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## CHERNOBYL EXCLUSION ZONE - A WORLD FAMOUS TOURIST BRAND OF UKRAINE

**Annotation.** The article identifies the main principles of functioning and development of the tourism in the Chernobyl radiation and ecological biosphere reserve affected by the technogenic disaster. The paper provides a rationale for tourism development to the Chernobyl exclusion zone as a new direction of the international tourism service market. It defines the main principles of planning and development of the brand of "Chernobyl radiation and ecological biosphere reserve" (Chernobyl exclusion zone) and provides proposals for its promotion as the world-famous tourist brand of Ukraine on the international tourism service market through popularisation of the safe tours to Chernobyl exclusion zone. This article examines the important role of the state in the optimization and arrangement of the market participants activity in this region and tourist offers. The study has confirmed the safety of the proposed tours with the assistance of specialists of the State Agency of Ukraine on the Exclusion Zone Management, the Chernobyl radiation and ecological biosphere reserve, and State specialised enterprise "Ecocentre". This paper proposes a number of practical measures in the context of the formation of the renewed Strategy of the Chernobyl exclusion zone development for optimization of the international tourism service market that will ensure the highest level of the travel market consumer's interest in purchasing tours to this region of Ukraine.

**Keywords:** nuclear energy, accidents at nuclear power plants, international tourism, extreme tourism, tourism safety, branding, Safe Chernobyl

### Introduction

Activity of participants of the tourist service market as an important branch of the national economy is influenced by a number of factors which determine the results obtained by us. That is exactly why it is necessary to investigate the management processes specific to the participants of the tourist service market that offer different tours to the Chernobyl exclusion zone and determine practical mechanisms that will provide the new development direction of the international tourism.

### Statement of problem

Investigation of the new development directions on the international tourist service market, rise of the consumer interest in purchase of the extreme tours necessitates a search for the effective instruments and means of achieving the set tasks.

### Analysis of main researches and publications.

The main tendencies of the extreme tourism development including in regions which were affected by the man-induced disasters, are represented in researches of the foreign and national scholars, in particular A.V. Babkin, T.O. Buryachok, Z.Yu. Bucio, G.B. Varlamov, K.B. Denisevich, S.V. Dubovsky, V.A. Zhovtyansky, V.N. Klymenko, Yu.O. Landau, V.O. Neyman, I.Ya. Sigal, V.A. Smolij, V.M. Suleimanov, V.K. Fedorchenko, V.I. Tsybukh, B.A. Shilyaev. The result of these researches is the analysis of peculiarities of the demand formation for the extreme tourism services on territories affected by the man-induced disasters, motivational components of the demand formation for such types of the tourist services, outlooks for the extreme tourism development etc.

**The purpose of the article** is to research the main principles of planning and development of the brand for organisation of tours to the Chernobyl radiation and ecological biosphere reserve (Chernobyl exclusion zone), and development of proposals for the new development direction of the international tourism service market through popularisation of the safe tours to Chernobyl exclusion zone.

### **Accidents at the nuclear power plants (hereinafter NPP): historical aspects**

Let's consider the historical aspects of the accidents at different nuclear power plants of the world. According to a number of researches made by the team of experts in the energy sphere with respect to the NPP accidents [8; 9], the NPP accidents according to the world statistics are recorded by the Major Hazard Incident Data Service – MHIDAS) (table 1).

Table 1

### **The major NPP accidents by scale and consequences**

*Source: developed by authors based on [8; 9]*

Year	Country	Location	Place of accident
1949	Russia	Chelyabinsk, Ural-region	Mayak reprocessing plant
1952	Canada	Chalk River, Ontario	CANDU reactor
1955	USA	Idaho Falls, IdahoState	Experimental Breeder Reactor I
1957	United Kingdom	Windscale (now Sellafield)	Reactor at Windscale Pile
1957	Russia	Chelyabinsk, Ural-region	Mayak reprocessing plant
1961	USA	Richland	Reactor HTRE
1961	USA	Idaho Falls, IdahoState	Stationary Low-Power Reactor 1
1966	USA	Laguna Beach	Fermi 1 nuclear plant
1968	Switzerland	Lucens	Lucens reactor
1969	France	Loir-et-Cher	Saint-Laurent Nuclear Power Plant
1971	USA	Minnesota State	Reactor “Northern States Power”
1979	USA	district of Susquehanna River	Three Mile Island 2 reactor
1981	Japan	Tsuruga	Tsuruga Nuclear Power Plant
1982	USA	New York State	GINNA Nuclear Power Plant
1983	Canada	City of Toronto	NPP near of Toronto
1986	USA	Gore, Oklahoma	Kerr-McGee nuclear plant
1986	Ukraine	district of Kyiv oblast	Chernobyl Nuclear Power Plant, reactor 4
1986	Germany	Hamm-Uentrop	HammNuclear Power Plant
1991	Ukraine	district of Kyiv oblast	Chernobyl Nuclear Power Plant, reactor 2
1997	Japan	Tokaimura, Ibaraki Prefecture	Tokai Nuclear Power Plant
1999	Japan	Tokaimura, Ibaraki Prefecture	Tokai fuel fabrication facility
2002	Japan	Fukui Prefecture, Honshu	Mihama Nuclear Power Plant
2004	Japan	Fukui Prefecture, Honshu	Mihama Nuclear Power Plant

The NPP accidents lead to radioactive substance release, pose a threat not only for population of certain territories but also for the participants of liquidation of such accident consequences and environment.

To evaluate the impact caused by the NPP nuclear reactor release, the International Nuclear Event Scale – INES was developed and recommended for practical use by IAEA (International Atomic Energy Agency) in 1988-1990 as shown in table 2. [9, p. 187– 188].

