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Evaluation of Transport Security Taking into Account Extratransport Effect

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Abstract. In the general security system of the Russian Federation, transport security is given a special place. Improving the legal framework, the emergence of vocational training and certification of persons providing it, equipping the facilities of the transport infrastructure with engineering and technical equipment contributes to the development of the transport system. The article discusses the principles of ensuring transport safety. The concept of non-transport effect is defined and types of transport safety are presented taking into account the non-transport effect. Measures are proposed to ensure transport safety on various modes of transport, taking into account the non-transport effect. Threats to transport security in the Russian Federation by mode of transport: rail, road, air and sea are examined. The indicators of transport safety in the Russian Federation in the period January-September 2019 are reviewed and analyzed. The tasks of ensuring transport safety are presented taking into account the extra-transport effect at transport enterprises.

1. Introduction

Transport security is an integral part of the national security of Russia, and is regulated by the Constitution, legislation of the country, principles, international law and national standards [1].

1.1. The urgency of this topic

In the Russian Federation, the problem of ensuring transport security is becoming increasingly important every year. This is due to the increasing number of technological accidents and terrorist attacks occurring in recent years [2, 3].

1.2. Literature review

The issues of transport safety, taking into account the non-transport effect in their writings, were considered by Russian scientists: Sokolov V.G., Galaburda N.P., Tereshina A.P., Abramov E.N., Germanov G.A., Polyakova S.S., Znatnov I.V., Mace E.A., Kondratiev. E.A., Ilyina V.A., etc.

1.3. Problem statement

Transport safety implies a system of measures ensuring the safety of goods, life and health of passengers traveling on trains, traveling on ships, airliners, etc [4]. A security system for transport means a set of measures fixed by law aimed at protecting passengers and their baggage, as well as



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cargo [5]. It applies to all types of transport: aviation, rail transportation, water and air transport. To assess the level of transport safety on various types of transport, it is necessary to control the quantitative indicators of accident rate and damage for various types of transport activity, as well as to characterize the degree of threats to transport security [6].

The system of transport security allows timely detection and prevention of the threat of illegal interference in the work of the transport complex of the state, thereby ensuring complete safety of the movement of passengers and transportation of goods at any distance [7]. Ensuring transport safety of the transport complex from potential internal and external threats of unauthorized interference in its activities is of great strategic importance to the state.

According to the Federal Law No. 16-Φ3 dated February 9, 2007 (signed by President of the Russian Federation V.V. Putin) transport security is a state of protection of transport infrastructure and vehicles only from acts of unlawful interference [8].

Transport safety expresses the state of the transport system of the Russian Federation, which allows ensuring national security and national interests in the field of transport activities, the stability of transport activities, and preventing (minimizing) harm to human health and life, damage to property and the environment, and national economic damage during transport activities [9]. The goals of ensuring transport safety are the protection of owners and passengers of vehicles, recipients and carriers of goods, workers of transport infrastructure, as well as its tangible property, the stable and safe functioning of the transport complex, protection of the interests of society and the state in the field of the transport complex from acts of unlawful interference [10].

In the context of economic development, it is necessary to formulate and solve the problem of taking into account the non-transport effect of the implementation of various measures on transport.

1.4. Theoretical basement

The non-transport effect is defined as the benefits, associated effects or losses received in various spheres of the socio-economic life of society as a result of the use of a particular type of transport and various transport technologies, but which do not affect the financial performance of transport enterprises [11]. The obtained value must be adjusted taking into account negative factors: damage from land alienation for transport construction, additional costs for transport safety and environmental protection [12].

The extra-transport effect should be taken into account when comparing competing modes of transport; in the development of investment projects for passenger transport to service new (under construction) microdistricts of cities; when substantiating the mechanism of state regulation of the passenger transportation market at the municipal and regional levels [13].

The basic principles of ensuring transport safety are presented in Figure 1.

