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Articles relating to carrier management, modal and intermodal transportation of goods and people in both the domestic and international areas are accepted. Topics from allied areas such as public policy, logistics, purchasing and distribution are also acceptable if they are specifically related to the objective stated above. Because articles are to have a real-world orientation, those which are theoretical in content with no application for practitioners are inappropriate for The Journal of Transportation Management.

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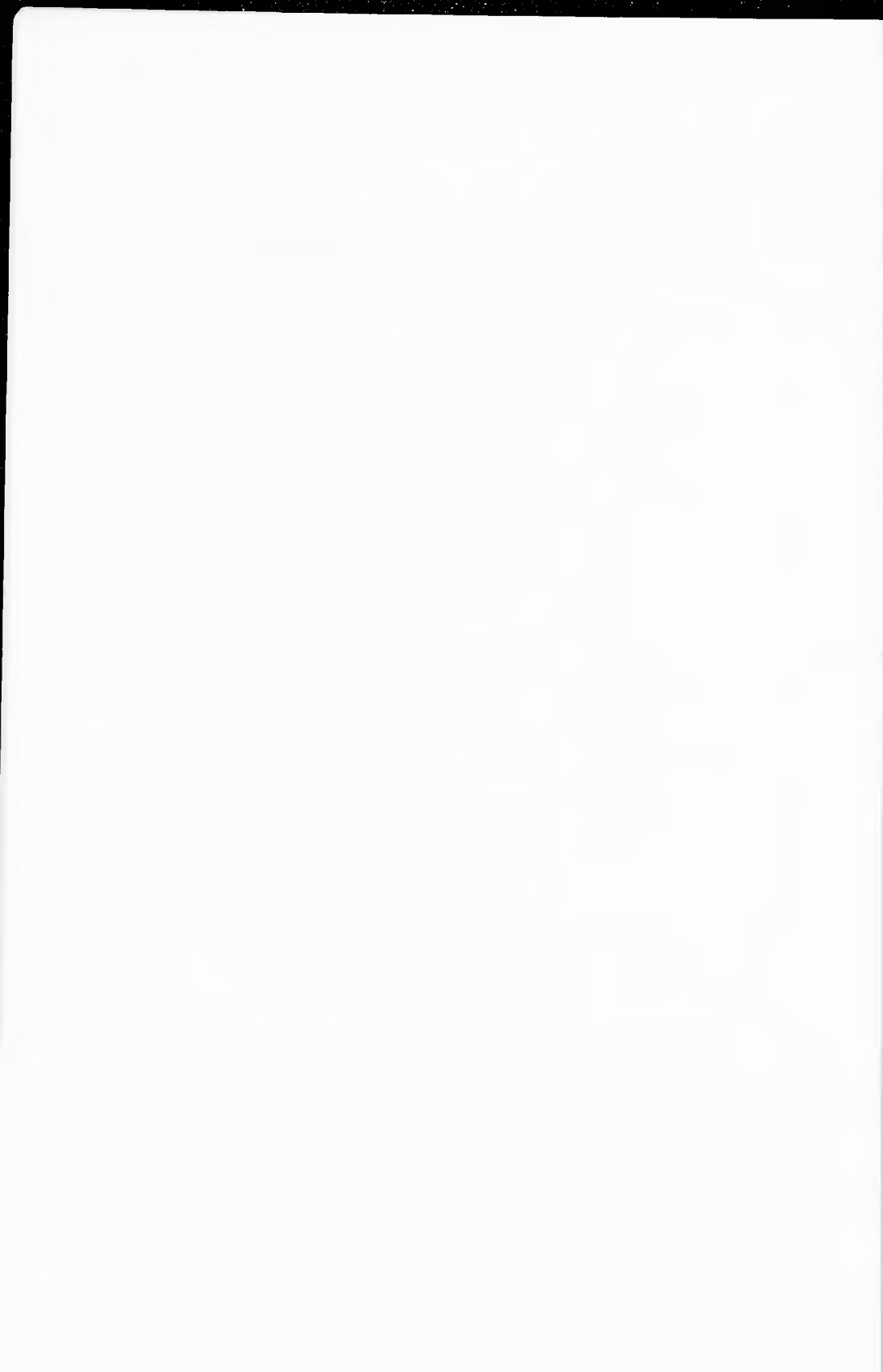
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HIGHER SPEED LIMITS AND SAFETY: THE CASE OF PRODUCE HAULERS

by
Richard Beilock
University of Florida

INTRODUCTION

Despite heightened concerns regarding motor carrier safety, in the spring of 1987 the U.S. Congress enacted legislation permitting states to increase speed limits to 65 miles per hour along most rural portions of the Interstate System and, subsequently, along rural portions of comparable roadways. It is generally recognized that accidents tend to be more severe the higher the speeds of the vehicles involved. Relative to automobiles, heavy trucks have larger mass, longer stopping distance, and more limited maneuverability; in addition, the probability of jackknifing increases at higher speeds. In its recent report to Congress, the Office of Technology Assessment found a strong positive relationship between posted speed limits and fatal truck accidents. It concluded:

In view of the major role speed plays in fatal truck accidents and the many characteristics of heavy vehicles that make more difficult and time consuming to stop safely, Congress may wish to reexamine the decision to permit truck speeds of 65 mph at the discretion of States and to explore other methods of controlling excessive speeds for heavy vehicles. (OTA, p. 105)

