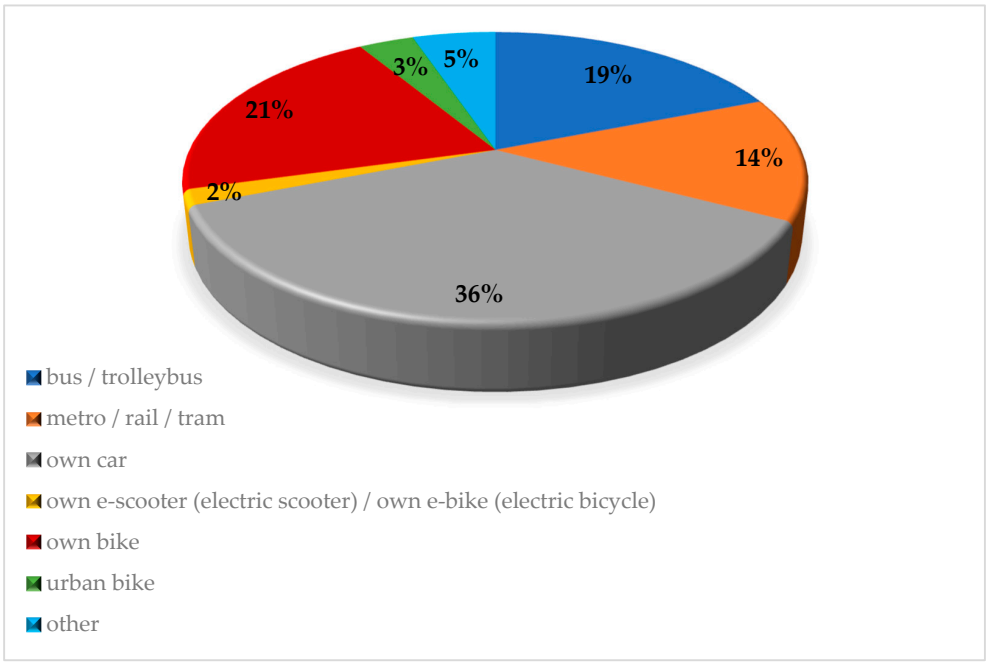

Figure 6. Means of transport preferred by the surveyed experts. Source: own elaboration.

The number of responses from 22 countries in each of the 6 threat categories revealed changes in the prioritisation of threats affecting TB in FUAs. Interestingly, economic factors were classified as **high** priority threats in both stages of the survey (during the COVID-19 pandemic in November 2021, and after the outbreak of the geopolitical conflict in July 2022). These threats included an increase in fuel/electricity prices (2E), lower service frequency (such as bus lines) (2D), parking fees/fees for driving into the city centre (2C), and high ticket prices/decreased availability of tickets (2B) (Table 5). Traffic congestion (4B), job loss and change of employment (1A), and new place of residence (1C) were also regarded as **high** priority threats. High priority threats in the group of legal factors included the introduction or expansion of paid parking zones in the city (3F), and loss of driver's license or passenger transport license (3A). Epidemic risks (1G) were also classified as high priority threats. Adverse weather conditions (6B) were regarded as the highest environmental threat. Most economic and legal risks were identified as high priority threats (Table 5).

Table 5. Impact of innovative factors on TB (November 2021; July 2022).

