

Summary

Increasing the implementation of traffic safety management systems by organisations

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Authors: Ross O. Phillips, Tor-Olav Navestad, Guri Natalie Nordbakke

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A broad implementation of traffic safety management systems (traffic SMS) by organisations has the potential to improve road safety for employees and other road users. A systemic analysis identifies management perceptions and framework conditions acting as obstacles to broad uptake. These could be addressed by a coordinated effort involving key sector actors, the aim of which would be to provide organisations in the same branch with a clear and consistent message about the need for traffic SMS, the content of traffic SMS, and common measures for traffic SMS. This would provide highly fragmented industrial sectors, such as goods transport, with a common frame of reference on traffic SMS, and stimulate progress by enabling knowledge sharing and transparency on safety. The need to manage traffic safety risks needs to be better integrated into procurement processes at all levels. For optimal uptake of traffic SMS, customers, insurers, regulators, interest groups and other actors in the economic and socio-political environments of organisations also need to play a role.

Driving in traffic is the riskiest activity that employees of many transport and non-transport companies face while at work. The overt and hidden costs of road accidents in which employees are involved are considerable – for the employees themselves, their employers and society. Research suggests that there is much that transport and other organizations can do to help the situation by better managing its traffic risks. Professional driver behavior is the main cause of serious crashes triggered by heavy vehicles, and company-level factors are often implicated as root causes of this behaviour. Employers also influence traffic risks more directly in the way they manage factors such as routes, rosters, delivery schedules or fleet standards and maintenance. Despite this, research indicates that many employers fail to meet even minimum legal requirements to manage and mitigate work-related road safety risks, both in Norway and internationally.

To help structure and improve road traffic safety management by organisations, the International Standards Organization's introduced a quality standard on Road Traffic Safety Management Systems (ISO 39001). ISO 39001 lays out standard requirements for an effective traffic safety management system (SMS) and is designed for use by any organization who influences or is influenced by road traffic. The standard was launched in Norway in 2013 as NS ISO 39001, and hopes were expressed that widespread certification in the standard would result in better management of work-related road risks and improve traffic safety. The National Public Roads Administration (NPRA) commissioned a report on requirements for implementation by Nja (2015), and held a seminar in 2016 in which the problem of relatively slow uptake of the standard in Norway was raised and possible solutions discussed, one of which was a need for greater knowledge on the effects of traffic SMS on safety and business outcomes, and on obstacles to implementation.

Towards ideas for increased implementation of traffic SMS

The present report aims to verify and build on existing reports and discussions by identifying evidence-based measures that would increase the rate of implementation of traffic SMS by Norwegian organizations. To build a foundation for recommendations, the report considers what SMS are (including approaches to SMS in different transport sectors), evidence for effects of traffic SMS, and briefly reviews status of SMS implementation by firms in Norway. The report's focus is businesses or firms (organisations run for profit) involved in the transport of goods or passengers by road. It also considers firms whose main activity is not transport but who nevertheless employ work-related drivers. Since the actions of key market actors are key to the business decisions managers make (including whether to implement traffic SMS), the report pays attention to the system in which businesses find themselves.

Method

The above lines of enquiry were investigated using the methods indicated in Table S1.

Table S1. Methods used to investigate lines of enquiry addressed by our study. Interviews were conducted with three representatives from the Federation of Norwegian Transport Organisations (NHO Transport), the Norwegian truck owner's association (NLF) and an SMS accreditation service.

Line of enquiry	Authors' knowledge of existing literature	Literature review	Theoretical analysis	Interviews
1 Description of SMS and approach in road other transport sectors	✓			
2 SMS and traffic SMS in organisations	✓	✓		
3 Evidence for effect of SMS on traffic safety and other organisational measures	✓	✓		
4 Status of traffic SMS implementation in Norwegian businesses	✓	(✓)		✓
5 Measures needed to stimulate broader implementation of traffic SMS		✓		✓
6 Market changes to ensure that management of traffic safety is the norm		✓	✓	✓
7 Case studies / good practice		✓		(✓)

What are SMS?

A safety management system (SMS) is an integrated set of organisational elements supporting and enabling risk management, along with processes for designing, evaluating and improving those elements. Common elements and processes can be identified (e.g. policy, roles and responsibilities, data-driven continuous evaluation, and safety assurance), but their extent and nature can depend on the size and activity of the organization. SMS often result in safety programs comprising safety measures, but some elements can be identified both as part of SMS and a safety management program (e.g. recruitment and selection). It is not clear whether successful implementation of SMS requires a positive safety culture and organizational-wide engagement, or whether SMS is a way to gain

improvement in these areas – it seems that SMS both can influence and be influenced by organizational culture, and this reflects the ever-evolving cyclical process of SMS. It is also worth noting that SMS support new ways of thinking about risk that account for the need to understand rapidly evolving transport systems as complex systems.