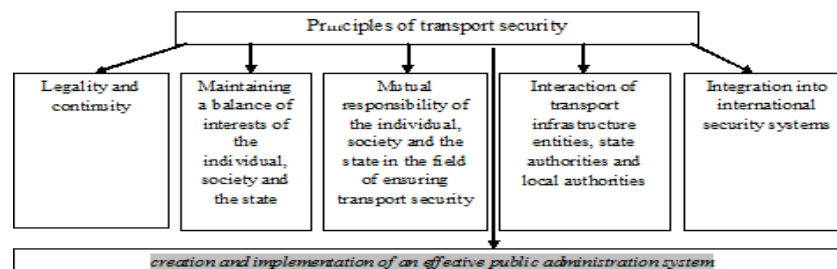


Figure 1. A figure caption is always placed below the illustration. Short captions are centered, while long ones are justified. The macro button chooses the correct format automatically.

Transport safety, taking into account the non-transport effect, covers 10 types of security (Figure 2).

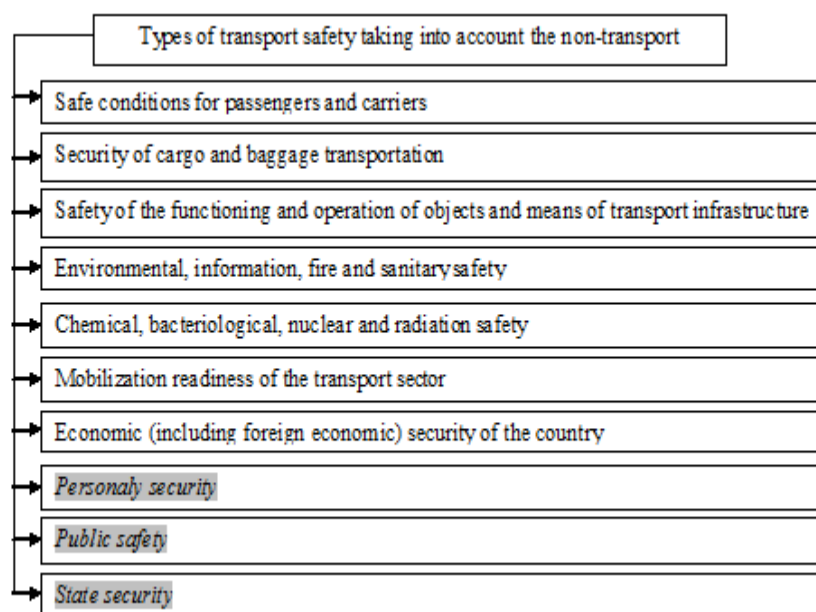


Figure 2. Types of transport safety, taking into account the non-transport effect.

Measures to ensure transport safety on various modes of transport, taking into account the extra-transport effect, are presented in Figure 3.

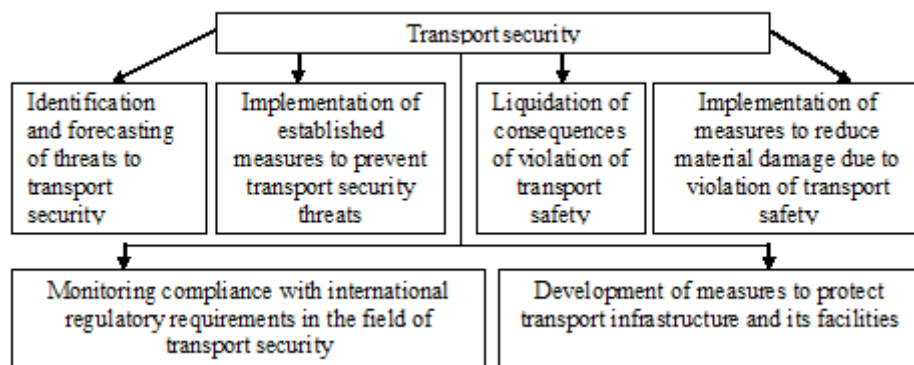


Figure 3. Measures to ensure transport safety on various modes of transport, taking into account the extra-transport effect.

An important role in practical activities to ensure transport safety is played by the classification of security threats according to certain criteria for certain types [14]. According to the localization of sources of threats to transport security are presented in Figure 4.