Along with speed, driver fatigue is widely recognized as a major safety hazard. Drivers are normally paid on a piece rate basis (i.e., by the mile or load),¹ and shipper/receivers or carriers normally set schedule requirements. Therefore, drivers may have incentives to drive longer and/or faster than is prudent or legal. In a study of 346 severe accidents involving motor carriers, U.S. D.O.T. found 27 percent due to excessive speed, 25 percent linked to driver fatigue or dozing at the wheel, and a further 21 percent associated with inattention, which could be a sign of fatigue. Moreover, 11 percent of the drivers had falsified log books or were otherwise found to be in violation of Hours of Service Regulations (HSR).²

A possible safety benefit from higher speed limits could be less pressure on drivers to speed or drive for long periods. With higher speed limits, a driver should be able to complete the same amount of work as before in a shorter time without violating speed limits or HSR. This advantage could be reduced or eliminated if schedules were adjusted to require more work per unit time. For example, Beilock and Capelle (1988) found that among general freight haulers, the combination of schedule adjustments and the 65 mph speed limit had resulted in very modest reductions in pressures to speed or violate HSR.

In this paper, the effects of higher speed limits on the pressures experienced by produce haulers to violate speed or HSR are examined. These pressures are measured, in this study, in terms of the relationship between the time allowed drivers to move from origin to destination points and the amount of time necessary to legally cover these distances. Schedules with smaller allowed time to legally-necessary time ratios will be referred to as being "tighter." The exact methodology employed for measuring schedule tightness is discussed in the next section. Produce haulers are of particular interest because they are likely to be subjected to greater shipper/receiver-induced pressures to deliver quickly than are those hauling most other goods. Indeed, a comparison of produce haulers and nonproduce haulers indicates that the former are much more likely

to be on schedules which would force violations of speed limit or HSR.³ This follows because produce is highly perishable and because most of the buying activity on wholesale produce markets is concentrated into a few hours each day. A late delivery to a market, even by as little as an hour, can result in a much reduced price received or force expensive refrigerated storage for a day (if available) or both.

The specific objectives of this paper are to:

1. Develop and compare schedule tightness estimates for long-distance produce haulers before and since passage of legislation permitting 65 mph speed limits.
2. Examine the sensitivity of the results to assumptions regarding previous driving times and average speeds attainable with 65 miles per hour speed limits.
3. Assess whether or not there are significant differences in schedule tightness by driver, carrier, or trip characteristics.

DATA AND METHODOLOGY

Data for this study are drawn from two surveys of produce haulers as they exited the Florida Peninsula. The first survey was conducted for three, two-day sessions during the 1984/85 growing season. One thousand three hundred and forty-six drivers were interviewed.⁴ The second effort involved interviewing 1,762 drivers over four, two-day sessions during the 1987/88 growing season.

The sites for both surveys were the Florida Agricultural Inspection Stations located on U.S. 1-10, 1-75, and 1-95. All trucks passing the stations are required to stop. These three sites account for 85 to 90 percent of all traffic and all other roadways have similar stations (so avoidance is not an option). Refusal rates at each station were low, averaging under 10 percent.⁵

Drivers were asked a wide range of questions regarding their current produce load, the trip which brought them to Florida, and some demographic information. Interspersed among these were questions regarding: pickup points, drop points, number of drivers, and latest time the driver could arrive at the first drop without being late.⁶ The answers to these questions, a record of the time and place of the interview, and mileage estimates⁷ were used as inputs in calculating schedule tightness. The spreading of these questions across the interviews and the nonthreatening approach used for the survey essentially eliminated the problem of response bias due to self-protection motives. In over 3,000 interviews no respondent ever indicated awareness that we were developing information to estimate schedule tightness.

The tightness of a schedule may be gauged by either the amount (or percent) of time over or under the legal limit necessary to drive while obeying speed limits, or by the average speed necessary while obeying HSR. For this study, the latter approach was adopted. The estimated average speed necessary to maintain the schedule (as far as the first destination subsequent to the interview) is denoted as SCHSPD. Three basic assumptions were made:

1. The driver drove nonstop from central or southern Florida to the interview sight. For 1984/85 this driving time was assumed to be 4 hours. For 1987/88 driving time to the interview sites were estimated according to distance calculations. As a practical matter, the two approaches were essentially identical.⁸
2. The driver was fully rested prior to the trip. (That is, there were no driving or on-duty hours that would affect HSR calculations.)
3. All roadways in a state used by a trucker had speed limits equivalent to the highest speed limit in that state.

Except for stops for fuel and meals, the assumption that drivers drove nonstop from the origin points to the interview sites is probably true in virtually all instances. The interviews were conducted each day from 6:00pm to 1:00am. It seems unlikely if many drivers passing the inspection stations during these hours had slept between picking up their loads and reaching North Florida. This would not be true if the interviews had been conducted from 3:00am through noon.

