SECTION IV. TECHNICAL SCIENCE

Sinitsyn A. A., Kapkina E. S.

Calculated-experimental research of a new portable thermal container efficiency in extremely hot climatic conditionsVologda state University
(Russia, Vologda)

doi10.18411/gq-31-03-2018-07

idsp000001:gq-31-03-2018-07

Abstract

Innovation is traditionally presented as a direction of scientific and technological progress and as a process associated with the introduction of the scientific researches and development results in the real sector of the economy. Required property of the innovation is scientific and technical novelty. Innovation is a clear factor of changes resulted from the activity that are embodied in new or improved processes, new services and new approaches to meeting social needs. One of the objectives of health saving innovation is to increase the level of human life due to the diversity and quality of products and services to meet the needs of the population. An example of such products can be a portable thermal container, which can find application in various branches of tourism, medicine and sports. The article explains the scientific rationale and specified the prospects of its application.

Keywords: Crimea, tourism services, portable cold boxes, ambient temperature, cooling of the body.

Аннотация

Инновационная деятельность традиционно представляется как направление научно-технического прогресса и как процесс, связанный с внедрением результатов научных исследований и разработок в реальный сектор экономики. Обязательное свойство инновации – научно-техническая новизна. Инновация выступает в качестве явного фактора перемены, как результат деятельности, воплощенный в новый или усовершенствованный продукт, технологические процессы, новые услуги и новые подходы к удовлетворению социальных потребностей. Одной из задач здоровьесберегающих инноваций является повышение уровня жизни человека за счет разнообразия и качества производимой продукции и услуг, удовлетворяя потребности населения. Примером такой продукции может являться портативный термоконтейнер, который может найти применение в различных отраслях туризма, медицины и спорта. В статье дается научное обоснование, и указываются перспективы его применения.

Ключевые слова: Крым, туристские услуги, портативный термоконтейнер, температура окружающей среды, охлаждение организма.

Relevance: In many countries tourism plays a significant role and has sufficient influence on the key sectors of the economy such as housing and utilities construction, transportation, manufacture of consumer goods etc., i.e. acts as an activator of socio-economic development of a region.

Tourism, from the economic point of view, is a special kind of consumption of tourist services, goods, wealth, that is regarded as an independent and at the same time, integrated industry, which provides tourists with everything necessary: it is not only comfortable accommodation and food, but also health resorts and tourist and excursion services.

For Russia, the development of tourism plays an important role, because it serves as a favorable environment for development of small and medium-sized businesses and promising sphere to attract foreign investment on a large scale and in a short time.

According to the Federal Agency for tourism of the Russian Federation, this summer the citizens of Russia prefer to have a rest on domestic resorts; in the summer of 2017 tourism cluster Sochi has been filled with a record 80%, and in certain months the number of tourists in the resort increased by 23-40%. According to representatives of the tour operators, considerable growth of tourist traffic on domestic routes was recorded in July of this year.

Currently, the goal is to maintain the achieved results, improving the quality of the organization of tourist programs and the creation of conditions for the maximization of the positive social effects of tourism development in the country. In addition, the tourist service sphere faces new challenges with the entry of new subjects – Republic of Crimea and Sevastopol into the Russian Federation. Traditionally popular holiday destinations of Russians in the Republic of Crimea increase the attractiveness of domestic tourism, which imposes additional responsibility on the executive authorities in the sphere of tourism for the quality of services and tourist infrastructure, tourists' safety, providing jobs and tourism contribution to the budget of the Russian Federation. Therefore, the implementation of Federal and regional strategies and programs of development of tourism is very important.

One way of solving this problem is to increase the competitiveness of tourist services through the development of their innovative component, including the design, creation and implementation of the latest achievements of Russian science and technology. Regarding tourism this could be the better transport, sanatorium and hotel services, as well as the introduction of new information technologies can substantially increase the comfort of tourists.

Vologda State University, as a leading scientific-educational and innovative center of the North-Western region and with its 40-year history, profound academic and scientific traditions [1], provides research, including the safety of human life in extremely low and high ambient temperatures [2,3]. Continuing this trend, a new device – a portable cold box used to transport chilled food and non-food and medicine in extremely hot temperatures is investigated and tested (fig. 1).

The majority of our compatriots choose the areas with fairly hot climate for their holiday. The climatic factor affects the functioning of the organism as a whole; this fact is proved by many experiments and observations. The deviation of the climate parameters (temperature, relative humidity and air velocity) from the comfort ones leads to disruption of heat and water balance.

The impact of high temperatures on a human: overheating of the body above the permissible limit (hyperthermia), heat stroke, weakness, headache, rapid pulse and breathing. In order to avoid overheating of the body, in addition to traditional recommendations it is recommended to regulate the fluid in the body and normalize the thermal balance due to the chilled drinks.

Currently there are many devices designed for the transportation of food and non-food products, they all have different design, but all of them have the same principle: the preservation of the temperature due to the obstacles of heat transfer from the outside air to the contents of your device. The main disadvantages are the following: lack of thermostatic properties of the material from which the device is made; the volume, weight, and dimensions of the devices are very high, that is not applicable for individual personal use.

The principle of operation of the proposed device is based on the mechanism of conservation of temperature by thermal insulation and lack of heat exchange with the environment. Known technical solutions closest to destination and technical nature of the claimed device is a thermos for the battery [4]. The proposed new portable cold box is designed as a small bag, the shell of which consists of a textile water- and wind-proof material, the internal space is a heat-insulating layer with a reflective surface. If you reduce

the cap size compared to the size of the top of the container when opening the lid to check food products (for example, containers with water) you will reduce the energy loss to the environment due to the reduction of the output section to the internal air, at least by $\frac{1}{4}$ or more.

