CHAPTER **2**

CARRIER SAFETY MANAGEMENT SURVEY

2.1 SURVEY METHODOLOGY

The primary vehicle for obtaining information in this research project was surveys. Two parallel survey forms were employed: (a) one for current CMV fleet safety managers and (b) one for other experts in motor carrier safety. These are provided in Appendixes C and D, respectively. This section describes the survey methodology in more detail, and the next section of this chapter provides principal results.

The 20 specific problem areas and 28 specific safety management solutions (i.e., practices) listed were identical on the two forms. For the problem areas, respondents were asked to rate the relative importance of the areas on a 5-point scale, and then to identify the five most important problem areas. Safety managers were asked to respond in relation to their own fleets; other experts were asked to respond in relation to CVO in general. Both the rating scale (1–5) and "Top 5" selection choices were employed to make the results more discriminative among the 20 problem areas. For example, if a respondent rated more than five problem areas as "5," he or she still had to select which five of the 20 items were most important. Both safety managers and other experts were instructed to answer the problem items in relation to CMV drivers, not in relation to drivers in general.

For the 28 solutions, safety managers were first asked to indicate "yes" or "no" whether they currently used the safety management method with their fleets. If "yes," they rated the effectiveness of the method in their fleet using the same 5-point scale, and then selected the five most effective methods. Again, the purpose of using both ratings and rankings was to increase the sensitivity of the results. For the other experts, there was no "yes" or "no" question; instead, they simply rated each method in terms of its general effectiveness in carrier safety management and selected their "Top 5" methods.

In the analysis, the scale ratings were treated as interval scale values. That is, it was assumed that there are equal differences between successive values of the scale (e.g., the difference between 1 and 2 is the same as the difference between 2 and 3, and so forth). There was no verification of this assumption, but it was implicit when means were calculated. Means are likely the most sensitive and valid statistical measure of central tendency for the data, even though the interval scale assumption is unverified.

Each survey form collected some basic respondent information. For safety managers, the form asked questions relating to years of experience, fleet size, and primary fleet operations type (e.g., truckload, less-than-truckload [LTL], motor coach). For other experts, the form asked years of experience and specific experience areas (e.g., government, industry trade association, driver, fleet safety manager, research).

The survey forms were distributed through various organizations (e.g., primarily industry trade associations for safety managers) and professional contacts. For the vast majority of fleets, there was only one respondent per fleet. Nevertheless, it was possible for individual fleets to have more than one respondent; most notably, one company had seven respondents representing safety managers at different company terminals throughout the country. Both samples may be characterized as representing safety-conscious individuals working in the industry or otherwise associated with CVO. For example, most of the participating trade associations distributed the survey to their safety council members only. Attendees (both safety managers and other experts) at several truck and bus safety conferences were also sent survey forms. Of course, those who completed and returned a survey of this nature were probably those most interested in the topic and committed to support efforts relating to it. Study resources did not permit the design of a systematic subject sampling and survey distribution process or the tracking of survey return rates for various respondent groups.

Survey responses were entered by hand into a spreadsheet, which was programmed to tabulate results. All survey responses were confidential and there is no attribution of responses by individual, company name, or other organizational affiliation in this synthesis. Nevertheless, for several trade associations, survey results were tabulated separately for their members and returned to their safety coordinators for their own organizational use. In this report, however, unless otherwise indicated, statistics cited are only for the two major (and separate) respondent groups: fleet safety managers and other experts.

2.2 PRINCIPAL RESULTS

2.2.1 Safety Management Problems

Table 1 provides a summary of the importance ratings and rankings of the 20 CMV safety problem areas addressed by

