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TRANSPORT OF DANGEROUS GOODS BY ROAD FROM A EUROPEAN ASPECT

Summary. Transport plays an important role in national economies and impacts on economic development. The scale of the transportation of goods that may be dangerous to humans and the environment is expanding every year. Overall, transport is dangerous for the environment and road users, causing the increased emission of pollutants, accidents and traffic collisions. The rise in demand of basic materials, such as petrol and diesel, has led to a growth in the transport of dangerous goods, which in turn has increased the risk of road accidents. The research method used in this article involves an analysis of the inspection rates regarding the transport of dangerous goods by road in the EU and related legal documents.

Keywords: transportation; dangerous goods.

1. INTRODUCTION

The transport of goods is a basic element in logistical systems. According to global statistics, about half of transported goods may be regarded as dangerous. All means of transport are used in this process: road, railway, air, maritime and sailing transports. However, land and railway

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transport are used more frequently [1]. In order to predict and minimize risk, there are international agreements for all means of transport [2,3]. International transport of dangerous goods by land is regulated by agreements worked out between appropriate international bodies [4,5,6,7,8,9]. The goal of these regulations is to improve the level of transport safety by applying technical standards, which are harmonized on a global scale to create a coherent and user-friendly system of regulations, while removing any differences between national and international requirements, implementing a mechanism for the constant improvement of regulations, and eliminating or minimizing the risk related to the transport of dangerous goods [10,11]. Such actions should not result in transport bans, but they should be subject to legal requirements and limitations.

The transport of dangerous goods and related requirements are carefully controlled in the EU [12]. In Poland, inspections may be carried out by inspectors from the Inspectorate of Road Transport, entrepreneurs possessing dangerous goods, officers from the State Fire Service, police officers, officers of the Border Guard, inspectors of the National Labour Inspectorate, officers of the Customs Service, soldiers of the Military Gendarmerie and military security services (with reference to vehicles of the Armed Forces), authorized employees of the National Atomic Energy Agency, and authorized employees of the Transport Technical Supervision Authority. During inspections regarding the transport of dangerous goods, many thorough and comprehensive actions are carried out, for example, in terms of the completeness of the documentation, the required qualifications of people participating in the transport, and the technical condition of the transported material [13].

2. INSPECTION OF DANGEROUS GOODS BY ROAD IN THE EU

Member states are requested to provide, if possible, an estimate of the scale of the transport of dangerous goods in tonnes or tonnes per kilometres carried out within their territory on an annual basis. To allow for an objective comparison between member states, the volume of the transport of dangerous goods is based on information available from the Eurostat database [14]. This information is used to estimate the frequency of checks relative to the volume of transport (Fig. 1).