Rank	During the Pandemic	Value	Category	Change in Rank		At a Time of Economic Crisis Caused by Geopolitical Conflict in Eastern Europe	Value	Category
	High priority threat					**High priority threat**		
1	2E—Increase in fuel/electricity prices	11.94	Econ.	↓	1	2D—Lower service frequency (such as bus lines), changes in public transport timetables	10.65	Econ.
2	2D—Lower service frequency (such as bus lines), changes in public transport timetables	11.69	Econ.	↑	1	2E—Increase in fuel/electricity prices	9.59	Econ.
3	2C—Parking fees/fees for driving into the city centre	9.46	Econ.	→	0	2C—Parking fees/fees for driving into the city centre	7.46	Econ.
4	4B—Traffic congestion (caused by the existing transport network, e.g., the only access road in a given direction)	8.–6	Inf.	→	0	4B—Traffic congestion (caused by the existing transport network, e.g., the only access road in a given direction)	7.05	Inf.
5	1G—Epidemic risk (risk of COVID-19 infection)	8.51	Social	↓	4	2B—Ticket price is high/tickets are difficult to buy	6.84	Econ.
6	2B—Ticket price is high/tickets are difficult to buy	7.78	Econ.	↑	1	1A—Job loss, change of employment, change in working hours, remote work, retirement	6.37	Social
7	3A—Loss of driver's license or passenger transport license	7.2	Legal	↓	1	1C—New place of residence (changes in commuting distance and route)	6.03	Social
8	4E—Absence or decreased availability of parking spaces	7.06	Inf.	↓	5	3A—Loss of driver's license or passenger transport license	5.86	Legal
9	1C—New place of residence (changes in commuting distance and route)	7.02	Social	↑	2	1G—Epidemic risk (risk of COVID-19 infection)	5.23	Social
10	1A—Job loss, change of employment, change in working hours, remote work, retirement	7.02	Social	↑	4	3B—Downtown area is closed to traffic	4.69	Legal
11	3F—Introduction or expansion of paid parking zones in the city	6.87	Legal	→	0	3F—Introduction or expansion of paid parking zones in the city	4.36	Legal
12	6B—Adverse weather conditions (snow, rain, low temperature, slippery surfaces, wind, etc.)	6.19	Envir.	→	0	6B—Adverse weather conditions (snow, rain, low temperature, slippery surfaces, wind, etc.)	4.3	Envir.
13	3E—Urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre)	6.05	Legal	↓	5	4E—Absence or decreased availability of parking spaces	3.88	Inf.
	Relatively high priority threat					**Relatively high priority threat**		
14	3B—Downtown area is closed to traffic	6.05	Legal	↑	4	4C—Traffic bottlenecks and unsafe junctions	3.73	Inf.
15	1E—Crowding in public transport (bus, tram)	4.56	Social	→	0	1E—Crowding in public transport (bus, tram)	3.62	Social
16	4H—Prolonged travel time	4.35	Inf.	↓	1	5A—Deterioration in public transport punctuality	3.53	T/S
17	5A—Deterioration in public transport punctuality	3.8	T/S	↑	1	4H—Prolonged travel time	3.53	Inf.
18	1D—Health problems/decline in emotional well-being, injuries	3.8	Social	↓	4	3E—Urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre)	2.68	Legal
19	6C—Poor air quality (resulting from human activity, such as smog)	3.73	Envir.	↓	7	1B—Changes in the family environment: new partner, separation, children that have to be transported, etc.	2.47	Social
20	4C—Traffic bottlenecks and unsafe junctions	3.62	Inf.	↑	6	5F—Old public transport fleet (longer commuting time)	2.47	T/S
21	5F—Old public transport fleet (longer commuting time)	3.6	T/S	↑	1	4A—Prolonged construction and modernisation of roads, bike paths, etc.	2.43	Inf.
22	4A—Prolonged construction and modernisation of roads, bike paths, etc.	3.44	Inf.	↑	1	1D—Health problems/decline in emotional well-being, injuries	2.41	Social
23	1H—Annoying behaviour of other passengers	3.42	Social	→	0	1H—Annoying behaviour of other passengers	2.41	Social
24	5D—Errors in the traffic management system	3.4	T/S	↓	5	6D—Difficult terrain (large slopes) and natural barriers (rivers and water bodies without bridges or ferry services)	2.41	Envir.
	Moderate priority threat					**Moderate priority threat**		
25	6A—Environmental pollution (caused by failures that lead to chemical or biological contamination)	3.15	Envir.	↓	6	6E—Natural disasters (hurricane, earthquake, flood, tornado, etc.)	2.37	Envir.
26	2A—High cost of spare parts, vehicle maintenance, and repair services	3.08	Econ.	↓	4	6C—Poor air quality (resulting from human activity, such as smog)	2.15	Envir.
27	1B—Changes in the family environment: new partner, separation, children that have to be transported, etc.	2.99	Social	↓	9	2G—Interrupted supply of fuel or electricity	2.13	Econ.
28	4G—Lack of transit hubs	2.72	Inf.	→	0	4G—Lack of transit hubs	2.12	Inf.

