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ScienceDirect

Transportation Research Procedia 40 (2019) 1343–1348

Transportation Research Procedia

www.elsevier.com/locate/procedia

13th International Scientific Conference on Sustainable, Modern and Safe Transport (TRANSCOM 2019), High Tatras, Novy Smokovec – Grand Hotel Bellevue, Slovak Republic, May 29-31, 2019

Specifics of Monitoring and Analysing Emergencies in Information Systems

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Abstract

The information systems serve as tools for collecting information in connection with emergencies and their monitoring. The database eMars according to the SEVESO III Directive which comprises data from all member states serves for collecting information about major industrial accidents in the EU. According to the type and extent of an emergency, in Slovakia the industrial accidents are registered in two databases and two ministries keep files on them – the Ministry of Interior and the Ministry of Environment and are assessed according to different parameters. The first one is the information system of the civil protection managed by the Ministry of Interior and the second one is the information system of the major industrial accident prevention managed by the Ministry of Environment. Regarding hazardous substances related accidents we are discussing transport of dangerous goods on the roads. The main aim of this article is to analyse the emergencies in mentioned databases and to assess the statistical data which are involved in all information systems.

Peer-review under responsibility of the scientific committee of the 13th International Scientific Conference on Sustainable, Modern and Safe Transport (TRANSCOM 2019).

Keywords: information systems, database, industrial accident, dangerous goods, hazardous substances;

1. Introduction

The information systems serve for collecting information about the emergencies and for monitoring them. In the EU the database eMars where data from all EU countries can be found serves for collecting information about major industrial accidents (MIA) according to the SEVESO III Directive. In Slovakia, according to the type and extent of

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2352-1465
Peer-review under responsibility of the scientific committee of the 13th International Scientific Conference on Sustainable, Modern and Safe Transport (TRANSCOM 2019).
10.1016/j.trpro.2019.07.186

an emergency the industrial accidents are recorded in two databases by two ministries – the Ministry of Interior of the Slovak Republic and the Ministry of Environment of the Slovak Republic, they are processed according to different parameters. The first one is the Information System of Civil Protection controlled by the Ministry of Environment of the Slovak Republic and the second one the Information System of Preventing Major Industrial Accidents administrated by the Ministry of Environment of the Slovak Republic. The international agreement ADR (transport of hazardous substances) is also connected with transporting hazardous materials. The information system monitoring the movement of the hazardous materials in the EU is the Eurostat/Transport of Dangerous Goods, the data of which is discussed at the end of this article.

2. Prevention of major industrial accidents and the eMars database

The database eMars is a European database collecting data about major industrial accidents and near-misses in the enterprises under the SEVESO III directive in the EU. The purpose of this database is to provide data for statistical assessments with the goal to prevent these events and it also serves as a source of lessons learned from the accidents. The EU member states provide information about major industrial accidents and near-misses on the basis of the defined rules by the corresponding EU institutions to the common EU Research Centre in ISPRA just through the electronic database MARS. The reporting of the events to the MARS database is compulsory for the EU member states in the case of events that fulfil the criteria of the major industrial accident shown in the Appendix IV of the SEVESO III Directive.

The state administration bodies of the EU member states, industrial and trade associations, trade unions, etc. can utilise the MARS database. Currently also an interactive version of the MARS database, the so called eMARS version accessible at the internet address https://emars.jrc.ec.europa.eu/?id=4 is available.

The figure 1 shows the majority of the major industrial accidents during the monitored period during of 1979 - 2015 developed in 2002. The major industrial accidents show a declining trend especially due to the high level of security and safety that have to be achieved by the SEVESO companies in their operation. There are fewer near-misses and this fact is also caused by non-reporting of all dangerous events by the companies. The most other events occurred in 1999.

The Slovak Republic utilises the Information System for Preventing Major Industrial Accidents. The table 1 shows the numbers of the major industrial accidents (MIA) registered in the framework of the Information System for Preventing Major Industrial Accidents.