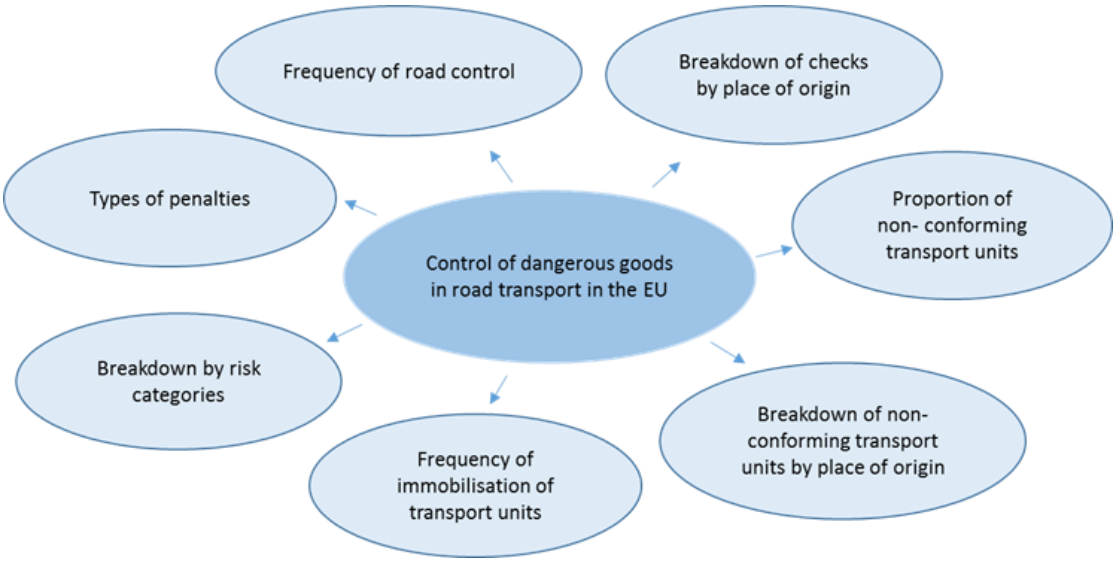

Fig. 1. The inspection regime for the transport of dangerous goods by road in the EU

2.1. Frequency of road checks

The frequency is calculated as the ratio of the number of checks per million tonnes per kilometre of dangerous goods transported in each member state. In 2012, the average in the EU was 0.52 checks per million tonnes per kilometre. In 2013, this declined to 0.48, implying an annual decrease of 9.6%, while, in 2014, the figure increased again to 0.49. The highest frequency of checks in 2012 was recorded in Austria (12.89%), Hungary (7%) and Bulgaria (5.84%). In 2013, the highest values were observed in Austria (12.34%), Slovakia (10.10%) and Sweden (6.72%), while, in 2014, they were observed in Austria (14.85%), Slovakia (10.73%) and Hungary (9.47%). In 2012, the frequency of checks in Austria was almost 24.78 times the EU average, 13.46 times the EU average in Hungary, and 11.23 times the EU average in Bulgaria (Fig. 2) [15].