Table 2

**International Nuclear Event Scale with examples of the radiation accidents of different levels**

*Source: [9, p. 187–188]*

Level of accident	Classification of accident	Accident examples of different levels
7	Major accident	Chernobyl disaster, Ukraine, 1986
6	Serious accident	Kyshtym, Mayak, Russia, 1957
5	Accident with wider consequences	Windscale fire, UK, 1957 Three Mile Island, USA, 1979
4	Accident with local consequences	Saint-Laurent, France, 1969, 1980 Buenos Aires, Argentina, 1983
3	Serious incident	Sellafield, UK, 2005 K-19 Nuclear Submarine, Russia, 1961
2	Incident	
1	Anomaly	
0	Deviation (no safety significance)	

Other researchers [8], who investigated the impact of the world's NPP accidents have

determined the top-10 of the largest accidents in history and their hazard level (table 3):

Table 3

**Top-10 of the largest accidents in history and their hazard level**

*Source: [8]*

Rank	Location	Year	Level of accident
10	Tokaimura, Japan	1999	Level 4
9	Buenos Aires, Argentina	1983	Level 4
8	Saint-Laurent, France	1969	Level 4
7	Idaho State, USA	1961	Level 5
6	Goiânia, Brazil	1987	Level 4
5	Three Mile Island, Pennsylvania, USA	1979	Level 5
4	Windscale (Sellafield), UK	1957	Level 5
3	Kyshtym, Russia	1957	Level 6
2	The Fukushima, Japan	2011	Level 7
1	Chernobyl, Ukraine	1986	Level 7

It should be mentioned that the accident at "Fukushima-1" NPP, happened on March 11, 2011 was rated as level 7 by the International Nuclear Event Scale (table 3). The accident at "Fukushima-1" NPP was caused by the strongest earthquake in the Japan history with magnitude (the conditional unit characterising the energy released in the earthquake in form of the seismic waves) of 9 units. The earthquake and tsunami blow damaged the external power supply and backup diesel generators. It caused the failure of all systems of normal and emergency cooling and led to meltdown of the nuclear reactors of the power units 1, 2 and 3 in the first days of the accident development.

In December 2013 "Fukushima-1" NPP was officially closed but the works on liquidation of the accident consequences are still under way.

The Japanese nuclear engineers evaluate that bringing the object to a stable and safe condition may last up to 40 years.

It is worth noting that in Japan, 4 major investigations had been conducted independently one from another, the results of which were presented in 2012. They include the reports of the NPP's owner of the Tokyo Electric Power Company (TEPCO), reports of the commission of the Cabinet of ministers and the Parliament, and independent commission [1; 7; 22; 24]:

1. The investigation of the reasons of the accident at the "Fukushima-1" NPP held by IAEA involving the international experts has found that the accident was caused by [1]:

- earthquake and tsunami;
- deficiencies of the accident-prevention measures.

2. According to the NPP's report of the Tokyo Electric Power Company (TEPCO), it was recognised that "the tsunami assessment was finally found unsatisfactory and the core reason of the accident was insufficient preparedness to the tsunami impact" [24].

3. The parliamentary commission called the disaster the "man-made" in that sense that although the deficiencies in the NPP safety especially with respect to the natural disasters were detected even before 2011, neither TEPCO, nor the regulatory authorities, nor the subject ministry did anything to eliminate them [22].

4. The independent commission took notice of the "myth of the safety" ruling in the whole nuclear industry in Japan. In the very industry, regulatory agency and consciousness of the local authorities no thought that NPPs may pose a serious hazard was admitted. This resulted in that the significant accidents did not considered probable and no preparation was made with respect to them [7].

Financial losses including the expenses on the consequences liquidation, deactivation and compensations as of 201 were evaluated to 189 bln of US dollars; as of 2019 – from 35 to 81 tln. Yen [1; 7; 22; 24]. And considering that the works on liquidation of the "Fukushima-1" NPP accident consequences will continue for many years - this amount will increase many times.

### **Accidents at Chornobyl NPP: impact on natural resources**

The next phase of the research will be devoted to the review of the historical course of events of the Chornobyl NPP accident that took place in the UkrSSR (now Ukraine) on April 26, 1986 and caused the failure of the 4th power unit. It determined further development of the cities of Chornobyl and Prypiat of so-called 30-kilometres zone of exclusion. For a certain period the access to these cities was prohibited and the "State agency of Ukraine on the exclusion zone management" was created. [5].

The Chornobyl NPP accident had an explosion character, the reactor was fully destroyed and a large amount of the radioactive substances was released to the environment.

The Chornobyl NPP accident is considered the largest for the whole history of existence of the nuclear power industry both by number of the died and injured people and by the economic losses. During the first 3 months after the Chornobyl NPP accident 31 person died; certain

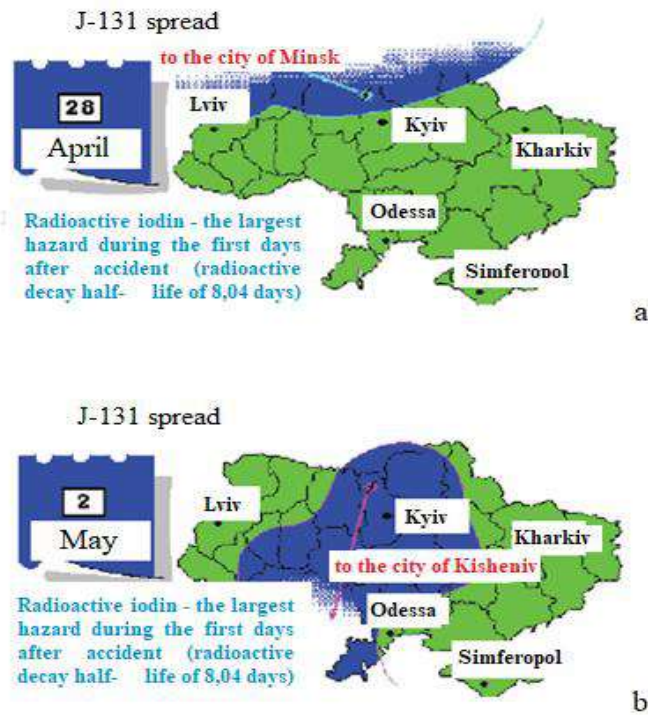
late effects of radiation exposure detected in 15 years became the cause of death of from 60 to 80 persons and 134 persons suffered radiation disease of different severity level; over 115 thousand persons from the 30-km zone were evacuated. More than 600 thous. persons participated in liquidation of the Chornobyl NPP accident consequences [9, p. 180-181].

The Chornobyl NPP disaster had an impact on the natural resources of Ivankivskyi district of Kyiv oblast (city of Chornobyl and city of Prypiat) and on the northern territory of the Poliskyi district of Kyiv oblast, Zhytomyr oblast and Belarus. The natural resources of the Baltic states, Finland, Russia, Poland, Sweden and other countries of Europe were negatively affected.