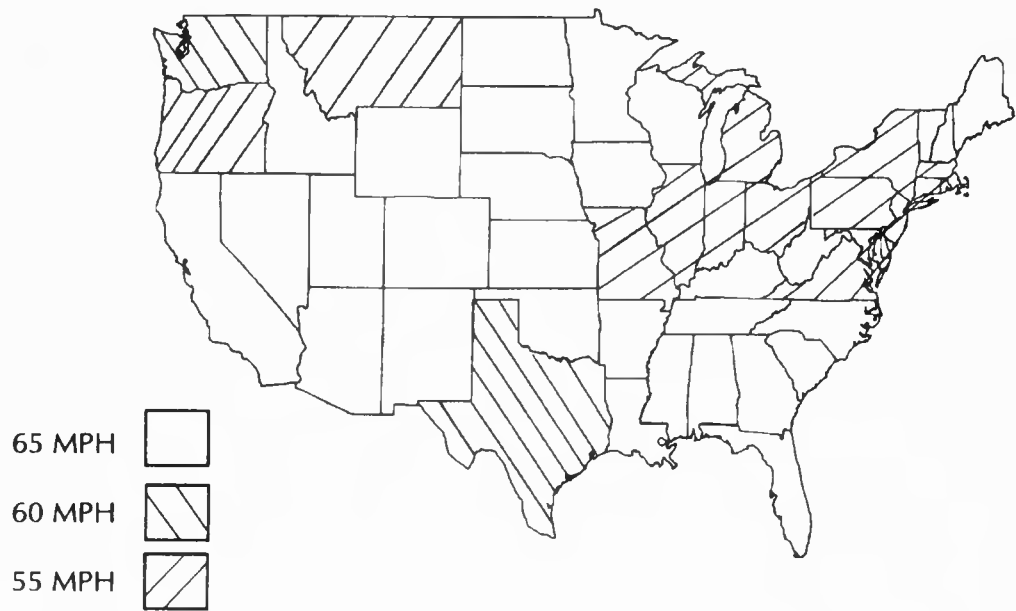
Assuming that drivers were fully rested prior to their current journey is extremely conservative. As part of the analysis of the 1987/88 data, this assumption was relaxed. Also conservative is the assumption that all roadways used to cross a state have speed limits equal to the highest in the state. The assumption is particularly unrealistic for speeds over 55 MPH, because such speeds are legal only on eligible rural Interstates and comparable limited-access highways. The effect of relaxing this assumption for states with maximum speed limits over 55 MPH will also be explored.

To facilitate the pre/post 65 MPH comparison of schedules, 55-MPH-time-equivalent distances (DIST55) were calculated as follows:

$$(1) \quad \begin{array}{lcl} \text{DIST55} & = & \text{DIST} * (55/\text{SPDMAX}) \\ \text{where: DIST} & = & \text{actual distance} \\ \text{SPDMAX} & = & \text{maximum speed limit in state} \end{array}$$

In other words, DIST55 is the distance which could be traveled at 55 MPH in the same time as the actual distance could be crossed at the prevailing maximum speed limit. For example, if the actual distance to be traversed across a state was 300 miles and the prevailing maximum speed limit in the state was 55 MPH, then the actual (300 mile) distance would be employed in calculating schedule tightness. However, if the prevailing maximum speed limit was 60 MPH, then 275 miles ($300 \times 55/60 = 275$) would be used in the calculation, and 253.85 miles ($300 \times 55/65 = 253.85$) would be

FIGURE 1
MAXIMUM SPEED FOR TRUCKS ON RURAL INTERSTATE HIGHWAYS, 1987-1988



used if the maximum speed limit were 65 miles per hour. This adjustment, is intended to eliminate or control for changes in speed limits; i.e., to make SCHSPD estimates consistent regardless of the speed limits in force. The maximum speed limits in force for trucks in each of the 48 Continental U.S. States at the time of the 1987/88 survey are presented in Figure 1.

To accomplish objective 2, the analysis was repeated, using the 1987/88 data, with the following modifications:

1. To test sensitivity to previous driving time, schedule tightness was successively recalculated with 1, 2, 3, ... and 8 hours of driving time added to the origin-to-survey site portion of the movement.
2. The analysis was also repeated with the following maximum legally attainable speeds assumed:

Maximum legal <u>speed limit</u>
60
65

Maximum legally <u>attainable speed</u>
57.5
60

and

Maximum legal <u>speed limit</u>
60
65

Maximum legally <u>attainable speed</u>
55
55

For Objective 3, contingency table analysis or simple correlations between schedule tightness measures, on the one hand, and selected driver, carrier, and trip characteristics, on the other

hand, was performed. While of interest, misleading results from such univariate analyses is possible as an uncontrolled covariate(s) may mask true relationships. Therefore, a multivariate approach was desirable. To meet this need, the following regression was estimated:

$$(2) \text{ SCHSPD} = b_0 + b_1 \cdot \text{DIST2} + b_2 \cdot \text{RAT65} + b_3 \cdot \text{DRIVERS} + b_4 \cdot \text{EXPER} + b_5 \cdot \text{AUTH} + b_6 \cdot \text{PRIV} + b_7 \cdot \text{OWNOP} + b_8 \cdot \text{VALUE} + E$$

Where:

- $b_0 \dots b_8$ = unknown parameters to be estimated
- DIST2 = actual distance from interview site to the next destination.
- RAT65 = the proportion of DIST2 through states with maximum speed limits above 55 MPH
- DRIVERS = the number of drivers in the tractor
- EXPER = the years of professional driving experience of the individual driving the truck at the time of the interview
- AUTH = equals 1 if the firm owning the tractor has an ICC authority, zero otherwise
- PRIV = equals 1 if a private carrier, zero otherwise
- OWNOP = equals 1 if an owner-operator, zero otherwise
- VALUE = equals 1 if strawberries, tomatoes, or ornamentals, zero otherwise

The rationales for postulating that SCHSPD might be a function of each of these variables are briefly discussed below.

