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SAFETY MANAGEMENT SYSTEMS IN CANADA'S TRANSPORTATION SECTOR

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EXECUTIVE SUMMARY

Safety management systems (SMSs) are internationally recognized frameworks that help companies identify safety risks and prevent potential accidents. In Canada, SMSs were introduced into federally regulated transportation in the early 2000s.

In terms of air and marine transport, respectively, Canada has complied with the international protocols for developing SMSs set out by the International Civil Aviation Organization in Annex 19 to the Convention on International Civil Aviation and by the International Maritime Organization in its International Safety Management Code. The regulations that govern SMSs in rail transport are those that have undergone the most changes in the last decade. As for road transport, most aspects of motor vehicle usage come under provincial or territorial jurisdiction, and to date, Transport Canada has not required interprovincial or international trucking companies to adopt SMSs.

Transport Canada's safety management and regulatory oversight has been the subject of several reviews, including by the Transportation Safety Board and by the Office of the Auditor General of Canada. These reviews showed that despite the improvements made to SMSs in federally regulated transportation in recent years, some issues remain. Consequently, many air and marine carriers are not legally required to implement an SMS.

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1 INTRODUCTION

A safety management system (SMS) is a formal framework designed to foster a culture of safety within an organization. It sets out individual roles and responsibilities, and accountabilities for safety. It is designed both to increase employees' awareness of various safety aspects that relate to their daily activities and to establish formal lines of communication within the organization for sharing information about hazards. By improving awareness, accountability and communication, an SMS allows an organization to identify safety risks before they escalate and become serious problems.

Moreover, the measurable safety objectives and periodic internal audits included in an SMS promote continuous learning within the organization, as well as constant system improvements. Putting an SMS in place usually involves a commitment from senior management for approving the organization's safety policies and objectives, and for providing oversight, among other factors. Introducing an effective SMS poses its own challenges, but once in place, the SMS plays a major role in preventing accidents, which reduces the organization's costs and increases its competitiveness.

This paper focuses on federal SMS requirements in the Canadian transportation sector. It first examines how SMS emerged as a new approach to industrial safety, then it gives an overview of Transport Canada's requirements regarding SMSs in the various federally regulated modes of transportation. Lastly, it discusses some of the problems that continue to arise in SMS implementation.

2 THE EVOLUTION OF APPROACHES TO INDUSTRIAL SAFETY

Until the 1960s, safety approaches in high-risk industries were based on reliability engineering, a field that studies and evaluates the probability of equipment failure.[1] Improvements in safety were primarily informed by accident investigations, which provided data about the likelihood of such events.

Increased public awareness of industrial hazards in the United States throughout the 1960s led to establishing a scientific approach to accident prevention.[2] Studies in this area helped to identify some key factors in industrial safety, namely, the causes of accidents, the interface between humans and machines, the role of management, and the relationship between the economics and efficiency of safety. This research paved the way for the development of SMSs.

The SMS approach relies not only on accident prevention, but also on a systematic process for identifying and controlling hazards derived from what is known as "process safety." Process safety has its roots in business ethics developed by the Canadian chemical industry in response to the 1984 chemical plant disaster in Bhopal, India. "Responsible Care," the industry's commitment to health, safety and environmental protection, was introduced in 1985; it has since been adopted by 73 countries and by 96 of the 100 largest chemical producers in the world.[3]

In the transportation sector, factors like increased traffic, constant technological change, the limited resources of regulators and the limited opportunities for infrastructure investment have driven the need for a more effective approach to safety. Another driver of change is research findings that organizations can comply with the regulations, yet fail to manage risks at acceptable levels.[4]

The SMS approach is considered a better way to motivate companies to manage their own risks, because it makes them accountable and responsible for the human, organizational, technical and environmental factors that lead to accidents.[5] It is also Transport Canada's strategy to maintain and improve the safety of the transportation system with the resources available. In a 2007 policy document, Transport Canada stated that the transportation industry would henceforth be responsible for the proactive and systematic management of the risks that weigh on its activities, and that the primary tool used to do so would be the SMS, where possible.[6]

3 SAFETY MANAGEMENT SYSTEMS IN FEDERALLY REGULATED TRANSPORTATION INDUSTRIES IN CANADA

Federal SMS requirements apply to air and marine transport, and to the federally regulated portion of rail transport. SMS principles also form part of the federal regulations that apply to the transportation of dangerous goods and to road transportation safety.

3.1 AIR TRANSPORT

In 2000, the International Civil Aviation Organization first recommended that its member states adopt SMSs for aviation. Transport Canada was the first civil aviation authority in the world to bring in regulations that compelled aviation companies to use SMSs.