Table 5. *Cont.*

Rank	During the Pandemic	Value	Category	Change in Rank		At a Time of Economic Crisis Caused by Geopolitical Conflict in Eastern Europe	Value	Category
29	2F—Problems in the market of transport services (strikes, bankruptcies)	2.6	Econ.	↓	5	5D—Errors in the traffic management system	2.11	T/S
30	2G—Interrupted supply of fuel or electricity	2.49	Econ.	↑	3	2A—High cost of spare parts, vehicle maintenance, and repair services	2.01	Econ.
31	4D—Poor roadway design and construction errors	2.47	Inf.	↓	7	6A—Environmental pollution (caused by failures that lead to chemical or biological contamination)	1.94	Envir.
32	6E—Natural disasters (hurricane, earthquake, flood, tornado, etc.)	2.28	Envir.	↑	7	4I—Poor condition of infrastructure	1.76	Inf.
33	6F—Noise	2.22	Envir.	↓	4	3C—Driving restrictions on rental cars (restricted driving area, zones where parking is not allowed)	1.68	Legal
34	4I—Poor condition of infrastructure	2.17	Inf.	↑	2	2F—Problems in the market of transport services (strikes, bankruptcies)	1.68	Econ.
	Low priority threat					**Low priority threat**		
35	1J—Low travel comfort	2.1	Social	↓	7	1F—Negative image of public transport	1.61	Social
36	6D—Difficult terrain (large slopes) and natural barriers (rivers and water bodies without bridges or ferry services)	2.1	Envir.	↓	2	1I—Safety issues in public transport (risk of terrorist attack)	1.61	Social
37	3C—Driving restrictions on rental cars (restricted driving area, zones where parking is not allowed)	1.8	Legal	↑	4	6F—Noise	1.61	Envir.
38	4F—Decrease in the number of public transport stops	1.63	Inf.	↓	5	4D—Poor roadway design and construction errors	1.51	Inf.
39	5E—Dependence on the Internet and GSM access	1.5	T/S	↓	1	5G—Vehicle failure	1.46	T/S
40	5G—Vehicle failure	1.49	T/S	↑	1	5E—Dependence on the Internet and GSM access	1.14	T/S
41	1I—Safety issues in public transport (risk of terrorist attack)	1.33	Social	↑	5	3D—Speed limits	1.14	Legal
42	1F—Negative image of public transport	1.33	Social	↑	7	1J—Low travel comfort	1.07	Social
43	5B—No charging stations for electric vehicles	1.2	T/S	↓	2	4F—Decrease in the number of public transport stops	1.06	Inf.
44	5C—Unavailability of travel planning applications and systems	1.1	T/S	→	0	5C—Unavailability of travel planning applications and systems	0.81	T/S
45	4J—Inadequate road signage	0.54	Inf.	↓	1	5B—No charging stations for electric vehicles	0.81	T/S
46	3D—Speed limits	0.49	Legal	↑	5	4J—Inadequate road signage	0	Inf.
	Class					**Priority**		
						High		
						Relatively High		
						Moderate		
						Low		

Inf.—infrastructural, T/S—technological/SMART, and Envir.—environmental. → the same level ↓ decrease ↑ increase. Source: own elaboration.

Health problems, including injuries (1D), crowding in public transport (bus, tram) (1E), annoying behaviour of other passengers (1H), prolonged construction and modernisation of roads, bike paths, etc. (4A), prolonged travel time (4H), and old public transport fleet (5F) were recognised as **relatively high** priority threats in both stages of the survey.

The following factors were identified as **moderate** priority threats in both stages of the survey: interrupted supply of fuel or electricity (2G), lack of transit hubs (4G), poor condition of infrastructure (4I), and environmental pollution (caused by failures that lead to chemical or biological contamination) (6A).

No charging stations for electric vehicles (5B), unavailability of travel planning applications and systems (5C), negative image of public transport (1F), safety issues in public transport (risk of terrorist attack) (1I), dependence on the Internet and GSM access (5E), and decrease in the number of public transport stops (4F), were recognised as **low** priority threats in both stages of the survey.