HSR mandate periodic rests. If schedules do not fully account for these stops, violation-inducing schedules will result (i.e., SCHSPD's will tend to be higher than are legally attainable). The longer the distance, the longer the driving time necessary, and the more legally required rest stops, *ceteris paribus*. Therefore, if stops are not fully accounted for in schedules, schedules will tend to be higher, the longer the distance (DIST2). By similar reasoning, if schedules have not been fully adjusted to take advantage of higher-than-55 MPH speed limits, SCHSPD and the proportion of DIST2 with higher speed limits (RAT65) should be inversely related.

Team driving allows one driver to rest without stopping the vehicle. Therefore, it is expected that, on average, SCHSPD would be lower for similar trips if team drivers are used (i.e., if DRIVERS is greater than one).

EXPER is included on the premise that more experienced drivers may differ from their less experienced colleagues regarding the tightness of the schedules they are willing to accept or expected to meet. There may also be differences in SCHSPD across carrier types (OWNOP and PRIV, with for-hire fleets as the omitted category) and between those holding and not holding Interstate Commerce Commission Authorities. Reasons for such hypotheses include the widespread perception among drivers that owner-operators are the most likely to disregard speed and HSR (Beilock and Capelle, 1987), and the Office of Technology Assessment's findings that ICC-exempt carriers have higher violation rates and more serious safety problems (OTA, p. 99).

Tomatoes, strawberries, and ornamentals are among the most valuable and/or perishable crops hauled out of Florida. Freight rates for higher valued commodities generally tend to be higher. DeVany

and Saving suggest that this may be due to demands for expedited service. If true, delivery schedules for these commodities would be expected to be tighter, *ceteris paribus*, than for less valuable commodities.

RESULTS

Pre and Post 65 MPH Scheduling

The results indicate that between 1984/85 and there has been a marked easing of the schedules produce/ornamentals drivers operate under. The average SCHSPD for 1984/85 was 50.5 MPH versus 40.9 MPH in 1987/88. This difference is easily significant at the .01 Level of probability.

What percent of the drivers in each year had violation-inducing schedules? The rule of thumb for the U.S. Department of Transportation's Office of Motor Carrier Standards is that for trips over 10 hours duration (as was the case for virtually all in the samples) on roadways with 55 MPH speed limits, average speeds over 45 MPH are suspect (violation-suspect schedules) and over 50 MPH are considered impossible without violating the speed limit or HSR or both (violation-inducing schedules). By this rule, 44 percent of the drivers in 1984/85 had violation-suspect schedules and 35 percent had schedules which were clearly violation-inducing. The corresponding percentages in 1987/88 were 32 and 22 percent, respectively (Table 1). While the drop in clearly violation-inducing schedules from a over a third to less than a quarter is impressive, it should be remembered that this is still a very high percentage and that extremely conservative assumptions were used to develop the estimates. The impacts of relaxing those assumptions are discussed in the next subsection.

The results also suggest that the easing of schedules is due in large measure to higher speed limits, rather than to changes in schedules. In Figure 2 the percentages of drivers whose schedules required them to exceed speeds from 30 to 80 MPH (while obeying HSR) are presented. A smaller percentage of the 1987/88 drivers needed to exceed each speed level to stay on schedule than was true for the 1984/85 drivers. However, if the 55 MPH National Speed Limit had still been in force in 1987/88, the results for both years would have been virtually identical over a wide range of speeds (in Figure 2 and Table 1, compare 1984/85 and 1987/88-unadjusted).

TABLE 1
PERCENTAGES OF DRIVERS NEEDING TO EXCEED SELECTED
AVERAGE SPEEDS

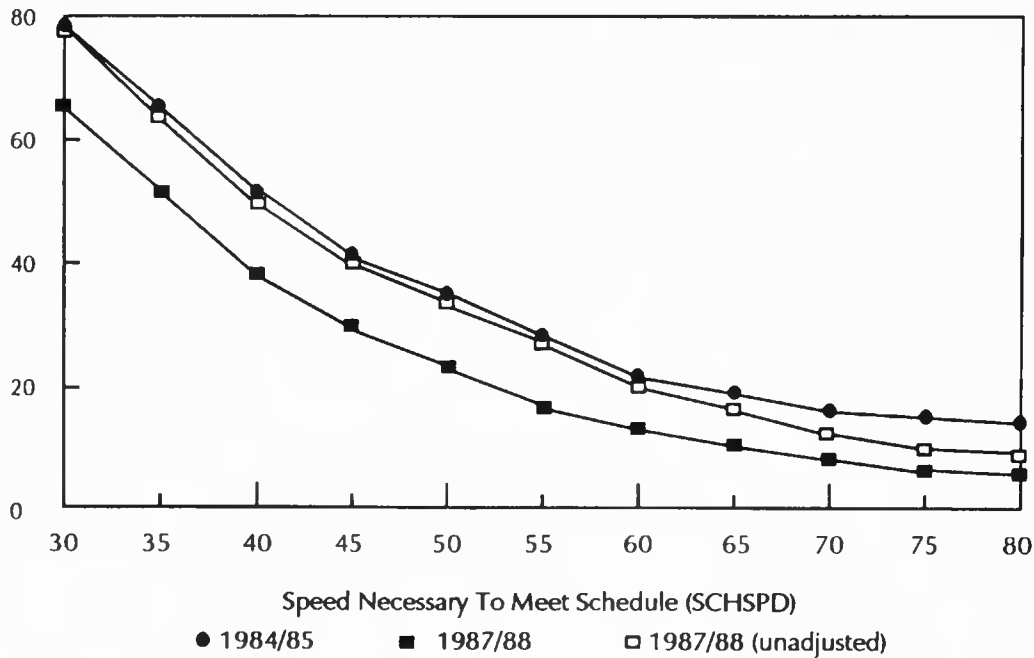
	Average Trip Speed		
	<u>45 MPH</u>	<u>50 MPH</u>	<u>55 MPH</u>
1984/85 drivers	44	35	38
1987/88 drivers	32	22	15
1987/88 drivers (1/2 adj) ¹	37	29	20
1987/88 drivers (unadjusted) ²	43	34	28