The SMS requirements for air transport are set out in the *Canadian Aviation Regulations*[7] made under the *Aeronautics Act*. Air carriers whose aircraft carry more than 20 passengers (and companies that maintain these aircraft) were the first required to put SMS policies, processes and procedures into place. While SMS regulations for these companies were introduced in 2005, compliance only became mandatory in 2008.

SMS regulations for airports and providers of air navigation services came into force in 2008 and 2009.[8]

In October 2020, Transport Canada launched a review of the policy on SMS modernization in civil aviation[9] to assess the SMS requirements in the sector and determine whether they need to be improved. There are no plans at this time to extend the SMS requirement to other sectors, such as flight training units, air taxi service organizations or organizations that certify aeronautical products.[10]

3.2 MARINE TRANSPORT

The International Maritime Organization first developed SMS guidelines in 1989. Experience gained applying these guidelines formed the basis of the *International Management Safety Code* (ISM Code), adopted in 1993 and made mandatory in 1998.[11]

In 1998, Transport Canada introduced the *Safety Management Regulations*[12] originally made under the *Canada Shipping Act*, in order to meet the requirements of the ISM Code; these regulations continue to apply under the *Canada Shipping Act, 2001*. The *Safety Management Regulations* apply to Canadian passenger and cargo vessels subject to the *International Convention for the Safety of Life at Sea* (SOLAS Convention).[13] Currently, only Canadian vessels on international voyages that are subject to Chapter IX of the SOLAS Convention are required to comply with these regulations.

3.3 RAIL TRANSPORT

Transport Canada has required federally regulated railway companies to have SMSs in place since 2001. The associated requirements were first introduced in the *Railway Safety Management System Regulations*,[14] made under the *Railway Safety Act*.

Amendments made to the *Railway Safety Act* in 2013 gave the Governor in Council power to make additional regulations concerning the SMS requirements for railway companies. Consequently, the Governor in Council can make regulations that require an SMS to include:

- a non-punitive reporting system for employees who raise safety concerns about rail practices;

- continuous monitoring and regular assessments of the level of safety the company achieves;

- involvement of railway company employees and their union representatives in the development and implementation of the SMS; and

- identification of an executive who is responsible for fulfilling the requirements of the company's SMS.[15]

Changes to the *Railway Safety Act* led to amendments to the 2001 *Railway Safety Management System Regulations* to improve regulatory oversight of SMSs in the Canadian rail sector.[16] These regulations were repealed and replaced by the *Railway Safety Management System Regulations, 2015*. The new regulations, which came into force in April 2015:

- expand their scope to make local railway companies operating on main track subject to the regulatory provisions on SMSs;

- clarify the regulatory requirements and further detail the objectives to improve and standardize the way the requirements are applied; and

- provide a procedure for employees, implemented by railway companies, to report a contravention of the Act or regulations or a safety hazard, without fear of reprisal.[17]

The *Railway Safety Act* has been amended a few times since 2013. Amendments made in June 2015 established, among others, the authority to regulate the sharing of information, records and documents that concern the safety of railway operations among third parties, for example, between a railway company and a municipality.[18]

3.4 ROAD TRANSPORT

While most aspects of motor vehicle operations are under provincial and territorial jurisdiction, the federal government has two roles with respect to road safety:

- it regulates the safety performance of new and imported vehicles under the *Motor Vehicle Safety Act* (MVSA); and

- it oversees the safety of interprovincial truck and bus operations under the *Motor Vehicle Transportation Act* (MVTA).[19]

The provincial and territorial governments have jurisdiction over traffic signage, driver licensing, vehicle registration, commercial vehicle inspection, traffic laws and enforcement. On Canada's roads and highways, each province and territory is responsible for enforcing and complying with its own regulations as well as federal regulations, such as the *Commercial Vehicle Drivers Hours of Service Regulations*.[20]

A 2006 study commissioned by Transport Canada assessed the feasibility of SMSs in the interprovincial motor carrier industry and concluded that since truck and bus organizations in Canada are generally small – or lacking in the case of owner-operators – it was not likely that motor carriers would implement an SMS regime "without a regulatory requirement or a very strong inducement."[21] To date, Transport Canada has not required nor encouraged companies that provide interprovincial and international truck and bus services to adopt SMSs.

In a 2007 policy document on transportation safety, Transport Canada noted however that certain SMS principles were incorporated into both the directives for the manufacture and certification of vehicles under the MVSA, and the provisions on notices of defect (recall) and compliance.[22] SMS principles are also included in the performance criteria set out in the *National Safety Code* that is "designed to create a comprehensive code of minimum performance standards for the safe operation of passenger and commercial vehicles [and] has a specific focus on those responsible for the operation of commercial vehicles on the road, including trucks, buses, tractors, and trailers,"[23] all of which come under the MVTA.