TABLE 1   Safety management problem areas

PROBLEM AREA:	SAFETY MANAGER				OTHER EXPERTS			
	Importance Rating		"Top 5" Selections		Importance Rating		"Top 5" Selections	
	Mean	Rank (of 20)	%	Rank (of 20)	Mean	Rank (of 20)	%	Rank (of 20)
1. Insufficient training:								
a. Lack of basic driving skills.	2.74	14	17%	12	3.26	17	16%	9
b. Poor knowledge of federal, state, and/or company rules	3.04	12	18%	11	3.30	16	11%	13
2. At-risk driving behaviors (e.g., speeding, tailgating)	3.75	1	55%	1	4.21	3	58%	4
3. Aggressive driving (i.e., "road rage")	3.26	7	26%	8	3.33	11	14%	11
4. Lack of defensive driving skills (e.g., space management around vehicle)	3.48	4	40%	4	3.58	8	23%	7
5. Driver fatigue/drowsiness	3.37	6	29%	6	4.28	2	67%	2
6. Delays associated with loading and unloading (e.g., resulting in long working hours, tight schedules, and fatigue)	3.45	5	40%	4	4.18	4	60%	3
7. Alcohol and/or illicit drug abuse	1.99	20	2%	20	2.54	20	2%	19
8. Driver health and wellness problems, specifically:								
a. Lifestyle/general health-related (e.g., poor diet, smoking)	3.65	3	46%	2	3.79	6	44%	6
b. Sleep apnea	3.07	11	9%	14	3.79	6	16%	9
c. Cardiovascular illness/heart disease	3.19	8	13%	13	3.32	12	4%	17
d. Prescription drug side effects (e.g., drowsiness)	2.73	16	3%	19	3.32	12	2%	19
e. Mental illness (e.g., depression, anxiety, mood disorders)	2.59	17	4%	17	3.05	19	4%	17
9. Poor attitude and morale, loneliness, alienation, unhappiness	3.16	9	29%	6	3.47	9	14%	11
10. Driver turnover resulting in unstable workforce	2.96	13	23%	10	4.09	5	46%	5
11. Drivers unfamiliar with routes	2.74	14	9%	14	3.32	12	11%	13
12. Neglect of vehicle maintenance (e.g., brakes, ties)	2.36	19	8%	16	3.38	10	18%	8
13. Failure to inspect vehicle (e.g., pre-/post-trip)	3.16	9	24%	9	3.32	12	5%	15
14. Unsecured loads	2.38	18	4%	17	3.23	18	5%	15
15. High-risk drivers [all causes combined] (i.e., the degree to which managers should focus on the worst 10-20% of their drivers)	3.69	2	42%	3	4.43	1	68%	1

the survey. The statistics for safety managers (N = 139) and other experts (N = 57) are presented separately. For each group, four statistics are provided:

- Mean importance rating,
- Rank of importance ratings (i.e., highest average rating = 1),
- Percent of respondents selecting problem as among "Top 5," and
- Rank of percent selection as among "Top 5" (i.e., highest percentage = 1).

One interesting systematic difference between safety managers and other experts was that the safety managers' mean importance ratings were generally much lower on the 5-point scale. The overall average importance rating for all 20 items was 3.04 for the safety managers versus 3.56 for the other

experts. All 20 problem items received lower mean ratings from safety managers than from other experts. Recall that safety managers were asked to respond in regard to their own fleet, whereas other experts were asked to respond in relation to CMV safety in general. This seems to parallel the common finding that drivers tend to rate their own driving as much safer than that of drivers in general. An alternative explanation is that, since the safety manager respondents did represent a safety-conscious sample (see Section 2.1), their ratings of their own fleets are an accurate reflection of safer operations. Regardless, this difference is worth remembering when interpreting the results. Comparisons between safety managers and other experts in this synthesis will address their *relative* ratings of the various problems, as opposed to their absolute mean ratings.

Not surprisingly, there were high correlations across the four statistics for the 20 problem areas shown in Table 1.

Although the correlations were high, there were a few notable differences in relative importance ratings. The two largest differences in the relative ratings were as follows (note: lower rankings indicate higher relative importance ratings):

- Driver turnover resulting in unstable workforce (Item 10):
  – Safety managers: rated 13th of 20 problems
  – Other experts: rated 5th of 20 problems
- Neglect of vehicle maintenance (Item 12):
  – Safety managers: rated 19th of 20 problems
  – Other experts: rated 10th of 20 problems.

The various specific findings in Table 1 will be discussed primarily in the context of the individual problem areas (see Chapter 3).

