

Document Version

Final published version

Licence

CC BY

Citation (APA)

Nævestad, T. O., Sam, E. F., Farah, H., Mwamba, D., Masaki, J., Laureshyn, A., Magnusson, M., Miyoba, T., Bisht, L. S., & More Authors (2026). Safe System maturity and Safe System readiness in three European and three African countries: A comparison of an emerging versus a mature context. *Transportation Research Interdisciplinary Perspectives*, 37, Article 102015. <https://doi.org/10.1016/j.trip.2026.102015>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

In case the licence states “Dutch Copyright Act (Article 25fa)”, this publication was made available Green Open Access via the TU Delft Institutional Repository pursuant to Dutch Copyright Act (Article 25fa, the Taverne amendment). This provision does not affect copyright ownership.
Unless copyright is transferred by contract or statute, it remains with the copyright holder.

Sharing and reuse

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

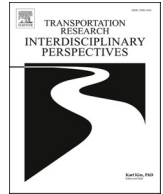
Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Transportation Research Interdisciplinary Perspectives

journal homepage: www.sciencedirect.com/journal/transportation-research-interdisciplinary-perspectives



Safe System maturity and Safe System readiness in three European and three African countries: A comparison of an emerging versus a mature context

Tor-Olav Nævestad^{a,*}, Enoch F. Sam^b, Haneen Farah^c, Daniel Mwamba^d, Jaqueline Masaki^e, Aliaksei Lareshyn^f, Matilda Magnusson^f, Thomas Miyoba^d, Ingeborg Hesjevoll^a, Andras Varhelyi^f, Rune Elvik^a, Jenny Blom^a, Laxman Singh Bisht^c, Filbert Francis^f, Lars E. Egner^a

^a Institute of Transport Economics, Oslo, Norway

^b University of Education, Winneba, the Republic of Ghana

^c Delft University of Technology, Delft, Netherlands

^d Zambia Road Safety Trust, Lusaka the Republic of Zambia

^e University of Dar es Salaam, Tanzania

^f Lund University, Lund, Sweden

ARTICLE INFO

Keywords:

Safe System maturity
Safe System readiness
Road safety
European
African

ABSTRACT

The study provides a comparison of Safe System maturity and Safe System readiness in three European countries (Norway, Sweden, the Netherlands) and three African countries (Ghana, Tanzania, Zambia), based on document studies and focus group discussions ($n = 73$ interviewees and $n = 44$ interviewees). Safe System maturity refers to the level of Safe System implementation related to national road safety management, while the readiness assessment focuses on the factors influencing maturity. The study develops a model to assess Safe System readiness. Interviewees in the focus groups discussions in the African countries discussed insufficient implementation from the position of an emerging Safe System context, where factors like insufficient economic resources, corruption and insufficient institutional robustness limit Safe System implementation. Interviewees in the European countries discussed insufficient implementation from a mature Safe System context. These countries have had considerable reductions in fatal accidents since they implemented Safe System policies, but there is still room for improvement. Interviewees in the European countries generally indicated that they know what is needed to reach the Safe System, but that societal factors are constraining this implementation (e.g. cultural focus on freedom to take risk, lacking political sense of urgency related to road safety). There are several very effective measures that are not being used in the European countries, because factors like explicit political choices, goal conflicts and values limit Safe System implementation. The study concludes that there are considerable implementation barriers in both the emerging and the mature Safe System context, although they differ in nature.

1. Introduction

1.1. Background

According to WHO estimates, 1.19 million deaths occur in traffic each year (WHO, 2023). Low- and middle-income countries are the main location of road safety problems globally, standing for 93% of traffic

fatalities, a share which is completely out of proportion if accounted for their populations and vehicle fleets (Academic Expert Group, 2020). Traffic fatality rate (per population) in Africa is the worst among all world regions and is 3 times higher than in Europe (4 times in comparison to EU-countries).

The expertise and experiences of the countries that are best performers in road safety are highly relevant for African countries. During

* Corresponding author.

E-mail address: ton@toi.no (T.-O. Nævestad).

<https://doi.org/10.1016/j.trip.2026.102015>

Received 27 September 2025; Received in revised form 16 April 2026; Accepted 20 April 2026

Available online 3 May 2026

2590-1982/© 2026 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

the 1990 s, a real ‘revolution’ took place in the world of road safety. Countries like Sweden, Norway and the Netherlands were pioneers in formulating and then implementing what was later called the Safe System approach to road safety. The approach emerged as a response to a slowdown in traffic fatalities and injuries reduction and realisation that “doing more of the same” would not bring the ultimate solution to the road safety problem (Green et al., 2022).

The success of certain Northern European countries when it comes to road safety records can be attributed to a road safety management system, which is based on the Safe System approach (Elvik and Nævestad, 2023). Elvik (2023) defines such a road safety management system as a system that ensures continuous improvement and learning, so that a sustained reduction in the number of fatalities and serious injuries can be maintained over time, and quantified targets for reducing fatalities and serious injuries can be achieved. Road safety management is a crucial pillar within the Safe System approach (Carnis 2022). Road safety management is the first and fundamental pillar of the Decade of Action’s Global Plan for 2021–2030 (WHO, 2021) and the Global Status Report on Road Safety (WHO, 2023). The Decade of Action and the Global Plan emphasise that improving road safety performance requires a systematic and planned approach.

There is a reason to believe that low-and-middle-income countries can learn from the principles of Safe System road safety management systems (ITF, 2022). This is because the Safe System approach addresses the root causes of road crashes through an integrated and system-based framework that combines safe roads, safe speeds, safe vehicles, safe road users, and effective post-crash care. By adapting these principles to their specific contexts; such as infrastructure constraints, enforcement capacity, and cultural factors, LMICs can implement targeted interventions that have proven successful in high-performing countries after tailoring them to local conditions. This knowledge is especially relevant in African countries, as this region has the worst fatality rate (per population) among all world regions.

In the present study, we therefore compare road safety management in three leading European countries (Norway, Sweden, the Netherlands), with three African countries (Ghana, Tanzania, Zambia), with poorer road safety records. The fatal road accident rate per capita is on average 8.4 times higher in the three African countries than in the three European countries (WHO 2024). The three European countries have both records of excellence in traffic safety, and they are pioneers when it comes to practicing Safe Systems principles. The purpose of this comparison is to develop and test a model for understanding Safe System readiness and understand the main barriers for implementation. Safe System readiness is important, as previous research indicates that the implementation of Safe System (“Safe System maturity”) are contingent on several organisational, technological and societal preconditions (“Safe System readiness”). Thus, Safe System maturity refers to the level of safe system implementation, while Safe System readiness refers to factors influencing this. Safe System readiness refers to the extent to which a country, region, or organisation has the necessary conditions in place to successfully implement the Safe System approach to road safety. It assesses preparedness across multiple dimensions: e.g. institutional capacity and robustness, regulatory, infrastructural, road safety culture, political climate, road safety commitment among politicians and administrative leaders, economy and resources, competence and knowledge etc. The focus of studies of safe system readiness in general are different types of social units, e.g. populations, authorities and stakeholders at national, regional and local levels, and members of specific organisations that aim to implement the Safe System approach, etc. (e.g. Green et al 2022; Fosdick et al., 2024; Muir et al 2018; Keefe et al 2024; Stipdonk et al 2024; Bliss and Breen 2013). Safe System readiness concerns the societal willingness and capacity to change, and to further develop your own progress to a higher level of Safe System maturity, i.e. from an emerging state to a mature level.

Measurements of Safe System maturity assess the level of Safe System implementation, across Safe System pillars, while readiness

measurements assess the factors influencing the level of implementation. Current studies of these issues tend to mix these two aspects. Thus, an important contribution of the present paper is to separate between maturity and readiness. Assessments of Safe System readiness are important, as they may allow for detailed diagnoses, along several dimensions of readiness, and thus tailored interventions aiming to improve Safe System readiness along different dimensions. By studying Safe System readiness in African countries, we can discover important steps necessary to improve Safe System maturity.

Safe System maturity can also be improved even more in European countries; even among the best performers in road safety. Despite the high level of road safety in Norway, Sweden and the Netherlands, studies indicate that the Safe System implementation in these countries is far from complete. A Norwegian study estimate that the number of road fatalities in Norway can be reduced by 50–70% by fully following the Safe System principles (Elvik 2023). Moreover, a recent review of Safe System research, indicates that in studies from high-income countries which have adopted Safe System, entities that have formally adopted the Safe System have relatively low levels of actual implementation, due to implementation barriers, and the fact that it is not necessarily clear how the Safe System should be operationalized (Nævestad et al 2025a). Studies from high-income countries, e.g. Norway (Elvebakk and Steiro 2009), Australia (Green et al 2022; 2023; 2024), the US (Larsen and Bomberg 2022) Poland (Pistelok and Straub 2021) demonstrate insufficient Safe System implementation, and potential for significant results when these principles are adapted and implemented. Thus, a major challenge, also in mature Safe System contexts, is to facilitate actual Safe System implementation and map barriers/facilitators and Safe System readiness, to define actions to realize the full potential of Safe System implementation.

There are unfortunately not many tools for measuring Safe System readiness. Many of the existing approaches mix descriptions of maturity and readiness, and some of the existing criteria for describing maturity (e.g. ITF, 2022) are too abstract for operationalisation in scientific studies (Elvik and Nævestad 2023). Moreover, there are few studies examining maturity and readiness in both emerging and mature contexts. Thus, there is a need to develop and test such frameworks across national and continental contexts.

1.2. Aims

The aims of the study are to:

- 1) Describe the level of Safe System implementation (i.e. maturity) related to the pillar “Road Safety management” in the three African and the three European countries.
- 2) Map factors influencing the level of Safe System implementation (i.e. the readiness) in the three African and the three European countries.
- 3) Compare factors influencing Safe System readiness across contexts, to develop a model of influencing factors in an emerging versus a mature Safe System context.
- 4) Discuss differences between readiness factors at the different Safe System maturity levels, and how we can improve Safe System implementation related to road safety management in both.

1.3. Previous research

1.3.1. Operationalization of Safe System road safety management systems

In this study, the Safe System road safety management systems maturity assessment is based on Elvik and Nævestad (2023) and Elvik (2023), who relate the continuous improvement process approach to Safe System road safety management to reductions in fatal road accidents in Norway, since 2001. Based on previous research on Safe System road safety management (e.g. Varhelyi, 2016; Elvik, 2023), they identify four key indicators of the continuous improvement process (Plan-Do-Check-Adjust), which is crucial in Safe System road safety management.

1) Plan. The first aspect of continuous improvement is related to formalised strategies and visions, setting the stage for the systematic alignment of policies, resources, and actions toward long-term safety goals. Relevant examples are Vision Zero, Safe System and Sustainable Safety.

2) Problem analysis is another important part of the “Plan” aspect of the PDCA process (Prashar, 2017). The analysis of road safety problems should be linked to plans for implementing road safety measures that may reduce the problems. Quantitative analyses of accidents, risk, involved road users, trends over time and place, are necessary to identify system deficiencies and opportunities for learning.

