Review

Community Road Safety Initiatives for the Minerals Industry

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Abstract: Major companies in the minerals industry are increasingly recognizing that their operations have an impact in the wider community. Regarding transportation issues, this impact extends beyond purely the safety of company vehicle fleets to consideration of Community Road Safety (CRS) concerns, which address the driving, walking, and riding practices of community members in a locale with increased heavy vehicle traffic. Our assessment here of national and international trends in approaches to road safety awareness and associated road safety strategies is meant to inform companies in the minerals industry of developments that can influence the design of their road safety initiatives. The review begins by considering the overall road safety context and the dominant "safe systems" framework employed internationally. Thereafter, it considers what is typically included in CRS initiatives for the minerals industry. Three case studies are then presented to highlight approaches that feature exemplary collaboration, design, implementation, or impact. Thereafter, we analyze lessons learnt by key researchers and practitioners in the CRS field. Finally, we conclude that best CRS practices for the minerals industry rely on eleven factors, including for example collaboration with local entities and stepwise implementation.

Keywords: safe systems; mining; minerals industry; road safety; community

1. Background

When minerals industry development booms, the number of road accidents in a region increases. Cause and effect are not hard to identify, but the range of effective responses suitable to the region in question can be harder to specify and implement. Mining companies have developed an array of road safety measures for their own staff, often extending to contractors as well, but giving attention to residents and other local road users' calls for different approaches entirely, we focus here on this latter area—community road safety—particularly where mining may be a new activity in a region.

The minerals industry presents road safety challenges to rural communities that are similar to the challenges presented by onshore oil and gas extraction, forestry, and agribusinesses. These challenges can be greatest when such an industry first enters or grows rapidly in a region. Local residents may not be used to heavy vehicle traffic, increased light vehicle traffic, traffic that corresponds to shift work, an increase in population generally, changing conditions of roads (improvements and degradation), and shifts in patterns of traffic (e.g., more vehicles on what were less travelled roads). Changes occur in the quality, timing, and volume of traffic in town centers as well as in outlying areas. In addition, there may be new residents in the community, brought by a resource boom, who are unfamiliar with local roads and local driving practices (e.g., yielding to farm equipment on the roads). Such factors can be contributors to an increase in the number of vehicle accidents in the local region.

As a result, our research was undertaken to assess options for ongoing road safety awareness programs for the minerals industry, to supplement existing road laws and regulations. This assessment involved a search for policies, practices, and overarching strategies in various parts of the world with an eye toward programs that could be adapted to a region that is undergoing a resource boom. This search has revealed lessons and options for the minerals industry in relation to community road safety.

1.1. The International Context around Which a Minerals Industry CRS Strategy Fits

In recent years, there has been a coordinated international response to road safety by key agencies. Perhaps most importantly, the United Nations (UN) "Decade of Action for Road Safety" 2011–2020 aims to stabilize and then reduce global road deaths by 2020 [1] in the face of increasing vehicle ownership and operation in the developing world.

The UN proclamation for the Decade of Action for Road Safety focuses on five key pillars [1]:

1. Road safety management (e.g., monitoring and evaluation of targets);
2. Safer roads and mobility (e.g., road safety audits);
3. Safer vehicles (including seatbelts);
4. Safer road users (e.g., alcohol, young drivers, speed restricting);
5. Post-crash responses (e.g., establish trauma databases).

Such international responses have, in turn, driven renewal of road safety strategies and plans of action in many countries around the world. This movement is certainly evident in Australia where there have been several recent federal and state-based initiatives that include a CRS element. On a national level, again using Australia as the example, the key one is the *National Road Safety Strategy 2011–2020* [2]. Within it, the main elements are:

- Road safety goals, objectives and actions: Safe roads, Safe speeds, Safe vehicles, Safe people.
- Reduce Australia's annual number of road deaths and serious injuries by at least 30% by 2020.

Key challenges of this strategy associated with local communities include [2]:

- Develop interventions that respond to the different needs and circumstances of urban, regional and remote Australia. The predominant crash types and risk factors vary between these broad areas. Fatality rates per population are significantly higher in regional and remote areas.
- Reduce serious casualties on roads controlled by local government. Local roads account for more than 50% of serious casualties in some states.
- Reduce the incidence of serious casualties within Indigenous communities and among other disadvantaged people.

Therefore, it is clear, on both an international and a national level, that broad strategic approaches exist that can help companies in the minerals industry to develop CRS initiatives around their operations.