2.2.2 Safety Management Solutions

Table 2 provides a summary of the effectiveness ratings and rankings of the 28 CMV safety solutions (management methods) addressed by the survey. The statistics for safety managers and other experts are presented separately. For safety managers, five statistics are provided:

TABLE 2   Safety management solution areas

SOLUTION AREA:	SAFETY MANAGERS					OTHER EXPERTS			
	Effectiveness Rating			"Top 5" Selections		Effective-ness Rating		"Top 5" Selections	
	% Who Use	Mean	Rank (of 28)	%	Rank (of 28)	Mean	Rank (of 28)	%	Rank (of 28)
1. Safe driver recruiting methods									
a. Requiring that new hires meet or exceed a minimum number of years of driving experience	86%	4.15	4	46%	2	3.55	24	13%	15
b. Hiring based on criteria relating to driver crash, violation, or incident history	90%	4.19	2	53%	1	4.36	2	54%	1
2. Training standards/programs:									
a. Standardized training for all new hires [e.g., company policy & procedures, customer relations, defensive driving skills, rules for driving (e.g., speeding, headway)]	87%	4.11	6	40%	3	4.18	4	32%	5
b. Apprenticeship and "finishing" programs for new drivers, conducted by safety manager or senior driver	51%	4.01	9	15%	17	4.36	2	27%	6
c. Regular refresher training for all drivers	63%	3.94	16	16%	15	4.18	4	24%	7
d. Remedial training programs for problem drivers	69%	3.99	10	14%	20	4.14	6	21%	10
3. Regularly-scheduled safety meetings	75%	3.96	14	31%	8	3.57	22	7%	22
4. Regular safety performance evaluations:									
a. Observation of driving behaviors through ride-alongs	48%	4.07	8	31%	8	3.55	24	13%	15
b. Continuous tracking of driver's crashes/incidents/violations	92%	4.16	3	24%	12	4.46	1	38%	2
5. Tracking of overall fleet safety statistics (e.g., fleet crash/violation rate)	88%	3.98	11	13%	24	4.00	10	15%	13
6. Driver incentive programs for outcome-based safety measures (i.e., reward for crash-free miles)	73%	3.83	21	28%	10	3.89	14	20%	11
7. Behavior-based safety [i.e., observation, self-observation, feedback, incentives focusing on safety-related driving behaviors (e.g., safety belt use, safe speeds, safe headways)]	59%	3.80	22	14%	20	3.95	12	11%	20
8. On-board computer monitoring devices *with* management review, feedback and rewards/punishments for good/poor performance	36%	3.85	18	33%	7	3.86	16	22%	9
9. On-board computer monitoring (e.g., speed monitoring) and feedback to drivers *without* management review	21%	3.09	28	9%	27	3.05	27	5%	24
10. Event-data recorders ("black boxes") used to reconstruct crashes and incidents	24%	3.59	24	17%	14	3.41	26	7%	22

- Percent who use ("yes/no" response),
- Mean effectiveness rating,
- Rank of effectiveness ratings (i.e., highest average rating = 1),
- Percent of respondents selecting solution as among "Top 5," and
- Rank of percent selection as among "Top 5" (i.e., highest percentage = 1).

As for the safety problems, safety managers were responding in regard to their own fleets in their effectiveness assessments. They were asked to rate the items on the 5-point effectiveness scale only if they reported "yes" to the yes/no use question, and the mean effectiveness rating for each item was calculated only for those who rated the item.

The fourth statistic (percent of respondents selecting solution as among "Top 5") was also calculated by dividing the number of such selections by the number of respondents who rated that item. These statistics were then used to derive the fifth statistic listed (rank of percent selection). Thus, it would be possible for a rarely used method (i.e., not rated by many respondents) to still receive a high ranking, if those who did use the method rated it highly.

For other experts, there was no "yes/no" question, but the remaining four statistics are the same as those for safety managers. The other experts were responding in regard to CVO

