

Safety Review of a Dangerous Goods Transport Company: A Case Study

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Abstract

A twelve-element fleet safety management model system was used to conduct a gap analysis of fleet safety management practices of transport and depot operations of a dangerous goods transport company. This formed part of a holistic and systematic review, leading to the preparation of a safety management improvement plan. The review took a systems approach to identify and analyse elements of the company's management system to assess if there were any deficiencies. The review method included a fleet safety 'maturity' survey of drivers, managers and executives of the company, in-depth interviews with a selection of staff, driver and manager focus groups, and specialist inspections of truck fleet purchasing and maintenance practices and fatigue risk management practices. The results and recommendations were fully embraced by the company. The 67 recommendations were adopted and programmed for implementation. Achievements after two years since the review are reported. While the study has methodological limitations, important lessons about how to use data gathering for organisation improvement, have been gained.

Keywords

Fleet Safety, Safety Management, Transport, Review, Model

Introduction

Despite a range of examples of models [1-4] for managing work related road safety, or fleet safety, there is no single agreed safety management framework. This paper describes the use of a safety management system for fleet and driver management. The case study illustrates how a fleet safety management framework was used as a template to measure how well a company was performing in its efforts to reduce the likelihood and severity of road crashes.

The model framework is a 12-element safety management system is shown in Figure 1. The first author developed the model based on a review of the literature [5-7] and consultations with other road and fleet safety specialists.

The example company operates an extensive network of bulk fuel and lubricant depots, delivery vehicles and service stations. By April 2008, in this company 27 employees had been injured at work, requiring medical attention that year. Moreover, a total of 16 of these employees required time of work to recuperate. These accidents and further incidents such as product crossovers, motor vehicle accidents and incidents requiring onsite first aid attention prompted a review process to understand why incidents were occurring and how to improve practices to prevent further incidents. The Review focused on safety

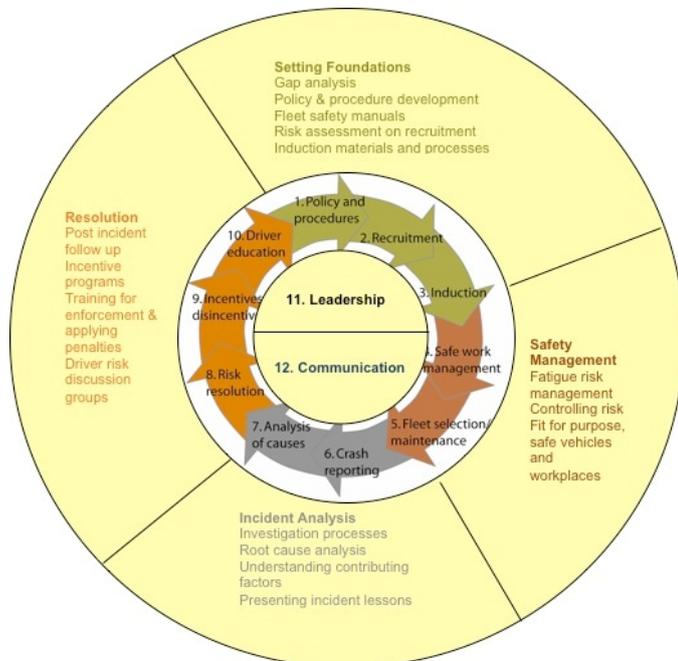


Figure 1: 12-Element Fleet Safety Management Model

management practices of the operations business unit, covering the transport and depot/dispatch functions of the company.

A safety consultancy company was engaged to implement review methods founded on the safety management framework shown in Figure 1. The development of the twelve-element safety management model involved examination of fleet safety manuals and tools (Elliott and Shanahan, 1995, Sochon, 1999, Queensland Transport, 1998) that were publically available by the year 2002 as well as OHS management systems (Standards Australia, 2001, ILO, 2001) and effective road safety interventions (RTA, 1999). The authors of some of these and other resources, as well as users, were consulted about the usefulness and shortcomings of these frameworks. Through a consultative process a 10-element model was developed and constructed as a continual process of policy development, driver/journey/vehicle management, incident analysis and reactive/proactive resolution of risk.

The first ten elements are described below.

1. Policy and Procedures - *Clear statement of priority on safety combined with defined behavioural expectations*
2. Recruitment - *Select staff with low risk driving tendencies*
3. Induction - *Ensure that employees understand the priority placed on safe driving*
4. Safe Work Planning - *Ensure that work tasks don't compromise safe driving*
5. Fleet Selection/Maintenance - *Make sure that vehicles are safe for occupants and other road users*
6. Crash Reporting - *A system to ensure reporting of timely accurate crash incidents*
7. Data Analysis - *Rigorous interpretation of crash reports identifying risk areas*
8. Risk Resolution - *Follow up incidents to alleviate identified risks*
9. Incentives and Sanctions - *Rewards or recognition for safe practices and safety results and sufficient penalties to deter unsafe practices*
10. Driver Education - *Make staff aware of crash risks and how to avoid them*

Later, informed by an Australian quality assurance process (see www.benchmarkingpartnerships.com.au) two more elements were added – leadership and communication. These elements became elements 11 and 12 and are described below.