The results of the survey are presented in Table 5. All six categories of threats (social, environmental, etc.) were ranked based on the results of the survey. The identified threats

were ranked separately for the first (COVID-19 pandemic; Table 6) and the second stage of the survey (geopolitical conflict; Table 7).

Table 6. Ranking of threat categories (November 2021).

Weight	Priority	Social	Economic	Legal	Infrastructural	Technological/SMART	Environmental
4	high	30%	57%	50%	20%	0%	17%
3	relatively high	30%	0%	17%	30%	43%	17%
2	moderate	10%	43%	0%	20%	0%	50%
1	low	30%	0%	33%	30%	57%	17%
Total		100%	100%	100%	100%	100%	100%
Ranking		2.60	3.14	2.83	2.40	1.86	2.33

high, low. Source: own elaboration.

Table 7. Ranking of threat categories (July 2022).

Weight	Priority	Social	Economic	Legal	Infrastructural	Technological/SMART	Environmental
4	high	30%	57%	60%	20%	0%	17%
3	relatively high	40%	0%	20%	30%	29%	17%
2	moderate	0%	29%	0%	20%	14%	50%
1	low	30%	14%	20%	30%	57%	17%
Total		100%	100%	100%	100%	100%	100%
Ranking		2.70	3.00	3.20	2.40	1.71	2.33

high, low. Source: own elaboration.

The threats in the technological/SMART category were regarded as the least significant (Tables 6 and 7). Most factors in this category were identified as **low** priority threats. In turn, economic and legal factors were recognised as **high** priority threats. Economic threats were ranked highest (3.14) during the pandemic (Table 6), whereas legal (3.20) and economic threats (3.00) were recognised as the most severe threats after the outbreak of the geopolitical conflict (Table 7).

The prioritisation of the classified threats changed between the two stages of the survey. Changes were noted in the perceived priority (high—low) of 11 out of the 46 analysed threats (Table 5).

The following transport-related threats received a higher priority in the second stage of the survey: urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre) (3E), poor roadway design and construction errors (4D), errors in the traffic management system (5D), poor air quality (6C), problems in the market of transport services (strikes, bankruptcies) (2F), and noise (6F) (Figure 7).

In the second stage of the survey, the following public health threats were ranked as more significant: changes in the family environment: new partner, separation, children that have to be transported (1B), downtown area is closed to traffic (3B), poor condition of infrastructure (4I), difficult terrain (large slopes) and natural barriers (6D), and driving restrictions on rental cars (3C) (Figure 7).

The results of the ranking were used to validate the research hypotheses postulating that: (1) the COVID-19 pandemic increased the demand for private transport, whereas the energy crisis prompted commuters to rely on shared and public transport to cut costs; (2) social threats were predominant during the COVID-19 pandemic, whereas economic threats came to the forefront during the energy crisis.

To validate the research hypotheses, the classification of TB threats was narrowed down to factors that affect public and private transport. Threats that impact both types of transport were disregarded. The perceived significance of these threats was compared in both analysed periods (the COVID-19 pandemic and the geopolitical conflict), and the results are presented in Table 8. Changes in rank are marked with arrows. An up arrow denotes an increase in rank; a down arrow denotes a decrease in rank, and a horizontal arrow denotes no change between the two stages of the survey (Table 8).