1.2. A Safe Systems Framework

The above-mentioned national and international strategic approaches help give general impetus for minerals industry CRS initiatives. However, in themselves, they do not specify how such initiatives should be developed. The "safe systems" approach provides a valuable framework here; it is the current guiding philosophy to improve road safety in Australia and elsewhere. It includes four key aspects: road users; vehicles; speeds; and road environment (and their interactions). A basic premise is that road users will continue to make mistakes, so the road needs to be designed to accommodate human error. Also, road safety needs to consider the limitations of the human body to absorb forces during accidents [3].

This strategy's development can be traced to European road safety, based on Vision Zero in Sweden and Sustainable Safety in the Netherlands. Vision Zero shifts the responsibility from just the road user to a shared responsibility for safety among system designers, regulators and road users. Likewise, in sustainable safety, the entire traffic system is adapted to human limitations—with a focus on prevention being better than cure [4].

Overall, the approach moved road safety away from just blaming the driver for accidents and injuries. The safe system approach recognizes that where a serious incident occurs, there has been a failure of the safe road transport system. So, error should be viewed as a consequence of a poorly designed system, not a cause [5]. The approach relies on four main inputs: legislation and enforcement, education, understanding crashes and risk, and a licensing/training process to allow admittance to the system [4].

1.3. Safe Systems and CRS for the Minerals Industry

The first example of a formal community road safety (CRS) project occurred in Sweden in the late 1970s. In Australia, CRS properly began in the 1980s [5]. As will be seen below, CRS is now a widespread and often effective approach—the success of which has been attributed to the harnessing of existing local community networks, covering all ages, environments and scenarios and empowering all of those involved in the process.

The safe systems approach to road safety has renewed the need for an informed and engaged community to adopt and apply effective road safety strategies. There has been a paradigm shift from individual drivers to safe systems. Within this thrust, community partnerships and shared responsibility are key elements [6]. A safe system approach is one where citizens demand and expect safety improvements (OECD). According to Smithson [6], it requires:

- Creating an informed community;
- Mobilizing resources to tackle road safety issues at a local level;
- Promoting effective action at a local level;
- Integrating activities—linking key stakeholders to support each other's activities.

Given that companies in the minerals industry are recognizing that their operations have an impact in the wider community, as will be seen below, there is now an increasing interest from major minerals companies in being a partner in CRS initiatives. However, there is uncertainty regarding precisely how they should actually be involved. In general terms, Bekefi [7] suggested that such involvement may be either enabling (including safety culture, standards and funding) or on the ground delivery (including raising awareness, capacity building, product development or infrastructure adaptation). For Bekefi [7], at the community level, an example of enabling would be safe driving campaigns; at the delivery level, it might include the donation of materials (e.g., retro-reflective material for school children). One of the aims of our review is to identify best practices in this area to help companies in the minerals industry to develop strategic policies.

2. Community Road Safety Initiatives Relevant to the Minerals Industry

2.1. The Main Topics of CRS Initiatives

As noted above, the "Safe Systems" approach addresses road safety issues from a broad perspective, often considering roads, speeds, vehicles, and driver behavior. The types of areas typically considered in road safety initiatives include the following [8]:

- Speed behavior and enforcement;
- Safer vehicles;
- Restraints/seatbelts;
- Drink driving behavior and enforcement;
- Driver distraction;
- Road sense (*i.e.*, greater awareness in the community about road rules, skills and road deaths);
- Aboriginal road safety;
- Legislative changes (e.g., to laws about driving under the influence of drugs).

2.2. Analysis of Road/Traffic Safety Interventions

Our research identified, for the period 1999 to 2013, 60 road and traffic safety programs; these programs were found in the academic literature, company websites, program reports and news media. The search was limited to English language sources and to online academic journal databases (e.g., Web of Science), mining and associated conference databases (OneMine, OnePetro), transportation

industry and research conferences, as well as content from news media and Google. The search string included terms like "road OR traffic" and "safety OR awareness" and "community OR program". The collection of papers was supplemented by contacting authors for additional material they may have published and by searching publication records at transportation-focused research institutes.

This review considers 25 key projects that have strong links to the minerals industry. It includes road and traffic safety management programs with both international (more than one country) and national (only one country) scope from Australia, USA, and European, Asian, African and Latin American countries. In addition, for some of the key interventions, we undertook supplementary internet searches (especially media reports) and made contact with program leaders to gain more information for inclusion in the "Case Studies" section of this article.