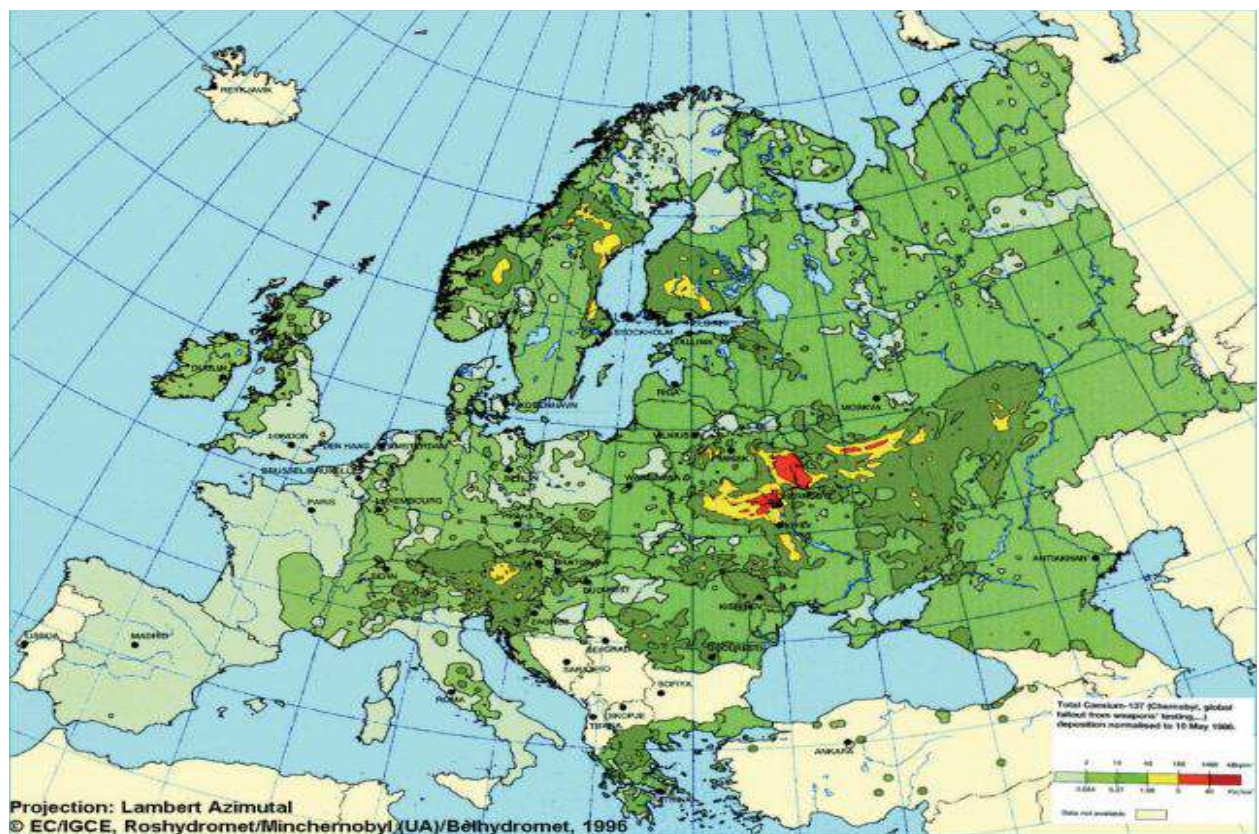
The peak load periods of the radioactive iodine spread on territories of Ukraine and Belarus affected in result of the Chornobyl NPP accident fell on April-May of 1986 (fig. 1).

The Chornobyl NPP accident changed significantly the radiation situation on large territories in many European countries. In the consequence of explosion of the Chornobyl NPP's 4th power unit nuclear reactor and destruction of its containment vessel, the huge release of the radioactive substances into environment happened which according to various authors' calculations made up to 13 exa-bequerels (10<sup>18</sup> radionuclides). Around 200 radioactive isotopic elements moved to the distance of thousand kilometres from Chornobyl NPP and in May of 1986 they were observed in all countries of the Northern hemisphere, basins of the Pacific, Atlantic and Arctic Oceans [13].

Accident at the Chornobyl NPP's 4th power unit has led to contamination of more than 145 thousand km<sup>2</sup> of the territory of Ukraine, Republic Belarus and Russian Federation. Density of its contamination with radionuclides of <sup>137</sup>Cs and <sup>90</sup>Sr exceeded 37 kBq/m<sup>2</sup>. In consequence of the disaster more than 5 mln persons were affected. About 5 thous. settlements were contaminated with radionuclides, from which in Ukraine – 2218 village and towns with population of around 2.4 mln. persons. The Chornobyl disaster led to unprecedented radiation exposure of the population of the mentioned countries, besides Ukraine, Republic of Belarus and Russian Federation, the impact of the Chornobyl disaster were experienced also by Sweden, Norway, Poland, Great Britain and other countries [13].



**Fig. 1. The peak load periods of the radioactive iodine spread on the territories affected in result of the Chornobyl NPP accident: a) Republic of Belarus; b) Ukraine**  
*Source: [9, p. 183]*



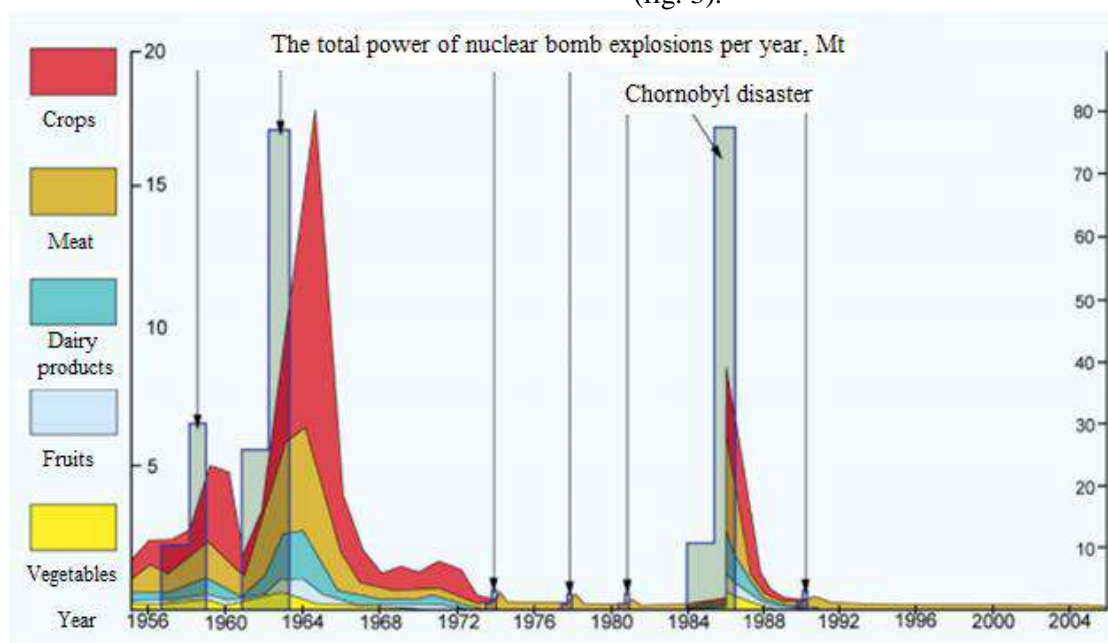
**Fig. 2. Spread of the radioactive fallout of  $^{137}\text{Cs}$  on the European continent on May 10, 1986 (colour indicates the scale of the fallout activity for  $^{137}\text{Cs}$  in  $\text{kBq}/\text{m}^2$ , territories in yellow – territories not exposed to the radioactive contamination from the Chornobyl NPP accident)**  
*Source: [9, p. 180]*



In the result of explosion of the Chornobyl NPP's 4th power unit the huge release of the radioactive substances in atmosphere happened. Theseradioactive fallout occurred mainly within the Euro-Asiatic continent. This caused serious prolonged effects including such that may be detected at the genetic level of certain groups of

the NPP's personnel, liquidators and population residing near the accident zone.