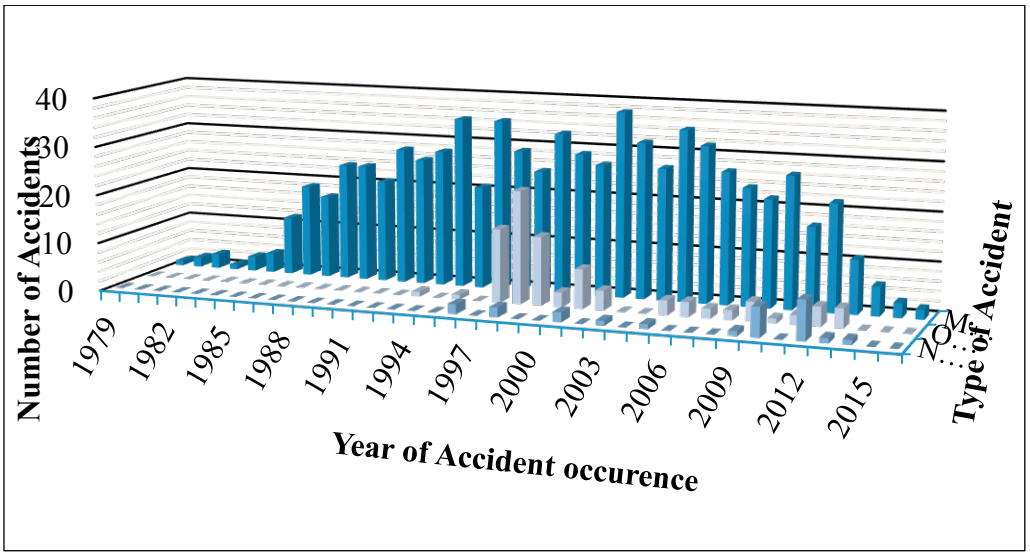

Fig. 1. Overview of Industrial Accidents from 1979 to 2015

Table 1 Number of major industrial accidents in Slovakia (Registry 2018)

Year	2014	2010	2009	2006	2005
Number of MIA	1	1	1	1	2

As the table clearly shows the total number of the major industrial accidents developed in the Slovak territory is 6. Compared with the number of the accidents in the whole EU this number is relatively low, however, it is necessary to take measures which would eliminate the occurrence of these events as much as possible. The last registered accident in this system is from the year 2014 and the first one from 2005 (in this year two accidents developed).

3. Civil Protection Information System

The Regulation of the Ministry of Interior of the Slovak Republic no 388/2006 Coll. solves all doubts in connection with providing the technical and operational conditions of the civil protection information system. The information system is created by the announcing service and the information service of the civil protection as follows:

a) the announcing service ensures the early warning of the inhabitants and informing persons active during solving the effects of an emergency and municipalities about the threat and development of an emergency,
b) the information service ensures collecting, processing, assessing and providing information.

The announcing service ensures giving the warnings through an information network of the civil protection created by the warning and information centres of the civil protection and technical means in the given territory. The scope of the warning and announcing centres complies with the administrative organisation of the Slovak Republic (The Regulation no 388/2006; Notification 2018).

In the framework of the Ministry of Interior of the Slovak Republic the Central Monitoring and Control Centre monitors the functionality of the communication and information technology, the operators´ activities and the information flow about the undesirable events (Monoši 2015).

The recorded data are subsequently assessed and processed in the summary overviews. The individual data is classified from the point of view of the occurrence of emergencies and announcements of emergency situation, then according to the type of emergency event (MU), according to the regions and districts in Slovakia. The table 2 shows emergencies with occurrence of hazardous substances. The item (MU type) leakage of a hazardous substance (HS) includes the leakage of HS to the soil, water and air (e.g. a leakage of CO2, of methane, propene, chlorine, finding barrels with mercaptan, leakage of automotive gas oil, azotic acid, oil products to the rivers, leakage of ammonia) (Regec 2016). In the years 2013 – 2014 this type of emergency was designated as a leakage of crude oil products, since 2015 as a leakage of a hazardous substance.