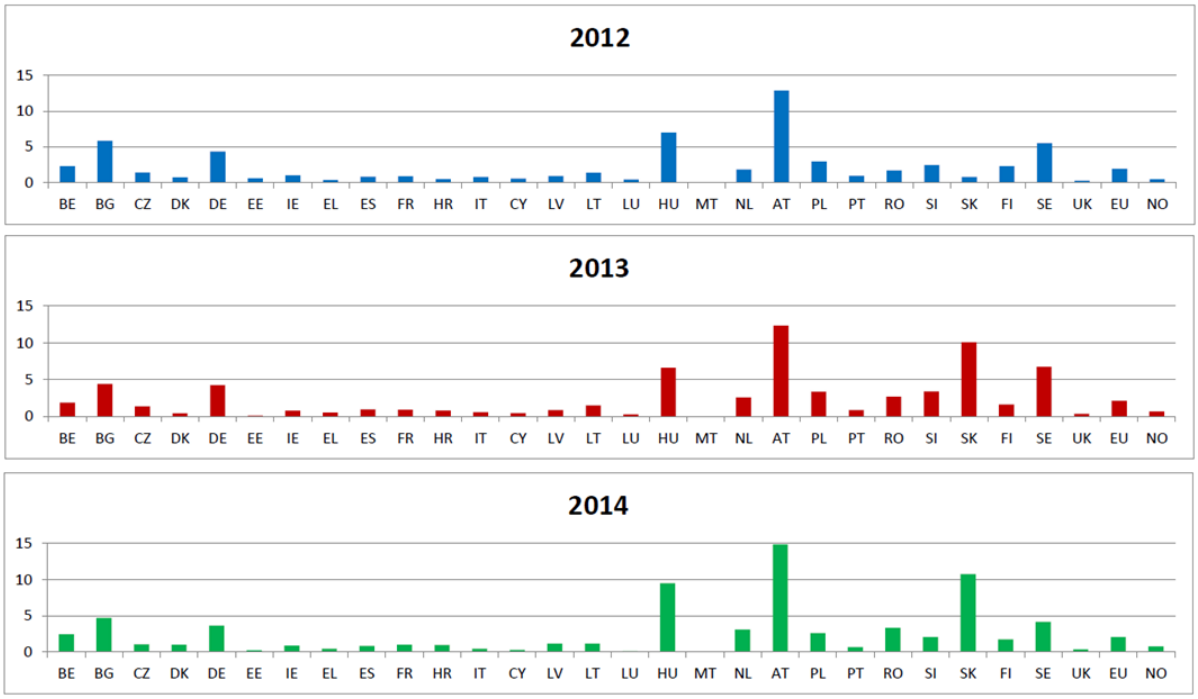

Fig. 2. Frequency of checks per million tonne-kilometre in years 2012-2014

2.2. Breakdown of checks by place of origin

The breakdown of checks by origin of the transport unit is shown in Fig. 3 [15]. This indicator is affected not only by the decisions of the enforcement authorities, but also by the geography of the member states; for example, on islands, there is less international transit by road. Between 2012 and 2014, Malta and Cyprus did not check any transport units registered outside the EU. The share of transport units registered in the country of the check was 65% during the reporting period. The share of checked units coming from other EU countries increased from 28 to 30% between 2012 and 2014. The share of checks concerning units registered outside the EU decreased in 2013, when compared to 2012, from 5 to 4%, before rising to 6% in 2014.

Fig. 3. Breakdown of checks by place of origin in 2012-2014

2.3. Proportion of non-conforming transport units

The share of checked transport units with at least one infringement is presented in Fig. 4 [15]. The proportion of non-conforming units decreased from 22.12% in 2012 to 19.73% in 2014, with major decreases notably in Cyprus, Slovenia, Poland and Lithuania. However, there are some member states where there was an increase in this proportion, namely, Slovakia, Greece, Hungary and the Netherlands.

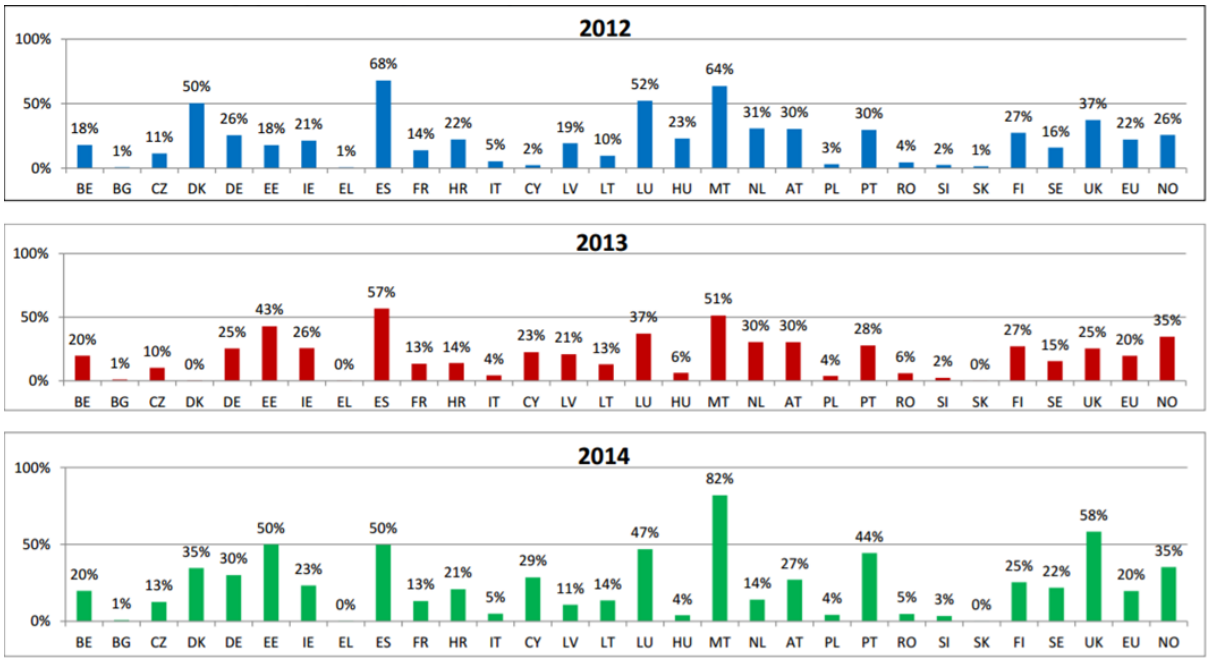

Fig. 4. Proportion of transport units not conforming to provisions in 2012-2014

2.4. Breakdown of non-conforming transport units by place of origin

The distribution of transport units not conforming to the provisions in place at the point of origin of the transport unit is presented in Fig. 5 [15]. As noted, the geography of the member state in question considerably affects this indicator too.