In addition, by locating tank cover zipper of the heat-shielding valve collar at the inner side which in a closed condition of the zipper is tightly adjacent to it, you create an additional thermal barrier that reduces heat energy loss through it.

Fig.1. General view of the device:

- 1-body thermal container;
- 2-thermal insulation layer;
- 3-thermal insulation material;
- 4-the inner space;
- 5-zip;
- 6-the valve collar;
- 7-pocket;
- 8-thermal energy source

Fig.2. Graph of temperature of heating water to bags without narrowing of the upper cover and valve collar (option 2) and if available (option 1)

The efficiency of the container is confirmed experimentally. Using the methods of temperature data measurement according to [5, 6], the tests were conducted at ambient temperature 32...36°C for bag without narrowing of the upper cover and valve collar (option 2) and when they are available (option 1). The graph (fig.2) shows that the temperature difference of the liquid medium of the two vessels, placed in bags with the equal initial temperature conditions (9, 8 °C) is 33% in favor of option 1.

The application of the thermal container can be quite diverse: these products can be potentially used by athletes and outdoor enthusiasts, tourists; as well as in medicine to transport drugs, biological samples and vaccines that lose their effectiveness if they are heated; portable cold boxes are suitable for the storage of food while working in acritically high temperature conditions.

Conclusion. Thus, the use of portable thermal container is an example of tourist product quality improvement and may be of interest to all types of cultural-cognitive, ecological and health tourism. The device may become an essential accessory for people of different ages and different spheres of activity.

1. Sinitsyn, A. A. Innovative potential of the Vologda state University / A. A. Sinitsyn // Innovative interaction of business with science and education: opportunities for transboundary cooperation, 2015. S. 37-48.
2. Sinitsyn, A. A. features of the development of new products in the framework of the activities of small innovative enterprises at the University / A. A. Sinitsyn, K. Th. Lawrenz, A. S. Sazanov // Scientific-

- technical progress in ferrous metallurgy: proceedings of the III International scientific-technical conference. Executive editor A.L. Kuz'minov, 2015. P.262-264.
3. Sinitsyn, A. A. Experience of small innovative enterprises foundation in the Vologda region / A. A. Sinitsyn // Middle East Journal of Scientific Research. 2013. T. 16. No. 10. P. 1424-1427.
 4. Pat. 106051 Russian Federation, IPC B60J 11/00. Thermos for battery / O. A. Ehrlich; applicant and patentee O. A. Ehrlich. No 2010139549/11; Appl. 24.09.2010; publ. 10.10.2011, bull. No 28.
 5. Sinitsyn, A. A. The development of new sensors for monitoring the temperature regime of the working fluid / A. A. Sinitsyn, I. A. Sukhanov // Energy-Efficient technology in modern institution: materials of the International energy forum, 2013. P. 107-109.
 6. Sinitsyn, A. A. Development and experience with a series of sensors to control the temperature of the working fluid in the system process control, drying of ceramic products / A. A. Sinitsyn, D. A. Belianska // Measurement techniques. 2013. No. 11. S. 46-49.
 7. Sinitsyn, A. A. Investigation of thermal conductivity of heat-insulating materials / A. A. Sinitsyn, I. A. Sukhanov // Science, education, society: problems and prospects: collection of scientific works on materials of the International scientific-practical conference: in 10 parts, 2013. Pp. 129-130.

Бойко Н.С., Гнедова С.Б., Рябинов А.В.

Рациональное решение проблемы безопасности полетов в гражданской авиации

*Ульяновский институт гражданской авиации
имени Главного маршала авиации Б.П. Бугаева
(Россия, Ульяновск)*

doi10.18411/gq-31-03-2018-08

idsp000001:gq-31-03-2018-08

Аннотация

Анализируются основные проблемы управления безопасностью полетов авиационной системы. Разработанные методы и подходы к обеспечению безопасности полетов требуют пересмотра методов обучения и переподготовки персонала, а также внедрения новых технологий управления человеческими ресурсами.

Ключевые слова: система управления безопасностью полетов, авиационные происшествия, методы обучения и переподготовки, человеческий фактор.

Применяемые в настоящее время в Российской Федерации и за рубежом методы управления безопасностью полетов авиационной транспортной системы позволяют обеспечивать безопасность в определенных пределах, но не исключают полностью авиационные происшествия (АП). Регистрируемые в эксплуатации авиационные происшествия оказывают отрицательное влияние на моральное состояние личного состава, на безопасность полетов и безопасность функционирования авиационно-транспортной системы в целом. Проблема обеспечения безопасной эксплуатации воздушных судов (ВС) имеет большое значение для Российской Федерации в силу территориального фактора и состояния автотранспортной и железнодорожной структуры.

Отсутствие комплексных теоретических работ, в которых безопасность сложных технических систем, в том числе и авиационных, была бы исследована системно и многоаспектно, а также некоторые недостатки аналитических и расчетных методов оценки уровня безопасности и рисков, в конечном итоге приводит к тому, что в настоящее время состояние безопасности авиационных систем не исключает авиационные происшествия. Кроме того, дополнительными факторами, влияющими на состояние безопасности авиационных систем, является недостаточная гибкость их структур, несовершенство существующих отечественных нормативных документов, регламентирующих требования по обеспечению безопасности полетов, которые не достаточно учитывают международные стандарты безопасности [1].

В комплексном исследовании по формированию «Национального плана развития науки и технологий в авиации» Российской Федерации на период до 2030 года» указывается на недостаточность эффективности используемых методов и средств