Table 2. Emergencies in Slovak republic from 2013 – 2017 (Statistical 2013-2017)

Emergency	Year	Regions *								Total	Emergencies - Total
		BA	BB	KE	NR	PO	TN	TT	ZA		
Leakage of hazardous substance	2017	6	2	2	0	8	2	4	0	24	378
	2016	4	3	3	3	1	4	1	0	19	285
	2015	6	4	3	0	4	1	2	0	20	236
Leakage of crude oil products	2014	3	0	1	0	5	0	1	0	10	372
	2013	7	1	0	1	1	0	0	0	10	362
Total		26	10	9	4	19	7	8	0	83	1 633

* Slovak regions: BA – Bratislava; BB – Banská Bystrica; KE – Košice; NR – Nitra; PO – Prešov; TN – Trenčín; TT – Tranava; ZA – Žilina

As the table 2 shows, during the last five years the Central Monitoring and Control Centre has registered 83 leakages of a hazardous substance, it represents 5.1 % of the total of emergencies (1,663). The highest occurrence was in the Bratislava region (26) and the lowest occurrence in the Nitra region – in the Žilina region there has not been any leakage of a hazardous substance during last five years. The figure shows the share of the emergencies with hazardous substances in the total number of emergencies during last five years.

The highest number of leakages of a hazardous substance was recorded in 2017 (24 emergencies with occurrence of HS) from the total number of 378 – it is a 6.3 % share. The highest share of the hazardous substance leakage (8.5 %, 20 emergencies with HS) in the total of 236 emergencies was registered in 2015.

4. The accident rate on roads

The accident rate on the Slovak roads is connected with threatening the health and life of individual citizens. Our table 3 brings data about the transport and traffic accident rate as a significant crisis event of the current era.

Table 3. Road Accidents number (Traffic 2018)

Year	Month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2017	956	904	1 044	1 037	1 259	1 250	1 280	1 238	1 174	1 258	1 239	1 286
2016	973	925	950	1 057	1 114	1 264	1 158	1 215	1 219	1 186	1 162	1 227
2015	1 027	852	986	1 023	1 107	1 194	1 187	1 239	1 162	1 272	1 213	not shown
2014	988	872	1 033	1 036	1 206	1 175	1 153	1 100	1 055	1 316	1 081	1 190
2013	1 133	984	1 046	974	1 074	1 182	1 192	1 187	1 162	1 190	1 196	1 179

The total number of the traffic accidents in individual years is 13,000 (except for the year 2015, when the accident rate was not published for December). The highest number of accidents is registered in 2017 – 13,925.

A specific area for handling with hazardous substances is their transportation on the roads. The ADR agreement about the road transportation of hazardous substances controls this area in the EU.

The accidents that happen in this area are monitored both in the EU and the Slovak Republic. For comparison in the Czech Republic the vehicles transporting hazardous loads are considered the cause of frequent traffic accidents. The same is valid also for Slovakia. Several hundreds of thousands of tonne-kilometres of hazardous loads are transported through Slovakia every year. In 2017 657 thousand of tonne-kilometres and in 2016 253 thousand tonne-kilometres of hazardous loads were transported across Slovakia.

Information regarding to the amount of hazardous substances transported through the EU countries can be found at http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do (fig. 2).

The transport of hazardous substances by the tank trucks brings a lot of risks compared with the common truck transport. Besides the possibility of an explosion and fire of the products in the case of an accident, there are dangers of damaging the environment, human life or health. The carrier takes the main responsibility for the safety of the transport through a trained truck driver. The carrier ensuring the transportation has to fulfil the basic requirements of the ordering party to maintain the quality, quantity and deadlines of the deliveries (Kampová 2018).

The majority of the accidents have the tank truck transporting motor fuels. Recently also the number of the traffic accidents caused by the trucks transporting technical gases has increased (e.g. propane-butane, hydrogen of CNG).