Following Bekefi [7], the twenty-five key projects were classified into two streams (see Figure 1): outside the fence (companies investing in community road safety, $n = 12$) and inside the fence (companies improve their own road safety performance, $n = 13$).

There were 24 issues extracted from the 12 interventions that companies used to contribute to improving "outside the fence" community road safety. Figure 2 shows the eight top issues. Safety of pedestrians, substance abuse, cyclist/motorcycles, and seatbelts were the most four common areas of focus (each with a total 4 of 12 interventions).

There were 29 issues addressed by companies during their own road/traffic safety operations. Figure 3 shows the eight top issues. Driver fitness and traffic management were ranked at the top as most common issues (each with 7 of 13 interventions) that needed to be addressed to reduce traffic accidents or injury severity. As an example, Energy Resources of Australia has the publication, *Road Safety Initiatives* [9], which sets the minimum requirements for undertaking a safe journey for all of their staff driving activities.

Comparing the key issues of the initiative inside the fence with those outside the fence, substance abuse, seatbelts and speeding are common areas of focus. For example, the Global Road Safety Initiative (GRSI) supported China's Ministry of Health conducts roadside and hospital-based surveys about alcohol involvement in road crashes in Guangxi province. Traffic police randomly stop people and carry out breath tests. At the same time, hospitals checked blood-alcohol levels in all drivers admitted to hospital after a crash [10].
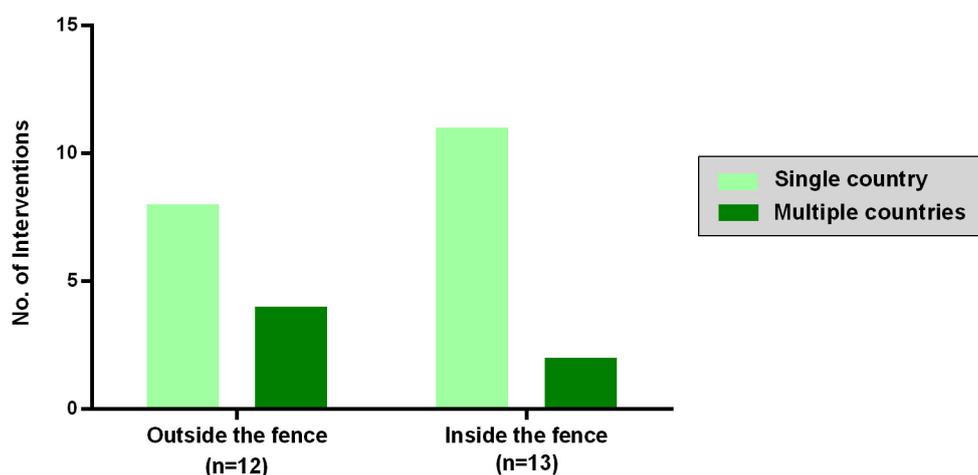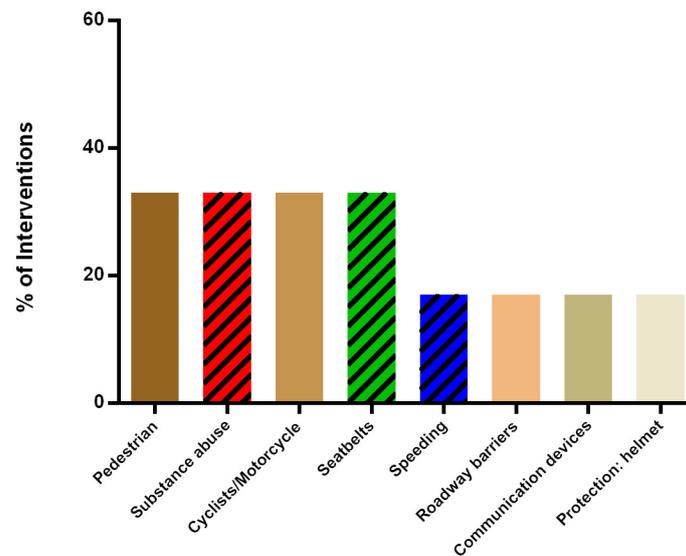
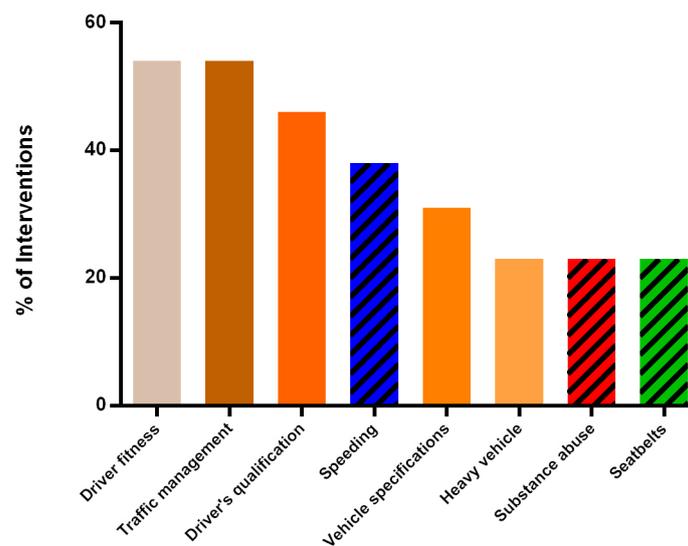**Figure 1.** Scale of interventions.