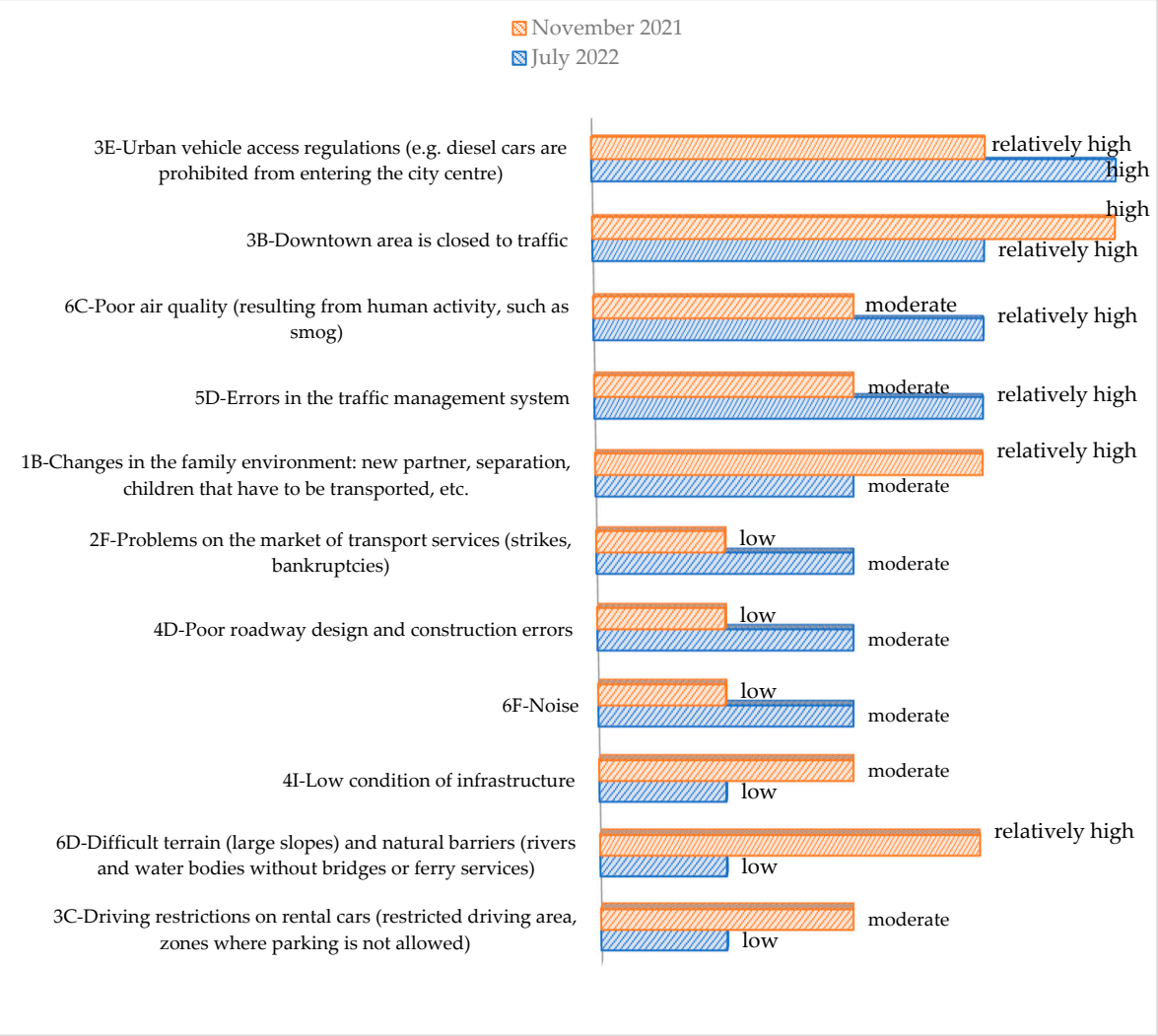

Figure 7. Threats whose perceived significance changed between the first and the second stage of the survey. Source: own elaboration.

Table 8. Threats to TB which affect public and private transport.

	Factor/Criterion (Public Transport)			Factor/Criterion (Private Transport)		
1	1E—Crowding in public transport (bus, tram)	0	→	2A—High cost of spare parts, vehicle maintenance, and repair services	4	↓
2	1F—Negative image of public transport	7	↑	2E—Increase in fuel/electricity prices	1	↓
3	1H—Annoying behaviour of other passengers	0	→	3A—Loss of driver's license or passenger transport license	1	↓
4	1I—Safety issues in public transport (risk of terrorist attack)	5	↑	3B—Downtown area is closed to traffic	4	↑
5	1J—Low travel comfort	7	↓	3E—Urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre)	5	↓
6	2B—Ticket price is high/tickets are difficult to buy	1	↑	3F—Introduction or expansion of paid parking zones in the city	0	→
7	2D—Lower service frequency (such as a bus line), changes in public transport timetables	1	↑	4E—Absence or decreased availability of parking spaces	5	↓
8	2F—Problems in the market of transport services (strikes, bankruptcies)	5	↓	4J—Inadequate road signage	1	↓
9	3C—Driving restrictions on rental cars (restricted driving area, zones where parking is not allowed)	4	↑	5B—No charging stations for electric vehicles	2	↓
10	4F—Decrease in the number of public transport stops	5	↓	6B—Adverse weather conditions (snow, rain, low temperature, slippery surfaces, wind, etc.)	0	→
11	4G—Lack of transit hubs	0	→	6C—Poor air quality (resulting from human activity, such as smog)	7	↓
12	5A—Deterioration in public transport punctuality	1	↑	6D—Difficult terrain (large slopes) and natural barriers (rivers and water bodies without bridges or ferry services)	2	↓
13	5F—Old public transport fleet (longer commuting time)	1	↑			