The statistical data based on the use of information and projections obtained from investigation of people survived after the nuclear bomb explosions and other populations exposed to considerable impacts are presented below (fig. 3).



**Fig. 3. Comparative data by sources of the radioactive contamination that forms the load dose of the population by food chains caused by the nuclear weapon tests and Chornobyl NPP accident.**

*Source: [9, p. 184]*

Among the main reasons of the accident the experts recognised the technical factors (the electrical experiment held incompletely and prepared incorrectly), inadequate safety level (with respect to the RMBK – 1000 graphite-uranium reactor), errors of personnel (low level of the operator's culture and top management both of the stations and Ministry of electrification in sphere of the nuclear safety as a whole).

The scope of the negative effects after the Chornobyl NPP accident is quite wide including:

- negative impact on the health of persons who liquidated the accident consequences, personnel of NPP, fire-fighting service and police, and the population;
- high levels of the radioactive iodine precipitated on the domestic animal pastures which then concentrated in milk used for meal;
- quite a long time of exposure of the population and participants of the accident consequences liquidation to negative impact, and other effects.

### Chernobyl exclusion zone: realities

Let's describe the present state of Chernobyl exclusion zoneincluded to Kyiv oblast, its geographic location and available natural resources.

Kyiv oblast as the administrative-territorial unit of Ukraine was created on 27th of February of 1932. Is is located in the north of Ukraine, in the basin of the middle reaches of the river Dnipro. Kyiv oblast occupies the area of 28.1 thous.sq.km (without city of Kyiv, that makes 4. 7 % of the area of Ukraine. In administrative respect Kyiv oblast is divided into 25 districts, 9 united territorial communities, 13 cities of the oblast subordination, 30 towns of the district subordination (urban-type villages), and 1125 settlements. The natural resources of Kyiv oblast to which Chernobyl exclusion zone is also included, are characterised as follows: [19, p. 7-8]:

- the terrain of Kyiv oblast is flat with continuous gradient to the valley of the river Dnipro;
- the northern part of Kyiv oblast lies within the frames of Poliska lowland;
- in the eastern part of Kyiv oblast – there is a part of the Prydniprovsk lowland;
- the southern and south-western parts of Kyiv oblast are occupied by Pryniprovsk highland;
- the most widespread lands are blackearth;
- for the northern part of Kyiv oblast the masses of softwood and mixed forests are typical, and for the southern part – broad-leaved forests;
- the animal world of Kyiv oblast is very versatile;
- Kyiv oblast is located on the border of two natural zones: the northern part is located in the Polissia zone and the southern - in the forest-steppe zone;
- the natural environment of Kyiv oblast has favourable soil and climatic conditions;
- the rivers of Kyiv oblast belong mainly to the basin of the river Dnipro;
- the affluents of the river Dnipro are the rivers Prypiat, Teteriv, Irpin, Ros, Desna, Trubizh;
- in Kyiv oblast there are 13 ponds and water reservoirs, including Kyiv and Kaniv water reservoirs;
- in Kyiv oblast there were built over than 2000 ponds and 50 small lakes;
- the length of the cost-line of the rivers and reservoirs within the oblast makes 17. 8 thous.km;
- the climate – moderately continental.

The natural resources of Kyiv oblast suffered from depletion; the surface and underground waters, atmosphere air, ground etc. were exposed to radioactive contamination.

Consideration of the Chornobyl NPP accident in scale of the spread to the different countries of Europe requires to define a notion of “transboundary air pollution” as the air pollution whose physical origin is situated wholly or in part within the area under the national jurisdiction of one State and which has adverse effects in the area under the jurisdiction of another State at such a distance that it is not generally possible to distinguish the contribution of individual emission sources or groups of sources.[19, p. 52-56].

To provide management and prevent spread of the transboundary pollution, the United Nations Organizations, the United Nations Economic Commission for Europe initiated the Convention

on Long-Range Transboundary Air Pollution (1979) [10]. The main principles of the activity of the parties to the Convention are to protect the human and environment against the air pollution. The need to conduct regular monitoring and research of impact of the transboundary air flows of the toxic substances, first of all on the natural eco- and socio-ecological systems was recognised.

The radiation state of the water objects of the Dnipro basin in 2017 as well as in other years after the Chornobyl NPP accident was determined mainly by the technogenic radionuclides wiped of the water intake facilities contaminated in the result of the accident releases. Hydrometeorological conditions in the 30-km exclusion zone in 2017 did not led to the deterioration of the radiation situation on the water objects of Chernobyl exclusion zone and Dnipro water system [19, p. 75].

It should be noted that within the context of introduction of the nation-wide reforms, Kyiv oblast state administration made its focus on activation of all spheres of economy of the region. Among the number of tasks set for implementation there were also such related to the environment protection including natural and geographic (geological, ground and plant, fauna, water, climate, landscape), and natural and antropologic (national natural parks, natural and biosphere reserves, natural monuments, dendrological parks, botanical gardens, zoological gardens) resources.

In July 2019 Chornobyl NPP took into operation the new safe confinement (shelter) made by Novarka. This protective object was designed and put into operation over the NPP's fourth power unit destructed in 1986. According to the State agency of Ukraine on the exclusion zone management, the experts specify the positive characteristics of the new confinement as follows [5]:

- the new shelter fully covers the old one;
- the new shelter is fully hermetic;
- the design provides for different systems of control over the inside space;
- The "Arch" is not only the shelter but a complex system of buildings that includes all things required for the personnel work;
- the confinement does not let the fine radioactive powder pass;
- 3000 specialists from Germany, France, Japan and Ukraine worked on the "Arch" construction;

- the shelter is designed for 100 years of operation under the proper use.