Fig. 5. Breakdown of transport units not conforming to the provisions in place at the point of origin in 2012-2014

2.5. Frequency of the immobilization of transport units

The oscillatory trend mentioned above was maintained in relation to the frequency of the immobilization of transport units: the proportion of vehicles immobilized in 2012 was 26.16%, before increasing to 28.06% in 2013 and slightly decreasing to 27.72% in 2014.

The highest frequencies regarding immobilization in 2012 were recorded in Bulgaria (84.38%), Slovenia (57.89%) and Ireland (54.84%). In Norway, 71.07% of infringements led to immobilization in 2014. Meanwhile, no immobilizations were reported by Estonia, Spain, Italy, Cyprus, Latvia, Malta and Slovakia between 2012 and 2014 (Fig. 6) [15].

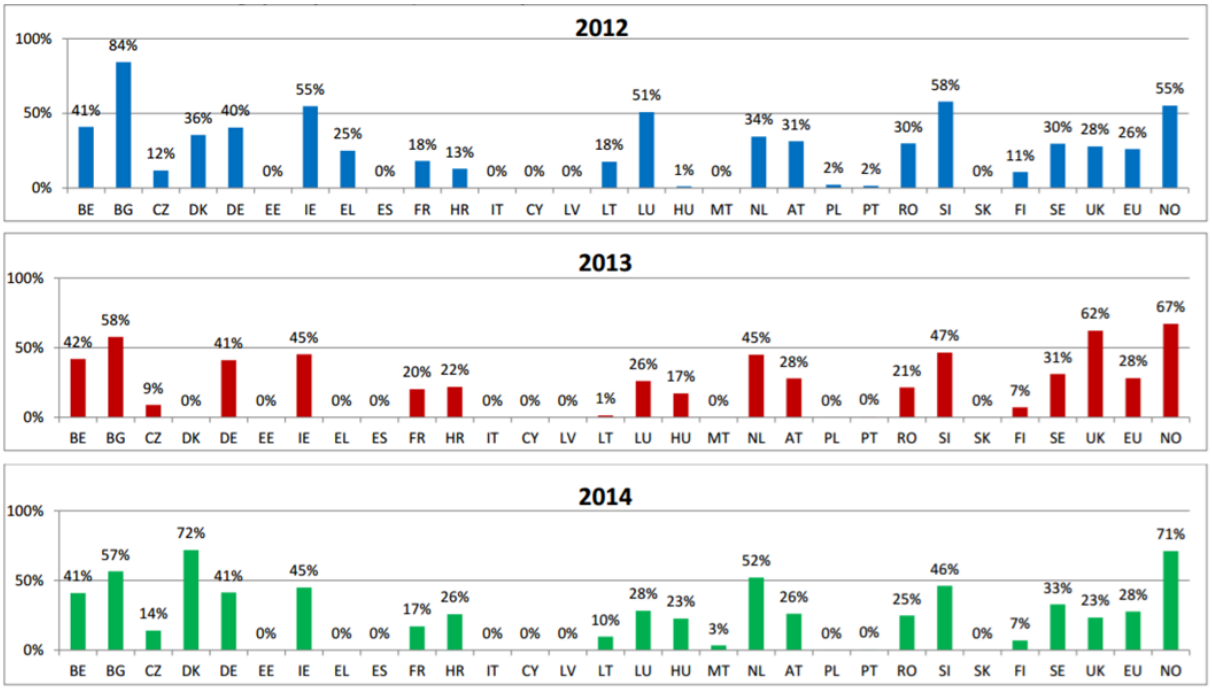

Fig. 6. Frequency of the immobilization of transport units not conforming to provisions in 2012-2014

2.6. Breakdown by risk categories

All member states have reported at least one category of infringement per transport unit checked, while some member states did not report any data for certain categories. In 2012, Cyprus and Slovakia did not report any infringements for Risk Categories I and II. Furthermore, Greece reported no infringements in Risk Category III throughout the period and no infringements in Risk Category II in 2014 and 2013.