→ the same level ↓ decrease ↑ increase. Source: own elaboration.

The comparison revealed that the perceived significance of seven threats associated with public transport increased in the second stage of the survey (Table 8). These were: high ticket prices (2B), lower service frequency (2D), deterioration in public transport punctuality (5A), negative image of public transport (1F), old public transport fleet (5F), safety issues in public transport (1I), and driving restrictions on rental cars (3C).

Problems in the market of transport services (strikes, bankruptcies) (2F), high ticket prices (2B), and lower service frequency (2D) were recognised as high priority threats.

The perceived significance of three public transport threats did not change between the first and second stage of the survey: annoying behaviour of other passengers (1H), lack of transit hubs (4G), and crowding in public transport (1E) (Table 8).

In contrast, eight threats associated with private transport were regarded as less significant in the second stage of the survey. These were: high cost of spare parts, vehicle maintenance, and repair services (2A), loss of driver's license or passenger transport license (3A), urban vehicle access regulations (e.g., diesel cars are prohibited from entering the city centre) (3E), absence or decreased availability of parking spaces (4E), no charging stations for electric vehicles (5B), and environmental pollution (caused by human activity, such as smog) (6C).

Additional data on the registration of new cars in the European Union and the number of registered passenger cars in Poland may be crucial for a more comprehensive understanding of changes in travel behaviour during the pandemic [124] and energy crisis. The decline in the sale of passenger cars was particularly noticeable during the outbreak of the pandemic, reaching 23.7% in the EU (Figure 8). An improvement occurred in 2021, where the decrease was only 2.4%, indicating the gradual adaptation of society to the new conditions. Nevertheless, with the onset of the energy crisis in 2022, there was a renewed deterioration in the automotive market situation, increasing the decline in the sale of passenger cars to 4.6%. The registration of passenger cars in Poland was also at its lowest in 2022, as can be seen in the presented chart (Figure 9).

Moreover, it is important to note the increase in the interest in public mass transport from 2021 onwards (after the decline caused by the COVID-19 pandemic) [127,128] (Figures 10 and 11).