3.5 TRANSPORTATION OF DANGEROUS GOODS

The *Transportation of Dangerous Goods Act, 1992*[24] (TDGA) and the *Transportation of Dangerous Goods Regulations*[25] set out the requirements for containers, the marking of dangerous goods and the emergency response to accidents involving dangerous goods. Various amendments have been made to the regulations over the years, including the introduction of a requirement in 2019 that all tank cars used to transport toxic inhalation hazard substances be constructed of normalized steel.[26]

Also in 2019 and under the authority of the TDGA, the federal government introduced the *Transportation of Dangerous Goods by Rail Security Regulations*[27] in order to enhance safety in the transportation of dangerous goods by rail and to harmonize Canadian and international regulations.

Neither the TDGA nor the associated regulations contain any specific SMS provisions. However, the TDGA does allow the Governor in Council to make regulations "requiring safety management systems to be established by prescribed persons or classes of persons with respect to specified quantities or concentrations of dangerous goods."[28] It should also be noted that many of the provisions based on SMS principles – such as staff security training and awareness, emergency response and the requirements for documenting incidents – are found in the TDGA, associated regulations and applicable standards. As well, the SMS provisions contained in the federal legislation for shipping dangerous goods by air, marine or rail transport are applicable.

3.6 ISSUES WITH SAFETY MANAGEMENT SYSTEMS THAT CONTINUE TO ARISE IN CANADA

The Transportation Safety Board of Canada (TSB) publishes an annual watchlist that identifies key safety issues in Canada's transportation system.[29] Safety management has appeared on this list every year since 2010, as TSB investigations continue to highlight deficiencies for some transportation operators.[30] In Watchlist 2020, the TSB noted that 90% of all commercial aviation operators in Canada were still not subject to the SMS requirements of the *Canadian Aviation Regulations*. The TSB also

pointed out that the current marine regulations do not cover the majority of Canadian vessels, only those on international voyages that are subject to Chapter IX of the SOLAS Convention.

The TSB would like to see all commercial air and marine operators required to adopt a formal safety management process. It also believes that operators should be required to demonstrate to Transport Canada that, in addition to complying with existing regulations, their process is effective for identifying hazards and mitigating risks.

In a 2017 report on aviation safety, the House of Commons Standing Committee on Transport, Infrastructure and Communities (TRAN) also recommended, among other things, the implementation of an SMS for all commercial operators and more on-site SMS inspections to complement regulatory compliance audits.[31]

The TSB also believes that Transport Canada should audit the effectiveness of SMSs implemented by federally regulated railway companies more frequently. Similarly, in a 2016 report on rail safety, TRAN recommended that Transport Canada increase the frequency of its on-site inspections to monitor operators' compliance with rail safety regulations.[32]

In its 2018 report, the *Railway Safety Act* Review Panel noted significant improvements to Canada's railway SMS regime since 2015. That said, it also noted persistent issues with regulatory oversight:

> This will require a shift for Transport Canada from a focus on pure compliance and enforcement, to playing a more facilitative role in providing railway companies with observations, based on risk, with a view to improving their safety management systems, while also ensuring that the core elements of the SMS processes are in place.[33]

In a 2021 report on rail safety, the Office of the Auditor General of Canada (OAG) noted that Transport Canada had increased the number of risk-based inspections, but "did not assess the effectiveness of the railways' safety management systems – despite the many reports over the last 14 years recommending that [the department] audit and assess these systems."[34]

4 CONCLUSION

Because of the high cost of industrial accidents to organizations and to society generally, the need to develop effective and efficient public policies on safety and accident prevention persists. Since the mid-20th century, prevention through hazard control actions has been the preferred approach to industrial safety. Because SMSs require safety awareness and accountability at every level of an organization, they are

widely considered the most effective approach to reducing the risk of industrial accidents. In fact, the international organizations that govern aviation and marine transport have called on member states to implement SMSs.

In the federally regulated transportation sector, the industries are currently at varying stages of assessing, adopting and implementing SMSs. Transport Canada is making changes to the regulatory requirements for SMSs and conducting reviews and public consultations on transportation safety issues. Large commercial operators are now required by regulation to have SMSs, whereas smaller operators and those not federally regulated are encouraged to adopt them. However, due to the cost and complexity of implementing a SMS, this approach may not be appropriate for some industries where the majority is made up of small businesses, such as in Canada's trucking industry.