11. Leadership - *Senior management placing an unambiguous priority for fleet safety in the organization*
12. Communication - *Conveying strong and regular communication about the commitment to fleet safety*

Leadership and communication might be seen as measures for building a safety climate within organisations [8, 9]. Numerous safety culture measurement scales have been developed and empirically tested, but as yet there is still no agreement about what indicators are the most important for assessing safety culture. However leadership and communication, or what Zohar refers to as *social interaction*, are believed to be two key antecedents of building a safety climate [10].

These twelve elements are graphically depicted in Figure 1, to convey a dynamic interlinked process with the basic elements of leadership and communication forming the hub of the fleet safety management “wheel”. As a package, the framework enables a systematic set of items that can be used as a template for assessing safety management practices [11] as well as safety culture [12].

Review Methods

The project commenced with the recruitment of a fleet safety specialist consultant team to assist the review. An internal review team was established to guide the project, with the head of health and safety as project leader. Then the managing director distributed a memo to all staff in the operations business unit to fully support the Review process and team.

Review involved conducting a safety management maturity survey of all operations staff, management and associated leaders in the company. The survey, based on a fleet safety management model (Figure 1) asked respondents to rate the importance of the specific practices described on a 6-point Likert scale, from “not at all” to “extremely” as well as to rate the company’s performance on a 6-point scale from “very poor” to “excellent”. This type of survey has been used extensively in occupational safety research [11, 13, 14]. In this survey, there were 2 to 6 statements, for example in the element of “Risk

Resolution”, one of these statements was “Visible changes resulting from identifying risks and solutions”. In total the questionnaire contained 50 statements.

Gaps that represent the numerical difference between the ratings of Performance from the ratings of Importance, were then interpreted as the amount of improvement the respondents would expect the company to make. In other words, participants in the survey rated the levels of importance of safety management items within each element, and then rated how well the organization is performing against these. The difference between them represents the priority levels placed on making specific improvements. For example, if the importance rating for “Driver safety assessment on recruitment” is 5, and the performance rating is 4, the difference value, or *gap*, is 1.

It should be noted that this data serves to indicate possible priority areas for action, based on staff and management self assessments on how mature, focused and effective the company is in managing key elements of safety. It does not necessarily reflect the actual level of performance, nor does it explain fully how or why there are gaps between expectations and performance.

Preliminary survey results were discussed in sessions with two groups of metropolitan based drivers (City 1 and City 2) and two groups of rural based drivers (Town 1 and Town 2) and one group of representative area operations managers. The group sessions were structured to seek clarification of the underlying reasons for the outcomes of the survey. In other words, more detail about how and why there were larger or smaller gaps in the various safety management elements was drawn out of these discussions.

In addition, 20 individual interviews were conducted with all key leadership personnel in the operations business unit, as well as with the managing director and leaders of health and safety with a view to drilling down into the safety management practices and gaps identified. Additionally, a group of depot (frontline) managers was consulted about the findings of the survey in a half-day group session. This process sought to further define the specific safety management shortcomings and/or why the perceptions of shortcomings may have been expressed in the survey.

Technical specialists in vehicle safety and fatigue risk management were engaged to review practices in vehicle safety management and roster and scheduling practices. This enabled an objective technical assessment of practices in these key areas of risk.

The information collected was analysed to find opportunities to make improvements in safety management. These improvements were then prioritized in a workshop session with key leaders and managers into an action plan. Following this a resource plan for implementing changes was put into place.

Two years after the Review, the executive director of the operations business unit was interviewed regarding the actions taken against the recommendations, and any changes in incident data. The 3-hour interview was extensive and the researcher was able to elicit an update on progress against all 67 recommendations. Documentation of new management monitoring tools as well as injury and accident data was also provided.