Among the checks carried out in the EU in 2012, in 42.69% of cases where infringements were detected, the most serious was classified in risk category I. Risk Category I infringement implies a failure to comply with relevant safety provisions creating a high-level risk of death, serious personal injury or significant damage to the environment. These infringements call for immediate and appropriate corrective measures, such as immobilization of the vehicle. The most serious infringements that were reported in Risk Category II represented 33.48% of checks where an infringement was detected. Risk Category III covered the remaining 23.83% (Fig. 7) [15].

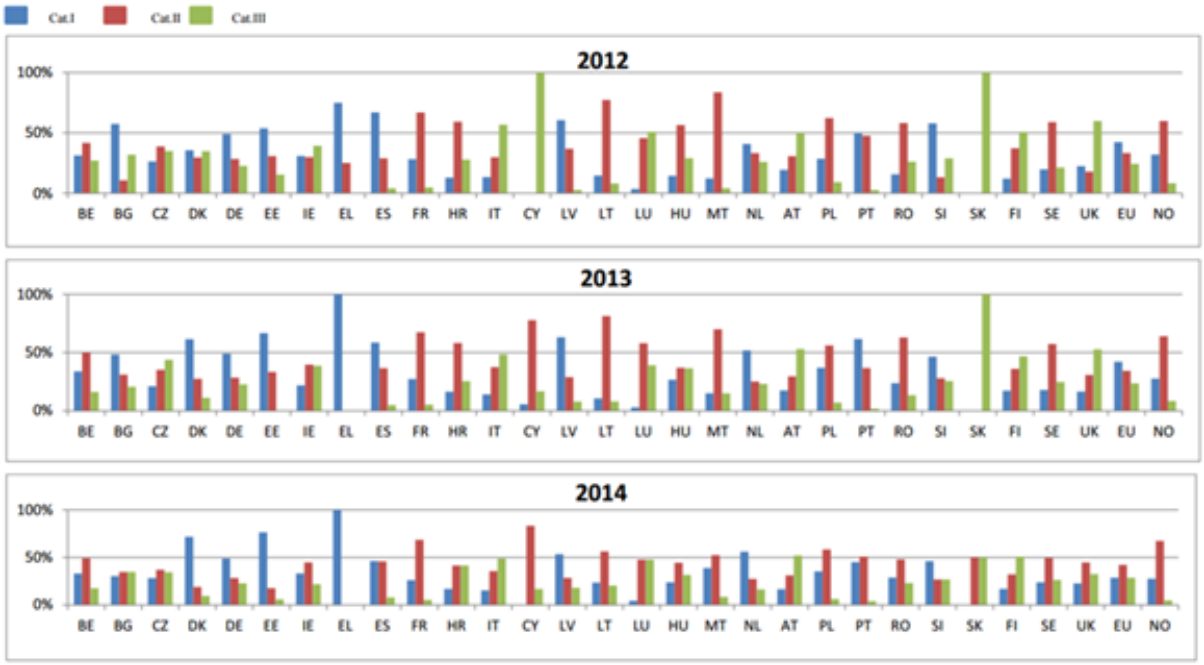

Fig. 7. Breakdown by risk categories in 2012-2014

2.7. Types of penalties

In 2012-2014, only France and Malta did not report any statistics on penalties. Although, in 2012, Slovakia did not report any penalties, it started reporting such data in the ensuing years.