3) Safety performance indicators and targets. Indicators relate to the “Check” aspect in the PDCA cycle. Indicators are crucial for the PDCA process of continuous improvement, to check the overall progress towards the target and whether measures have the intended effects or should be modified (Prashar, 2017). Safety performance indicators are important, as changes in them may give early indications of changes in the number of killed or injured road users. Moreover, the Safety Performance Indicators (SPIs) define the status of the Safe System approach and its pillars. Safety performance indicators measure changes in risk factors that are causally related to the number of accidents or injured road users. For each performance indicator, a target for its improvement over time should be set. Establishing policy objectives is crucial for the PDCA process of continuous improvement (Prashar, 2017). Quantified targets for reducing the number of killed or injured road users have been found to improve road safety performance (Elvik, 1993, 2001; Allsop et al., 2011). Ambitious targets, i.e. targets aiming for a large annual percentage reduction of the number of killed or injured road users, are more effective than less ambitious targets. A long-term target is more likely to be successful than a short-term target (Sze et al., 2014).

4) Action plan with road safety measures relate to the “Do” aspect in the PDCA cycle. The use of road safety measures should be evidence-based. This includes extending and updating the evidence base by conducting evaluation studies. An evidence-based road safety plan should ideally include only measures for which there is evidence that they improve road safety.

5) Stakeholder involvement and definition of responsibilities. There are many road safety measures, and no single public or private

organisation is in charge of all of them. The power to implement road safety measures is divided between the private and public sector and between different levels and sectors of government. A stakeholder can be defined as any actor, private or public, who has the possibility of influencing road safety by implementing one or more road safety measures. A successful road safety plan requires co-ordination between all stakeholders (Elvik, 1979). The involvement of stakeholders is effective, if it is extended to include more stakeholders and the measures proposed by the stakeholders are included among those that are followed up formally (Kimiagari et al., 2013). The responsibility of each stakeholder must be clearly defined, e.g. by making it as concrete as possible, or by announcing it publicly and thereby invest prestige in the failure to carry it out. Based on this, we may assume that the division of responsibilities is effective if no measure is proposed without assigning a responsible agent for implementing it, and if responsibilities are defined in a sufficiently binding way to be able to determine if they have been exercised or not (cf. Elvebakk et al., 2016).

6) Continuous follow-up of the status of accidents, risk and indicators, and adjustment of the measures if they fail to fulfil the targets.

1.3.2. Using the Pentagon model to understand Safe System readiness

In this study, we take Schiefloe's (2011) Pentagon model as a point of departure to understand Safe System readiness. The Pentagon model is a basic sociological model (cf. Fig. 1), which focuses on five key organisational aspects: structure; technologies, infrastructure, and equipment; culture; leadership and communication; and social relations and networks (Schiefloe, 2011). Structure and technology concentrate on formal aspects of organisations, whereas the latter three aspects centre on informal aspects. The Pentagon model has been adapted to study readiness. First, in this study, we adapt the model to an inter-organisational setting, like road safety management. Although the Pentagon model takes the organisational setting as a point of departure, it can also be used in an interorganisational setting, like road safety management. Second, we also include external societal factors, in addition to this inter-organisational setting.

Structure. This concerns not only defined roles, responsibilities, and authority in the formal organisations, but also its procedures, regulations, and working requirements. Road safety management requires cooperation between several organisations: authorities, companies, and

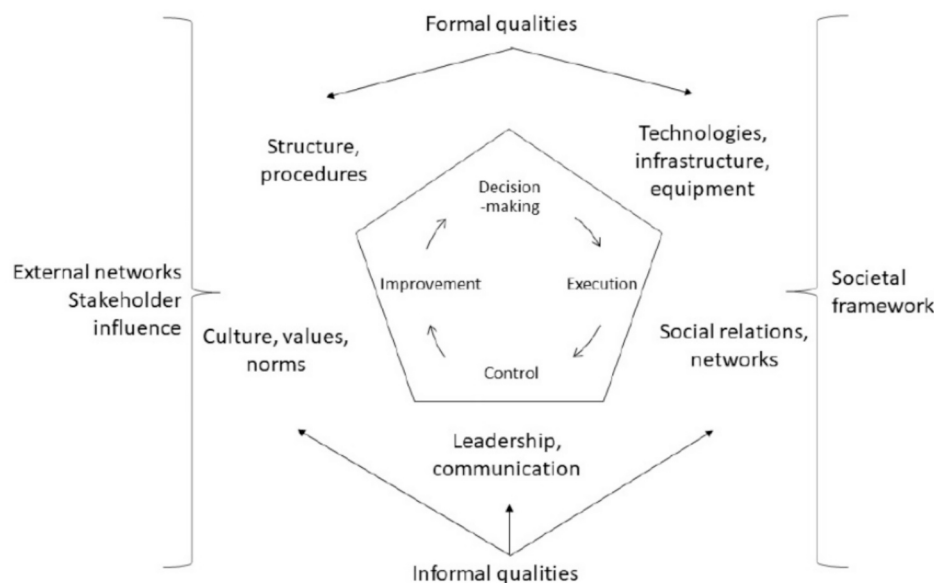


Fig. 1. The Pentagon model with five key organisational aspects: structure; technologies, infrastructure, and equipment; culture; leadership and communication; and social relations and networks. . Adapted by to also include societal frameworks and external conditions.

Source: adapted from Schiefloe (2011) Rolstadås et al (2014)

NGOs, as they each contribute complementary resources, knowledge, and responsibilities, e.g. in developing road safety management strategies and plans, follow up of indicators and targets and implementation of measures.

Technology, infrastructure, and equipment. This denotes the hardware, tools, and infrastructure that members of the organisations are dependent on, or use to perform their activities. This may e.g. apply to resource and infrastructure to record, measure and analyse road accidents and road safety indicators related to all Safe System pillars.

Culture. This refers to factors such as shared concepts, values, norms, knowledge, and established expectations related to common 'ways of working'. The shared ways of thinking and acting provide a basis for interpreting the world, and (re)creating these interpretations in social interaction as a way of motivating and legitimising actions (Schein, 2004). The shared ways of thinking are also related to identities and emotions.

Leadership and communication. This entails management practices, work processes, flows of information, communication, cooperation, and coordination. Road safety management involves inter-organisational cooperation, facilitated by a lead agency and institutionalized ways of communicating and cooperating to follow the continuous improvement process to achieve common goals.

Social relations and networks. This refers to the informal structure and the social capital of the organisation; factors which influence the quality of the inter-organisational cooperation. Key words and phrases are personnel, knowledge, experiences, trust, friendship, access to knowledge and experiences, informal power, alliances, competition, and conflicts.

The Pentagon model may also include external framework conditions. As noted, the model originally focuses on an organisational setting, and not an inter-organisational setting (like road safety management), although it has been applied to interorganisational settings (Rolstadås et al 2014; Orru et al 2021). External framework conditions can be operationalised in different ways, depending on the empirical context studied. We will give three examples. First, it can be operationalised as *external networks*, with other organisations. In the case of national road safety management, this could be various international organisations and NGOs, e.g. at the European level, WHO, UN etc. Second, it can be operationalised as the *societal framework conditions*, that is, the national, legal, social, economic and political contexts. The latter types of factors will be especially important in our study. We expand on this below.

1.3.3. Previous research on Safe system maturity and readiness

The ITF (2022) describes different levels of Safe System implementation, that defines different levels of maturity, e.g. ranging from starting, to emerging, developing, mature to perfect. ITF mainly focuses on the three middle levels: 1) Emerging: There is awareness and knowledge of what a Safe System looks like, 2) Developing: Interventions and policies are linked and organised by robust institutional governance focused on road safety, transport, and mobility. 3) Mature. Highly sophisticated interventions are used in technical and public areas. LMIC contexts can often be described as starting, or emerging, while Western European countries (Norway, Sweden, the Netherlands) can be defined as mature.

There is little existing research studying Safe System readiness across different levels of Safe System maturity levels (i.e. emerging to mature), and few available models to analyse this. Such models are important, as they may provide a good diagnostic tool to implement targeted policies. The existing research focuses either on mature Safe system countries, or capacity challenges in LMIC.

When it comes to readiness in mature contexts, Nævestad et al (2025a) provides a scoping review of the research on Safe System and Vision Zero. A total of 14 studies are labelled as studies focusing on "Safe System readiness". The studies point to various factors that inhibit implementation, for example at the political level, administrative level,

cultural level, technological level, infrastructure, etc. Muir et al (2018) found that the challenges in implementing the Safe System strategy were generally neither technical nor scientific – they were primarily social and political. Several studies focus on the role of road safety culture, emphasizing that the principles of the Safe System approach are at odds with cultural norms, e.g. related to responsibility for road user behaviour and accidents. Muir et al (2018) state that although many governments claim to be developing strategies based on Safe System thinking, actions depend largely on what politicians consider to be publicly acceptable. Otto et al. (2022) write that developing a road safety culture and adopting the Safe System approach requires organizational change. Schell and Ward (2022) emphasize that while a Safe System approach has proven successful in other countries and has great potential in the United States, adopting this method requires a significant paradigm shift. Muir et al. (2018) also studies the institutional change required to support the transition to a holistic approach to road safety planning and management in Victoria, Australia, concluding that implementing a Safe System approach requires strong institutional leadership and close collaboration between all key stakeholders involved. Fosdick et al. (2024) has developed a model to examine how culturally mature organizations are in relation to Safe System thinking and practice, called the Safe System Cultural Maturity Model (SSCMM). Keefe et al. (2024) adapt and use the Community Readiness Assessment (CRA) tool in seven Vision Zero communities in a US state.

When it comes to readiness in emerging contexts, previous research reports inadequate data collection and analysis in LMICs (Odero et al., 2003). Summing up road safety in LMICs, the WHO (2018) lists nearly half of the countries as "Countries without eligible death registration data". Limited financial, technological and human resources is an important constraining factor. Nævestad et al (2025b) report that the average GDP of LMIC countries is € 728, or 1/22 of the average of all other nations. This makes the financing of some road safety measures difficult. Moreover, corruption has negative direct and indirect effect on road safety (Hua et al., 2010). Nævestad et al (2025b) refers to the corruption perception index, which ranks 180 countries and territories worldwide by their perceived levels of public sector corruption. The results are given on a scale of 0 (highly corrupt) to 100 (very clean). The value of LMICs is 28.3 compared do 45.6 for other countries. Although the index has received valid criticism (De Maria, 2008), we see it as a general tool for quickly displaying larger differences between groups of nations. Insufficient institutional capacities are also important. The collection, validation, and analysis of traffic crash data, and overview of implementations and intervention, giving input to policy, and guiding research are necessary components of a fully implemented Safe System learning and continuous improvement cycle. This requires cooperation between several different actors, e.g. police recording accidents, authorities analysing the statistics, etc. While traffic-institutional influence is difficult to operationalise, there seems to exist a trend where it is low or non-existent in a considerable portion of low-income countries. While a lead road safety agency's existence and funding are simple to operationalise, an agency's influence is difficult to measure. Existing research on the topic has pointed out that this is often missing (Usami et al., 2021). A national traffic institution, if it exists, often lacks the funding and influence to operate at a level required for a Safe System implementation. Without an influential and capable road safety institution, implementing a Safe System approach is very difficult.