Figure 2. Key issues of "outside" interventions (*n* = 12).

Figure 3. Key issues of "inside" interventions (*n* = 13).

2.3. Approaches often Used

In addition to the wide number of road safety issues focused on, a diverse set of approaches and media are used for CRS education and awareness campaigns. According to Murray *et al*. [11] and Murray and Watson [12], these approaches typically include:

- Marketing programs;
- Family member programs;
- Simulators;
- Safety groups;
- Road safety "weeks";
- Conferences and safety awards;
- Media outreach;
- Regulator briefings and involvement.

Added to this list, according to Lewis *et al.* [13], two other important approaches are the use of advertising and educational awareness programs. As Davis and Quimby [5] note, often the most effective programs are those that use a combination of approaches/media.

3. Case Studies of Community Road Safety Initiatives

Three case studies provide practical examples of CRS initiatives undertaken by either mining companies or related industries. These interventions have been selected to highlight differences according to the level of involvement a company has in an intervention (active or passive), location of the intervention (first world country, developing country), and whether or not the intervention includes the involvement of one or several/many companies.

The passive/active dimension is similar to Bekefi [7] categories of "enabling framework"/ "on-the-ground delivery", respectively. Passive involvement relates to corporate activities that allow or support the development or implementation of a strategy, such as an initial donation of funds or equipment. In contrast, active involvement refers a corporate's "hands-on" delivery of an intervention, such as use of company staff. The latter suggests a higher level of ownership or responsibility of the intervention.

The location in which an intervention is used is also important, as evidence-based CRS interventions may be expected to have "quicker gains" in middle and low income countries that are only more recently motorized, have relatively inadequate road safety regulations, infrastructure and practices (including enforcement of road safety regulations) and poor road safety performance. Further, multi-stakeholder involvement may be an important means of strategically targeting interventions that are relatively complex, require a lot of resources or difficult to change.

For each case study, we briefly describe, evaluate, and provide evidence that supports community engagement/partnership or ownership of the intervention.

3.1. The Mackay "Road Accident Action Group—RAAG"

3.1.1. Description of Intervention

The Mackay Road Accident Action Group (RAAG) [14] is an alliance of regional government agencies, industries, local businesses and community groups that works to improve local road safety outcomes. The Mackay region is in eastern Australia and is vulnerable to road safety accidents because of the growth in traffic (including heavy vehicles) as a result of local mining, agricultural, marine and tourist industries. These industries make use of the major highway that links south and north Queensland as well as the various western arterial roads. Situated in the Mackay region is one of Australia's most important mining regions, known as the Bowen Basin. The Bowen Basin covers about 60,000 km^2 and has 15 townships and 30 operational mines within its boundaries. A number of these mining organizations are major supporters of RAAG, including BHP Billiton, Rio Tinto and Thiess.

Potential benefits of a cross-organizational alliance are a more co-ordinated or strategic approach to improving road safety outcomes, operational efficiency, and wide-ranging expertise and resources to tackle multifaceted problems and deliver sustainable interventions. Additional benefits are less

duplication of initiatives (across organizations), knowledge of community issues, and the sway of politically influential partners.