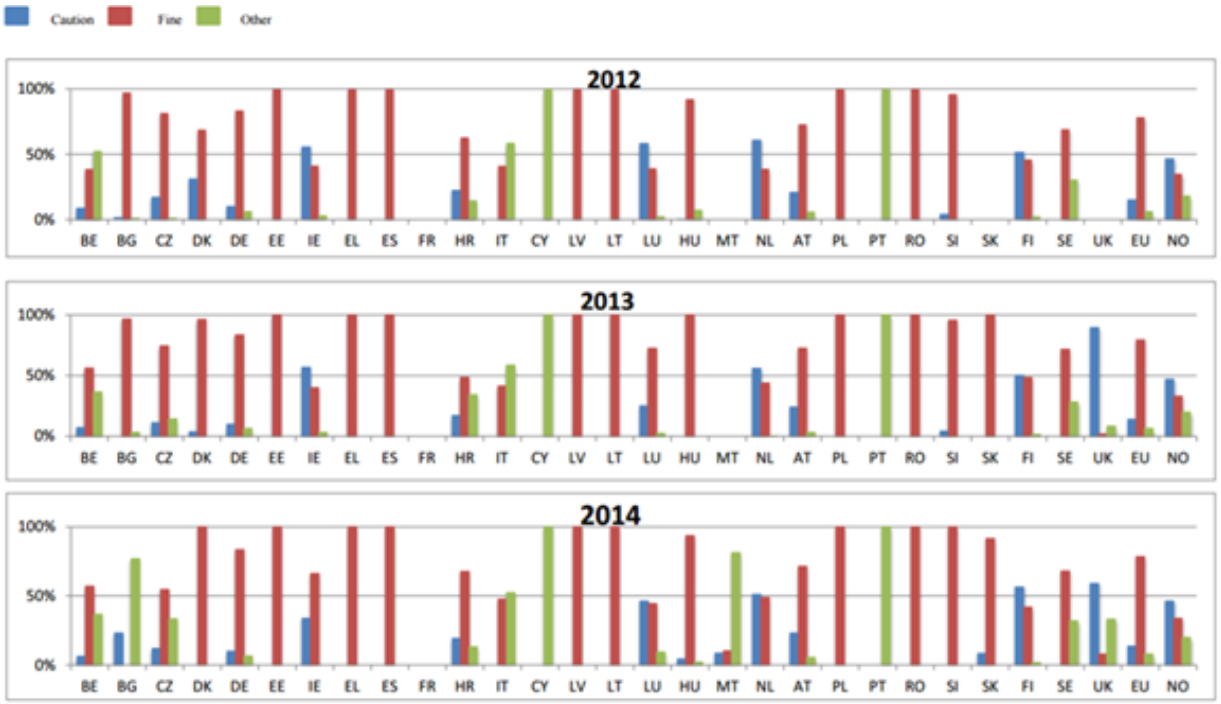

Fig. 8. Breakdown per types of penalties in 2012-2014

During the inspections carried out in the EU in 2014, 5,066 cautions were issued: fines were imposed in 29,206 cases and 2,963 cases led to other penalties, including criminal and administrative juridical processes. Although, in general terms, three quarters of penalties in the EU are fines, there is a large variation between member states.

In 2014, there were, in total, around 10.50% fewer penalties than in 2012. While the number of cautions decreased by 18.1% over the period and the number of fines by 10%, other penalties increased by 9.8%. (Fig. 8) [15].

3. TRANSPORT OF DANGEROUS GOODS BY ROAD IN POLAND

The countries participating in the international transport of dangerous goods enter into agreements concerning the inspection of cargo while crossing the border. Many issues related to the transport of dangerous goods are additionally specified by national regulations. In Poland, the following legal acts are in effect with regard to the transport of dangerous goods by road:

- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), Drawn Up in Geneva on 30 September 1957 (Dz.U. [Journal of Laws] of 1975, No. 35, Item 189)
- The Act of 15 November 15, 1984 - Transport Law (Dz.U. [Journal of Laws] of 1995, No. 119, Item 575)
- The Act of 10 April 1986 - Atomic Energy Law (Dz.U. [Journal of Laws] No. 12, Item 70, and of 1987, No. 33, Item 180)
- The Act of 1 February 1983 - Traffic Law (Dz.U. [Journal of Laws] of 1992, No. 11, Item 41, No. 26 and Item 114; Dz.U. [Journal of Laws] of 1995, No. 104, Item 515)
- Regulation of the Ministers of Communications and Internal Affairs of 2 December 1983 on the Inspection of the Transport of Dangerous Goods (Dz.U. [Journal of Laws] No. 67, Item 301, and of 1986, No. 42, Item 206)
- The Act of 19 November 1987 on Technical Inspection (Dz.U. [Journal of Laws] No. 36, Item 202, and of 1995, No. 104, Item 515), the Act of 19 August 2011 on the Transport of Dangerous Goods (Dz.U. [Journal of Laws] 2011, No. 227, Item 1,367)
- Regulation of the Minister of Defence of 28 September 2012 on the Issuance of Military Permits for Vehicles Carrying Dangerous Goods (Dz.U. [Journal of Laws] No. 227, Item 1367, and No. 244, Item 1454) [16]