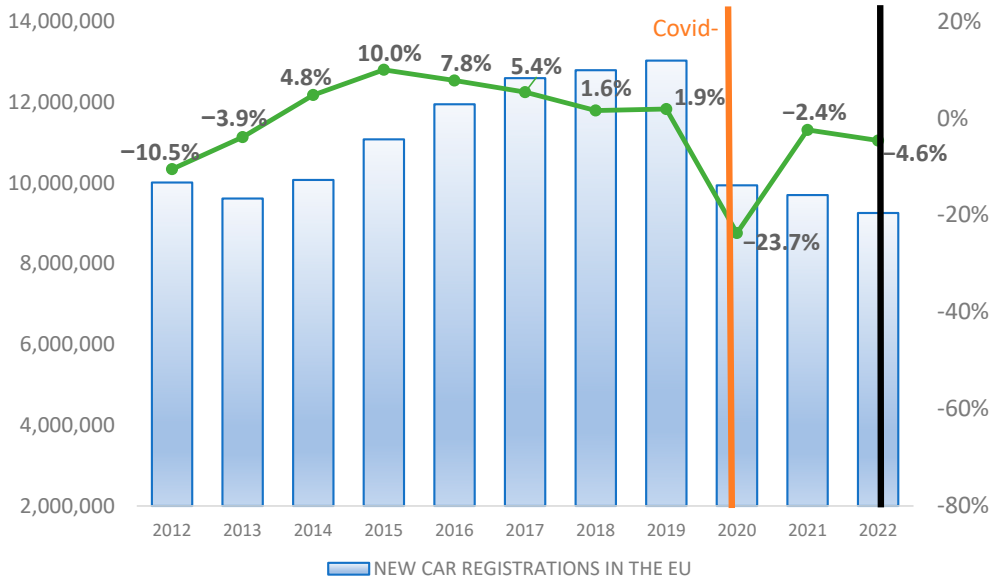

Figure 8. New car registrations in the EU. Source: own elaboration based on [125].

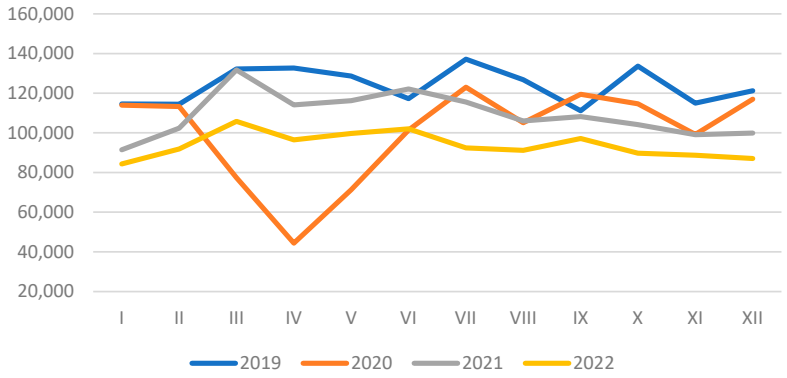

Figure 9. Number of passenger car registrations in Poland. Source: own elaboration based on [126].

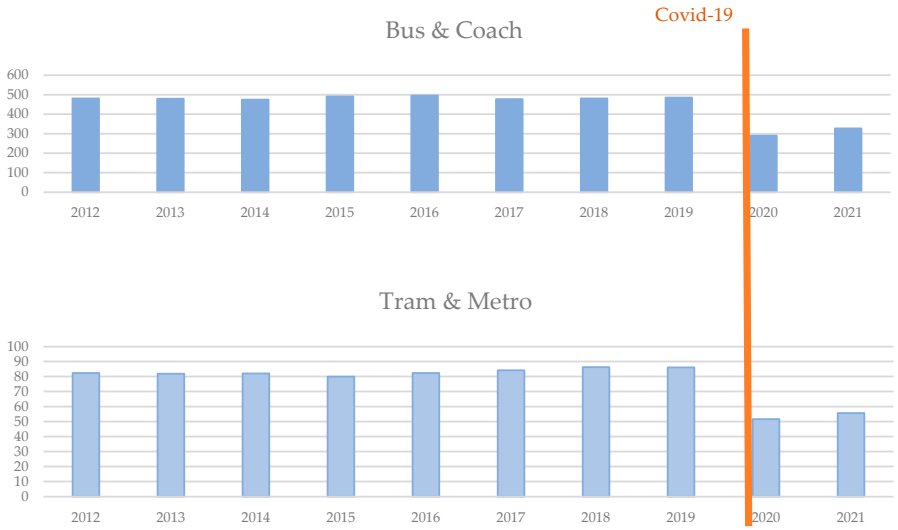

Figure 10. Increased importance of public transport—a case study of the EU-27 countries. Source: own elaboration based on [127].