This is also indicated by the framework of Bliss and Breen (2009), who provide guidelines on how to integrate Safe System principles into road safety management capacity reviews, national strategies, and investment planning. They highlight readiness factors related to institutional and managerial capacity requirements for Safe System implementation. Mignot et al (2018) provide policy and strategy evaluations for African road safety management in light of a Safe System framework. They assess the African Road Safety Action Plan and its regional and national implementation instruments through policy review and institutional and governance analysis, focusing on lead agency

capacity, funding gaps, coordination failures, data limitations, and regional–national alignment. Based on road safety management experiences from the African context, e.g. as reported in Mignot et al (2018), Carnis (2022) later presented a critique of the universal application of the Safe System approach. Carnis (2022) challenges the universality and managerial assumptions of the Safe System Management Model, arguing in favour of a model comprised of three analytical dimensions: 1) Institution, 2) Strategy and 3) Environment (ISE).

2. Method

The methods used in the study are summed up in Fig. 2.1. To fulfil the study aims, we started with a document analysis to study formal road safety management policies, followed by focus group interviews to study the actual implementation of the policies and factors influencing the level of implementation. In the second focus group interview round, we only included participants from the three African countries. The purpose was to discuss influencing factors, and how to overcome the identified barriers to Safe System implementation.

2.1. Document analysis

To assess the alignment of national road safety management (RSM) systems with the five elements identified above, we gathered and analysed a range of documents, including policy documents (such as road safety plans and strategies), reports on the current status of road safety—particularly in relation to the focus areas outlined in action plans—official websites, research reports, and academic papers. The empirical material was collected using purposive sampling, guided by predefined inclusion criteria: documents had to address the status of the elements of the Safe System road safety management systems, focusing on the continuous improvement cycle; Plan-Do-Check-Adjust, with particular emphasis on the formal aspects of road safety management (i.e., written strategies and plans). We then conducted a thematic content analysis following the approach of Braun and Clarke (2006), focusing on the above-mentioned elements involved in road safety management.

2.2. Group interviews to examine road safety management system and readiness

We conducted semi-structured interviews, mainly focus group interviews, with 73 road safety experts in the six countries, followed by a second round of focus groups interviews with 44 people in the African countries. To make the interview results comparable, we aimed to interview people with the same types of functions in each country. Some individual interviews were conducted, e.g. as some interviewees were unable to participate in the focus group interviews. For the sake of simplicity, we often refer to focus group interviews and individual interviews as interviews in the text.

In the first round, interviews were conducted either physically, or digitally via Microsoft Teams between April 2023 and January 2024, with interview durations ranging from 40 min to 2,5 h. The long duration was for group interviews. We employed a strategic sampling method, where the interviewees were selected based on criteria relevant to the research questions. We focused on assembling a sample that represented various roles in traffic safety work, including e.g. people working in authorities (e.g., road, vehicle, driving training and licencing), NGOs and people working as researchers. The interviewees are mainly people who work for national road safety authorities, NGOs working with road safety or mobility/transport, or researchers (Table 2.1).

The purpose was to include people who had knowledge of all relevant aspects of road safety management, and factors influencing its quality. These elements include both formal and informal aspects of road safety management. We can to a large extent obtain information about the formal aspects through review of documents. The informal

aspects of road safety management, e.g. the perceived level of commitment to road safety from politicians, authorities, the extent to which road safety strategies are known and alive, whether road safety is sufficiently funded and prioritized etc. is different from what we find in formal documents. Thus, obtaining information about this requires other methods, like e.g. interviews.

We also invited the interviewees to reflect upon factors that can explain the level of implementation of Safe System road safety management system in their country, i.e. the Safe System readiness. They were invited to mention factors freely, and if they did not mention anything, we asked about factors like. a) Economy, b) Institutional robustness or capacity, c) Equipment and technology, d) Knowledge, e) Other more pressing challenges in society, f) Corruption, g) The level of commitment to road safety among politicians, h) The level of commitment to road safety in the population, and i) Culture/mentality: are road accidents perceived as unavoidable?

There was also a second round of focus group interviews, only focusing on the African countries (Table 2.2). The participants in round two were basically the same as in round one.

The purpose of the second round of interviews in the African countries was to present and discuss the results of the first focus groups, and to get feedback on improving the national road safety management systems in each country. (We also label these interviews “results workshops”). These interviews generally lasted between two and three hours. Each workshop started with a presentation of the main results and the main recommendations for development of national road safety strategies in line with Safe Systems principles. Then there were discussions of the results and the recommendations.

The focus group meetings were recorded, and they were transcribed, and/or extensive summaries were written.¹ The interviewers took notes during each interview. In accordance with standard research ethics, the study was reported to SIKT (the Norwegian Centre for Research Data). Interviewees were informed about the purpose of the interviews in written invitations in weeks prior to the interviews, and informed consents were obtained at the start of the interviews.

We conducted thematic analyses of the interviews, focusing on systematically recurring themes in the interviewees' descriptions of specific topics (Braun & Clarke, 2006). In the first step of the process, the interviews were carefully read several times and then coded. The codes were then organized and grouped into broad categories. In the next step, the categories were reviewed. During this part of the process, we assessed the categories in relation to each other and the material, and necessary adjustments were made. Three researchers were involved in the thematic analyses. Some categories described the same overarching concept and were merged, while others emerged as subcategories under a more general theme. The result is overarching descriptions that address the most prominent trends (similarities and differences) in the interview data, related to each of the research objectives.

3. Results

3.1. Road safety situation in the studied countries

In Table 3.1, we sum up the road safety situation in the studied countries and regions for 2021, including averages for Europe and Africa (cf. Nævestad et al. 2025c). The final row includes the groups with the largest shares of killed road users (car = car driver). The numbers are based on estimates from WHO (2024). The estimates from WHO are different from the official numbers of fatal accidents reported by national authorities, especially in the African countries. In Tanzania, the WHO estimated number of road fatalities is seven times higher than the official number reported by national authorities.

¹ A couple of the interviews were not recorded due to practical reasons, but in these cases comprehensive summaries were made.

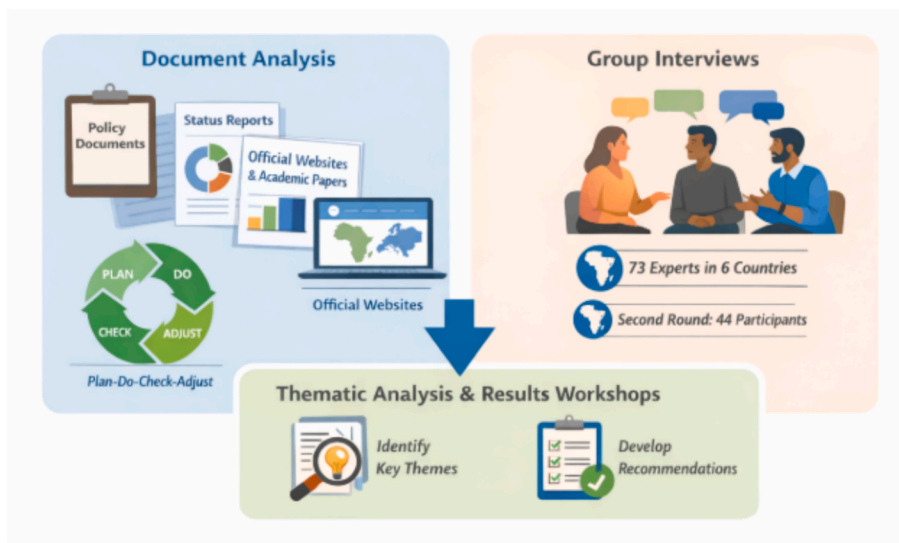


Fig. 2.1. Overview of the methods employed in the project. Figure generated by ChatGPT 5.2.

Table 2.1

Types of organisations, number of participants and functions in each country. First interview round.

Country	Dates	participants ^a	Types of organisations, functions
Norway	08.03.2023 08.04.2024	7 + 4 = 11	NGO, authorities, researcher
Sweden	29.04.2024 08.05.2024	6 + 1 = 7	Authorities, NGO
The Netherlands	21.11.2023 22.11.2023	3 + 4 = 7	Road safety authority, researcher, NGO
Ghana	23.10.2023 24.10.2023	16 + 9 = 25	Authorities, researchers, NGOs
Zambia	25.01.2024 06.02.2024	6 + 4 + 1 = 11	Authorities, researchers, NGOs
Tanzania	May 2023 30.01.2024, 31.01.2024	2 + 5 + 5 = 12	Authorities, researchers, NGOs working with road safety
Total		73	Authorities, researchers, NGOs

^a 7 + 4 = 11 means two meetings: one with seven external participants (interviewees), one with four, which makes 11 interviewees in total from the country.

Table 2.2

Types of organisations, number of participants and functions in each country in the second round of feedback and interviews.

Country	Date	Number	Types of organisations / functions
Ghana	28.11.2024	14	Authorities, researchers, NGOs
Tanzania	04.12.2024	11	Authorities, researchers, NGOs
Zambia	05.02.2025	19	Authorities, researchers, NGOs
Total		44	

3.2. Safe System maturity in road safety management

The focus of this section is the first aim of the study, which is to examine the alignment with Safe System principles in the road safety management systems in each country. In Table 3.2, we sum up the results for the seven dimensions describing Safe System maturity in road safety management.²

Table 3.1

The road safety situation in the studied countries or regions for 2021, including averages for Europe and Africa^a.

	NO	SE	NL	GH	TZ	ZA	EUR	AFR
Road fatalities	82	217	600	8494	10,052	3338	300	7295
Million population	5,5	10,4	17,5	32,8	63,6	19,5	11,1	38,6
Killed per mill. Capita	15	21	34	259	158	171	27	189
% killed road users	Car 52%, MC 19%	Car 56%, MC 14%	Cyclists 36%, Car 32%	MC 33%, Ped 31%	Car: 50%, MC 22%	Other/unknown: 48%, Car 35%	Car, MC, Cyclist	MC, Ped. Car

^a NO: Norway, SE: Sweden, NL: the Netherlands, GH: Ghana, TZ: Tanzania, ZA: Zambia, EUR: Europe, AFR: Africa.

As indicated by the table, the studied African countries have a far higher level of road fatalities per capita than the European countries.

² See also Nævestad et al (2025c).

Table 3.2

Results for seven dimensions describing Safe System maturity in road safety management, in the three European and three African countries.

Dimension	European countries (Norway, Sweden, the Netherlands)	African countries (Ghana, Tanzania, Zambia)
Visions and plans	Vision Zero / Sustainable Safety adopted; clear Safe System principles including system owner responsibility and shared responsibility	No formal Safe System-based visions; Ghana has a general safety vision; Tanzanian strategy outdated (recently revised)
Problem analysis	High-quality accident, exposure and risk data; enables systematic risk analysis and tailored countermeasures	Significant underreporting of fatalities; accident data insufficient for reliable problem analysis and trend evaluation
Safety performance indicators (SPIs) and targets	Extensive use of accident- and non-accident-based SPIs; quantified targets for fatalities, serious injuries and SPIs	Limited or unsystematic use of SPIs; Ghana defines SPIs but lacks follow-up.
Action plans and measures	Comprehensive, largely evidence-based action plans; generally aligned with Safe System principles	Action plans may exist (aligned with UN Decade of Action), but implementation is weak and plans are not “alive”
Stakeholder involvement and responsibility	Clear allocation of responsibilities (Norway, Sweden); more decentralized but coordinated approach in the Netherlands	Responsibilities often unclear; lack of dedicated budgets (Ghana); no single coordinating body (Tanzania)
Continuous follow-up and monitoring	Annual monitoring, reporting and feedback loops in place; systematic use of indicators	Monitoring is largely formal or fragmented; limited systematic follow-up; poor data quality hampers evaluation

3.3. Participants' description of their Safe System readiness

Participants from Norway, Sweden and the Netherlands said that they have had considerable reductions in fatal accidents since they implemented Safe System policies, but there is still room for improvement. Participants from the European countries stated that we know what is needed to reach the Safe System, but it seems that societal factors are constraining this implementation.