The Chornobyl disaster created the hazardous situation on the considerable territory of Ukraine and neighbour countries. The hazard lied in causing damage to the human health as well as to natural resources of certain regions. There occurred a need for determination of the legislative principles of functioning and development of the radioactively contaminated territories and introduction of a number of practical measures enabling to mitigate the effects of the radiation exposure of people, ecological systems and natural resources.

Accordingly, the provision of tourist services requires adjustment of the regulatory and law base of their implementation, observance of the rules of radiation safety by the visitors and tourists while staying in Chernobyl exclusion zone, review of restrictions and prohibitions of carrying out the different types of activity, introduction of the environment protection measures, establishment of boundaries of the Chornobyl radiation ecological biosphere reserve, etc.

Such regulatory and law documents include:

1. The Decree of the President of Ukraine "On certain issues of the development of territories affected by radioactive contamination as a result of the Chernobyl disaster" of 10.07.2019. No512/2019 [14] provides for implementation of a number of tasks of revival of the territories affected by radioactive contamination as a result of the Chernobyl disaster, support of the environment protection activity on these territories, creation of conditions for use of their tourist potential, popularisation and establishment of the "Safe Chornobyl" brand-message.

2. The Decree of the President of Ukraine "On additional measures on revival of territories affected by radioactive contamination as a result of the Chernobyl disaster, social protection of the affected people, safe treatment of the radioactive waste" of 05.07.2018. No 196 [15] is directed at provision of the radiation protection and safety on the territories affected by radioactive contamination as a result of the Chernobyl disaster, rehabilitation and revival of such territories, support of the environmental, scientific and research activity in the exclusion zone and unconditional (compulsory) evacuation zone, improvement of social protection of

citizens affected as a result of the Chernobyl disaster.

3. The Law of Ukraine "On legal regime of territories affected by radioactive contamination as a result of the Chernobyl disaster", as amended on 14.07.2016. No 1472–VIII [16] regulates the issues of division of the territory into the respective zones, regime of their use and protection, conditions of living and working of the population, scientific, research and other activity in these zones. The Law establishes and guarantees provision of the regime of use and protection of the said territories with a purpose to reduce the radiation impact on the human health and ecological system.

4. The Order of CMU "On approval of the concept of implementation of the state policy in sphere of development in certain zones of the radioactive contamination as a result of the Chernobyl disaster" of 18.07.2012. No535–p. [18] determines the set of problems, purpose and time terms of the Concept implementation, the ways and means for solving the problems, the expected results and assessment of financial and labour resources required for the Concept implementation.

5. The Resolution of the VRU "On recommendations of the parliamentary hearings of the "Present stay and actual tasks of overcoming the consequences of the Chornobyl disaster" of 05.04.2011 No 3191–p. [17] sets a number of tasks for implementation with respect to improvement of the regulatory and law base of the international cooperation on implementation of the international projects on site of Chornobyl NPP, complex approach to overcoming the consequences of the Chornobyl disaster and protection of the affected population, information policy of the state, financing of the on-site researches, storage and exposition of the historical and ethnographic pieces, archeological sights, archive documents and other cultural values detected and saved on the territory of the exclusion zone and unconditional (compulsory) evacuation zone with a purpose of their preservation and inclusion to the Museum fund of Ukraine and National archive fund of Ukraine, and provide premises for foundation of the museum-archive of the folk culture of the Ukrainian Polissia.

At the international level, a number of regulatory documents and agreements were also adopted with a purpose to liquidate consequences of the Chornobyl disaster in Ukraine, including:

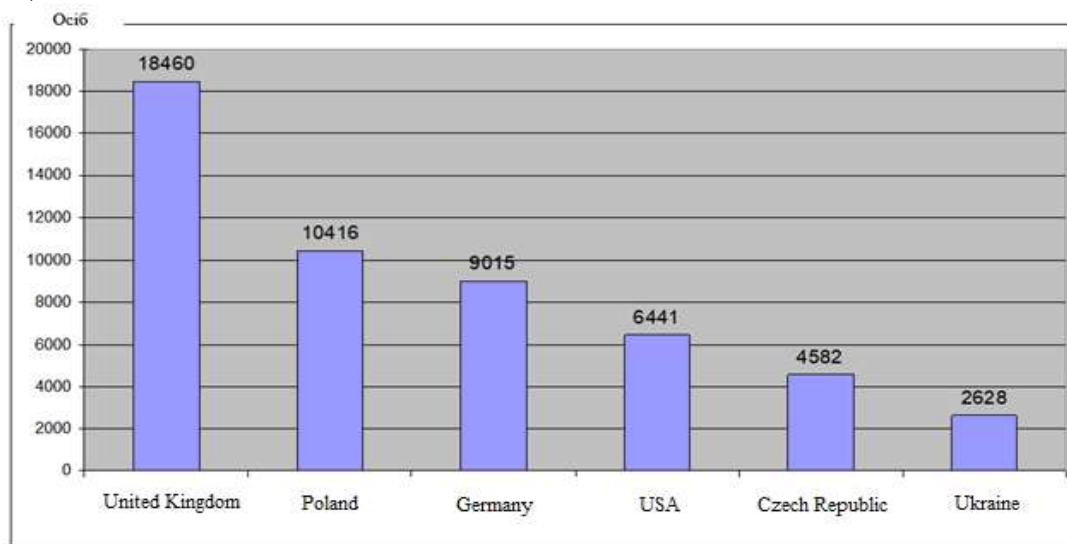


- "Agreement on carrying out the international research of the consequences of the Chernobyl NPP accident" between IAEA, USSR, BSSR and UkrSSR, 1991;
- "Master agreement of international cooperation on issues of liquidation of the Chernobyl accident consequences " between IAEA and CIS countries, Brussel, 1992;
- "Strategy of liquidation of the consequences of the Chernobyl accident: decontamination and desactivation on the territory of Ukraine after the Chernobyl accident", with financial assistance of the "Know-How" fund of the Ministry of International Affairs of Great Britain, 1992;
- "Program of joint research in ChNNP zones of Ukraine and Belarus for 1999-2001";
- "Joint project ISP-3 between Ukraine and Japan Atomic Energy Research Institute", 1992-1999;