The main goal of the legal articles regulating the transport of dangerous goods is to eliminate and minimize the risk of accidents and the size of potential damage [17]. Therefore, regulations should encourage transport to use effective and tried-and-tested solutions. The transport of dangerous goods by road is internationally regulated by the ADR, which consists of the main agreement and Annexes A and B. The main agreement formulates the legal relationships between participating countries, whereas the annexes include regulations regulating the conditions for the transport of specific dangerous goods in the context of international road transport. In accordance with the ADR's main agreement, dangerous goods are divided into classes as presented in Table 1.

Legal regulations contained in all documents include the whole process of transport, while taking the credibility of all participants of this process into consideration [16].

Table 1. The classification of dangerous goods (source: ADR 2011-2013).

Category	Name
1	Explosive materials and objects
2	Gases
3	Flammable liquid materials
4	Inflammatory solids
4.1	Self-igniting materials
4.2	Materials producing flammable gases in contact with water
4.3	Oxidizing materials
5.1	Organic materials
5.2	Organic peroxides
6.1	Poisonous materials
6.2	Infectious materials
7	Radioactive materials
8	Corrosive materials
9	Various dangerous materials and objects

In Poland, the transport of dangerous goods by road constitutes about 10-15% of all transport. The central routes for the transport of dangerous goods mainly run through urbanized areas. Industrial enterprises are the main recipients of dangerous chemical compounds transported by tank trucks. The largest amount of dangerous goods is transported in the area of Łódź, Tricity, Tarnów, Bydgoszcz, Kielce and Czechowice-Dziedzice. There are about 2,000 plants in Poland, including about 400 plants with a high risk of serious industrial accidents. The transport of chemical agents by road from industrial and petrochemical plants through cities is particularly risky because the probability of disaster is very high, as well as the risk concerning the loss of life or the adverse impact on the health of several thousand people and the ecosystem. Leaks of petroleum substances and acids as a result of leaky valves, damage to tanks or collisions are particularly dangerous to the environment, possibly resulting in tank trucks carrying petroleum-derived fuels catching fire or exploding.

4. CONCLUSION

The transport of dangerous goods by road is a complex process, which requires know-how, qualifications related to and knowledge of appropriate regulations. Organizing transport in accordance with binding regulations and norms in the field of security not only minimizes risks resulting from the transport of dangerous goods, but also ensures its effectiveness and guarantee of security.

All member states carry out checks on vehicles carrying dangerous goods. As it is in the interest of member states to detect and prevent any dangers that may arise in the transport of these goods, the EU is keen to encourage the exchange of best practices and further investment in this field. The number of violations during the analysed period was relatively stable: in 2014, one check out of five was confirmed or suspected as an infringement in the carriage of dangerous goods, while in 2012 it was one out of 4.5 checks.

Where infringements were detected, 42.69% of cases were of the most serious type. Consequently, some 8,875 vehicles were immobilized in 2012. Moreover, in the EU, a common set of provisions has been applied for the transport of dangerous goods, which is also used in

an identical fashion in many countries outside the EU. Nevertheless, almost 32,000 of the 150,000 or so annual roadside checks result in confirmation that the transport in question does not comply with the compulsory safety requirements.

However, the high number of infringements reported by member states may also be due to their targeted checks policy, which aims to identify and sanction the worst performing transport operators in order to maximize the efficiency of the scarce resources available. This implies that the statistics presented are not wholly representative of the EU market for the transport of dangerous goods, which in practice is much safer than it may appear from the data reported. Therefore, the EU has started to explore possible amendments to the annexes of the directive in order to improve the way in which data on checks and sanctions are recorded and reported by member states.

To conclude, the penalties for non-compliance with legal regulations and OHP regulations should be as high as the costs of repair in the case of failure. Furthermore, the transport of dangerous goods requires knowledge relevant to this field and the application of meaningful safety measures.

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