3.1.2. Intervention Strategies

RAAG views its role as developing, implementing and evaluating community-based road safety initiatives, providing expert advice to stakeholder groups, and monitoring trends in causes of regional road incidents. It targets a number of vulnerable groups, including young drivers, fatigued drivers, drug and alcohol affected drivers and drivers who display inappropriate driving behaviors. In response to community concerns and fatalities, 15 initiatives were undertaken in 2012, such as a student bike education program, a "rest area stopping place" project aimed at improving use of highway rest spots (for heavy and light vehicles), and "flooded roads", "livestock on road" and "wide load" campaigns (e.g., roadside advertising, media—TV and radio, and DVD production).

3.1.3. Intervention Evaluation

Criteria RAAG uses to evaluate outcomes include the number and severity of local road crashes, the extent of community involvement, the level of involvement of external agencies and government departments, and information distribution.

3.1.4. Evidence of Community Engagement/Partnership or Ownership

In the last five years (*i.e.*, 2009 to October 2013), "RAAG" has been named in nearly 100 articles in the leading regional newspaper, *The Daily Mercury* ($n = 97$) [15], highlighting its prominence as a community road/traffic safety advocate.

3.2. "Helmets for Kids"

3.2.1. Description of Intervention

A non-profit Asian-based group, Asia Injury Prevention Foundation (AIPFP [16]) and many corporate organizations (including founding supporter BP) have supported the "Helmets for Kids" intervention since its inception in 2000 [17]. It aims to distribute high-quality helmets free of charge to primary school children in Vietnam. Motorcycles are the primary means of transport to work and school in Vietnam, and children are the most vulnerable motorcycle passengers. There is resistance to wearing helmets, particularly for children, because helmets are relatively expensive and the full-faced helmets used in the West are considered too hot or heavy to wear in a tropical country.

3.2.2. Intervention Strategies

An Asian-based factory (Protec [18]), owned by AIPFP, was established to manufacture high-quality, affordable helmets specially designed for a tropical climate and the traffic demands of Vietnam. Profits from the sale of helmets to adult riders help to pay for helmets for children. Corporate sponsorship also funds the donation of children's helmets. The factory has a benevolent focus, with more than one-third of its workers having a disability.

Helmets are donated to primary schools to distribute to children. In this way, the school can reinforce helmet usage via an education program that includes teacher training, helmet observations, child-friendly resources, and extracurricular activities. The intervention also includes strategies that encourage parents to reinforce their children's use of helmets.

3.2.3. Intervention Evaluation

- Brondum, Truong, and Dinh [17] investigated helmet use before and after the intervention in 24 schools in four provinces of Vietnam. They found that helmet compliance increased from 24% in the pre-intervention period to 95% in the post-intervention period. However, qualitative information showed that parents of children could be more effectively engaged in encouraging their children's use of helmets.
- In 2007, a compulsory helmet law was introduced in Vietnam. It is thought that the "Helmets for Kids" campaign played a major role in bringing this law to fruition [19].

3.2.4. Evidence of Community Engagement/Partnership or Ownership

Ensuring the sustainability of this program is the incorporation of helmets into the school curriculum so that helmets are seen as being part of the school uniform. This intervention continues in Vietnam and has now been extended to other Asian countries. There are now many other companies involved in supporting this intervention (e.g., Johnson & Johnson, United Postal Service—UPS).

3.3. "The Light Vehicle Project"

3.3.1. Description of Intervention

This recent intervention (2011) was developed by Energy Resources of Australia Ltd (ERA) to promote driver safety on the remote Arnhem Highway, a 260-km roadway that links their uranium oxide mine in Jabiru to Darwin, in the Northern Territory, Australia [9]. While this intervention is primarily directed at ensuring the safety of the company's workforce and related contractors, it is also aimed at the broader community of travelers, including local commuters, tourists, and drivers of heavy vehicles.

This intervention was triggered by an internal audit that revealed road travel on this highway to be one of the biggest safety risks for ERA employees. As a result, a risk-based management program was developed to identify key causes of accidents on the Arnhem Highway, controls to prevent and mitigate risks, and means to monitor the effectiveness of these controls.

3.3.2. Intervention Strategies

The Light Vehicle Project targeted known causes of local crashes: changing road conditions; overtaking of heavy vehicles; fatigue on long stretches of road; unpredictability of tourist vehicles (including sudden stoppages to view sites of interest); wandering stock and animals; setting and rising sun; and heavy rain. Control measures focused on vehicle safety, roads and roadsides, vehicle speed and road user behavior (including seatbelts, alcohol, fatigue). A stringent set of ERA safe driving rules specific to driving on this highway was developed, and they are now embedded into the company's

procedures. A DVD giving safety advice about driving on the Arnhem Highway was developed and made freely available to the general public. ERA has also run awareness sessions in the communities of Jabiru and Darwin, at local events, in road safety forums, and in schools. For example, one local event focused on pre-start vehicle checks, and an ERA light vehicle mechanic gave advice on improving the effectiveness of pre-start checks.