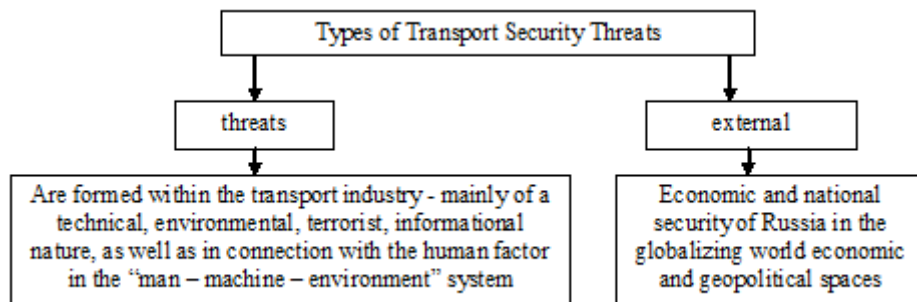


Figure 4. Types of threats to transport security.

The main threats to transport security lead to a decrease in the level of transport security, damage to the national security of the Russian Federation, violation of the sustainability of transport activities, damage to human health and life, damage to property and the environment, national economic losses, and a decrease in non-transport effects (Figure 5).

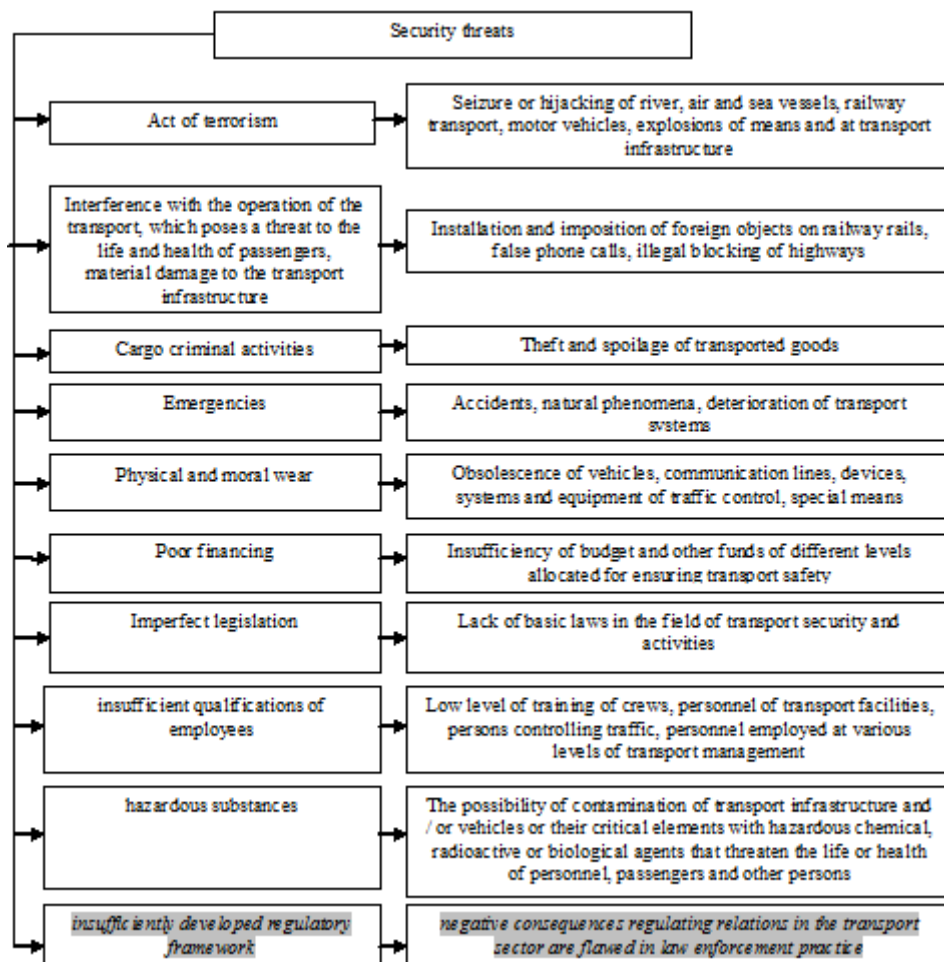


Figure 5. The main threats to transport security in transport enterprises.

Threats to transport safety in the Russian Federation by mode of transport are presented in Table 1 [15].

Table 1. Threats to transport security in the Russian Federation by mode of transport.