The elements and processes found to be common to descriptions of general SMS are also found in descriptions of SMS laid out in international guidelines in the air, maritime and rail sectors (policy, management commitment, roles and responsibilities, documentation, risk management, emergency preparedness, assurance), although the way elements and processes are structured and grouped varies. The idea that SMS should be the norm for commercial road transport organisations is relatively recent, and has been encouraged by the arrival of ISO 39001, a growing number of published work-related road safety programs, and the EU's PRAISE project.

Is there a need for broader implementation of traffic SMS?

A need for improved implementation of traffic SMS in firms would be justified if the following three statements were true:

- i. Organizations employing people who drive for work contribute to traffic safety levels.
- ii. Traffic SMS implementation reduces traffic safety problems caused by organizations employing people who drive for work.
- iii. Implementation has been insufficient to date.

Support for statement (i) was presented at the start of this summary. Regarding statement (ii), we find no robust empirical evidence to show that traffic SMS implementation leads to positive effects on road safety, business or other organizational outcomes. There are, however, two main types of indirect evidence that SMS improve safety: (a) Correlations or cross-sectional studies linking SMS-like organizational processes to traffic safety outcomes, and (b) The traffic safety effects of isolated measures of the sort typically output by SMS.

There are several reasons why evaluating the effects of SMS implementation is challenging. For example, SMS are often implemented in the presence of existing safety management measures, making it difficult to isolate effects that are due solely to implementation of a “new” SMS. SMS are also intractable systems and as such it is hard to fully describe them and isolate their effects, which will also vary depending on the cultural contexts into which they are introduced. Given such challenges, one can wonder whether it will ever be possible to gather robust empirical evidence using traditional evaluation methods.

Lack of direct empirical support begs the question, why should companies implement them? The best answer comes from evidence suggesting safety measures are more effective when implemented in a supportive organizational culture, which SMS help nurture. Several authors argue that inspiration and motivation SMS give to workers is beneficial, and certainly better than doing nothing in the absence of robust empirical evidence. Finally, although traffic SMS implementation itself is hard to evaluate, the resulting measures often have good empirical support. Faced by a lack of empirical evidence of effect in the research literature, it seems that, recognizing the need for a systematic and holistic approach involving the participation of multiple stakeholders, practitioners have taken matters into their own hands and got on with things.

Support for statement (iii) comes from the fact that only eight of several hundreds of applicable transport firms in Norway have been accredited in the formal safety management certificate NS ISO 39001, despite it being launched in 2013. No non-transport firms had been certified in Norway as of May 2018.

Considering the above three statements together, the evidence supports the assumption that there is a need for broader implementation of traffic SMS by both transport and non-transport firms employing people who drive for work.

Theoretical insight

To help guide the search for factors influencing uptake of traffic SMS, as well as learn about ideal conditions for safety management in the road sector, we reviewed three main relevant theories: Risk management in societies (Rasmussen 1997), Sociotechnical systems (Davis et al. 2014), and Sociotechnical transitions and triple embeddedness of firms-in-industries (Geels 2014). Lessons drawn from each area are summarized in Table S2.

Table S2. Conclusions drawn on implementing SMS, from a selected theoretical review.