Notes: ¹Maximum attainable speeds with 60 MPH speed limits assumed to be 57.5 MPH. For states with 65 MPH speed limits, maximum attainable speeds of 60 MPH assumed.

²All states treated as though they had 55 MPH speed limits.

FIGURE 2
SCHEDULE TIGHTNESS BEFORE AND AFTER 65 MPH SPEED LIMITS

Percent of Drivers Needing Higher
Speed to Meet Schedule



RELAXING ATTAINABLE SPEED AND PREVIOUS DRIVING ASSUMPTIONS

The assumption that all roadways used have speed limits equal to the highest in the state no doubt results in underestimates of schedule tightness. This is likely to be particularly true for states with speed limits exceeding 55 MPH, because such speed limits are only applicable to rural portions of selected limited-access highways. It may seem more reasonable, therefore, to discount a portion of the speeds above 55 MPH. As discussed in the previous subsection, without such discounting, the 1987/88 schedules appear to be much looser than those in 1984/85, but with complete discounting (i.e., with no "credit" for supra-55 MPH speeds) the results for both years are essentially identical (Figure 2 and Table 1).

Taking the middle ground of crediting half of the supra-55 MPH speeds (equivalent to assuming that half the roadways used in a state have supra-55 MPH speed limits) still results in significant improvements over 1984/85. While in 1984/85 the average SCHSPD was 50.5 MPH, the 1987/88 average would be 43.7 MPH and only 29 percent would have clearly violation-inducing schedules (Table 1).

Assuming the driver had not logged driving or on duty time prior to the current produce haul is also extremely conservative. Earlier in the day, many, if not most drivers spent several hours of driving or on-duty time dropping off the previous load and repositioning for one or several pickups. Driving during the days immediately preceding the produce haul would also have an impact if the driver is close to the 60 hour limit (see footnote 2). However, there was not sufficient time with each respondent to determine his/her recent driving/on-duty history and, moreover, such inquiries would have alerted drivers regarding our intent to determine legal and illegal schedules.

Schedule tightness is very sensitive to the amount of prior driving time. Going from zero to 4 hours prior driving time, the number of drivers with violation-suspect schedules (i.e., SCHSPD over 45 MPH) increases by nearly a fifth from 32 to 38 percent of all drivers, and the violation-inducing schedules (i.e., SCHSPD over 50 MPH) increases by nearly half from 22 to 31 percent of all drivers (Table 2). With 8 hours prior driving, 44 percent of all drivers have violation-suspect schedules and 35 percent have violation-inducing schedules. Again, it was impossible to determine the actual number of previous driving and on-duty hours for each driver. Therefore, the conservative approach of assuming none was adopted. The sensitivity of the results to this assumption suggests that considerably more drivers actually have violation-suspect or violation-inducing schedules than is indicated under the zero prior driving time assumption.

DIFFERENCES IN SCHSPD ACCORDING TO CARRIER, DRIVER, AND TRIP CHARACTERISTICS

Identifying driver, carrier, and trip characteristics associated with tight schedules would be of value to policymakers and industry participants. In this subsection, the associations of selected characteristics with SCHSPD are examined via both univariate and multivariate analyses.

Univariate Analysis

There are no indications of (statistically significant) differences regarding schedule tightness across carrier types or between carriers possessing and not possessing ICC Authorities (Table 3). These results are consistent with the position that structural changes and reduced economic regulations do not or only tangentially impact upon attained safety Levels.

TABLE 2
RELATIONSHIP BETWEEN (SCHSPD) AND THE NUMBER
OF HOURS ASSUMED DRIVERS IMMEDIATELY PRIOR TO
CURRENT TRIP

<u>Hours of prior driving time</u>	<u>Percent of drivers with SCHSPD over 45 MPH¹</u>	<u>50 MPH²</u>
0	32	22
1	34	25
2	36	28
3	37	29
4	38	31
5	39	31
6	40	32
7	43	33
8	44	35

Notes: ¹Violation-suspect schedule.

²Violation-inducing schedule.

Team drivers are only about a third as likely as single drivers to have violation-suspect or violation-inducing schedules (Table 3). This finding no doubt reflects understandable reticence on the part of some carriers to employ a second driver. According to USDA estimates (Buxton), variable costs for a fleet-owned produce truck were 92 cents per mile in April 1989, of which fully 33 cents was associated with the driver (pay, food allowance, etc.). Unless a

second driver can significantly reduce transit time, it is clear that team driving is extremely expensive. However, the dramatic differences in schedule tightness suggest the importance of team driving.

Consistent with DeVany and Saving's contention that higher valued cargoes receive expedited service, the schedules are much tighter for strawberry, ornamental, and tomato loads, on average, than for other commodities (Table 3). This result may also explain, at least in part, why higher valued produce and ornamentals tend to command higher freight rates than do other commodities for similar hauls.