Means of transport	Main threats
Car	1. Mass motorization of the population, an increase in the number of vehicles, leading to an increase in vehicles and inexperienced drivers; 2. Underdevelopment and unsatisfactory technical condition of roads and fleet; 3. Moral obsolescence of motor vehicles produced by the national automobile industry; 4. Low consumer demand, not stimulating the production of modern and equipped with passive and active safety devices for vehicles; 5. Corruption of state bodies responsible for driver training, issuing a driver's license, technical inspection of vehicles, traffic regulation, preventive and educational sanctions on the roads; 6. Insufficient financing of the road sector in Russia; 7. Low discipline and law-abiding drivers and pedestrians; 8. Imperfection of technical means of organizing and managing traffic; 9. Insufficiency of regulatory support for road and road (construction, reconstruction, repair) activities.
Air	1. Reduction in the number of airports; 2. A high degree of wear and aging of aircraft and other equipment of existing airports and airfields; 3. Reduction of the aircraft fleet, reduction in the production of aircraft manufactured in Russia, lack of production of civil aircraft that meet modern requirements of navigation, ecology, noise and technical and flight operation support, which puts the Russian civil aviation industry at risk of closure; 4. Continuation of the practice of installing substandard spare parts and assemblies on aircraft; 5. The imbalance between the demand for air travel and the possibilities of covering it with the carrying capacity of the air fleet; 6. High probability of terrorist acts; 7. Incomplete formation of the legislative framework for transport security in air transport; 8. Insufficiency of own funds of air carriers for the implementation of all measures to ensure transport security, unregulated budgetary procedures for reliable support of transport security; 9. Inconsistent reforms in the areas of air traffic control, organization of flight operations, and flights to maintain the airworthiness of civilian vessels; 10. Gaps in the legislative framework in the field of ensuring safety in air transport; 11. Incomplete categorization of transport facilities and vehicles by degree of vulnerability.
Railway	1. Reduction of budget financing; 2. Inconclusive debugging in connection with the re-adjustment of management as a result of the abolition of the Ministry of Railways; 3. Lack of budget funds allocated for this industry; 4. Non-compliance with the rules and procedures for the technical operation of communication lines and rolling stock; 5. Non-compliance with the rules of technical operation of the track and rolling stock; 6. Unreasonable, from the perspective point of view, closure of inactive lines; 7. Decentralization of management in connection with the planned further privatization of the main production activities; 8. The increase in depreciation of fixed assets, rolling stock and auxiliary equipment; 9. The persistence of terrorist threats in the Southern Federal District; 10. The military and

	<p>economic vulnerability of the Trans-Siberian Railway that remains even with the existing BAM; 11. Difficulties with transit through the Baltic countries in the Kaliningrad direction; 12. Inadequate management of tariffs for traction energy resources, reducing the profitability of railway transport; 13. Non-delimitation of the ownership rights of Russian Railways for power generating facilities with RAO UES; 14. Obsolescence of railway equipment and technology; 15. Lack of regulatory support for transportation in some types of communications; 16. Lack of regulatory regulation in the field of transportation of dangerous goods in general and by rail.</p>
Water	<p>1. The decline in domestic marine waterways; 2. High level of wear of hydraulic structures in operation for 40-60 years or more, approaching the critical; 3. Reduction of funding for the reconstruction and modernization of hydraulic structures, which are in Federal ownership; 4. A sharp reduction of capital investments in reconstruction and modernization of hydraulic structures, which are in the Federal ownership; 5. The predominance of small companies among economic entities; 6. The gap in technological re-equipment and modernization of the fleet and ports (60% of all Russian ports are shallow, the condition of more than a quarter of the length of the mooring front and poor protective structures); 7. Lack of laws on Maritime trade (and fishing) ports, intermodal transport; 8. Unsuccessful, merely leading the organization's processes, transport supervision in ports and on ships; 9. Low level of budget financing of the procurement of new vessels; 10. The lack of a clear legal procedure of issuing Russian courts under the control of foreign companies mobilization tasks, their opinion, attraction of seafarers and his special training; 11. Lack of measures of protection of Russian sea transport in the global routes; 12. The inefficiency of the methods and techniques of transport supervision on ships and in ports; the budget deficit, which is reflected in the purchase of new ships to replace the old; 13. Lack of measures to encourage Russian cargo owners to Charter Russian vessels conduct ship repairs at Russian shipyards.</p>
Car	<p>1. Mass motorization of the population, an increase in the number of vehicles, leading to an increase in vehicles and inexperienced drivers; 2. Underdevelopment and unsatisfactory technical condition of roads and fleet; 3. Moral obsolescence of motor vehicles produced by the national automobile industry; 4. Low consumer demand, not stimulating the production of modern and equipped with passive and active safety devices for vehicles; 5. Corruption of state bodies responsible for driver training, issuing a driver's license, technical inspection of vehicles, traffic regulation, preventive and educational sanctions on the roads; 6. Insufficient financing of the road sector in Russia; 7. Low discipline and law-abiding drivers and pedestrians; 8. Imperfection of technical means of organizing and managing traffic; 9. Insufficiency of regulatory support for road and road (construction, reconstruction, repair) activities.</p>