One of the main themes in the focus group interviews in the European countries, was factors that impede Safe System implementation in the European countries. Participants generally said that: “we know what is needed to reach the Safe System, but it is not being done”. The focus group interviews were to a great extent devoted to discussing the reasons for this. One of the participants from Sweden, said that:

There is a clear gap between where we need to be—the well-defined safe system we know is necessary—and how to actually get there. That's the challenge. We don't lack knowledge about what is needed. We can calculate how many grade-separated crossings are required, how many median barriers should be installed, and how much reduced drunk driving is needed—where alcohollocks may be the only viable solution. But the real issue is how we make it happen (SE-1).

Participants mentioned implementation research, which could answer questions like: How do we ensure that the right actors take action? What mechanisms drive decision-makers and stakeholders? What societal forces can influence them to act? It was mentioned that:

We are very good at measuring effects and understanding cause-and-effect relationships in traditional road safety analysis, but we are not nearly as good at understanding the mechanisms that drive real-world implementation. There is a missing link in our understanding of what kind of road safety work actually leads to real action and policy change. That's a major research gap—we need to better understand how to turn knowledge into action. (SE-1).

Interviewees stressed that implementation of the Safe System is insufficient in Sweden. One of the participants talked about his work on estimating the actions needed to reach Safe System and zero fatalities in 2050, in accordance with the goal:

In the projections I've been working on, we've used a structured approach. First, we try to define what it means to be close to zero fatalities—that is, to define what a safe system would look like by 2050. The goal is that by then, we should be near zero fatalities. To model this, we apply all the known safety measures available in our toolbox. (...) This includes e.g. installing median barriers on all roads of a certain type and speed limit, or using other safety measures like centreline rumble strips and speed reduction strategies, where median barriers aren't feasible. Essentially, we try to construct a theoretical safe system, and infrastructure plays a significant role in this model. (...) Even when we apply all known measures, our projections show that we can reduce fatalities by 85%—which is a significant improvement, but still not close enough to zero by 2050. While an 85% reduction is an impressive achievement with today's knowledge, the challenge is that these measures are highly investment intensive. The costs are significant, and that is what ends up on the other side of the scale—balancing safety improvements against the financial burden. This raises important questions about how much we are willing to invest to get even closer to zero fatalities. (SE-2).

Participants from the African countries stated that there is low quality on the statistics and that implementation of existing plans is lacking. They underlined that they believed that the accident data are incomplete, due to underreporting, as indicated by the WHO numbers. It was also mentioned that it is problematic that the accident data are analogous and not computer-based, and that they often lack geographical information about where the accidents occurred.

One of the participants from Zambia said that:

I agree with the statement by the World Health Organisation that we are missing vital statistics that could actually help to influence decision making. Remember, at the end of the day we want to use the statistics that are correct. (ZA-1).

Participants in the Tanzanian workshop said that a new road safety plan for Tanzania was launched in the fall of 2024. The former plan was from 2009. Nevertheless, it was mentioned that the implementation is still lacking.

3.4. Safe System readiness

The focus of this section is the second aim of the study, which is to map factors influencing the level of Safe System implementation (i.e. the readiness) in the three African and the three European countries.

3.4.1. Inter-organisational setting

3.4.1.1. Structure. Sector responsibility for road safety (e.g. for public roads administrations) is established in the European countries, although it can be noted that the Dutch system involves far more freedom for e.g. regional authorities. Thus, it is more difficult to ensure that Sustainable safety actually is implemented at lower levels, by regional and municipal authorities. Additionally, national road safety committees exist, which follow up action plans targets, etc. The studied countries also have definitions of institutional roles and responsibilities for important functions of road safety management to be defined, i.e. who should be the responsible for the accident data register, road maintenance, vehicle inspection, vehicle register, driver training, driver testing, driving-license register, enforcement of traffic rules, emergency assistance, traffic safety analyses, research and documentation services, training of professionals. A crucial issue is however the coordination of these functions. In Norway, Sweden and the Netherlands, it occurs through sector responsibility or something relatively equal to that, and

joint committees working with road safety action plans, with clear definition of responsibilities.

When it comes to the African countries, responsible bodies are defined, but Tanzania stands out as an example where it is unclear which body has the main responsibility for road safety. The issue of a lacking lead agency in Tanzania was also brought up by some of the participants. It was mentioned that there were plans to start up a lead agency that can coordinate all the stakeholders in the road safety plan, and the Ministry of Works was mentioned in that respect.

3.4.1.2. Technologies, infrastructure, equipment. The European countries have well-developed tools and infrastructure for collecting and analysing accident data. Their systems integrate safety performance indicators across all Safe System pillars, which are systematically monitored and reported annually. They also have tools and infrastructure to set and follow up on quantified road safety targets, ensuring that progress is continuously tracked. Moreover, systematic research on the value of statistical life is applied, which allows for socio-economic assessments of road safety measures and investments. This provides a solid basis for evidence-based policymaking, and ensures that resources are allocated effectively to measures with proven safety benefits (Varhelyi 2016).

In contrast, the three studied African countries face severe challenges in this area. There is serious underreporting of accidents, as highlighted by large discrepancies between official statistics and WHO estimates. This means that national authorities often lack reliable data on the actual scale of fatalities and injuries (Odero et al 2003). Furthermore, there is no systematic follow-up of SPIs, even when they exist formally in strategies or action plans (Nævestad et al 2025b). This is largely due to missing infrastructure and resources for collecting and analysing such data. Without robust data systems, African countries cannot effectively monitor progress, evaluate interventions, or apply cost-benefit approaches such as valuing statistical life. This reduces their ability to run a continuous improvement process in line with Safe System principles.

3.4.1.3. Culture (language/concepts, values, attitudes, norms, knowledge and established “ways of working”). In the studied European countries, inter-organisational cooperation models are well established, such as the Norwegian cooperation model. Similar structures exist in Sweden and the Netherlands, where joint committees and national road safety forums provide coordination and oversight. These models are reinforced by systematic follow-up of action plans and annual monitoring of safety performance indicators, ensuring that cooperation is not only formalised but also “alive” in practice. A Vision Zero culture is firmly embedded, with a strong focus on evaluating measures and ensuring that only scientifically validated interventions are implemented. The Safe System way of thinking is well established across all pillars. In Norway, Vision Zero enjoys broad support, not only from all political parties, but also from motoring organisations and industrial associations, including those representing freight transport companies. There is essentially no opposition to Vision Zero. In Sweden, Vision Zero has been in place since 1997 and remains a cornerstone of road safety policy, while the Netherlands’ Sustainable Safety framework plays a similar role. However, several interviewees noted that while the road safety commitment remains strong, the sense of urgency among decision-makers was higher a couple of decades ago than it is today.

A further hallmark of the European context is the scientific orientation of policy and practice. There is a strong focus on evaluation and on ensuring that interventions are based on scientifically validated effectiveness. Action plans are informed by comprehensive accident databases, safety performance indicators (e.g. speed compliance, seat belt use, vehicle safety ratings), and in-depth accident investigations. These provide a solid empirical foundation for continuous improvement. For example, both Sweden and Norway carry out detailed investigations of every fatal crash to generate systemic learning and inform

countermeasures.

In the African countries, by contrast, the Safe System approach is not yet culturally embedded as a way of working. Formal strategies may often reference Safe System principles and, in some cases, even include safety performance indicators, but these are rarely implemented or monitored systematically. Many road safety plans remain formal documents rather than living processes, with implementation fragmented and dependent on the priorities of individual politicians or external donors. There is less knowledge of, and competence in, applying Safe System principles among staff, meaning that the Safe System approach has yet not become an established part of daily road safety management. Accident data systems are weak, often analogue, and there is a high level of underreporting. This hampers the possibility of systematic problem analysis and evidence-based countermeasures, which are central to the Safe System.

3.4.1.4. Interaction (management, leadership, work processes and information flow connected to communication, cooperation, and coordination).

In the studied European countries, cooperation around road safety management is highly structured and institutionalised. Norway, Sweden, and the Netherlands have long-standing cooperation models that are firmly rooted in Vision Zero or Sustainable Safety frameworks. These models bring together government agencies, police, road administrations, NGOs, municipalities, and industry stakeholders under the coordination of a lead agency. For example, the Norwegian cooperation model clearly assigns sector responsibility to specific actors and establishes joint committees to monitor progress. In Sweden each stakeholder is required to report annually on implementation of its own measures. This institutionalised collaboration ensures that action plans are not static documents but living frameworks that are systematically followed up through annual reports, road safety results conferences, and adjustments when indicators deviate from expected targets. Cooperation in these European countries is further reinforced by comprehensive databases of crash records and performance indicators that give all stakeholders a common evidence base. Accountability is high, and stakeholders have long-term trust in each other.

In the studied African countries, cooperation is not as effective as in the European countries, and it seems that the strong, central coordinating mechanisms that we saw in the European countries often are lacking. In Tanzania, there is no dedicated lead agency, and responsibility for road safety is spread across multiple ministries, councils, and police departments. In Ghana and Zambia, responsibilities are somewhat clearer on paper, but implementation was reported to be relatively weak, e.g. due to resource scarcity. As a result, many initiatives are externally driven, for instance by international NGOs, UN agencies, or bilateral aid projects.

3.4.1.5. Social relations and networks (the informal structure and the social capital of the organization, i.e. trust, friendship, access to knowledge and experiences, informal power, alliances, competition, and conflicts).

In the European countries, the social capital built through decades of collaboration contributes to stable, cross-sectoral networks, where knowledge and experience are continuously exchanged. In practice, this means that cooperation is not only formalised in policy but also embedded in daily routines and professional culture, with common processes shaping how road safety work is done.

A recurring theme in the African focus group interviews was institutional fragmentation, in the sense that there is not enough systematic collaboration or learning across institutions. Instead, it was mentioned that competition over limited resources and unclear role divisions may undermine trust and slow down implementation. One of the participants said that more collaboration is needed:

And then there's also fragmentation of how we work. As a road safety organization, we are supposed to be learning from each other. (...) Collaborations will be key in how we implement road safety, especially at a

crucial time when funding in roads (...) is insufficient and is dwindling. (...) We look at how we can collaborate more as road safety actors. (ZA-1).

The consequences of this fragmentation are clear: road safety action plans often remain under-implemented, and continuous improvement processes may break down. Monitoring of safety performance indicators, when it exists, is irregular, and feedback loops are weak or absent. Participants in focus groups noted that plans may exist formally but are rarely “alive” in the way they are in the studied European countries, where cooperation processes ensure that plans are systematically followed up and adjusted.