Suggesting that legally mandated rest periods are not fully accounted for in schedules, the distance to the first post-interview destination is positively correlated with SCHSPD (Table 3). The percent of that distance through states with speed limits over 55 MPH is negatively correlated with SCHSPD. This result suggests that dispatchers have not fully adjusted schedules to take advantage of higher speed limits.

Years of professional driving experience is negatively related to SCHSPD (correlation significantly different from zero at the .05 level, Table 3). This may reflect increased prudence with greater experience. Alternatively, this result (and the others presented in this subsection) may be an artifact of not controlling for other variables, such as trip distance. For this reason I now turn to the multivariate analysis.

Multivariate Analysis

Considering the exploratory nature of this work, the results of the regression analysis are quite good. The equation is highly significant, the signs and magnitudes of the parameter estimates are consistent with expectations, and several are highly significant (Table 4). Only 10 percent of the variation in SCHSPD is explained by the

TABLE 3
SCHEDULE TIGHTNESS AND SELECTED CARRIER,
DRIVER, AND TRIP CHARACTERISTICS

<u>Item</u>	Drivers with SCHSPD over			
	45 MPH		50 MPH	
	<u>Percent</u>	<u>Chi sq.</u>	<u>Percent</u>	<u>Chi sq.</u>
Carrier status:				
For-hire fleet	30		21	
Private carrier	33		27	
Owner-operator	33	2.8	21	3.8
ICC Authority:				
Yes	34	1.8	24	
No	31		21	1.9
Drivers:				
Single	36	24		
Team	10	52.8***	9	24.3***
High value cargo: ¹				
Yes	40		29	
No	30	13.1***	20	11.9***

<u>Item</u>	<u>Correlation with SCHSPD</u>
Distance to first post-interview destination (DIST2)	.11***
Percentage of DIST2 through states with speed limits above 55 MPH	-.11***
Years of driving experience	-.06**

Notes: ¹High value cargoes considered to be strawberries, ornamentals, and tomatoes.

- *** statistically significant at the .01 level
- ** statistically significant at the .05 level
- * statistically significant at the .10 level

TABLE 4
MULTIVARIATE ANALYSIS OF SCHEDULE TIGHTNESS

Dependent variable: SCHSPD

<u>Independent variables</u>	<u>Estimated parameters (standard error)</u>
Intercept	59.44 (3.49)
DIST2	.0065*** (.0013)
RAT65	-.095*** (.023)
PRIV	1.20** (.55)
OWNOP	.13 (1.34)
AUTH	3.20*** (1.24)
DRIVERS	-14.59*** (1.60)
EXPER	-.13*** (.048)
VALUE	5.59*** (1.33)

Equation statistics:

F Statistic	18.88***
R2	.10
Number of observations	1,454

Notes: *** statistically significant at the .01 level
 ** statistically significant at the .05 level
 * statistically significant at the .10 level

equation. However, this is not surprising due to the limited information available. The inclusion of data on factors such as price levels and trends for commodities at the various destinations,⁹ vehicle age and condition, driver health and prior driving/on-duty history no doubt would have improved the explanatory power of the equation.

The parameter estimates associated with DIST2 and RAT65 are both easily significant at the .01 level and are, respectively, positive and negative. This supports the results of the univariate analysis that schedules tend to be tighter the longer the distance and looser the greater the percentage of that distance over roadways with speed limits in excess of 55 MPH.

The parameter estimate associated with PRIV is positive and significant at the .05 level, indicating that private carriers tend to maintain somewhat tighter schedules than for-hire fleets (incorporated in the intercept). The parameter estimate associated with OWNOP also is positive, but is not different from either for-hire fleets or private carriers at any conventional level of probability.

Carriers possessing ICC Authorities appear to maintain tighter schedules than those not possessing such authorities. The parameter estimate associated with AUTH is significant at the .01 level and indicates that drivers for carriers with ICC Authorities must average 3.2 MPH faster to stay on schedule than drivers for independent carriers. This result flies in the face of the "common wisdom" expounded by many in the trucking industry that carriers subject to economic regulation are the more safety conscious. It should be noted that the relationship between AUTH and SCHSPD was not significant at conventional levels in the univariate analysis. Evidently not controlling for the other covariates masked the relationship.

The relationship between SCHSPD and EXPER is also stronger when controlling for the covariates (significant at the .01 level in the multivariate analysis and at the .05 level in the univariate analysis). The negative sign of the estimated parameter indicates that the more

experienced the driver, the looser the schedule, *ceteris paribus*. While the estimated relationship is highly significant in a statistical sense, the magnitude of the parameter is small (.13). For a one MPH reduction in SCHSPD based on experience, an individual would have to have driven nearly additional 8 years.

The relationship between VALUE and SCHSPD is positive and highly significant in both the univariate and the multivariate analyses. The estimated parameter in the equation indicates that drivers hauling tomatoes, strawberries, or ornamentals must average 5.59 MPH faster to stay on schedule than drivers hauling other commodities.

SUMMARY AND CONCLUSIONS

It is generally recognized that accident severity tends to increase with speed. From a safety standpoint, therefore, the only benefit from increased speeds would be reduced fatigue resulting from shorter driving times per unit distance. This advantage, however, could be dissipated if schedules were adjusted. The primary purpose of this study has been to determine the impact on the tightness of the schedules maintained by produce/ornamentals haulers from abandoning the 55 MPH National Speed Limit. This group of drivers was of interest because they operate under unusually tight schedules, presumably due to the value and perishability of their cargos (Beilock and Capelle 1987). The role of value in scheduling was supported in this study by the finding that drivers hauling higher-valued perishables (i.e., tomatoes, strawberries, and ornamentals) operate under much tighter schedules, on average, than do those hauling lower-valued perishables.