TABLE 2 *(Continued)*

SOLUTION AREA:	SAFETY MANAGERS					OTHER EXPERTS			
	Effectiveness Rating			"Top 5" Selections		Effectiveness Rating		"Top 5" Selections	
	% Who Use	Mean	Rank (of 28)	%	Rank (of 28)	Mean	Rank (of 28)	%	Rank (of 28)
11. Crash and incident investigation by carrier management (e.g., visit to crash site, completion of company forms, in-house review panel, final determination of fault/preventability with recommendations)	83%	4.13	5	27%	11	4.00	10	18%	12
12. "How's My Driving" placards and 800 numbers	22%	3.50	25	16%	15	2.61	28	5%	24
13. Improved communication between drivers and dispatchers regarding scheduling and dispatching to prevent fatigue	72%	3.97	12	35%	5	4.07	8	33%	4
14. Fatigue management programs [i.e., employing fatigue education, sleep disorder screening (e.g., sleep apnea), and "fatigue-conscious" scheduling and dispatching]	43%	3.85	18	23%	13	4.11	7	38%	2
15. Fleet-based medical programs:									
a. Medical screening/counseling (e.g., sleep apnea, cardiovascular)	38%	3.88	17	12%	25	3.91	13	15%	13
b. General health & wellness instruction/counseling	37%	3.46	27	7%	28	3.68	19	9%	21
16. Preventive maintenance programs:									
a. Regularly scheduled vehicle inspection and maintenance	91%	4.35	1	40%	3	4.07	8	13%	15
b. Trip sheets (driver documentation of pre- and post-trip maintenance inspections)	87%	3.76	23	11%	26	3.57	22	4%	28
17. Safety-related equipment on new vehicles:									
a. Basic equipment (e.g., engine specs, conspicuity lighting)	88%	3.97	12	14%	20	3.71	18	5%	24
b. Advanced technology collision avoidance systems (e.g., forward/rear obstacle detection)	16%	3.48	26	14%	20	3.68	19	13%	15
18. Within carrier management, alignment of operational and safety functions (e.g., the safety manager is also a direct supervisor)	59%	4.10	7	34%	6	3.89	14	23%	8
19. Safety management quality certification programs (i.e., involving outside consultant):									
a. Certification of carrier safety management practices	36%	3.85	18	15%	17	3.73	17	13%	15
b. Certification of individual fleet safety managers (i.e., professional certificate)	36%	3.96	14	15%	17	3.64	21	5%	24

in general and usually rated all 28 items, so the Ns for the various items were less variable. Consistent with this, the average *number* of ratings was much lower for safety managers than other experts. Safety manager respondents rated an average of 18 of the 28 items, whereas other expert respondents rated an average of 27 of the 28.

There was no consistent difference in the effectiveness ratings assigned by safety managers versus other experts. The overall means were very similar (3.89 versus 3.82). Moreover, because the safety managers rated only those practices that they used, direct comparisons of mean ratings between the two groups are not very meaningful. As previously mentioned, comparisons noted between safety managers and other experts will address their *relative* ratings of the various solutions, as opposed to their absolute mean ratings.

Once again, there were high correlations across the statistics for the 28 solution areas shown in Table 2.

Most solutions rated highly effective by the safety managers were also rated highly effective by the other experts, and vice versa. However, there were some differences. Examples from Table 2 include the following (note: lower rankings indicate higher relative effectiveness ratings):

- Requiring that new hires meet or exceed a minimum number of years of driving experience (Item 1a):
  – Safety managers: rated 4th of 28 solutions and
  – Other experts: rated 24th of 28 problems.
- Observation of driving behaviors through ride-alongs (Item 4a):
  – Safety managers: rated 8th of 28 solutions and
  – Other experts: rated 24th of 28 problems (tied with item noted previously).
- Regular refresher training for all drivers (Item 2c):
  – Safety managers: rated 16th of 28 solutions and
  – Other experts: rated 4th of 28 problems.
- Fatigue management programs (Item 14):
  – Safety managers: rated 18th of 28 solutions and
  – Other experts: rated 7th of 28 problems.

The various specific findings in Table 2 will be discussed primarily in the context of the individual safety management methods (see Chapter 4).

2.2.3 Respondent Information

Both survey forms asked respondents to provide some general demographic information about themselves and, for safety managers, their fleets. Key points are summarized as follows.

Safety Managers

The 139 safety manager respondents had been safety managers for an average of 12.0 years (range: 1 to 32) and had an average of 22.4 total years of experience in CVO (range: 3 to 43). Fleet size varied widely, ranging from 4 to 11,500 power units. The median fleet size was 200, indicating that the sample generally represented safety managers in larger fleets. Safety managers from LTL fleets generally represented very large operations; the median fleet size for these respondents was 1,475 power units. Figure 1 is a histogram showing the percentage of respondents in four fleet size categories for the overall sample (all operations types): small (1–24, 11%), medium (25–94, 24%), large (94–499, 34%), very large (500+, 32%). These specific ranges were selected for comparability with Corsi and Barnard (2003).