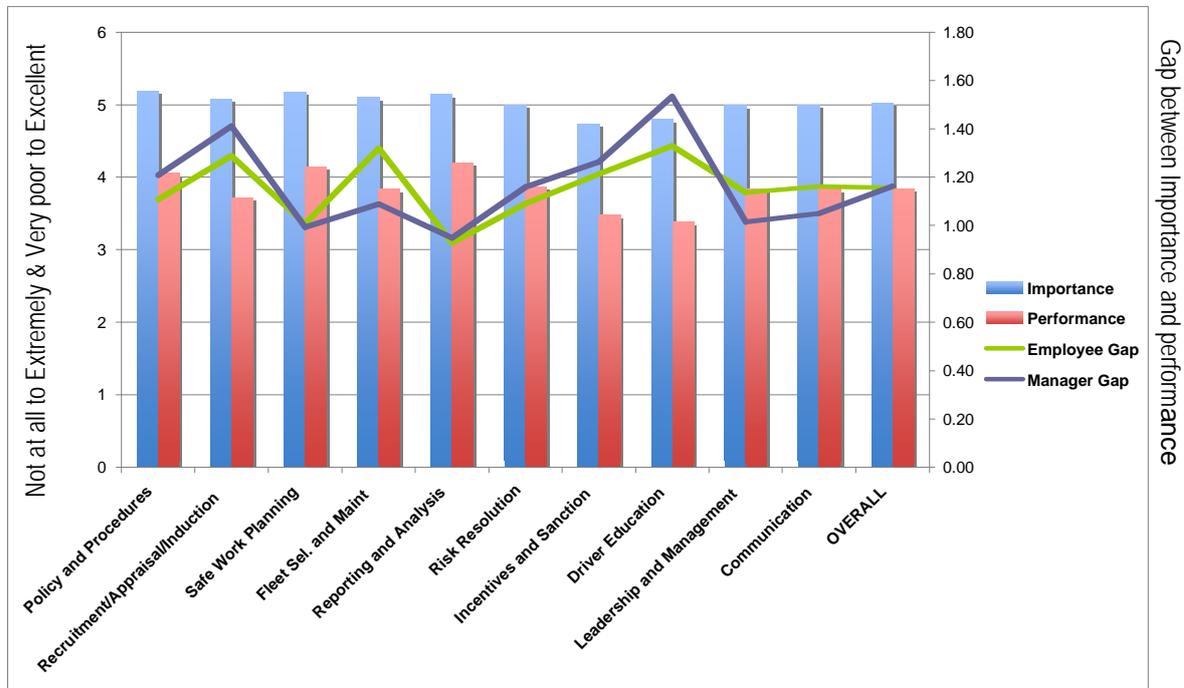
Survey Findings

A total of 315 Fleet Safety Maturity Survey forms were returned spanning all States in which the company operates and including employees, managers and leaders. Although an exact response rate cannot be determined, because in most cases local managers distributed the questionnaires, it is estimated that this is more than half of the possible respondents.

Overall, the results indicate that this is a company that places a high importance on all aspects of managing safety. And the perception by leaders, managers and employees is that the practices by the company demonstrate an above average level of performance. The data generated from the survey identify specific ratings by managers and employees and show differences between States and some specific locations.

The overall results of how Importance and Performance were ranked are shown in Graph 1 below. The “Gap” between the Importance levels and Performance levels are indicated for Employees and Managers¹.

Graph 1: Overall Rankings of Importance, Performance and Gaps Across All Topics



The results of the survey indicated that, overall, the operations business unit of the company placed a high importance on managing safety. This is indicated by the left-hand bars in the bar graph that shows that respondents rated the fleet safety management elements as high to extremely high. Moreover, people working in operations believed that the performance was pretty good across all elements of safety management. And there is little difference in the perspectives of employees and managers in terms of gaps in performance versus importance of these elements across the board with an overall gap ranking that is virtually equal. Note that the “gap” is simply the numerical difference between the Importance rating (between 1 and 6) and the Performance rating (between 1 and 6).

Just looking at the gap between the importance placed on managing the safety elements and the perceived organizational performance (the line graph) enables identification of the areas that the respondents believe there are the best opportunities for safety management improvements.

There is a fairly even spread of gap ratings across all categories, with peaks in the categories of recruitment/appraisal/induction, driver education, incentives and sanctions, and fleet selection and maintenance. While the gaps are not large they indicate areas of opportunity for priority improvements. There are not big differences between the ratings by employees and managers. However there was a discernable difference between managers’ – especially senior managers (“Leaders”) – responses and employees’ responses.

¹ Note: the Leaders were such a small group that statistical analysis was not practical. Therefore these responses were combined with Manager responses.

Table 1 summarises the gaps and differences in gap rankings between Importance ratings and Performance ratings in each safety management element by grade or level of position in the company and by location.