As can be seen from table 1, the most serious level of threats is caused by road transport, since the main and important threats are corruption of state bodies responsible for driver training, issuing a

driver's license, technical inspection of vehicles, traffic regulation, and preventive and educational sanctions on the roads, as well as low discipline and law-abiding drivers and pedestrians [16].

The ranking of modes of transport, specific to Russian transport conditions, by their safety (danger) is as follows (table 2).

Table 2. Indicators of transport safety in the Russian Federation in the period January-September 2019.

Hazard rank	I	II	III	IV
Means of transport	Car	Air	Railway	Water
Number of crashes and accidents	116900	24	37	13
Death toll	11700	66	14	2
The number of injured	151200	100	4	-
Damage, thousand rubles	1251,2	-	-	-

As can be seen from table 1, the safest mode of transport is the water mode of transport. For the three quarters of 2019, it was on this type of transport that there were fewer accidents and the number of fatalities. In this case, there are no wounded at all. It is worth noting that the most dangerous form of transport, compared to air, water and rail, is automobile. At the same time, this type of transport entails damage in the amount of 1251.2 thousand rubles. A number of threats to transport security can be very specific to different modes of transport. The most serious level they have in road transport.

The number of crashes and fatalities on all modes of transport in the period January-September 2019 presented in figure 6.

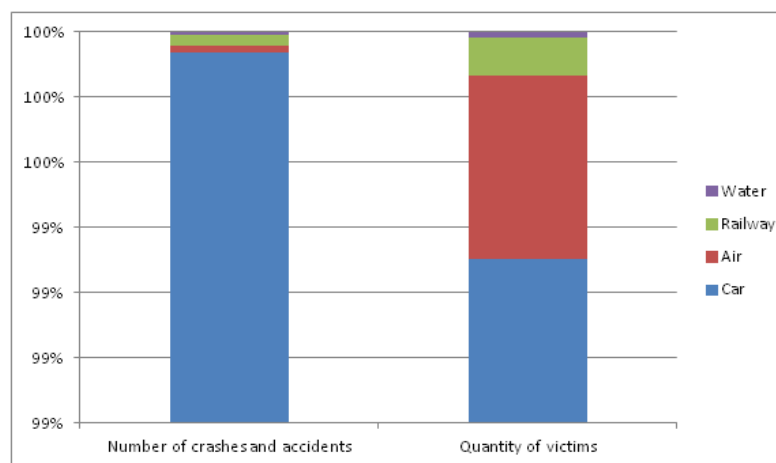


Figure 6. The number of wrecks and fatalities in transport during the period January-September 2019.

In Russia, all accidents cause damage to the economy equal to 2.5% of GDP. These losses that the company suffers from accidents entail damage to the country's economy.

The main tasks to ensure transport safety, taking into account the non-transport effect, are presented in Figure 7.