3.4.2. Societal factors

3.4.2.1. The stability and strength of institutions. Insufficient stability and strength of road safety institutions was an important impeding factor mentioned by the interviewees in the African countries. It was mentioned that the implementation of the road safety plans and strategies are more dependent on individual politicians than on stable institutional frameworks. Several participants indicated that the lack of institutional stability in their country is a factor constraining the implementation of road safety policies, as road safety plans are dependent on the politicians. If a politician is replaced, the policy or plans that he, or she has been implementing is abandoned. One of the participants from Tanzania said that:

I believe in Tanzania, as in most of African countries, politics and road safety are like intertwined issues. Like we cannot separate them. (...) because plans are being made with this political leader, and then when that leader goes, then the plan is also gone. So, we have to come up with another plan. (TZ-1)

In the African countries, it seems that the implementation of plans is more dependent on the individual politicians than in the European countries. It was mentioned that the road safety policy should not depend on which politician is in place. In the European countries in contrast, it was mentioned that the institutional system related to the road safety strategies and actions plans were so stable and strong, that it was very hard, or impossible for individual politicians to change them.

3.4.2.2. Funding of road safety. One of the most prevalent constraining factors mentioned by the African workshop participants was poor national economy and lacking funding of road safety. It was mentioned in the focus group interview in Zambia that there is a need to look at the issue of funding seriously, and that most organisations working with road safety in Zambia are small, that they lack funding, and that they lack capacity.

One of the participants from Tanzania said that agencies working with environmental issues were better funded than road safety issues, and thus the implementation was better in this area. One of the participants from Ghana said that, given lacking funding of road safety work in Ghana, they should revise their road safety targets to be less ambitious and more realistic.

We've realised that we cannot, as a country, as a developing country or a middle level developing country, we cannot achieve that target set by the UN, because our situation is different. Our economic conditions in our country are different. Therefore, there is a need for us to set our own targets, and we have not been able to do that. (GH-1).

Another issue that was mentioned in Ghana was that many different agencies and organisations have responsibilities for road safety, but no dedicated budgets. This also hinders the implementation of road safety measures. It was mentioned that some agencies may treat road safety as a “stepchild”, as here is no dedicated budget for road safety. One of the participants from Ghana said that:

The agencies treat road safety interventions as a stepchild. (...) It can be treated as, let's say a side parcel. If they have other available funds, then they may invest in the road safety side. (GH-1).

Lacking funding was also mentioned as an important influencing factor in the European group interviews. Interviewees generally stated that road safety measures are insufficiently funded in Norway. Norwegian interviewees mentioned that there are many effective measures that are not funded sufficiently, although their effect on accident reduction is well-known.

There is a bias in funding allocation. There are many well-documented and highly effective measures, as well as interventions with strong expected effects, that receive too little funding in the action plan. (...) The most effective measures—often relatively inexpensive but with high impact—end up underfunded. As a result, those working on road safety have to fight to get enough funding to implement them on a meaningful scale. (...) traffic safety measures under the National Action Plan are still treated as a “little sister” or “little brother” in the grand scheme of things. While infrastructure development takes priority, road safety funding remains secondary. (NO-1).

The underfunded road safety measures mentioned were e.g. a significant part of the police’s enforcement efforts, which increase detection risk for violations, vehicle measures and education. When asked what road safety competes over funding with, the interviewee mentioned large infrastructure projects, like new road construction.

A Swedish interviewee mentioned that:

It's quite obvious that there isn't enough funding to make many places truly safe in terms of road safety. (SE-2).

3.4.2.3. Corruption. One of the most prevalent factors constraining effective road safety management that was mentioned by the participants in the African countries was corruption. This issue was related to incomplete data on road accidents and road safety issues. If an accident occurs, or a driver is stopped by the police, it was mentioned that the drivers would prefer to unofficially pay the police officer to “see another way”, or pay other drivers directly if they are in an accident, as this is cheaper and more convenient. The result is, however, an incomplete accident statistic, and lower respect for traffic laws among road users, as corruption weakens enforcement:

And we have seen incidents where the offenders buy their freedom very cheaply. You know they know that they could give (...) very little money to a police officer who is supposed to be enforcing the law and taking the culprits to the courts of law. And he leaves them to go away.

Another participant said that

Just to give an example of the scenario on the ground here when it comes to underreporting of road accidents. You'll find most of the drivers are either unlicensed or their vehicles are not fit (...). So, they would rather cut out the police in general and deal with it one-on-one. So, the matter will not be reported to the police.

It was also mentioned that:

I believe we have quite a big challenge of law enforcement on traffic offences that (...) has made road users, especially the drivers. (...) Feel that they don't have to abide to the law because the law enforcement has been very weak.

Challenges related to corruption were not mentioned in the focus groups with the stakeholders in the European countries. When we discussed the overall project with participants, corruption was mentioned by participants as a challenge in LMIC countries.

3.4.2.4. Lacking sense of urgency and political commitment to road safety. Lacking sense of urgency and low political commitment to road safety

was an influencing factor mentioned by several interviewees, in both the African and the European countries.

Interviewees in the three African countries reported of relatively low sense of urgency related to road safety, e.g. among politicians. It was suggested, however, that this sense of urgency seemed particularly high around election times, although it might vanish later.

(...) we sometimes focus our advocacy around elections (...) at that time we are in the position to get politicians to commit to a road safety target or a road (...) Around election time, that's when you can get them to talk about road safety. You can get them to sign petitions, and later it's all gone. (GH-2).

Another participant said that other issues might be higher on the agenda and get more funding from the politicians. This applies to e.g. environmental issues.

In the European countries, traffic safety is part of a larger package and is less of an individual issue. Commitment for road safety was considered relatively high in the European countries, given that these countries have comprehensive institutional systems in place focusing on road safety, and relatively high public spending on road safety measures. On the other hand, European workshop participants said that there is not the sense of urgency related to road safety that existed a couple of decades ago.

(...) it is easy to take the issue a little for granted. Traffic safety work in Sweden does not have the highest priority. Politicians and decision-makers probably get the impression that it is "rolling on". The number of accidents has decreased very much, and there is no longer the same sense of urgency. (SE-2)

Thus, lacking sense of urgency related to road safety was also an influencing factor that was mentioned in the European group interviews. Focus group participants in Sweden also said that the focus on road safety among decision makers was higher a couple of decades ago. Some humorously referred to this as "the good old days". Additionally, some commented that traffic safety may lose when competing with other priorities, e.g. road user mobility in the regions:

Sometimes low-hanging fruit is dropped because it can be difficult to get road safety into the regional road network where decisions are made by the political regions. (SE-3)

3.4.2.5. Economy/social factors. Workshop participants in the African countries mentioned a group of pedestrians that have a high exposure to motorized transport. These are the hawkers, or the street vendors, selling their products in the middle of the road, also in road stretches with relatively high speed limits, although congestion stops the cars and "creates a market". Hawking is a niche that creates jobs for many people. It was mentioned that the government in Zambia has tried to move the hawkers away from the road and to other areas, but that hawkers returned to the road area. This shows that creating a pedestrian-friendly infrastructure is also influenced by economic and social factors, and that the level of fulfilment of Safe System road criteria is influenced by factors extending further than the Safe System pillars. As a consequence of poverty, people may turn the road system into a marketplace, influencing the level of road safety in manners unforeseen by road designers.

Zambian workshop participants mentioned that some pedestrians walk very long distances along main roads with high-speed vehicles. These are e.g. wheelbarrow pushers, who go to markets with products, like vegetables. There are also women getting products at markets, who walk from rural to residential areas. The roads these people walk along generally do not separate pedestrians from motorized transport, so that pedestrians are exposed to traffic and the risk of being hit by vehicles.

3.4.2.6. Cultural and political valuation of individual freedom. Focus group participants underlined that there still is a considerable valuation

of individual freedom to take risk in the European countries, which is a political choice. Traffic safety measures may often limit individual freedom, and this is why measures are not implemented, even though we know that they are effective. It was mentioned that we all know that road safety is strongly linked to the degree of freedom, and that a significant part of improving road safety comes from limiting individual freedom. One of the themes that were brought up in the discussion of the cultural valuation of freedom was that it leads to insufficient management of speed.

Norwegian interviewees mentioned that automatic traffic control is a measure with well-documented scientific effect on accident reduction. A 2014 report in Norway concluded that automatic section speed control cameras measurement halved the number of fatalities and serious injuries. It was also noted that this effect persisted for several kilometres beyond the actual speed control zone. Despite this, the use of this measure was constrained due to political choices from the new Norwegian government in 2019:

I was thinking about that case with automatic section speed control cameras from a few years ago. (...) at that time, there was a strong political pushback against expanding the use of these speed measurement systems. (...) a compromise was made where no new ones were introduced. The Norwegian Public Roads Administration was instructed by politicians to cover up existing systems that were ready to be activated. So, it's a case where a well-documented, effective measure was available, but was not used, due to political decisions. However, they didn't remove the cameras that were already in place. (NO-2).

Focus group participants underlined that there still is a considerable implicit/explicit valuation of individual freedom to take risk in the European countries, which are inscribed in technology, when they said that insufficient speed management also exists for motorcycles and passenger cars, as the maximum speed of these are not limited:

It is still entirely possible for me to get on my motorcycle (...) and ride at 200 km/h from Hamar to Oslo. That works just fine. I could get caught and end up in prison, and there would be shame and consequences, but physically, I can still do it. Even in a modern Volvo, I can do it. (...) There wouldn't be any problem implementing limitations to prevent that. (...) It's an interesting perspective—that we actually have quite a few very effective measures that we are not using. (NO-1)

In contrast, the maximum speed of buses (max. 100 km/h) and trucks (max. 90 km/h) is regulated, probably because it is more palatable to regulate occupational traffic.

In the interviews, we discussed why we sell cars that can go over 200 km/h when car manufacturers also have a shared responsibility for road safety, according to Vision Zero. This was related to the fact that our culture emphasizes freedom, so to speak. One of the interview participants mentioned that even in Norway, where the sense of community is so strong, the road remains one of the last arenas for the expression of peoples' individual freedom.

It was also mentioned that the car industry responds to market demands, and that when the car industry is challenged about why it is technically possible to reach very high speed in cars, they answer that they are constrained by market demands (i.e. what "the population and politicians want").

One successful Scandinavian effort to regulate risky road user behaviour was, however, mentioned in the interviews:

We need to push for Norway to follow Denmark's example, where they actually confiscate vehicles if someone drives at twice the speed limit in a 100 km/h zone, or is far above the legal blood alcohol limit. (...) So we have to keep pushing. (...) In many areas, we are constantly working reactively—we struggle to get ahead of the problem. That is, we fail to proactively limit these possibilities through technology or other systems before they become an issue. (NO-1)

3.4.2.7. *The valuation of mobility versus safety is constraining Safe System implementation.* Focus group participants in Sweden stated that the valuation of mobility versus safety is strong among people living in the Swedish regions. Many regional roads are used for commuting, and lowering speed limits on these roads is met with resistance:

(...) the regional engagement on these issues—such as the difficulty of implementing speed reductions from 90 to 80 km/h or from 100 to 80 km/h—is a challenge. Even on roads that are officially classified as high-risk, we struggle to implement these changes without facing resistance at the political level. (...) It seems like there was greater [safety] engagement in the past, both regionally and municipally, but that commitment has somewhat diminished over time. (SE-2)

One of the other interviewees mentioned that when cost-benefit analyses are carried out, mobility and accessibility are often prioritized high:

The prioritization often follows economic interests, meaning we constantly must fight against the emphasis on mobility and accessibility. The valuation models we use aren't necessarily adapted to road safety or sustainability. (...) Instead, the dominant perspective prioritizes high accessibility and smooth traffic flow, especially for commercial transport. The pressure from the business sector on politicians reinforces this emphasis on mobility, making it even more difficult to prioritize traffic safety measures that could, in some cases, limit accessibility. (SE-4)

3.4.2.8. *Geographical factors are constraining Safe System implementation.* Norwegian interviewees also mentioned geography as a factor constraining Safe System implementation, in the sense that Norway is a sparsely populated country, with many main roads in rural areas that have low traffic volumes and that are too narrow for middle separation. It was mentioned that the conditions (narrow roads, low traffic volume) in many parts of Norway do not allow for Safe System roads. It was mentioned that although a (perfect) Safe System road system should be built in such a way that anyone could drive drunk and still survive, this is impossible on the low traffic roads in rural Norway, and that “you can't build your way out of Vision Zero on Norwegian roads”.