In addition to tight schedules, produce/ornamentals haulers frequently operate under fairly rigid schedules. This rigidity is primarily the result of the manner in which much of the product is marketed and distributed. Most produce is delivered to wholesale

produce markets, chainstore warehouses, or individual supermarkets. Each of these tend to operate in fairly set 24 hour cycles, with produce/plant deliveries being desirable only for specific periods. The large majority of transactions at wholesale produce markets normally take place during a three to 3-4 hour period each day (usually from 2:00 AM to 6:00 AM). Produce that is late may have to be sold at a steep discount or stored overnight, if refrigerated space is available. Chainstore warehouses normally do not hold extensive inventories of perishable produce or plants. Rather, they endeavor to coordinate deliveries as close to outshipment times as possible. It is not uncommon for produce to be distributed to local delivery vehicles directly from the incoming linehaul truck. Similarly, individual stores have minimal storage capacities. Most produce and plant deliveries are immediately used to replenish the display cases. For all three of these facility types (i.e., wholesale produce markets, chainstore warehouses, and individual stores) deliveries a few hours early or late are highly undesirable. Unless a carrier can deliver a full day earlier, often there is no advantage to altering schedules.

The rigidity of the schedules is believed by the author to be the primary reason for the finding that scheduling demands on drivers have eased as a result of the return to speed limits above 55 MPH. The comparison of the 1984/85 and 1987/88 data indicated virtually no changes in schedules. The higher speed limits in effect in 1987/88 resulted, therefore, in reduced schedule tightness. It should be stressed that the extent to which the salutary effects of eased schedule tightness offset the negative effects increased accident severity with higher speeds is entirely unknown.

Similar results may be expected for shipments of other types of freight for which transportation demand conditions create rigidity in delivery schedules. Conditions which suggest rigid delivery schedules include: deliveries directly to retailers and deliveries to receivers having limited storage capacities and/or essentially immutable sales or production schedules.

Schedule tightness was found to increase with distance. This suggests that schedules typically do not fully account for legally-mandated rest periods. Another indication of this was the much lower rate of violation-inducing schedules among team drivers than among those operating solo. It may be prudent, therefore, for enforcement efforts regarding compliance with Hours-of-Service Regulations to focus on solo, long-distance drivers.

Perhaps the most surprising finding was that drivers for carriers possessing ICC Authorities tend to have tighter schedules than those who operate independently. A possible explanation for this result is that possession of an ICC Authority is an indication of carrier sophistication and organizational ability. If profit enhancement by optimizing equipment and personnel usage is a carrier's primary goal, then it would be expected that more sophisticated carriers would have tighter schedules, *ceteris paribus*. Whatever the reason, combined with the finding that there are only minor differences in schedule tightness across carrier types, the study suggests that at least this dimension of safety will not suffer as a result of economic deregulation.

Finally, while increased speed limits appear to have reduced schedule tightness among produce/ornamentals haulers, the problem is still severe. Employing extremely conservative assumptions, it is estimated that nearly a third of the drivers had violation-suspect schedules and over one in five had violation-inducing schedules. Relaxation of those assumptions resulted in far higher estimates of schedule tightness.

FOOTNOTES

*This study was funded in part by the Market Facilities Branch, Agricultural Marketing Service, United States Department of Agriculture.

¹In a survey of 1,762 long distance drivers, 93 percent were paid by the mile or load (Beilock, 1988).

²Hours of Service Regulations set legal limits to driving and on-duty hours. The basic provisions are:

1. 10 Hour Rule: For every 10 hours of driving time there must be at least 8 hours off-duty time.
2. 15 Hour On-Duty Rule: No person may drive after having been on duty for 15 consecutive hours.
3. No person may drive for more than 60 hours in 7 consecutive days.

³Beilock and Capelle (1987) found that 27 percent of a sample of nonproduce drivers had violation-inducing schedules versus 44 percent for produce haulers.

⁴The results of that study were presented in Beilock (1985).

⁵The high level of cooperation was due to several factors. The agricultural inspection stations normally are nonthreatening to truckers. Few citations are written and delays are normally slight. The enumerators wore University of Florida identification and introduced themselves as students. The questionnaires were brief, drivers were not asked to identify themselves or their company, and were assured of anonymity.

⁶The latest time which the driver believes he/she can arrive at a destination may differ from the actual requirements of the carrier or receiver. Such differences may be due to miscommunication between carrier and driver, the driver misjudging the leeway he/she actually has, or the driver having personal reasons for wishing to arrive earlier or later. However, for the purpose of gauging the tightness of the schedule the truck actually operates under, the driver's perception of the schedule, rather than that of the carrier or the receiver, is relevant.

⁷The source for calculating mileages was Household Goods Carrier's Bureau.

⁸The 1984/85 interviews took place during months in which virtually all produce originated between 200 and 350 miles south of the interview sites. However, nearly a third of the 1987/88 interviews were conducted when production areas located within a few miles of the interview sites were active. Therefore, while the 4 hour driving time rule for 1984/85 was a reasonable (though somewhat conservative) estimate, calculations based upon actual mileages were important for 8.