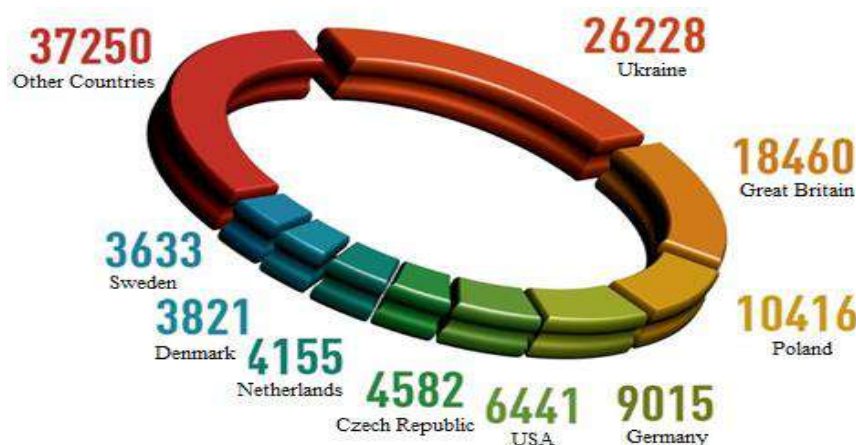
- "Agreement on increase of the operational safety and reduction of the operational risk level, and improvement of the regulation systems of the civil nuclear objects in Ukraine" between Ukraine and USA, 1998;
- "Agreement on establishing the International Radioecology Laboratory of the International Chernobyl centre on nuclear safety issues" between Ukraine and USA, 1998.

#### Development of tourism on the Chernobyl exclusion zoneterritory

Based on the data of the State agency of Ukraine on the exclusion zone management [5], let's carry out analysis of dynamics and structure of the tourist flows from certain countries to Chernobyl exclusion zone in 2019 (fig. 4-5).



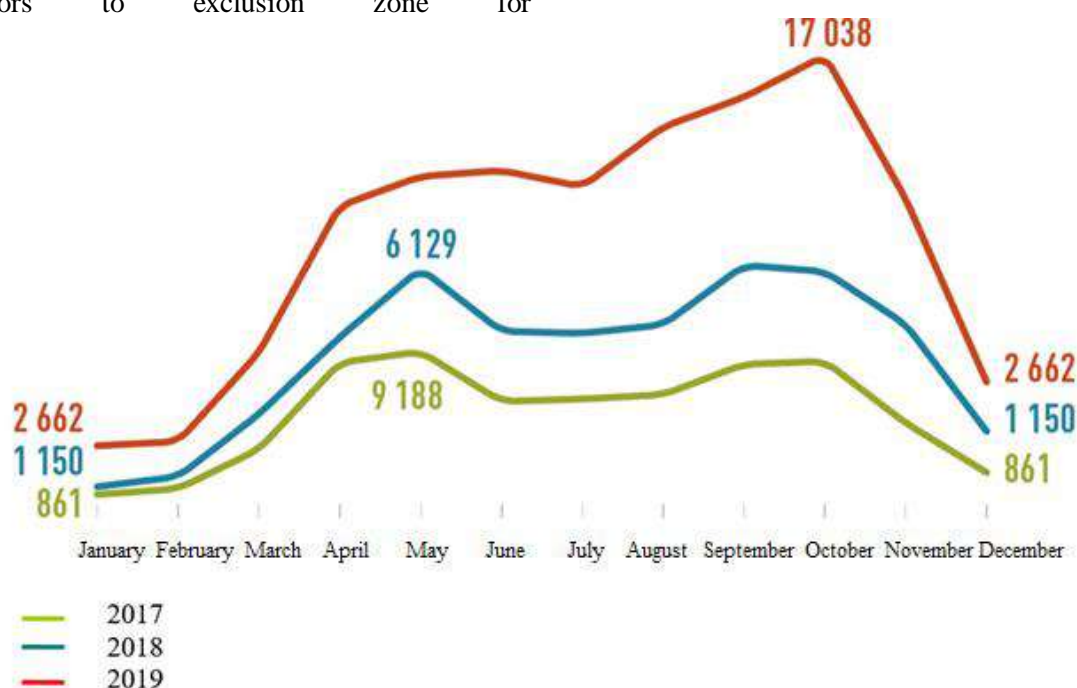
**Fig. 4. Dynamics of tourist number to Chernobyl exclusion zone, persons**  
*Source: developed based on data [5]*



**Fig. 5. Structure of tourist flows to Chernobyl exclusion zone, persons**  
*Source: developed based on data [5]*

The main increase tendencies of number of visitors to exclusion zone for

2017-2019 are shown in Fig. 6.



**Fig. 6. Dynamics of number of visitors to Chernobyl exclusion zone, 2017-2019, persons**

*Source: developed based on data [5]*

According to the official statistics [5], in 2019 the exclusion zone was visited by more than 120 thousand tourists, 80% from which – foreigners. In present time the tourists are offered 21 routes.

It worth noting that from that time more and more tourists including the foreign ones visit the exclusion zone. All them have the personal motivation, some wish to see how Chernobyl exclusion zone has changed after more than 30 years. The restoration of the international popularity of this location was also facilitated by the "Chornobyl" miniseries released in 2019 by Craig Mazin, and the "Emmy 2019" award ceremony of this film took place in city of Los Angeles (USA). In addition, a special coverage "Following the Chornobyl mystery traces" was prepared that increased the interest of tourists and visitors to see personally the cities of Chornobyl and Prypiat.

The tendencies of the tourist attendance of the closed zone of the city of Chornobyl and increase of their number were responded by the subjects of the tourist market. "Chornobyl–TOUR" [21] is a licensed tour-operator of the Ministry of development, economy, trade and agriculture of Ukraine. This is an association of organisations and individual specialists in sphere of ecology and tourism in the exclusion zone. The purpose of the project: Liquidation of the "informational

contamination" in the society in consequence of the Chornobyl NPP accident, holding lectures and trainings for the beginners and professionals directly on the accident site, learning how to behave in case of contact with radiation and main rules of survival in conditions of the technogenic disasters. In city of Chornobyl there is a hostel "Polissa" at disposal of visitors and tourists. The tourist offers of this tour-operator include:

- Chornobyl-air-tour;
- individual programs of attending the exclusion zone for 1-2 days;
- water tour routes;
- excursions inside Chornobyl NPP;
- tour following the "Chornobyl" miniseries;
- kayak-canoe-tour;
- Chornobyl–2 (Duga–1).

It is worth noting that the "Chornobyl–tour" has the scientific-research subdivision on issues of knowledge on radiation, radiation safety of tourists, training of the beginners on survival and radiation safety of tourists, etc during the excursion. The specialists of the "State agency of Ukraine on the exclusion zone management", State specialised enterprise "Ecocentre" of the Chornobyl radiation and ecological biosphere reserve are involved to the tourist route development. The department responsible for reception of visitors, delegations and holding the

events in the exclusion zone that is the structural subdivision of the State agency of Ukraine on the exclusion zone management performs the informational support of the tourists and visitors who wish to attend Chernobyl exclusion zone.