3.3.3. Intervention Evaluation

This intervention has been nationally recognized, winning two 2012 Australian Road Safety Awards [20].

3.4. Lessons Learnt from the Case Studies

There are a number of general lessons that can be learnt from these three case studies:

3.4.1. Identify a Pertinent Road/Traffic Safety Problem

- That is a significant need in a community;
- That can be addressed in the short term (e.g., 2 years).

3.4.2. Partner with Stakeholders Who Have Capabilities Different from Your Company's

For example:
- Groups who can identify a community road/traffic safety problem and intervention;
- Government agencies, so that interventions can be embedded into a community (e.g., education);
- Groups who can play an important role in modeling and or enforcing behavior (e.g., parents);
- Groups who can objectively evaluate the outcomes of a program.

3.4.3. Know Your Organization's Strengths

- One company provided funding and leadership in training and social marketing.

3.4.4. The Attributes of a Sustainable Intervention Include:

- Build community capacity or expertise (personnel or infrastructure): The "Helmets for Kids" intervention targeted children, hoping also to change the attitudes and behavior of children's families toward helmet use. It also established a national factory to manufacture helmets, a piece of infrastructure that would ensure the sustainability of the project;
- Intervention is in alignment with community needs and values: In the "Helmets for Kids" intervention, affordable, high-quality helmets were developed that were suitable for a tropical environment and for Asian traffic demands;
- Community can see that the intervention is effective and will provide long-term benefits.

3.4.5. Publicize the Outcomes of the Intervention in Meaningful Ways

- For example, highlight the impacts of the intervention in terms of fewer injuries or fatalities. Media releases posted by one company highlighted that "the estimated total number of disability-adjusted life years (DALYs) saved as a result of the intervention was 530".

4. Discussion: Which CRS Processes Are most Effective for the Minerals Industry?

4.1. Interventions often Work Best When Strategies Are Tailored to Local Community Needs and Use Collaborative Approaches

A common method that governments employ to engage with local communities is development of road safety groups that include a range of local stakeholders [21]. Minerals industry companies could be an active participant in this process, too. In so doing, important and "real" or meaningful hazards can become the focus. As seen in the case studies above, strategies are sustainable when they create an informed community, one that has a sense of ownership of programs and that causes local resources to be mobilized to achieve road safety. Also, road safety activities are integrated across a community—ensuring mutually supportive activities. Engaging and partnering with residents and organization in local communities in relation to road safety is also integral to implementing a "safe systems" approach [6].

Another method supported by these strategies is for agencies and minerals companies to partner in local road safety activities, building on established road regulations and laws. This effort might involve agencies/organizations:

- Supplementing and supporting existing programs that are successful;
- Providing sound advice to local community groups;
- Liaising with and influencing external stakeholders;
- Developing relationships with other agencies/organizations to involve them in community road safety programs.

Programs that promote community engagement on road safety strategies can be evaluated in terms of level of engagement and opportunity for local community members and other stakeholders to become involved in effectively addressing road safety needs and issues. Such measures can revitalize existing community road safety groups. A difficulty with this method of evaluation is that there are many different stakeholders with different expectations and aims. Reductions in crashes might be the most clear-cut indicator, but it can be problematic due to the difficulty in separating the influence of different initiatives and factors. One other way to measure success is through social capital, for example, the growth in engagement, trust, and active community participation [6].

4.2. Ambassadors

An innovative approach employing road safety "ambassadors" was instituted by Montero *et al.* [22]. The ambassadors proved to be very useful in training workers about road safety in industrial and community settings. This "train the trainer" strategy has proven to be effective in both Victoria,

Australia and Indonesia. It provides a locally informed and locally relevant response to road safety issues. This approach therefore suggests a peer role model, a community advocate and a mentor.

4.3. Building on Fleet Road Safety Programs

Occupational road safety programs by industry often involve strategies that may initially focus on road safety of their own personnel (e.g., fleet safety) but then can be extended to encompass CRS.