Various reviews of Transport Canada's implementation of SMSs conducted by the OAG, TSB, TRAN and the *Railway Safety Act* Review Panel indicate that the transition to SMSs has required a period of adjustment for both the transportation sector and Transport Canada. In addition, some issues persist, in particular the number of commercial operators not yet subject to SMS regulations, and the assessment of SMS effectiveness. Nonetheless, most independent bodies and stakeholders in Canada's transportation sector recognize that SMSs represent progress in transportation safety when they are well designed, implemented correctly and reviewed regularly by Transport Canada.

NOTES

1. Geoffrey R. McIntyre, *Patterns in Safety Thinking: A Literature Guide to Air Transportation Safety*, 2000.

2. Ibid.

3. Chemistry Industry Association of Canada, *Responsible Care*.

4. Ludwig Benner Jr., "What Is this Thing Called a Safety Regulation?," *Journal of Safety Research*, Vol. 14, 1983.

5. The relationship between cumulative organizational and managerial failures and accidents is most famously illustrated in Dr. James Reason's "Swiss cheese model of system accidents." See James Reason, "Human error: models and management," *British Medical Journal*, Vol. 320, 18 March 2000.

6. Transport Canada, *Moving forward – changing the safety and security culture: a strategic direction for safety and security management*, 2007. This policy document also discusses the use of security management systems in the federally regulated transportation system.

7. *Canadian Aviation Regulations*, SOR/96-433.

8. Transport Canada, *Implementation schedule: Safety management systems*.

9. Government of Canada, "Modernizing Safety Management Systems Policy Review: Civil Aviation," *Let's Talk Transportation*.

10. Ibid.; and Transport Canada, *2019–2020 Safety Management System (SMS) Oversight Activities Summary*.

11.   International Maritime Organization, "The International Safety Management (ISM) Code," *Human Element: Safety Management*.

12.   *Safety Management Regulations*, SOR/98-348.

13.   Vessels required to adopt a safety management system that complies with the ISM Code include oil tankers and chemical tankers. See Transport Canada, *Safety Management System*.

14.   *Railway Safety Management System Regulations*, SOR/2001-37.

15.   *Railway Safety Act*, R.S.C. 1985, c. 32 (4th Supp.), s. 47.1.

16.   *Railway Safety Management System Regulations*, SOR/2001-37.

17.   *Railway Safety Management System Regulations, 2015*, SOR/2015-26.

18.   Bill C-52, An Act to amend the Canada Transportation Act and the Railway Safety Act, 41st Parliament, 2nd Session.

19.   *Motor Vehicle Safety Act*, S.C. 1993, c. 16; and *Motor Vehicle Transport Act*, R.S.C. 1985, c. 29 (3rd Supp.).

20.   *Commercial Vehicle Drivers Hours of Service Regulations*, SOR/2005-313.

21.   SYPHER Division of Jacobs Consultancy Inc., *Feasibility Study Concerning Safety Management Systems For the Motor Carrier Industry in Canada*, Final report submitted to Transport Canada, June 2006.

22.   Transport Canada, *Moving forward – changing the safety and security culture: a strategic direction for safety and security management*.

23.   Canadian Council of Motor Transport Administrators, *National Safety Code*.

24.   *Transportation of Dangerous Goods Act, 1992*, S.C. 1992, c. 34.

25.   *Transportation of Dangerous Goods Regulations*, SOR/2001-286.

26.   Transport Canada, *Transportation of dangerous goods regulations: Regulatory change*.

27.   *Transportation of Dangerous Goods by Rail Security Regulations*, SOR/2019-113.

28.   *Transportation of Dangerous Goods Act, 1992*, S.C. 1992, c. 34, s. 27(1)(j.1).

29.   The Transportation Safety Board of Canada (TSB), governed by the *Canadian Transportation Accident Investigation and Safety Board Act*, has the mandate to advance safety in pipeline, air, marine and rail transport in Canada. The TSB does not have a mandate to investigate highway accidents, except in the case of accidents that also involve ships, trains, aircraft or pipelines. See *Canadian Transportation Accident Investigation and Safety Board Act*, S.C. 1989, c. 3.

30.   TSB, "Safety Management," *Watchlist 2020: Key Safety Issues in Canada's Transportation System*.

31.   House of Commons, Standing Committee on Transport, Infrastructure and Communities (TRAN), *Aviation Safety in Canada*, Fourteenth report, June 2017.

32.   TRAN, *An Update on Rail Safety*, Sixth report, June 2016.

33.   *Railway Safety Act* Review Panel, *Enhancing Rail Safety in Canada: Working Together for Safer Communities – The 2018 Railway Safety Act Review*, p. 24.

34.   Office of the Auditor General of Canada, *Follow-up Audit on Rail Safety – Transport Canada*, Report 5 in *2021 Reports of the Auditor General of Canada to the Parliament of Canada*.