The far lower share of head-on accidents in the Netherlands is likely to be attributable to different geographical conditions (e.g. flat, densely populated), combined with high traffic volume roads, which to a greater extent allow for divided roads, based on Sustainable Safety policies. It was also mentioned that geographical conditions in Sweden allow for more divided roads than in Norway.

4. Discussion

4.1. Safe System maturity

Table 4.1 sums up the main differences between the European and the African countries, when it comes to Safe System maturity, related to national road safety management.

The European countries have a living and ongoing continuous improvement process; with alignment between formal and informal aspects of road safety management, including:

- 1) Plans and visions
- 2) Relatively good statistics and data on accidents, exposure and risk for different groups,
- 3) Comprehensive safety performance indicators (SPIs) measuring all Safe system pillars,
- 4) Quantified targets related to SPIs,
- 5) Strategies and action plans to improve the SPIs to reach the targets,
- 6) Relatively clearly defined responsibilities for implementation of the measures in the action plans and

Table 4.1

Main differences between the European and the African countries, when it comes to Safe System maturity related to national road safety management.

Aspect	European Countries	African Countries
Plan–Do–Check–Adjust (PDCA)	<ul style="list-style-type: none"> • Mature Safe System learning cycle fully in place. • Plan: Vision Zero/Sustainable Safety policies; systematic problem analysis using complete data. • Do: Action plans implemented with evidence-based measures. • Check: Comprehensive Safety Performance Indicators (SPIs) monitored annually. • Adjust: Continuous feedback loop, corrective measures implemented when targets are not met. 	<ul style="list-style-type: none"> • Formal plans and strategies exist but weakly implemented. • Plan: Road safety strategies exist (e.g. Ghana, Zambia), but often outdated (Tanzania until 2024). • Do: Implementation fragmented, many measures remain on paper. • Check: Indicators defined but rarely monitored; accident data incomplete/underreported. • Adjust: Little or no systematic follow-up; revisions depend on political cycles.

7) Systematic follow up: The status of all the SPIs targets is monitored annually and reported in public reports.

The African countries do not have this continuous improvement process to the same extent. The accident data in the African countries are less complete, as indicated by the discrepancies between official data and WHO (2024) estimated numbers. Good data on accidents and SPIs is a precondition for Safe system road safety management, as indicated in the PDCA process (Elvik 2023; Elvik and Nævestad 2023; Varhelyi 2016). Without such data, one cannot know where and what type of measures should be implemented. Furthermore, if measures are implemented, one cannot assess their effect with a reasonable degree of certainty. Thus, reliable data on road accidents and SPIs is a precondition of the whole process of continuous improvement.

Ghana and Zambia have formal road safety strategies in place (and Tanzania from 2024), with SPIs related to different Safe system pillars, but the status for these SPIs is not followed up, neither are the effects of different measures evaluated. Thus, when it comes to the question of whether the road safety action plans and strategies are living systems that are used in practice, and whether the measures in the action plan are implemented in line with the plans, there seems to be an important difference between the European and the African countries. The African data indicates challenges related to implementation of the plans, while the action plans seem to be far more “alive”, i.e. implemented in the European countries.

4.2. Safe System readiness in the European and African countries

Table 4.2 sums up the main differences between the European and the African countries, when it comes to Safe System readiness, related to national road safety management.

4.3. Developing a model to understand Safe System readiness across maturity contexts

The third aim of the study is to compare factors influencing Safe System readiness across contexts to develop a model of influencing factors in an emerging versus a mature Safe System context. Fig. 4.1 sums up the main results of Table 4.2, combining the analytical frameworks that we have used to analyse Safe System maturity and Safe System readiness in the European and the African countries.

The model in Fig. 4.1 includes three layers. The core focuses on the

Table 4.2
Main differences between the European and the African countries, when it comes to Safe System readiness, related to national road safety management.

Aspect	European Countries	African Countries
Inter-organizational setting	<ul style="list-style-type: none"> • Structure: Clear lead agencies, defined roles; sector responsibility. • Technologies: Tools for in-depth accident analysis, advanced databases, valuation of statistical life. • Culture: Vision Zero as shared cultural norm; strong evaluation culture. • Leadership & communication: Institutionalized cooperation (e.g. Norwegian cooperation model). • Social networks: Long-term trust, collaboration between agencies, NGOs, industry. 	<ul style="list-style-type: none"> • Structure: Responsibilities fragmented; Tanzania lacks a strong lead agency. • Technologies: Accident data systems weak, often analogue; underreporting severe. • Culture: Safe System approach not integrated into daily practice; less scientific basis for measures. • Leadership & communication: Coordination weaker, often NGO-driven; dependent on individual politicians. • Social networks: Trust lower; cooperation fragmented; external donors play a large role.
Societal factors	<ul style="list-style-type: none"> • Institutions stable, policies survive political changes. • Funding relatively adequate but still seen as insufficient for full Safe System implementation. • Low corruption, high enforcement credibility. • Cultural/political barriers: tension between mobility vs. safety, individual freedom vs. regulation. • Lower sense of urgency today compared to early Vision Zero period, but political consensus remains. 	<ul style="list-style-type: none"> • Institutions unstable, plans often abandoned with leadership change. • Funding scarce • road safety often treated as “stepchild” issue with no dedicated budgets. • Corruption, undermining enforcement and data integrity. • Poverty & informal economy influence road use (e.g. hawkers on roads). • Low political commitment except around elections; road safety seen as less urgent than other issues.

output, or the Safe system maturity. This is based on research on Safe System maturity, as described by Elvik (2023) and Elvik and Nævestad (2023), and Varhelyi (2016). The two other layers describe Safe System readiness. The middle layer focuses on the inter-organisational process influencing readiness. This is based on the Pentagon model (Schiefloe 2011), adapted to national road safety management. The outer layer focuses on societal factors influencing readiness. This is based on previous research on Safe System readiness in mature contexts (e.g. Elvebakk and Steiro 2009; Green et al 2024, 2023) and emerging contexts (e.g. Odero et al., 2003), and the empirical results of this study. A unique contribution of the present study is that it provides a model to understand Safe System readiness across emerging and mature contexts.

4.4. Policy implications

4.4.1. Influencing societal factors in an emerging versus a mature Safe System context

The fourth aim of the study is to discuss differences between readiness factors at the different Safe System maturity levels, and how we can improve Safe System implementation in both. A unique contribution of the study is that it points to the importance of societal factors as a barrier to further Safe System implementation, especially the traffic safety culture in the population.

The focus group discussions in both the European and African countries circled around insufficient Safe System implementation, but from different reference points, or points of departure. The European countries discussed insufficient implementation from the position of a mature Safe System context, where explicit political choices, goal conflicts and values limit Safe System implementation. The African

countries discussed insufficient implementation from the position of an emerging Safe System context, where insufficient economic resources, corruption and institutional fragmentation were the main factors limiting Safe System implementation. In the mature European context, the main barriers were related to societal willingness. In the emerging African Safe System context, the main barriers highlighted in the interviews were related to capacity.

Norway, Sweden and the Netherlands have had considerable reductions in fatal accidents since they implemented Safe System policies, but there is still room for improvement. Interviewees in the European countries generally said that they know what is needed to reach the Safe System, but it seems that societal factors are constraining this implementation. They said that there are several very effective measures that are not being used. Thus, insufficient implementation was also an issue for them, constraining the ability to fully implement the Safe System.

Several societal factors constraining Safe System implementation were mentioned in the European focus group interviews:

- 1) Cultural and political valuation of individual freedom
- 2) The societal valuation of mobility versus safety
- 3) Geographical factors
- 4) Insufficient funding of road safety
- 5) Lacking sense of urgency related to road safety

These are mainly related to cultural factors, or cultural barriers. We may also refer to this as societal willingness.

In the African focus group interviews, the following societal factors constraining Safe System implementation were mentioned:

- 1) Insufficient stability and strength of road safety institutions
- 2) Insufficient resources and funding of road safety
- 3) Corruption
- 4) Lacking sense of urgency and political commitment to road safety
- 5) Economy, poverty social conditions

When it comes to the question of how we can improve road safety in both contexts, it seems that in both cases, we need to change society to improve road safety. In the African context, we need to improve capacity, through changing institutions, fighting corruption, improving national economy etc. In the European context, we need to improve societal willingness by changing societal culture, and political prioritization of competing considerations (e.g. freedom, mobility). It can also be mentioned that transferring Safe System implementation to LMICs seems challenging, especially when the “Safe System” pioneering countries have not been able to fully implement these principles fully themselves.

4.4.2. How can we improve road safety in both contexts?

Our model may provide detailed diagnoses of Safe System maturity related to road safety management and Safe System readiness at both the interorganisational and the societal level. We have developed detailed checklists that road safety authorities and other stakeholders can use to describe their own level of Safe System maturity and readiness. These diagnoses can e.g. be provided in radar charts, visually indicating the most important areas of improvement.

The detailed maturity and readiness diagnoses provided by our model can serve as a basis for tailored improvement measures, also taking societal constraints into account. Including descriptions of readiness factors at the societal level is crucial, because it influences to what extent general recommendations can be implemented. Too often, recommendations only focus at specific road safety management strategies, and not the preconditions for their implementation (Carnis 2022). For instance, our general recommendations for how the African countries can learn from Safe System countries focus on improving the process of the “inner circle” of the model. Key steps include:

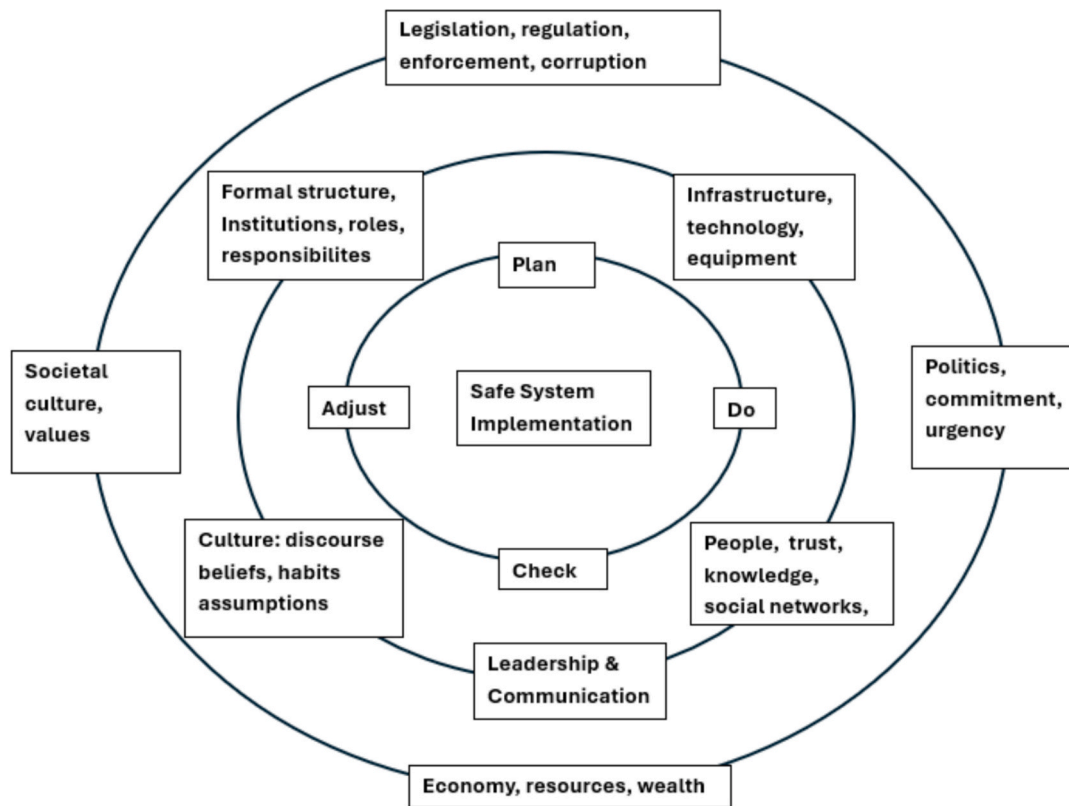


Fig. 4.1. Model to understand Safe System readiness across maturity contexts.