Table 1: Gaps Summarised by Question by Group and Location

| | ALL | GRADE | | | STATE | | | | |
|---------------------------------|--------|--------|-------|------|-------|--------|-------|-------|-------|
| | | Emp | Mgr | Lead | NSW | QLD | VIC | WA | TAS |
| Policy and Procedures | 1.14 | 1.11 | 1.21 | 0.96 | 0.68 | 1.31 | 1.01 | 1.18 | 0.76 |
| Recruitment/Appraisal/Induction | 1.36 | 1.29 | 1.41 | 2.40 | 1.23 | 1.52 | 1.05 | 1.35 | 1.10 |
| Safe Work Planning | 1.05 | 1.03 | 0.99 | 1.12 | 0.76 | 1.25 | 0.81 | 1.11 | 0.52 |
| Fleet Selection and Maintenance | 1.27 | 1.32 | 1.09 | 1.00 | 1.07 | 1.37 | 1.28 | 0.97 | 1.00 |
| Reporting and Analysis | 0.95 | 0.92 | 0.95 | 1.58 | 0.63 | 1.20 | 0.78 | 0.20 | 0.41 |
| Risk Resolution | 1.14 | 1.11 | 1.16 | 1.79 | 0.78 | 1.34 | 0.92 | 0.67 | 1.05 |
| Incentives and Sanction | 1.26 | 1.21 | 1.26 | 1.71 | 0.90 | 1.50 | 0.97 | 0.83 | 0.93 |
| Driver Education | 1.38 | 1.30 | 1.51 | 2.27 | 1.16 | 1.52 | 1.11 | 1.64 | 1.07 |
| Leadership and Management | 1.15 | 1.13 | 1.02 | 1.60 | 0.71 | 1.35 | 0.86 | 1.00 | 0.88 |
| Communication | 1.16 | 1.15 | 1.05 | 1.60 | 0.43 | 1.40 | 1.01 | 1.03 | 0.74 |
| OVERALL | 1.18 | 1.16 | 1.16 | 1.60 | 0.84 | 1.37 | 0.98 | 0.98 | 0.84 |
| <i>Sample size</i> | 308.00 | 226.00 | 63.00 | 6.00 | 37.00 | 174.00 | 60.00 | 14.00 | 22.00 |

(max respondents)

NOTES: 1) highest ranking gaps (> 1.25) are highlighted 2) some respondents did not indicate their positions, State or locations

3) excludes responses where all questions within a theme group were not answered

The average gap between the ratings for Importance versus Performance is 1.18 across all fleet safety management question groupings. Ideally this would be compared with results from other similar organizations using the same survey form so that a true benchmark comparison of fleet safety management *maturity* could be measured. However, surveys using similar types of tools for measuring management maturity have been conducted by Benchmarking Partnerships². The collective average results of these surveys find that the average level of gap between importance and performance is 1.5 and the lowest score is .8. So, at 1.18, the company has an above average management maturity rating but falls short of best practice.

Subsequent data analysis breaks down each element into specific components of safety management. The Review process involved presenting the survey data to individuals and groups within the company to ascertain more explanation of the performance assessments against performance expectations.

Key Review Findings against Each Element and Organisational Actions

For the sake of brevity, this section will summarise the general findings and progress made on each safety management element two years after the Review. The findings were derived from extensive consultations with managers and employees regarding the survey information, as well as independent safety specialist observations and assessments. The actions taken were reported in an extensive interview with the senior executive in charge of the operations area of the company.

A total of 67 specific recommendations were made, based on the findings of the Review. These ranged from aligning policies better with safety expectations to developing stories based on actual incidents to use in safety training. Meetings were held with company leaders and senior managers to determine what should be done about the findings and recommendations. At these meetings, a group process was used to set priorities for implementing all recommendations. The leadership team then determined resources that would be required and assigned one health and safety staff member to be dedicated to assisting the operations business unit to implement these actions. Importantly, a road show was undertaken by the internal Review Team to convey the outcomes of the Review to the operations staff throughout the

² The management maturity survey method was originally developed by the now defunct Australian Quality Council, and now is used extensively by Benchmarking Partnerships. See www.benchmarkingpartnerships.com.au

company. Power point presentations were used in Toolbox meetings to present a summary of the final report to drivers and other staff.

1) Policy and Procedures

Most people in the operations area believed that while there was good awareness of the safety policies and procedures and that they were well documented, there was a need for training and assistance in implementing these policies and procedures. Managers were not confident in their abilities to manage health and safety. They believed that there was a wealth of experience at this level in the company, but with regard to health and safety they were not satisfactorily skilled to manage work related risk. The operational managers know the basics, but prefer to leave the more complicated issues to health and safety specialists in the company. Moreover, there seemed to be a discrepancy between the ambition of the company's "Vision Zero Harm" policy and some of the specific policies and management procedures that seemed at odds with this policy stance. This was especially the case for the way the company managed driver fatigue.

Actions taken: Mid-year annual policy reviews have been instituted. The 2009 review removed any conflicts in the health and safety policy and provided work instructions. There is no high-level guidebook, but OHS training is provided to managers. An organizational and staffing change resulted in improved coordination between operations management and health and safety management areas of the company. However, despite the initial intention to keep work hours consistent with the Standard Fatigue Management guidelines with an upper work hours limit of 12 per 24 hours, the Fatigue Management Policy is consistent with the requirements of the Basic Fatigue Management system proscribed in new Fatigue regulations which enable shifts of up to 14 working hours in a 24 hour period. Also, an organizational and staffing change resulted in improved coordination between operations management and health and safety management areas of the company.