The survey asked safety managers to indicate the principal operation type of their fleet. The following is the breakdown:

- 49% for hire, long-haul/truckload;
- 13% for hire, long-haul/LTL;
- 10% for hire, local/short-haul (SH); most trips < 100 mi;
- 14% private industry [private carrier], long-haul (LH);
- 18% private industry [private carrier], local/short-haul (SH); most trips < 100 mi; and
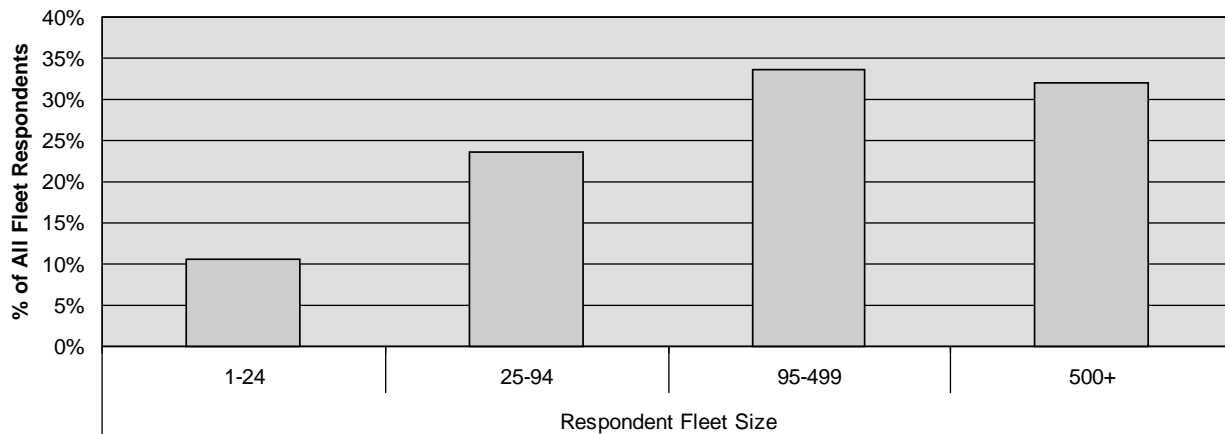- 3% other (1% passenger carrier, long-haul/motor coach; 2% mixed operations).

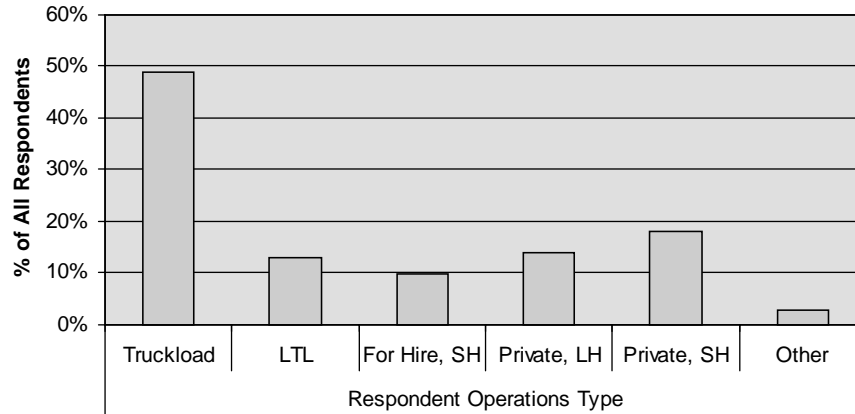

Figure 1.   Safety manager respondent fleet size.

Figure 2. Respondent fleet operation type.

Figure 2 shows these results graphically. Since a few fleets had multiple respondents, the operation-type percentages are reflective of the respondents, but not the participating fleets per se. Also, a few respondents indicated more than one operations type, so the percentages add to slightly more than 100%.

The for-hire LTL fleets represented by respondents tended to be very large; the median was 1,475 power units. For-hire truckload fleets had a median of 210, and private long-haul fleets had a median of 100. Short-haul fleets (most of which were private) had a median of 76 power units.

Other Experts

The 57 other expert respondents had an average of 16.6 years experience relating to CVO traffic safety (range: 3 to 33). These respondents were asked to indicate their professional experience area(s) relating to CVO safety. The following is the breakdown:

- 23% government enforcement;
- 32% other government (e.g., rulemaking);
- 30% industry trade association;
- 18% CMV driver;
- 19% carrier safety manager;
- 37% accident investigation/data analysis;
- 12% other carrier management position;
- 54% CVO safety research;
- 2% journalist;
- 18% driver trainer;
- 10% insurance for motor carriers; and
- 9% other (e.g., safety consulting).

The above percentages sum to well over 100% because most respondents gave multiple responses. The results show that the experience base of the other experts was both extensive and varied, with heavy representation of individuals with backgrounds in government, accident investigation/data analysis, and research.