On the web-site of the State agency of Ukraine on the exclusion zone management there is a number of the information material that confirms the safety of the offered tours [5]. On the official web-site of the Ministry of development, economy, trade and agriculture of Ukraine, in the "Tourism" section there presented information within the context of ISO 20611 standards which relate the adventure tourism, best practice of the steady development of tourism, requirements and recommendations for providers of such tourist services to customers. Also there presented a number of information material with respect to that how exactly to minimise or mitigate the negative ecological, economical or social impact of tourism and enhance the positive one. This web-site contains other statistical information on activity of the tourism sphere presented by UNWTO (World Tourism Organization) – Tourism Highlights 2018 Edition [12].

The State agency of Ukraine on the exclusion zone management offers in addition to 5 water routes also 13 land and 3 air routes to tourists and visitors. Regular information on continuous review of the radiation safety norms is provided and supervision over the participants of the tourist service market that offer tours to Chernobyl is performed. It is the interesting that the radiation level values differ if to measure them at the level of foets, head or height etc. of the person.

Presently the possibilities to hold the training and learning events in Chernobyl exclusion zone on prevention and liquidation accidents for partners from EU and NATO countries are examined. It should be mentioned that such object of Chornobyl as "Duga – 1" may obtain the status of the UNESCO World Heritage.

It should be noted that entrance to Chernobyl exclusion zone is allowed only by electronic passes which the visitors and tourists may acquire in advance. It is worth referring to one of the challenges of the tourism management on the radioactively contaminated territory of Ukraine – Chernobyl exclusion zone its "attendance by stalkers", the persons who penetrate this territory illegally and spend their time there.

The measures on the international popularisation of visiting Chernobyl exclusion zone may include:

- Holding the photo-expositions and exhibitions-presentations with a purpose to popularise the exclusion zone as the "territory of changes". Such event was held on the 28th international conference on the theme: "Achievement of goals of stable development. 33d anniversary in commemoration of the Chornobyl disaster" that took place on April 24-2 of 2019, in city of New York, USA, and presentation on the theme: "Chornobyl – the territory of changes"

- Presentation of the tourism potential of the exclusion zone, new directions of cooperation with the foreign partners and possibilities of the scientific researches during the World travel market "WTM-2019", London, Great Britain;

- Presentation of the "UKRAINE" national stand at the International Travel ShowTT Warsaw 2019 about development of the tourism and scientific potential of Ukraine in whole and of the exclusion zone in particular, Warsaw, Republic of Poland.

For optimisation and arrangement of the market participants activity in this region, the "State agency of Ukraine on the exclusion zone management" regulates the attendance of this closed area. The Decree of the President of Ukraine "On certain issues of the development of territories affected by radioactive contamination as a result of the Chernobyl disaster" and a number of resolutions provides for possibilities for tourists to visit the Chornobyl radiation and ecological biosphere reserve safely. This regulatory document describes the set of measures which are to be taken within a context of the environment protection activity on these territories including with a purpose of the tourism development, in particular [14]:

- creation of new routes for visitors including with use of the water ways;

- promotion of the new "Safe Chornobyl" direction on the international travel market.

- preparation and submission for consideration of Verkhovna Rada of Ukraine the draft laws including such relating to peculiarities of functioning of the Chornobyl radiation and ecological biosphere reserve, providing for specific aspects of the environmental protection regime of the reserve and organisational and legal form of its management and operation.

- creation of the tourist and research visit-parkings on the reserve territory etc.

The State agency of Ukraine on the exclusion zone management arranges for a great number of events on creation of the safe conditions and popularisation of the extreme routes including the event held on February 21, 2020 "Magnet. Chornobyl. Revival" with participation of representatives of the Ministry of energy and environment protection of Ukraine. Within the context of the event theme "Magnet. Chornobyl. Revival" the following was determined [5]:

1) creation of mechanisms and possibilities for activity of the international travel operators;

2) attraction of the Ukrainian and foreign investors;

3) development of the research activity in the exclusion zone;

4) development of the basis for the "Strategy on development of the research direction of the exclusion zone", creation of the Research hub;

5) discovery of new tourist routes and infrastructure objects.

### **Branding of Chernobyl exclusion zone**

The leisure represents a form of social activity realized in the sociocultural sphere of the community. As opposed to the professional activity, the leisure is directed at recreation of an individual, group or social community according to their cultural needs and interests, etc [3]. In turn, the tourism – is a multifunctional type of the natural resource use that has its specific aspects and is combined with other types of natural resource use: natural parks, forestry, fishery, environment protection, etc. The extreme tourism is its sub-type, a sort of adventure tourism that combines all kinds of travel connected with the active means of moving and resting in the open that by intent is aimed at obtaining of new experiences and impressions [2].

The tourist service represents a segment of the service sphere that meets the needs of people and realization of their activities during their rest, leisure or travel. A special attention should be paid to the fact that the tourist needs – the specific needs that by their form define the wish of people to change their place of living for a certain time, learn something new and get new impressions. It is widely known that purchase of tourist services envisages the tourist use of the natural resources that means the activity of the theory and practice area that involves search for

the optimal regimes of the natural resources use for the purposes of tourism. There are following types of the natural resources use: reserve, recreation, rural (defined by medium or high farming intensity) and urban [20].

The set of practical measures that will ensure the highest level of the travel market consumer's interest in purchasing tours to the "Chornobyl radiation and ecological biosphere reserve" should include the following:

- formation of the renewed Strategy of the Chernobyl exclusion zone development as a tourist attraction in Ukraine;

- building of the renewed system of the interaction with media, journalists, writers, artists and other concerned audience that will enable to visualise wider the presentation materials of the travel products of this region;

- presentation of the information materials on the official web-site of the Ministry of economic development, trade and agriculture of Ukraine (in the "Tourism" section) that will popularise tours to Chernobyl exclusion zone and confirm their safety;

- development of the set of measures on interaction between the travel market participants and government authorities that will ensure the highest level of interest of the consumers of the extreme tourism services on the international travel market;

- introduction of some disciplines to the curriculum of higher education institutions (without changing the total number of hours) which are studied by the students of the "Tourism" speciality that represent the safety of the tours to this region, etc.

Investigation of the outlook for the tourism development on the Chernobyl exclusion zone territory allowed us to make conclusions about necessity of forming the Chornobyl brand based on principles of the extreme tourism with observance of the norms and rules of safety of the tourist service provision.

The Brand (trade mark) – the name, term, sign, symbol, drawing or their combination intended for identification of products or services of a seller (or a group of sellers) and their differentiation from products or services of the competitors. Branding as a process is important not only for the commercial development of the business companies that manufacture products or provide services, but also for the social and economic development of the countries. It is a mark policy that allows recognising a product or

service among the similar ones [11]. Branding as two types of activity involves creation of the graphic or artistic presentation of a trade mark's individuality; creation of values the embodiment of which is the trade mark [4].