2) Recruitment, Induction and Appraisal

The survey showed peaks in gaps between performance and importance, particularly with respect to checking safety on recruitment and on inducting drivers, and orientations for new staff. Beyond a medical check for drivers there was no formal safety assessment of drivers or other staff in the recruitment process. It was sometimes assumed that if drivers hold the appropriate license they are competent and safe. Moreover, the recruitment process was lacking rigour, especially during periods and in areas where qualified drivers are scarce (for example in the mining areas of central Queensland). Also, staff safety performance indicators had not been established and used in work appraisals. So safety practices were not appraised in the general course of appraising work performance.

Actions taken: A recruit-a-friend bonus scheme has been well promoted and is working well. (Note the bonus is \$1,500 for any recruit that continues with the company for a year.) As part of the recruitment process a reference checking procedure now prescribes specific questions that must be asked. Also, driving records are now consistently checked. In addition, no driver under the age of 21 can be recruited to drive a heavy vehicle and none under 25 can be recruited to drive a heavy combination. While pre-employment psychometric tools were investigated, none were deemed valid enough for use. However, in-house driver trainers now carry out a pre-employment in-cab driver assessment. With regard to appraisal every driver is now assessed against 6 criteria (driving, loading, unloading above ground, unloading below ground, entering and leaving sites, and risk assessment). Managers' safety management performance is appraised annually. A new 6-week induction package was being rolled out, but it was determined that this was too costly, so now a 2-week induction and probationary trial and driver assessment is carried out by in-house trainers before drivers are put on the road.

3) Safe Work Planning

The largest gap in this element was in provision of practical options when safety might be put at risk. In individual and group consultations, most staff and managers said "if it's not safe, we don't do it". However, there were not clear protocols in place to give comfort to managers in making decisions that might border on an unsafe process. Within the operations business unit, there was rarely any pressure direct or implied to 'push the limits of safety'. However, there were instances where sales people and

schedulers try to push the limits. Drivers generally felt supported by management not to do anything unsafe; however, sometimes the drivers themselves – more out of dedication to their colleagues and operational efficiency reasons pushed themselves a bit beyond the safety boundaries. There may be an excessive reliance on staff to determine when a task is unsafe. Moreover, looking at the data broken down by State, it was noted that Western Australia and Queensland reported the most difficulty in finding practical options to driving at risk. The distances of the transport delivery points in these States, and the lack of practical facilities available might explain these differences for drivers for rest stops on particular routes.

Fatigue was found to be the most important single risk facing the company. At the time of the Review, much of the fatigue risk management is up to the drivers themselves supported by management. The technical specialists undertaking a review of fatigue risk management practices advised that there was more of a focus on driving and working hours limits than a holistic fatigue risk management program.

Line managers were reportedly trying to do their best to deliver what is expected and but indicated that the only key performance indicators (KPIs) on safety are numbers of Toolbox (safety) meetings held. There were not sufficient safety KPIs to provide incentives for good safety management in use in manager performance appraisals. It was also noted in a new business area, had not yet adopted the company's full set of safe work procedures.

Worksites are not considered to be unsafe, but there are some that need improvement, especially to prevent awkward lifting and manual handling strains. However, the company seemed to be performing relatively well in managing safety around parked vehicles whether loading, unloading or for other reasons.

Actions taken: The company's "Issue Resolution" policy and other safety messages are promoted on a new communication mechanism that involves recording a quarterly CD and providing it to drivers to listen while driving. With regard to fatigue management, the company believes that the accreditation process required by the Basic Fatigue Management (BFM)* scheme assisted to establish better management of this risk. Now, every driver, manager, scheduler and logistics manager is all trained consistent with BFM requirements. The company is currently consulting a company with the view to implementing a fatigue risk management rostering system. Managers check rosters and schedulers know the rules. The company is compliant with BFM but agree that they are not at best practice in terms of fatigue risk management. However, it was reported that there was a strong decline in the incidence of 70-hour weeks worked by drivers.

The health and safety manager has a strong focus on lead indicators and now conducts more mini-audits than the former less frequent full audits. The managers' appraisals include safety management assessment. There is now a database on all delivery point assessments. Of the 24,000 delivery points about 50% have been assessed. Lube drivers are trained and assessed and given regular medicals similar to heavy vehicle drivers. Lube trucks have load restraints and mechanical lifters are now a feature of all new trucks.