THEORY	
Risk management in societies	<p>In modern dynamic societies, safety management should be performance based, and SMS is a useful way in which organizations can help ensure they meet performance demands.</p> <p>In recognition of the emergence of risk in systems, safety management and SMS should be integrated across systems in which individual organisations are embedded. Regulators should collaborate with organisations to establish consensus on performance markers and ensure necessary competence is shared across system actors.</p> <p>Implementing SMS involves accounting explicitly for management interests in production and ensuring a shared understanding of the safety implications of this.</p> <p>Implementing SMS demands that companies make explicit how safety is valued against other priorities in its operations, increasing the visibility of its social responsibility, and allowing interest groups to assess the extent to which safety values of organizations and society are consistent. This is relevant since it implies ways in which SMS can be promoted to help organisations meet performance requirements effectively and demonstrably.</p>
Sociotechnical systems	<p>Safety management – like safety – is an emergent property of the system and cannot be limited within organizational boundaries.</p> <p>To understand how SMS should be implemented in and across organisations, we need to consider the influence of different people involved in safety management, their competing goals, the influence of culture in society and organisations, the constraints and opportunities presented by technology and infrastructure.</p> <p>As much as about <i>things</i> – processes, policies, technology, vehicles, infrastructure – safety management is about relationships among things and people that span the integrated sociotechnical system.</p>
Sociotechnical transitions and triple embeddedness	<p>It is important to understand the stabilizing mechanisms of <i>regimes</i>: Normative and cognitive – i.e. not only regulative – rules, shaping and reproduction of social rules, sunk investments in technology, market forces, existing competence/skills, customer value of safety, societal value of safety and so on.</p> <p>It is important to consider whether SMS is seen by managers as promoting or inhibiting for productivity. One way regulators can “sell” SMS to firms is as a tool for more operational flexibility in exchange for safety management that ensures they stay within “functionally acceptable boundaries of established practice”.</p> <p>Development of a regime is a game in which moves to implement change by outsiders is likely to be countered by influential actors who – due to stabilizing mechanisms – do not see the value of change and wish to maintain the status quo.</p> <p>Actors who see value in change may be encouraged to implement it, and where positive sociopolitical or economic outcomes are salient, there will be social learning with other actors implementing change.</p> <p>Different actors have different resources with which to follow their interests, i.e. those who see the value (or not) in implementing change may be able to do little or a lot about it, depending on their priorities and resources.</p> <p>We should consider that each organization has a unique local context in the system, and therefore optimal solutions for implementing SMS will vary.</p>

Factors influencing traffic SMS implementation

Systemic analysis based on interviews, literature review and theoretical insight together suggests several factors influencing SMS implementation in road transport:

- Isolated efforts to improve traffic safety management are poorly visible to other organisations due to the fragmented nature of the goods transport sector, and the lack of a coordinated effort to encourage *all* types of firm to manage safety (no “united front” presented by authorities and interest groups)
- Accepted gaps between actual practice and written regulations (i.e. between normative and regulative rules)
- Transport purchaser attitudes / contracts encouraging a compliance mindset in the operators
- Society’s lack of demand for stringent levels of traffic safety from goods transport companies.
- Lack of good examples in the form of public organisations demanding traffic SMS in procurement processes.
- Lack of accounting for traffic SMS in accident investigations, regulatory audits.
- European competition laws impeding the extent to which Norway can regulate for safety management.

Implication of findings for increasing implementation

The report underlines the importance of contracts and transport purchasers in improving traffic safety management by companies. In Norwegian goods transport, most companies are local outfits with few employees and limited resource. More advanced SMS may therefore be best applied across whole transport chains, in which the risk of activities of different companies involved is managed by an integrated SMS driven by the transport purchaser. This approach is supported by findings from our theoretical review that individual companies cannot manage road safety optimally independent of other organizations in their ecosystem, as well as findings from interviews on the importance of the contract-giver.

Given the importance of transport purchasers, an important question is how we can motivate them and their customers to value road safety enough to demand it. One way forward might be to learn from those involved in the purchase of hazardous goods transport, both about their approach and experienced benefits of encouraging operators to manage traffic safety. The development of tools could also help establish a norm for customers to demand that suppliers manage road safety, e.g. national benchmarking, certification schemes that are applicable to most Norwegian transport firms, or accessible information on how to include risk monitoring arrangements in procurement procedures.

Ultimately, we see that sector-wide implementation is desirable, but its stimulation requires that we consider the large number of smaller operators and intense productivity pressures seen in many Norwegian road transport sectors. Transport purchasers alone cannot be expected to bring about change, i.e. the challenges need to be met by the industry. Change could be encouraged by a network of “big players” among purchasers, insurers, operators, trade organizations and unions selling win-win ideas to the sector, such as that promoted by NPRAs Safe Trailer (*Trygg Trailer*) project. Each type of actor can play a role and several can be considered as untapped resources with respect to traffic SMS implementation (e.g. insurers).

Finally, a recurring finding in the report is that many smaller operators in goods transport do not have the means to learn about, justify and implement formal traffic SMS. To improve safety management, managers in these companies need ready access to consistent information about what *they* can do to manage traffic safety, including how to build comprehensive safety management over time. Nævestad et al.'s (2017) "Safety Ladder" approach is informative here, as it guides the gradual development of safety management measures, starting with the simplest and least resource demanding measures first. The approach taken would ideally be consistent across smaller companies, such that they could openly learn from each other and share safety management experiences.