It should be mentioned that formation of the brand of Ukraine is provided by the different factors including:

- activity of the different market subjects, government authorities, media, television and radio broadcasting companies, travel market participants, chamber of commerce and industry, education institutions, non-profit organizations, etc;

- national symbols, geographic objects and phenomena, cultural heritage and national customs, natural resources, travel service market, investments, social transformation processes of the country, etc.

The investigation of the issue of formation of the renewed brand of Ukraine allows the authors to assert that the participants of such processes should understand a certain specificity, namely: what audience the brand perception is targeted at: national or international? The natural resources of Chernobyl exclusion zone (natural and geographical, as well as natural and anthropological) are of more and more interest on the international travel service market. The International tourism (outbound and inbound) as one of the important direction of cooperation between people of different countries in various spheres of activity represents the interest for their national economies; contributes to improvement of understanding between the people, and determine the important role in the scientific and technological activities, social and cultural spheres, etc. The authors draw attention that not only the tourists or visitors show interest in functioning and development of Chernobyl exclusion zone, but also the artists, writers and experts in different fields. The attendance of Chernobyl exclusion zone by journalists and results of their investigations shown in media reports represents the media tourism. Therefore, the media tourism is the important development factor on the international travel service market; it induces the interest in the specific category of tourists – thrill-seekers.

Moreover, the prospects for tourism development on the territories affected by the technogenic disasters are determined by the factor of safety of such trips for the tourists and visitors. It is exactly the travel safety, results of

researches and their informational value for the concerned audience with confirm the precise safety level are the substantial factor of the formation of the demand of the travel service market including the international one [25] [25]. That is why it is important to conduct new researches within a context of changes in the safety level in Chernobyl exclusion zone, informational value for the concerned audience that plans such tourist trips and possibilities of popularisation of such tours both in Ukraine and abroad.

So, the travel safety is essential in arranging tours to the "Chornobyl radiation and ecological biosphere reserve". Travel safety – a system of the tourists' personal safety, save keeping of their property and non-causing damage to the environment during the tours and in course of the service provision [20].

In the present practice of the tourism development management on the radioactively contaminated territory of Ukraine, and changes on the travel service market, the task of use its natural resources as the new tourist brand is set. Accordingly, the Chernobyl exclusion zone shall be formed exactly on the safety principles. Based on the research results we propose to consider new possibilities of the Law of Ukraine "On Geographical Names" as amended of 25.04.2019 No2704 – VIII and several articles of this Law and to establish the own name of the "Safe Chornobyl" for the geographical object of Chernobyl exclusion zone. It should be noted that formation of the new tourist brand such of the "Safe Chornobyl" is very important not only for foreigners, but in the first turn for the collective memory of the citizens of Ukraine.

The following should be referred to the set of other indicators proposed for the "Safe Chornobyl" brand positioning:

- development of logotype for the "Safe Chornobyl" brand;

- use of the logotype for the "Safe Chornobyl" brand for advertisement purposes, at exhibitions and presentations including the international exhibition and fair events, and in the diplomatic institutions of Ukraine and culture and information centres, etc;

- availability of advertisement products of the "Safe Chornobyl" brand in all geographical regions of Ukraine;

- formation of the Chernobyl exclusion zone brand as the "Safe Chornobyl" on the

international market; creation of a number of projects on its popularisation;

- integration of the renewed brand of Ukraine to the the rating system of other global brands etc..

The following practical measures, the reasonability of which should be discussed with the state authorities and local self-government bodies are proposed for establishment of the own name of the geographical object of Chernobyl exclusion zone worded as the "Safe Chernobyl":

1) to conduct a survey or announce an all-Ukrainian competition, including through the mass media, with support of the population and other concerned persons, institutions and organisations on issue of establishment of the own name of the geographical object of Chernobyl exclusion zone worded as the "Safe Chernobyl";

2) to establish for the territory of Chernobyl exclusion zone that may have the established name of the geographical object of "Safe Chernobyl" and support it with the documents of the competent government authorities and local self-governments, including cartographic, statistical, archival, encyclopaedic, reference and historical sources;

3) to represent in the geographic name of the Chernobyl exclusion zone territory as the "Safe Chernobyl" its most specific features;

4) to register the geographic name for the Chernobyl exclusion zone territory worded as the "Safe Chernobyl" according to the Law of Ukraine "On Geographical Names" as amended on 25.04.2019 No 2704 – VIII;

5) activity related to the establishment of the geographical name for the Chernobyl exclusion zone territory should be financed from the different sources not prohibited by the legislation of Ukraine, including the budget funds.

### Conclusions

In conclusion it should be mentioned that Chernobyl NPP accident negatively affected the natural resources of the territories of Ukraine, Belarus, Baltic states, Finland, Russia, Poland, Sweden and other countries of Europe. Apart from the negative impact on the natural resources of the territories mentioned above, the Chernobyl NPP accident has also the prolonged action that

adversely affect the humans and animals at the genetic level.

The investigation of the research article theme with respect to the natural resources as the new tourist brand of Chernobyl is quite comprehensive. The natural resources as a set of historical, cultural, natural, climatic and other resources in Chernobyl exclusion zone underwent the considerable changes over the time after the Chernobyl NPP accident. The specialised enterprises perform assessment of the natural resources including the qualitative indicators that necessitate to find new possibilities and resources for ecological researches of Chernobyl region for different branches of the national economy. The territory on which the natural resources are revived, flora and fauna become more safe after the man-induced disaster for the visitors, tourists and researchers of different spheres etc. Chernobyl exclusion zone may become one of the indicators of the social and economic development of Ukraine in relation to the non-typical use of the existing natural resources.

Chernobyl as an integral brand of Ukraine is steadily changing and attracts more and more tourists year by year. We should pay attention that the "Safe Chernobyl" exists but it is possible to visit it only after acquisition of the electronic ticket and being accompanied by the specially trained and instructed persons engaged in organisation of tours to Chernobyl exclusion zone. The State agency of Ukraine on the exclusion zone management informs the concerned audience on results of the carried investigations that confirm the safety of the tourist trips and are visually presented on the official web-site; flora and fauna begin to revive and animals listed in the Red book appear. So, the tourist activities on the territory of Chernobyl exclusion zone is safe and promising direction of the international tourism development.

The recommendations presented in the article and their implementation in practice will provide the renewal of the brand of Ukraine, promote the higher level of its social and economic development and use of the tourism possibilities including through such important indicator as the "branding of territories".



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