4) Fleet Selection and Maintenance

According to the survey, the safety management of the purchase and maintenance of the vehicle fleet is assessed by leaders, managers and staff. Even though the survey respondents did not indicate a great deal of concern about the use of best information in selecting vehicles, the independent technical specialist advised that the current fleet selection practices have placed insufficient attention on safety criteria. Consultations with purchasers found that price for equipment that can do the job has been the main driver in fleet purchase decisions. In some cases the available safety equipment has not been installed. There did not appear to be any vehicle purchase policy or "Fit for Purpose" selection aids or purchase mechanism for either safety or efficiency. Instead purchasing decisions seemed to rely on the experience of a few key personnel. On the whole, the respondents believed that inspection and maintenance of fleet

* The company was accredited in the National Heavy Vehicle Accreditation Scheme (NHVAS) after demonstrating that they complied with six BFM standards covering scheduling and rostering, fitness for duty, fatigue knowledge and awareness, responsibilities, internal review, and records and documentation.

vehicles was very important, and that it was being done pretty well. This may reflect the feeling that as drivers do pre-checks on vehicles and don't really want more 'paperwork' the respondents who were mostly drivers, responded that the process was sufficient. Moreover, cargo barriers are not used in smaller vehicles that deliver drums of products.

In the case of maintenance, there have been problems with service providers as well as the system of logging and closing out maintenance orders. The big gap was in the area of auditing the safety of vehicles. In this regard, the technical expert reviewer advised that checking of brakes via testing to ascertain their compliance within the NTC requirements are not currently done by any service provider.

Actions taken: There is now a vehicle specifications policy that features a checklist of essential components. The only safety deficit is that it doesn't include air bags (because no American make has them.) Generally, the sturdier American made vehicles are used on the local delivery vehicles due to the maintenance costs associated with the European trucks – noting that the roads are often rough. In addition it was noted that if a truck is tipping over, the electrical switches automatically shut off so that the air bags would not work anyway.

The company has ceased using truck and dog combinations. Lube trucks now have load restraints.

Brake checking by maintenance providers is now done to NTC guidelines and is NHVAS³ compliant. The same maintenance logging system is still being used, but the processes for addressing maintenance jobs has improved and now there are 3 maintenance coordinators with whom drivers have direct access.

A new in-vehicle monitoring system is being examined for implementation soon. This system will include a sign-in and sign-out system, with GPS tracking and other features.

5) Incident Reporting and Analysis

While the company believes that it has good reporting and investigation processes, there is a gap in the area of follow up investigations. This could suggest that there could be some improvements made in finding systemic issues to address when there are incidents and known contributing factors. Moreover during group consultations concerns about less serious incidents and near misses was raised a number of times. It was felt that the company could learn a lot from reviewing factors in near misses.

Also, concerns were raised about the way in which some serious incidents were investigated and contributing factors assessed. For example, one "Incident Announcement" contained a manager's comment that: "I believe this incident would fall into the classification of 'accident'. I have personal knowledge of this portion of road, and believe XXX was in the wrong spot at the wrong time and there was nothing he could have done to avoid this collision." This comment raises a number of questions that would suggest that a full root cause analysis was not done.

There did not appear to be a database of past incidents and ranking of those incidents, i.e. delivery vehicle crashes, passenger vehicle crashes, rollover crashes, other crash types, spills, personal injury, falls from heights, etc. It was suggested the incidents be ranked, i.e. a top 10 list, and effort be focused on the reduction of those incidents starting with the highest ranked ones. Comment by one interviewee was made that the black box systems need to be implemented in the whole fleet. Only 40 systems were running at the time of the Review. The data from a black box from a crash is key to liability shielding and unbiased interrogation of what occurred in an incident. It also assists in driver behaviour in regards to complying with speed limits and advisory limits.

Action taken: Not much has been done to review or improve the accident investigation and reporting process.

However, the regional logistics managers receive a half-day training course as part of a 3-yearly learning and development program. Only the health and safety team conduct root cause analysis (for major incidents only). Protocols have depot managers investigate minor incidents & near misses, regional

³ NHVAS means National Heavy Vehicle Accreditation Scheme. This is a voluntary accreditation scheme managed by Australian Governments. It has three main components: mass management, fatigue management and vehicle maintenance management.

managers investigate medium level incidents. In the case of major incidents the senior operations manager issues a health and safety 'flash' to all sites that includes implications for the rest of the business.

6) Risk Resolution

The practices of resolving risks in the work of those in the operations business unit were explored in the next topic. Examining the topic of risk resolution, the biggest concern expressed by the company is in regard to how it manages high-risk drivers. While Toolbox meetings were well structured and conducted, they did not allow for good interactive discussion on risk analysis and resolution.

There was also evidence of high-risk drivers that other drivers believed should be better managed.

In some cases visible changes as a result of finding serious risks and solutions have seen long delays in doing something – eg farm tanks presenting working-at-heights risks in Queensland. There were comments by drivers that suggest that they had concerns about the driving risk behaviours exhibited by fellow drivers. Although reluctant to bring these specific drivers and behaviours to the notice of management, they seemed to be concerned that this phenomenon was not being sufficiently noted or managed.