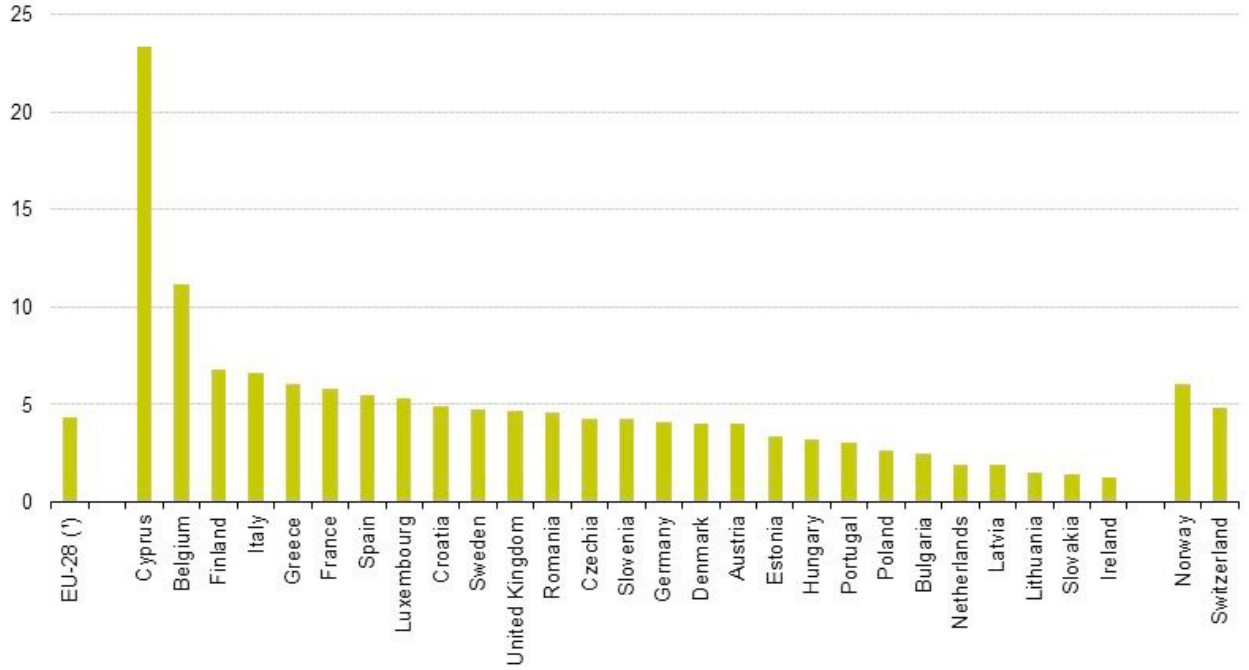

Fig. 2. Road freight transport of dangerous goods, 2017 (Road 2018)

Conclusion

The article shows a few statistical databases that gather data about the stationary and mobile equipment that are connected with emergencies where a hazardous substance was present. The information system for preventing major industrial accidents and the European database eMars are specific information systems and databases which contain data from the SEVESO organisations (SEVESO III Directive) about major industrial accidents and near-misses. The information system of the civil defence has a broader utilisation and contains information about various emergencies. From the point of view of the crisis phenomena connected with the hazardous substances we can utilise the information from the system under the title leakage of hazardous substances. The transportation of hazardous loads is also connected with the hazardous substances – here the company can be the sender or recipient of the hazardous loads and an emergency can develop by a leakage of the material during the transportation.

Every information system contains different information and in Slovakia this information is processed by two ministries and the information achieved has a different utilisation. Both the mobile and stationary equipment whose denominator is a hazardous substance are analysed.

Acknowledgements

This article was created as a one of research project outcomes VEGA 1/0581/19 Stating the Social and Individual Risk of Employees and Public Resulting from Impacts of the Domino Effects Caused by Industrial Accidents and Methods of Reducing their Possible Escalation.

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