- 1) Establishing a lead agency with coordinating and monitoring responsibility
- 2) Basing national road safety strategies on Safe System and Vision Zero principles
- 3) Improving the collection and quality of road accident data
- 4) Developing and monitoring comprehensive safety performance indicators (SPIs) across all Safe System pillars
- 5) Setting quantified targets, and
- 6) Developing evidence-based action plans with clearly defined responsibilities and annual monitoring of progress.

These are “standard recommendations”, which also have been developed in previous studies and frameworks (e.g. [Bliss and Breen 2013](#); [Mignot et al 2018](#)). However, the unique contribution of our model is that it may explain why implementing these recommendations may not be straightforward in the studied African countries, due to the factors constraining readiness at both the inter-organisational and the societal level. Because of the insufficient readiness at these levels, the studied African countries may be unable to implement our recommendations. Thus, our recommendations should ideally target the most important constraining factors at both the inter-organisational (e.g. establish a lead agency, improve data collection) and the societal level (e.g. target corruption). Our study indicates that constraining factors at the societal level may impede effective road safety management at the inter-organisational level, both in emerging and mature contexts. Moreover, our model indicates that the constraining factors are inter-related, e.g. there is no help in better data, if there is no institutional apparatus to use the data systematically to analyse the road safety problems, identify suitable scientifically validated measures to reduce the problems, plans for follow up of the situation etc.

When it comes to the European countries, these already show a high level of maturity in the continuous improvement factors represented in the inner circle of the model, and a well-functioning inter-organisational setting. Further road safety improvement in the mature context is

particularly constrained by cultural and societal factors. In mature Safe System contexts, further safety gains depend less on technical knowledge and institutional capacity than on societal willingness to accept restrictions (cf. [Keller et al 2026](#)). The most effective policy strategies may therefore be those that normalise restrictive interventions through gradual implementation and system design, allowing behavioural adaptation to precede cultural change. For instance, gradual normalisation of restrictive measures may work, as they do not trigger strong resistance, but instead reset what is perceived as “normal”. This may involve e.g. Stepwise reductions of posted speed limits (e.g. from 80 to 70 km/h on rural roads), and incremental expansion of low-speed urban zones (e.g. from 30 to 40 km/h). There are previous examples of this. In Norway, lowering posted limits (e.g., from 80 km/h to 70 km/h on significant rural road sections in the early 2000s) was followed by measurable reductions in actual travel speeds, indicating drivers’ adaptation to stricter limits over time ([Ragnøy et al 2005](#)). This indicates how behavioural adaptation may occur faster than attitudinal change. Combined with the cognitive dissonance mechanism, this may over time create new baseline norms. Moreover, with gradual reductions in posted speed limits, political costs may be spread over time rather than concentrated in one symbolic decision. Thus, the gradual reductions may perhaps allow societies to adapt behaviourally before cultural resistance crystallises. It is likely that the Norwegian lowering of posted speed limits was accepted, as it was part of a larger review of speed limits, which led to increased speed limits on some roads, e.g. motorway stretches. Thus, the changes were probably perceived as evidence-based and fair. Another approach is the use of professional and occupational traffic as “cultural frontrunners”, because restrictions are more acceptable when applied first to non-private traffic. Relevant measures can be mandatory ISA, alcohol interlocks, and speed caps (technically limiting maximum speed) e.g. for commercial fleets. This may set new norms without directly confronting private drivers and create spillover expectations for private vehicle regulation.

4.5. Methodological limitations and strengths

Why should we compare European countries that are high performers in road safety with African countries that are low performers? These countries are very different when it comes to economy, social conditions etc. Although the studied European countries are among the world's best performers in road safety, our analysis revealed substantial scope for improvement also in these countries, challenging the assumption that the best performers in road safety in the world have "full Safe System implementation" (cf. Elvik 2023; Nævestad et al 2025). This finding motivated the development of a road safety management maturity and Safe System readiness model applicable to both emerging and mature contexts. Comparing high-income and low-income countries with different social, political, and cultural conditions allows us to identify improvement dimensions across contexts and to highlight how both inter-organisational and societal factors influence road safety management. This gives us a model which is applicable across different types of countries and contexts, and which can contribute to learning and improvement in both emerging and mature road safety contexts. Our analyses shows that constraints differ systematically by Safe System maturity level (capacity constraints in emerging contexts vs. societal willingness/value constraints in mature contexts).

Moreover, there are to our knowledge no previous frameworks which includes readiness factors both at the inter-organisational level and the societal level, in a three-level hierarchical layered model. A main strength of our model is that it may explain why recommendations focusing only on the road safety management level (inner circle) may be insufficient in emerging Safe System countries, as interorganisational and societal factors constrain implementation. Additionally, recommendations focusing only on the road safety management level (inner circle) may be insufficient in mature Safe System countries, as societal factors constrain implementation. Thus, our model indicates that further road safety improvement is contingent on a holistic focus on the three levels of our model: road safety management, interorganisational factors and societal/cultural factors.

Thus, our model takes further important insights of previous research, e.g. the focus on the road safety management level and interorganisational factors (e.g. Bliss and Breen 2009; Mignot et al 2018), also including readiness factors at the societal level. The societal/cultural level is also indicated by Keller et al (2026), focusing on how societal willingness to accept restrictions is an important barrier to effective speed management policies in mature Safe System contexts like Sweden and Australia. Keller et al (2026) uses a model that they refer to as Actor Map, which is a systems-thinking tool based on Rasmussen's Risk Management Framework, but this model focuses on actors at different six levels, and not analytical factors indicating different aspects of readiness, like our model.

Carnis (2022) has also provided a framework which is closer to our model, in his critical analysis of why generic Safe System management recommendations may fail. Carnis (2022) challenges the universality and managerial assumptions of the Safe System Management Model, arguing in favour of a model comprised of three analytical dimensions: 1) Institution (constitutional-organizational-operational levels), 2) Strategy (SWOT-type assessment of assets/barriers) and 3) Environment, specified through the Pestel model (political, economic, social, technology, ecological and legal). Carnis argues that implementation is constrained by institutional arrangements, strategic positioning, and macro-environmental conditions. Thus, Carnis also argues in favour of including constraining factors at the societal level. There are, however, some important differences between our model and Carnis model. First, our model introduced Safe System readiness as a distinct analytical concept, and explicitly differentiates between Inter-organisational readiness and Societal/cultural readiness, relating this to Safe System road safety management maturity. Second, the ISE model proposed by Carnis (2022) is not conceived as a layered or developmental framework, like our model. Rather than organising factors hierarchically,

Carnis' model applies three analytical dimensions; institution, strategy and environment, simultaneously to diagnose the contextual feasibility of road safety policy implementation. In contrast, our model is explicitly layered and developmental, distinguishing between road safety management performance and the inter-organisational and societal readiness conditions that enable progression across Safe System maturity levels. This facilitates structured analysis of factors influencing readiness at different levels.

Another main advantage of our model is that it clearly distinguishes between road safety management at the formal level ("what is written") and the informal level ("what is actually done in practice"). This distinction is crucial in the Pentagon model (Schiefloe 2011). A major challenge with implementation of Safe System road safety policies e.g. in LMIC contexts is that they may remain only on the formal plan level and are not implemented in practice, due to constraining factors (Mignot et al 2018; Nævestad et al 2025c).

4.6. Issues for future research

An important first step in future research, taking the suggested framework further is to make it more usable for practical purposes. First, the approach can be used in future studies, by researchers. This requires, however, that the seven management factors in the inner circle, the five factors at the inter organisational level in the middle circle, and the four factors at the societal level in the outer circle, are specified. This can be done either as a qualitative interview guide, or as a quantitative survey. We have developed both, to support future research using the model. These will be used in future research. It is also evident that our model can be used to study maturity and readiness at different authority levels. We have recently used the framework in empirical research studying the traffic safety management of the regional county authorities in Norway. These serve as leading agencies at the regional level in the traffic safety management, and our framework provide the rich analytical understanding of different levels related to this.

Future research should also develop the framework into a practical checklist or self-assessment tool that can be used by road safety authorities and involved stakeholders to assess their own level of road safety management maturity according to safe system criteria, and factors influencing this (i.e. readiness). In this way the framework can be used as the basis of organisational self-assessment and self-development. Future research is needed to develop criteria to define different maturity and readiness levels, also applicable to different authority levels (municipal, regional, national).

Moreover, the present study focuses on Safe System maturity related to road safety management. A relevant development of our model is to apply it to additional Safe System pillars. This requires maturity description of the other pillars, using our model of factors at the inter-organisational level and societal level to understand readiness.

Finally, future studies need to identify measures to target the most important societal factors constraining Safe system maturity related to road safety management in LMICs, e.g. corruption. Based on insights from the present study, we are now planning a follow up study to examine the situational preconditions of corruption related to road safety in the African countries and ways of removing these preconditions, to improve enforcement and road safety management data quality.

5. Conclusion

The study develops a three-layered model to understand Safe System maturity and Safe System readiness in national road safety management, across an emerging versus a mature road safety context. Our analyses using the framework shows that the quality of the Safe System road safety management ("maturity") is influenced by factors at the inter-organizational and the societal level ("readiness"). Future studies are needed to develop the framework into a more specific research tool,

specified in a qualitative interview guide and a quantitative survey for researchers and a checklist for organisational self-assessment and self-development for practitioners.