Action taken: External counselling services provided to staff no longer require management approval to access. But not much has been done about follow-up post incident. Toolbox meetings are now held monthly with company-wide themes being discussed in them every second month. Counselling training has been provided but whether the managers are identifying and counselling drivers is unknown. There is a central tracking system to ensure follow up on safety actions lagging behind and seek reasons from the responsible managers and feedback to staff now with a close-out system in place. Risks identified through audit processes are resolved in a timely manner. But there is still a lot to do to improve farm tank (working at height) risks. Currently only 69% of farm tanks are compliant with safety specifications. There is a target of 94% compliance within the next year. A working at heights tank assessment and conversion report is now in place to track progress on this, by State and region.

7) Incentives and Sanctions

While it appeared that people were satisfied that effective and fair sanctions are in place, the biggest opportunity seen in this area is in making staff feel more valued for their work and safety efforts. It seemed there could be some opportunity to provide more incentives for fleet safety. Although there was no expectation from drivers that they would be rewarded for doing their job properly – other than getting home alive – small gestures of recognition go a long way. There was also an indication that management could be more rigorous in applying disciplinary measures for non-compliance to safety policies. It seemed that shortcuts, constituting breaches of policy were taken quite regularly.

Action taken: There is now an annual formal performance review process for managers with health and safety management comprising one quarter of the weight of these appraisals. Bonus payments of up to 10% of managers' annual salaries are tied to these appraisals. Drivers' performance is also appraised, but while managers are encouraged to give rewards (fuel vouchers and cash rewards) this system is not well patronised by managers.) Regular management training programs now include a session on safety breach disciplinary processes. And Leaders now coach local operations managers on how to deal with staff that breach safety procedures.

8) Driver Education

The biggest gap indicated in this category was regular risk education, followed by sound driver education. This represented a key opportunity for the company to address. Specifically, there was neither training nor policy on training for drivers of lube vehicles and insufficient attention to other light vehicle driver safety training. Heavy vehicle drivers gave positive feedback on the driver training courses that were offered by the company but said that these had not been conducted for a while. The nature of recent incidents suggested that vehicle orientation needs improvement. New drivers or drivers who had not

operated certain types of trucks/equipment needed to thoroughly briefed on operational risks associated with the vehicles and equipment.

Schedulers needed more training and would have perhaps benefit by going on at least one trip with a driver so that they have a better understanding of the operations. Moreover, drivers remarked that retail employees don't seem to know much about risks associated with filling tanks, nor did they appreciate exclusion zone requirements and how to assist drivers when unloading.

The "we don't do it if it's not safe" mantra needed more definitive advice to staff as it was subject to each person's judgment of what is safe and what is not. Moreover, safety was sometimes brushed aside in times of time pressures and when drivers are feeling complacent. The two risk aspects pertinent to driver education observed in the company were lack of orientation to differences in vehicle stability performance, and complacent higher risk tendencies of experienced drivers.

Action taken: Driver training was reviewed and a decision to appoint internal driver trainers (former truck drivers) was taken. The company now classifies all who do work-related driving as 'drivers' and the heavy vehicle transport drivers as 'professional' drivers. Training is provided to non-professional drivers every 3 years. No methods for checking for anxiety, complacency nor fatigue have yet been developed by the company. The company now conducts a scheduler education program, including, defining what makes a good scheduler.

9) Leadership and Management

Within the set of indicators for leadership and management performance, the gap spikes were in the areas of showing an unambiguous priority for safety, timely actions for improvements, and strong leadership skills. Generally there was a broad consensus that senior management was committed to safety, however, other pressures influence the day-to-day operational decisions by line management. There was a management skill deficit particularly with regard to people management and health and safety skills. Staff indicated disappointment that things, such as unsafe farm tanks were identified as high priority safety matters "five years ago" and were still awaiting corrective action. There seemed to be an expectation by managers that the health and safety group would be able to fix the safety problems if they are better resourced. This reflected both a lack of confidence in their own abilities to manage safety, and perhaps a misplaced notion of where responsibilities should lie.

Action taken: Although the specific recommendations in this area were not implemented, some additional safety management training is now taking place. Moreover, while there is not a special Safety Leadership award, managers can be awarded for safety leadership as part of the "Spot Awards" program. And 25% of the annual management reviews is focused on safety management.

10) Communication

While communications about health and safety were rated to be of a high standard in the company, many would like to see improved 2-way communications between managers, staff and the health and safety group. By and large, given the size and regionalized nature of the company, the communication systems and practices appeared to be very good. However, there was a slight disconnect between Leaders and line management when it came to translating policies into daily practice. Something was getting lost in translation between the roles of different levels of management. The main gap was in the clarity of the specific safety management expectations, and reinforcement of the primacy of safety over other performance expectations. In addition, the drivers sometimes didn't feel that they are heard or that Leaders took on board their suggestions. They felt they were given a voice at Toolbox meetings, but sometimes didn't get the full feedback from actions discussed.