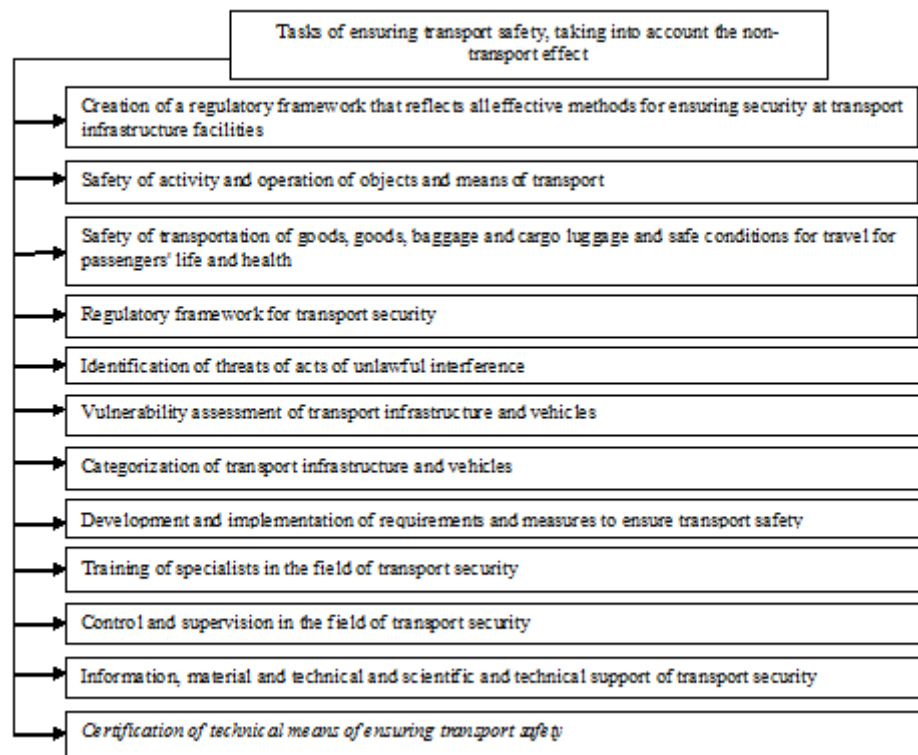


Figure 7. Objectives of transport security taking into account untransported effect.

2. Practical significance

The decision of problems of quality of transport security, is so time-consuming that the state cannot solve the problem independently [17]. Therefore, an important work on the involvement of other organizations who are also interested in a high level of security in the transport system as a whole and its objects. Such organizations often serve large enterprises not only of the transport and industrial, whose activity is impossible without the use of transport [18].

The system of ensuring transport safety, includes [19]:

- specially authorized body of state regulation in the field of transport safety;
- legal entities - operators and owners of vehicles and transport infrastructure, irrespective of their organizational-legal forms and forms of ownership;
- research, specialized centers in the field of transport safety;
- educational organization for training, retraining and advanced training of personnel in the field of transport security.

The development of the world technologies puts the direction of transport safety, new tasks to solve which is possible through integration of specialists in various fields and the improvement of the information space. Ensure transport safety in railway transport can be achieved with timely solution of problems that hinder its strategic development [20].

According to Transport strategy of the Russian Federation for the period till 2030, approved by decree of the Government of the Russian Federation from November 22, 2008 № 1734-R the improvement of safety of the transport system expressed in the three main indicators and is shown in Table 3.

Table 3. Increase of level of safety of the transport system.

Name of indicator	Unit of measurement	2015 y.	2020 y.	2030 y.
Decrease in accident rate in railway transport	%	66	58	43
Social Risk of Death in Road Accidents	death toll per 100 thousand	16	12	8
The number of air crashes per 100 thousand flight hours on scheduled flights	units / 100 thousand	0,01	0,009	0,008

Analyzing the dynamics of increase of level of safety of the transport system has a high level of achievement of this objective, says that the full and timely implementation of the transport sector all legal requirements aimed at ensuring security of the transport infrastructure and population [21].

3. Conclusion

The implementation of state transport policy and enhancing its effectiveness in the field of transport security up to 2030 will be implemented on the basis of the Federal law "On transport security" and includes a number on all types of transport system of legal, economic, organizational and other measures in the sphere of the transport complex, corresponding to threats of acts of unlawful interference, to improve the status of protection of transport infrastructure objects and means of transport from illegal actions, including terrorism-related [22].

Transport safety is of great importance to all aspects of life in Russian society, especially in conditions of economic instability the financial system and the global economic crisis [23]. The condition and quality of safe operation of the transport system of the Russian Federation is currently based on not only the prospects of further economic development, but also the ability of the state to effectively carry out such important principles as protection of national sovereignty and security of the country, ensuring the needs of citizens in traffic, creation of conditions for alignment of socio-economic development of regions.

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