CRedit authorship contribution statement

Tor-Olav Nævestad: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Enoch F. Sam:** Writing – original draft, Methodology, Investigation, Formal analysis. **Haneen Farah:** Writing – original draft, Methodology, Investigation. **Daniel Mwamba:** Writing – original draft, Methodology. **Jaqueline Masaki:** Writing – original draft, Methodology, Formal analysis. **Aliaksei Lareshyn:** Writing – original draft, Resources, Project administration, Methodology, Investigation, Funding acquisition. **Matilda Magnusson:** Writing – original draft, Methodology, Investigation, Conceptualization. **Thomas Miyoba:** Writing – original draft, Methodology, Investigation. **Ingeborg Hesjevoll:** Writing – original draft, Methodology, Formal analysis. **Andras Varhelyi:** Writing – original draft, Methodology. **Rune Elvik:** Writing – original draft, Methodology, Formal analysis. **Jenny Blom:** Writing – original draft, Methodology, Formal analysis. **Laxman Singh Bisht:** Writing – original draft, Methodology, Formal analysis. **Filbert Francis:** Writing – original draft, Methodology. **Lars E. Egner:** Writing – original draft, Investigation.

Funding

The present study is part of the EU-funded AfroSAFE project (Grant agreement ID: 101069500). The primary objective of the AfroSAFE project is to make a significant progress in propagation of the Safe System modus operandi within the road safety work context in African countries.

Declaration of generative AI use in writing.

During the preparation of this work, the authors used ChatGPT to check and improve language, and to identify repetitive or overly detailed text that could be shortened or removed., ChatGPT was also used shorten text and to it sum up e.g. in figures/tables, and to translate relevant text from Norwegian into English. All AI-generated output was reviewed and revised by the authors, who take full responsibility for the content of the publication.

Ethics statement.

The methods for data collection in the present project have been approved by Norwegian Agency for Shared Services in Education and Research (SIKT), which assists researchers with research ethics of data gathering, data analysis, and issues of methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We are very thankful to all the people who have participated in the focus group interviews and in individual interviews. The present paper presents data from a larger study, which is presented in an EU-deliverable: Nævestad et al (2025b): Deliverable 2.2 Road safety data and national road safety strategies—review and recommendations. Short summary of results are also presented in Nævestad et al (2025c).

Data availability

The data that has been used is confidential.

References

- Academic Expert Group, 2020. Saving lives beyond 2020: the next steps. Recommendations of the Academic Expert Group for the 3rd Global Ministerial Conference on Road Safety.
- Allsop, R.E., Sze, N.N., Wong, S.C., 2011. An update on the association between setting quantified road safety targets and road fatality reduction *Accid. Anal. Prev.* 43, 1279–1283.
- Bliss, T., Breen, J., 2009. Implementing the recommendations of the World Report on Road Traffic Injury Prevention: Country guidelines for the conduct of road safety management capacity reviews and the specification of lead agency reforms, investment strategies and Safe System projects. Global Road Safety Facility, World Bank, Washington, DC.
- Bliss, T., Breen, J., 2013. Road safety management capacity reviews and Safe System projects: guidelines, Updated ed. Global Road Safety Facility, World Bank, Washington, DC.
- Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. *Qual. Res. Psychol.* 3 (2), 77–101.
- Carnis, L., 2022. Towards an integrated road safety management: the institutional-strategy-environment (ISE) model. *Safety* 8 (4), 83.
- De Maria, B., 2008. Neo-colonialism through measurement: a critique of the corruption perception index. *Critical Perspectives on International Business*.
- Elvebakk, B., Steiro, T., 2009. First principles, second hand: Perceptions and interpretations of vision zero in Norway. *Saf. Sci.* 47 (7), 958–966.
- Global Plan for the Decade of Action for Road Safety 2021-2030, n.d.. World Health Organization, Geneva.
- Elvebakk, B., I. Storesund Hesjevoll, T. E. Julsrud (2016) 'På rett vei: Er myndighetenes trafikksikkerhetsarbeid ekspertstyring og paternalisme? [Heading in the right direction. Is public road safety work paternalism and expert rule?]', TØI: Institute of Transport Economics (Oslo, Norway), TØI rapport 1491/2016.
- Elvik, R. (1979). 'En teoretisk og empirisk drøfting [Atheoretical and empirical discussion]', TØI: Institute of Transport Economics (Oslo, Norway).
- Elvik, R., 1993. Quantified road safety targets: a useful tool for policy making? *Accid. Anal. Prev.* 25, 569–583.
- Elvik, R. (2001), 'Quantified road safety targets: An assessment of evaluation methodology', TØI: Institute of Transport Economics (Oslo, Norway), TØI Report 539/2001.
- Elvik, R., 2023. What would a road safety policy fully consistent with safe system principles mean for road safety? *Accid. Anal. Prev.* 193.
- Elvik, R.-T.-O., Nævestad, 2023. Does empirical evidence support the effectiveness of the Safe System approach to road safety management? *Accid. Anal. Prev.* 191.
- Fosdick, T., et al., 2024. Creating a cultural maturity model to assess safe system readiness within road safety organisations. *Journal of Road Safety-Jrs* 35 (1), 52–64.
- Green, M., et al., 2022. safe system in road safety public policy: a case study from victoria, australia. *IATSS Research* 46 (2), 171–180.
- Green, M., et al., 2023. When policy hits the road: Safe System in Victoria's policy environment. *Accid. Anal. Prev.* 189, 107129.
- Green, M., et al., 2024. Safe system in practice: a study of practitioner awareness, support and implementation. *Journal of Road Safety-Jrs* 35 (2), 36–48.
- Hua, L.T.R.B., Noland, A.W.E., 2010. The direct and indirect effects of corruption on motor vehicle crash deaths. *Accid. Anal. Prev.* 42 (6).
- International Transport Forum (ITF). 2022. The Safe System Approach in Action. Research Report, Paris, OECD Publishing.
- Keefe, E.M., et al., 2024. Using an adapted community readiness assessment to inform Vision Zero and safe systems action. *Transp. Res. Interdiscip. Perspect.* 23, 100992.
- Keller, M.E.B., Watson, S.-A., Kaye, M., King, I.L., 2026. Actors, roles and responsibilities for speed management: a systems-based analysis of key stakeholders in Sweden and Queensland. Australia, Safety Science, Volume, p. 193.
- Kimiagari, S., Keivanpour, S., Mohiuddin, M., Van Horne, C., 2013. The Cooperation Complexity Rainbow: challenges of Stakeholder Involvement in Managing Multinational Firms. *International Journal of Business and Management* 8 (22), 50–64.
- Larsen, H., Bomberg, M., 2022. Fremont Vision Zero Program: 5 Years of Traffic Safety Progress and a renewed Effort for getting to Zero. *Ite Journal, Institute of Transportation Engineers* 92 (5), 35–38.
- Mignot, D., Carnis, L., Adolehoume, A., Aketch, S., Anthony, E., Etienne, V., Fernandez, E., Lassarre, S., Remacle, E., Sanon, C., Schermers, G., Usami, D.-S., Welsh, R., Yerpez, J., Zagre, T., & Zammataro, S. (2018). Assessment of the Action Plan and of Regional Instruments (SaferAfrica Deliverable D3.1). SaferAfrica – Innovating Dialogue and Problems Appraisal for a Safer Africa, European Union Horizon 2020 Project No. 724029. Version of Record, 1 October 2018. Available from Loughborough University Repository.
- Muir, C., et al., 2018. Evolution of a holistic systems approach to planning and managing road safety: the victorian case study, 1970-2015. *Inj. Prev.* 24, 119–124.
- Nævestad, T.-O., Storesund Hesjevoll, I., Elvik, R., Brunstad, L., Øyvind, Blom, J., 2025a. Safe System, Vision Zero, and Sustainable Safety: a scoping review. *Traffic Safety Research* 9, e000115.
- Nævestad, T.-O., Sam, E. F., Farah, H., Mwamba, D., Masaki, J., Lareshyn, A., Magnusson, M., Hesjevoll, I., Varhelyi, A., Elvik, R., Blom, J., Miyoba, T., Singh Bisht, L., D'Agostino, C., Francis, F., Lubida, A., Rimoy, S., Grönvall, J.-F., & Egner, L. E. (2025b). Road safety data and national road safety strategies—Review and recommendations (Deliverable D2.2). AfroSAFE Project, Horizon Europe, European Union. Grant Agreement No. 101069500.
- Nævestad, T.-O., E. F. Sam, H. Farah, D. Mwamba, J. Masaki, A. Lareshyn, M. M., R. E., J. Blom, T. Miyoba, L. Singh Bisht (2025c) Safe System implementation in three

- African and three European countries: Preliminary results from a comparison of six countries, *Transportation Research Procedia*.
- Odero, W., Khayesi, M., Heda, P., 2003. Road traffic injuries in Kenya: magnitude, causes and status of intervention. *Inj. Control Saf. Promot.* 10 (1–2), 53–61.
- Orru, K., Nero, K., Nævestad, T.-O., Schieffeler, A., Olson, A., Airola, M., et al., 2021. Resilience in care organisations: challenges in maintaining support for vulnerable people in Europe during the Covid-19 pandemic. *Disasters* 45 (Suppl 1), 48–57.
- Otto, J., et al., 2022. Increasing readiness to grow traffic safety culture and adopt the safe system approach: a story of the Washington traffic safety commission. *Front. Future Transp.* 3.
- Pistelok, P., Straub, D., 2021. Evaluation of the Road Policy in the Light of Vision Zero in Jaworzno, Poland. *Sustainability* 13 (16).
- Prashar, A., 2017. Adopting PDCA (Plan-Do-Check-Act) cycle for energy optimization in energy-intensive SMEs. *J. Clean. Prod.* 145, 277–293.
- Ragnøy, A., Christensen, P., Elvik, R., 2005. Speed limit changes in Norway: Effects on speed, accidents and injuries (TØI Report 729/2004). Institute of Transport Economics (TØI), Oslo.
- Rolstadås, A., Tommelein, I., Schiefloe, P.M., Ballard, G., 2014. Understanding project success through analysis of project management approach. *Int. J. Manag. Proj. Bus.* 7 (4), 638–660.
- Schein, E.H., 2004. *Organizational Culture and leadership*, Third edition. Jossey-Bass, San Francisco, CA.
- Schiefloe, P.M., 2011. *Mennesker og samfunn*. Fagbokforlaget, Bergen.
- Schell, W. J., & Ward, N. J. (2022). A process for change: The safe system approach and Vision Zero. *Frontiers in Future Transportation*, 3.
- Stipdonk, H., Aarts, L., Campsall, D., Carnis, L., Feypell, V., Fosdick, T., Vadeby, A., 2024. Maturity measurement in road traffic injury prevention. *Traffic Safety Research* 8, e000045.
- Sze, N.N.S.C., Wong, C.Y.L., 2014. The likelihood of achieving quantified road safety targets: a binary logistic regression model for possible factors. *Accid. Anal. Prev.* 73, 242–251.
- Usami, D.S., González-Hernández, B., Persia, L., Kunsoan, N.B., Meta, E., Saporito, M.R., Schermers, G., Carnis, L., Yerpez, J., Bouhamed, N., 2021. Defining suitable Safe System projects: the experience of the SaferAfrica project in five African countries. *IATSS Res.* 45 (4), 594–601.
- Varhelyi, A., 2016. Road safety management—the need for a systematic approach. *The Open Transportation Journal* 10 (1).
- WHO (2023) *Global status report on road safety 2023*, <https://iris.who.int/bitstream/handle/10665/375016/9789240086517-eng.pdf?sequence=1>.
- WHO (2024) *Country profiles*: <https://www.who.int/teams/social-determinants-of-health/safety-and-mobility/global-status-report-on-road-safety-2023>.
- WHO. (2018). *GLOBAL STATUS REPORT ON ROAD SAFETY 2018*.