As an example, Murray *et al.* [11] outline how to develop effective Occupational Road Safety Programs. They lament that there are few recent, published and well-evaluated case studies of organizations who have successfully managed their occupational road safety [11].

Murray and Watson [12] recommend that organizations wishing to extend their fleet safety initiatives into community road safety ones need to:

- Build in road safety as part of their community engagement strategy;
- Join and be proactive members in existing safety groups;
- Be involved in road safety weeks or other community events;
- Enter award schemes to encourage, promote and evaluate good practice initiatives;
- Include family members in initiatives;
- Present papers at relevant conferences/forums;
- Develop public relations efforts around safety performance;
- Have a long-term strategy;
- Engage employees and local communities;
- Link road safety to other safety and environmental initiatives (e.g., less need to travel for work reasons);
- Work with industry regulators, such as inviting them to comment on aspects of operations.

They state that it is difficult to evaluate safety success directly (due to the number of different factors in play), but such initiatives may have benefits for community building, brand development and PR/marketing [12].

Within mine sites, techniques to improve safety include road design guidelines, road safety audits, proximity detection technologies, fatigue management, and separation of vehicles/pedestrians [3]. According to Vagaja [3], it is important that organizations take a proactive approach aimed at establishing themselves as critical stakeholders for the management of affected road networks. Within a safe systems framework, such measures include:

- Organizations doing their own road safety assessments (e.g., of routes to be frequently used);
- Scheduling of heavy vehicles to minimize disruption to other road users;
- Buying of safe vehicles;
- Requiring drivers to act safely (e.g., training, fatigue);
- Focusing on speed and helping to create safe road infrastructure (e.g., through co-investment with road authorities).

4.4. Factors Influencing CRS Success

Cairney [23–25] undertook a comprehensive review of the current status of community road safety in Australia and New Zealand. The key issues emerging were:

- Recognition of community road safety as part of good practice road safety;
- Value of strategic plans at the community level;
- Integration of community road safety with other aspects of local government activity;
- Wider communication of possibilities and benefits of community road safety;
- More cost effective use of the local media;
- The role of the road safety coordinator;
- Management of programs to maintain momentum.

In the UK, a major review of successful CRS was undertaken in the early 2000s. For Davis and Quimby [5], the key characteristics of community safety education include that it:

- Relies critically in the involvement of the community—they have the right to be fully informed about road safety;
- Measures are identified, initiated, and supported at a local level;
- Does not only focus on formal school education but can involve schools (essential, but only one part of the solution);
- Communicates to all groups—not just schools and school children;
- Combines analysis of accident data with stakeholder consultation;
- Anticipates being sustainable—local ownership of community road safety programs is essential for sustainability;
- Participatory methods are most effective in delivering community road safety;
- A wide package of different educational, enforcement, and engineering strategies are needed to change road user behavior and attitudes. Needs diverse sources (e.g., not all adults can read);
- Aims to produce behavioral change for a safer environment.

Davis and Quimby [5] argue that there is great merit from partnering with media, local newspapers, TV, radio and new media to bring visibility and improve communication.

5. Conclusions

Based on the above review, companies in the minerals industry can achieve effective CRS interventions with programs that attend to the following 11 factors:

- Fit within international, national and state approaches (e.g., Safe Systems), *i.e.*, they consider best practices elsewhere;
- Mobilize resources to address the actual needs of the local community;
- Engage and link all key stakeholders (e.g., councils, schools, and local community members) by integrating activities at local and central support levels;
- Build on successful existing RS initiatives (e.g., extending industry fleet safety programs to include CRS) and local government activity;
- Partner with local media for enhanced visibility and communication;

- Adopt collaborative and participatory approaches (e.g., road safety "ambassadors", road safety coordinators, or other key individuals);
- Are evaluated by a range of metrics (e.g., social capital, crash reductions, community engagement);
- Successes are disseminated (positive reinforcement);
- Have long-term proactive strategies to produce behavioral change (e.g., young people become compliant road users and advocates for safe road use);
- Become sustainable through an informed community with local ownership;
- Enable key players in local communities to believe that solutions are within their power and that they have the responsibility to play a role in implementing and delivering solutions.

By following these tenets, companies in the minerals industry can take a proactive approach to managing the impact of their operations in the wider community. In the next few years, it is hoped that mining companies—and natural resource companies generally—respond to this challenge and invest resources in effective CRS interventions.

Acknowledgments

Conflicts of Interest

The authors declare no conflict of interest.

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