Action taken: The 9 regional managers visit each depot once per quarter. And the senior manager of operations visits each depot once per year. Also, a message from the managing director features in every quarterly CD sent out to staff. A system or policy for feedback to staff on issues they raise has been implemented, with specific timeframes for feeding back progress.

Safety Outcomes

The data provided includes Days Away From Work due to Injury (DAFWI), reportable injuries, light and heavy crashes, near misses, and product losses. These are presented in Table 2 below, for the years, 2007-April, 2010.

Table 2: Operations area Incidents and Ratios for Years 2007-2010

| | 2007 | 2008 | 2009 | (Jan-April) 2010 |
|--------------------------------|------------|------------|------------|---------------------|
| DAFWI | 3 | 27 | 15 | 9 |
| Hours worked | 840,222 | 855,046 | 851,019 | NA |
| DAFWI rate (per 200,000 hours) | .71 | 6.3 | 3.5 | |
| Recordable injuries | 12 | 20 | 22 | 4 |
| Injury rate/hours | 2.9 | 4.7 | 5.2 | NA |
| Light vehicle crashes | 1 | 3 | 7 | 9 |
| Total kilometres travelled | 2,926,586 | 2,122,236 | 2,123,121 | NA |
| Light vehicle crash ratio | 4.4 | 1.4 | 3.3 | |
| Heavy vehicle crashes | 25 | 17 | 37 | 0 |
| Total kilometres travelled | 20,573,192 | 21,009,219 | 23,667,697 | NA |
| Heavy vehicle crash ratio | 1.2 | 0.8 | 1.6 | |
| Near misses reported | 92 | 40 | 25 | 6 |
| Product loss (litres) | 24,323 | 41,107 | 14,672 | 1,888 |

NA = Not available

As the incidents rates are small, it is difficult to detect pre- and post-Review changes in safety outcomes. The heavy vehicle crash rate has not appeared to have been improved nor worsened, but with such small numbers it is hard to say much about these outcomes for the time prior to the Review (in May, 2008) and after this time. The injuries and days away from work may or may not have occurred as a result of crashes. And the near miss incidents are not thought to be reliable figures as it is suspected that not all near miss incidents are reported.

However, there is evidence that safety management improvements have been implemented since the Review. It was also reported that the company safety manager is focusing more on “lead” indicators for safety management. These are reflected in a new system of staff appraisal for managers. There is evidence of improved processes for risk assessments at delivery points, follow-up corrective actions, vehicle maintenance procedures, recruitment procedures as well as much more systematic training and induction practices.

A review of actions taken against the 67 recommendations of the Review it was found that only 14 recommendations were not acted on. All of the other recommendations (around 80%) have been fully or partially addressed. Moreover, the most comprehensive changes were made in the areas of recruitment/induction/appraisal and driver education, the two safety management elements that the initial survey results indicated as the highest priority areas to address.

Discussion

This case study illustrates how a systematic review, utilizing a safety management system template, can result in observable improvements in safety management within an organisation. The process of this review differs from typical safety audit processes, in that there is a greater participation in the review process than is usually the case with audit procedures, which tend to be focused more on compliance with set procedures, systems, and documentation than consultations with people in the organisation [15].

Because the motivation for the Review was to find opportunities for improving safety management, rather than for accreditation or academic research purposes, an in-depth qualitative process was used [16]. This was necessary so that a good understanding of perceptions, practices and motivations could be understood well enough to proscribe the actions most likely to succeed. The post Review analysis was more of a process review. In other words, it focused on whether or not the recommendations were acted upon and not whether there was an improvement in safety outcomes.

This is an important aspect to safety management reviews, as while some companies espouse safety values, research has indicated that there is a difference in safety performance between organisations that espouse safety and those that adopt safety practices [17].

Limitations

This case study was not initiated as a research study, but rather as a consultancy. The survey development and survey data analysis were not done with scientific rigour, nor were tests for significance carried out. The survey was only used to give the consultants a way of consulting with staff and managers about the safety management items of most importance that needed attention. The survey method was a self-reported perception based survey. Therefore, caution was needed to ensure that the safety improvements did not overly rely on survey results. A follow-up survey has not yet been carried out, therefore, no pre and post survey comparisons can be made. The recommendations from the safety review were based on a combination of survey results, consultations with individuals and groups, safety specialist observations and assessments of systems and practices.

Conclusions

The use of a fleet safety management system template, combined with semi-structured consultations can be developed and generalized for applications in a number of industry sectors, but it is especially helpful in heavy vehicle transport operations.

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