Ideas for broad effective implementation of traffic SMS

The report identifies lack of a single coordinated message on (i) the need for firms to manage traffic safety, and (ii) how to go about doing this. Unlike other transport sectors with a recognized SMS framework, road transport does not share a frame of reference on SMS. The Ministry of Transport could therefore initiate a meeting with NPRA, Safe Traffic (*Trygg Trafikk*), the police, the Labour Inspection Authority, Norwegian Truck Owner Association (NLF), Federation of Transport Companies (*NHO Transport*), Accident Investigation Board Norway (AIBN) and other key actors to agree on a plan on how to present a "united front" to road transport and other relevant sectors on traffic safety management. The plan could be based on a consideration of the complex reasons for lack of consensus to date given in this report, and could consider level of restrictiveness of regulation in relation to resources of the companies targeted. It could include concrete roles for different actors to help address sector perceptions limiting SMS implementation, also outlined in the report. A result of the plan could be that representatives of core actors form a sector task force that could meet regularly, and work on activities and communications to convey the message that all firms in that sector influencing or influenced by the transport system, need to manage traffic safety. The plan could include a strategy for encouraging widespread implementation or the distribution of information on traffic SMS approaches appropriate for different types of firm. Plans could be centered around existing collaborations, not least existing quality accreditation programs promoted by NLF.

Beyond this there is a need to identify common measures for traffic safety management, and evaluate and promote the benefits of using common markers (e.g. information sharing and learning). There is little in the literature to guide authorities on how to measure traffic safety management, but it is reasonable to expect that progression in road safety management by firms would be improved if operators in the same sector used the same safety outcomes as measures, even if the means to establish these ends may vary. Standardization on measures would increase transparency on safety management, promote learning and increase shared understanding of good safety practice. Transparency and knowledge sharing can also be promoted by new digital technologies that allow companies to share data.

Considering other activities, attempts could be made to;

- Provide national figures on the direct and indirect costs of crashes to employers for use in business cases for SMS.
- Increase the visibility of SMS and the benefits experienced by firms that have already implemented NS ISO 39001 or other traffic SMS, by profiling in trade publications, handbooks, conferences and so on.

- Profiling of transport purchasers demanding traffic SMS, as well as steps taken to make more purchasers demand traffic SMS.
- Make tools available to help address traffic safety management in procurement procedures (based on PRAISE reports). NS ISO 39001 or NLF's existing accreditation schemes could be highlighted as a way for purchasers to assess transport quality, and schemes appropriate for smaller transporters (e.g. based on Nævestad's Safety Ladder) or non-transport firms could also be developed and promoted in procurement.
- Coordinate activities of NHO Transport, NLF and NPRA, to build on NLF's efforts to provide accreditation tools.
- Establish national benchmarking of firms on traffic management activities to help in the selection of quality transport.

NPRA could also conduct a campaign targeting figurehead purchasers of transport, to promote the benefits of including traffic SMS demands in public and private procurements. Finally, NPRA could build on Safe Trailer (*Trygg Trailer*) by involving NHO Transport and other key actors in exploring other ways to involve purchasers in traffic safety management by transporters.

Addressing societal influences, Safe Traffic (*Trygg Trafikk*), NPRA or others might promote traffic safety as a social issue alongside social dumping, environmental issues and security. In terms of regulation, it may be worth working with the EU towards more explicit treatment of traffic SMS in Health, Safety & Environment (HSE) legislation, or whether accreditation in SMS may be used as the basis for regulatory opt-outs or increased flexibility (e.g. increased loads allowed, more flexible driving hours).

To encourage traffic SMS implementation, research is also needed to address the following questions:

- What are the safety, economic and sociopolitical benefits of introducing traffic SMS in Norway – what happens to firms that implement traffic SMS? Norwegian case examples demonstrating cost-effectiveness and economic benefits of work-related road risk programs.
- What constraints do transport purchasers face in demanding traffic SMS from transporters in contracts?
- What content is needed for a national benchmarking of organizational traffic safety management, and how can this best be done?
- How can we change management's safety mindset – particularly in smaller companies – from one of safety compliance to proactive safety management? How can we establish leader commitment to traffic safety management, such that there is:
 - Openness to new ways of thinking, achieving true proactive safety
 - Willingness to create and execute on a business case for implementing traffic SMS
 - Trust and openness on sharing safety data with competitors?