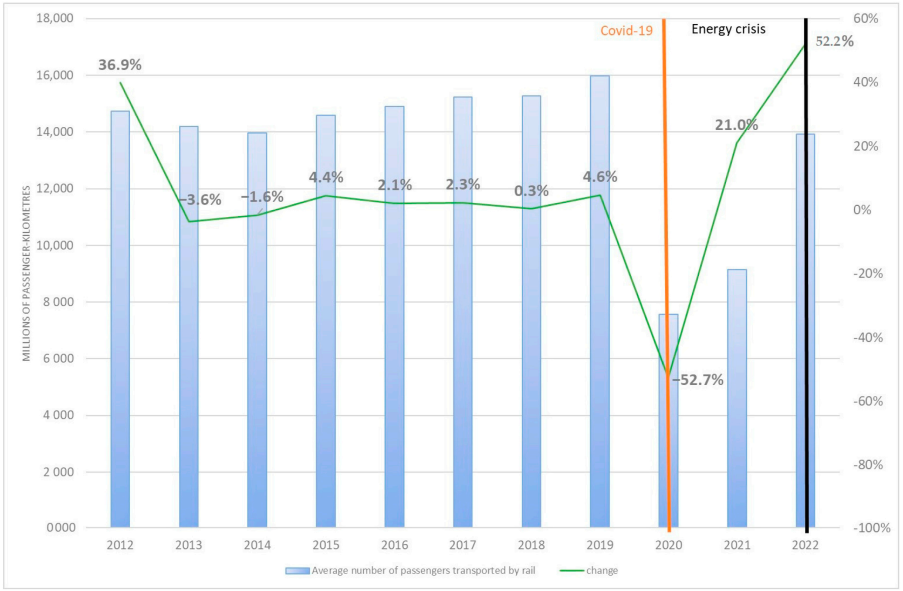

Figure 11. Growing significance of railway passenger traffic—A case study of the EU-27 countries. Source: own elaboration based on [128].

5. Discussion

Economic factors were regarded as the key threats during the pandemic, whereas economic and legal factors emerged as the highest and equally significant threats after the outbreak of the geopolitical conflict. The similarities and differences in the ranking of the identified threat factors were determined by comparing the responses of two expert populations from selected European countries. The analysis revealed that the pandemic increased demand for private transport. Similar observations were made in surveys conducted during the COVID-19 pandemic in selected cities in Canada [129] and Colombia [130]; in urban and rural areas of Slovenia, where the share of private transport (private cars) increased during the pandemic, in particular in rural areas [131]; and in the Netherlands, where more than 90% respondents avoided public transport [132].

In turn, the geopolitical conflict prompted European commuters to switch to public transport to reduce commuting costs. According to [133], low fuel prices, parking fees, and motorway tolls promote the development of private transport. Ingvardson and Nielsen [134] found that the costs associated with private transport (fuel prices and parking costs) are related to higher public transport ridership. The results of this study, in particular the increase in the perceived significance of public transport, confirm these observations. The economic consequences of the geopolitical crisis, including the rising cost of maintaining private vehicles, changed TB, and encouraged European commuters to considerably reduce the use of private cars or switch to public transport.

6. Conclusions

Geographic methods and tools were applied in this study to identify and classify threat factors that affect TB in various modes of passenger transport in FUAs. A total of 46 threats were identified and grouped into six categories. The results of the expert survey were used to rank (determine the perceived significance) threats in each category based on the number of indications in both stages of the survey (during the COVID-19 pandemic and after the outbreak of the geopolitical conflict).

This study constitutes a significant contribution to understanding the impact of changing socioeconomic conditions in Europe on travel behaviour. The analysis revealed how these changing conditions affect travellers' preferences, influencing their choice of transportation means. During the pandemic, there was an increased reliance on private transport, whereas following the outbreak of the geopolitical conflict, a greater focus on public transportation emerged.

The present findings indicate that transport threats should be monitored and that their impact on TB should be analysed regularly. Understanding preferences in travel behaviour is essential for designing effective and sustainable transport systems because it enables a tailored approach that aligns with the goals of Agenda 2030, ensuring mobility systems contribute positively to economic, social, and environmental aspects of sustainable development.

The long-term consequences of the geopolitical crisis in Eastern Europe are difficult to predict, and these emerging threats have led to considerable changes in the TB of European commuters within a period of only three years. In this context, the guidelines and practices in research on mobility patterns should be revised, and novel monitoring tools should be implemented to develop effective crisis management strategies.

A limitation of the study is the classified list of risks of 46 factors at the end of 2021, which must be supplemented by dynamically emerging new risk factors. Our forthcoming investigations will centre on examining and analysing disparities between countries, aiming to enhance their understanding and provide detailed explanations for variations in prioritization among European nations.

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