It should be noted that detailed questioning regarding previous driving and on-duty time was not undertaken both due to interview time constraints and likely problems with response bias (i.e., evasion).

⁹Falling (rising) produce prices would encourage receivers to demand faster (slower) deliveries, *ceteris paribus*.

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TRAFFIC MANAGERS AFTER DEREGULATION: NEW MOUNTAINS TO CLIMB!

by

Kenneth H. Forsythe, James C. Johnson, and
Kenneth C. Schneider
St. Cloud State University, Minnesota

INTRODUCTION

Transportation deregulation was started by the ICC and CAB in the mid-1970s and this trend accelerated when it was championed by President Jimmy Carter. Deregulation laws were enacted by Congress in the airline industry (1977 and 1978), the trucking industry (1980) and the rail industry (1980). We now have over a decade of experience with transportation deregulation which has substantially altered the transportation industry. Instead of government regulatory agencies establishing rates and services, these competitive factors are now determined by marketplace forces. The traffic management function has been drastically affected by the new competitive environment found in the transportation industry. The purpose of this article is to briefly review what traffic management was like before and after deregulation. Then the results of a survey involving 215 traffic managers will be examined. Specifically, traffic managers were asked how deregulation impacted their position and then they were asked to tell us, in their words, why they answered as they did.

TRAFFIC MANAGEMENT BEFORE DEREGULATION

Before deregulation, when the federal government was heavily involved with day-to-day transportation issues, such as rates and service offerings, the traffic management function was a Byzantine world of gigantic tariffs -- frequently a single tariff would be greater than a thousand pages -- and incredibly complex federal regulations. Roy W. Mayeske worked for six years at Minnesota Mining and Manufacturing [3M] in purchasing and then -- to his chagrin -- was transferred to the traffic department. He felt at the time that this new position was the equivalent of being sent into exile to corporate Siberia. Mayeske declared:

My career path had no plans for transportation. If you look at transportation 15 years ago [1973], it was highly regulated -- there were all kinds of books with chapter and verse as to what you could do and couldn't do. My initial reaction was: Where did I goof and why am I getting this punishment.¹

Mayeske, who eventually came to like traffic management, advanced at 3M to his current position of executive director of transportation. Reflecting back on his initiation into transportation, he noted that he was suspect by transportation managers both within 3M and outside the company because he was not conversant with the galaxy of regulatory details. At that time, traffic managers were often thought to be highly specialized "technocrats" who could fathom the inexplicable rules and regulations issued by the ICC and CAB. Transportation executives were typically thought to be unimaginative -- dull -- people, because the federal government quashed almost every attempt at inspired solutions to distribution problems. Therefore, the conventional wisdom was that innovative people would not stay in transportation, because their initiative would be constantly thwarted by federal regulations and rulings.²

Mayeske observed:

In the regulated days it was almost a case that the shipper or transportation person would say to the rest of the company: "This aspect of the business is very complicated -- you couldn't begin to understand it, so you just come and ask me a question and I'll tell you whether you can do it or you can't do it."³

TRAFFIC MANAGEMENT AFTER DEREGULATION

Deregulation has drastically transformed the traffic management function. Today, traffic managers can negotiate almost any aspect of their relationship with carriers. Rates, service levels, and loss and damage claims are examples of factors that can now be negotiated. It is no exaggeration to say that if a traffic manager in 1974 was accidentally hit on the head and went into a coma for the next 15 years, and then awoke in 1989 -- he or she would literally be dumbfounded by the changes that had taken place. Bob Delaney, a transportation management consultant with Arthur D. Little, Inc., captured the magnitude of the alterations brought about by deregulation, "Since deregulation, half of what I know is obsolete -- the problem is knowing from day to day which half that is."⁴

Because traffic managers have many more options available to them now, their positions are becoming more complex. Richard G. Velten, director of transportation for Johnson and Johnson Hospital Services, noted that while some companies are decreasing their traffic management personnel because of corporate downsizing -- which is also happening to every functional area -- this should not be interpreted to indicate that the traffic function is perceived by senior managers to be of less importance. He observed:

As far as the transportation professional's job diminishing, I think just the opposite. I think it's increasing. I think the transportation professional can provide more value-added services to a corporation than ever before because the capability has increased so dramatically, especially since deregulation.⁵

Roy Mayeske of 3M concurs with Velten. He stated, "Today we have to understand the objectives of the business and how we fit in enhancing it. You can't be a narrow specialist with tunnel vision anymore -- you've got to see the broader picture."⁶ James R. Eaton, executive vice-president of Carolina Freight Carriers, believes that deregulation, with its release of regulatory constraints that formerly restricted imaginative solutions to distribution problems, has enhanced the importance of the traffic management function. He noted:

These people [traffic managers] now are more of a decision maker in their company than they used to be. When deregulation came upon us it put them in almost the same situation as purchasing agents. Purchasing agents in the old days had more clout than the traffic group. But today the traffic group has as much clout as the purchasing group because they really are purchasing now and they can get prices and tie in value . . . They're more marketing oriented than they were.⁷

It should be noted that because of the substantial changes in the day-to-day operation of the traffic management position, some traffic managers were not able to adjust to the new environment.

Mr. Mayeske noted, "There were some people who fell by the wayside, couldn't cope, and left or moved into other aspects of the business."⁸

The above suggests that the traffic management function has been substantially altered by deregulation. A survey was undertaken to determine specifically in what ways deregulation has changed the day-to-day activities of traffic managers.

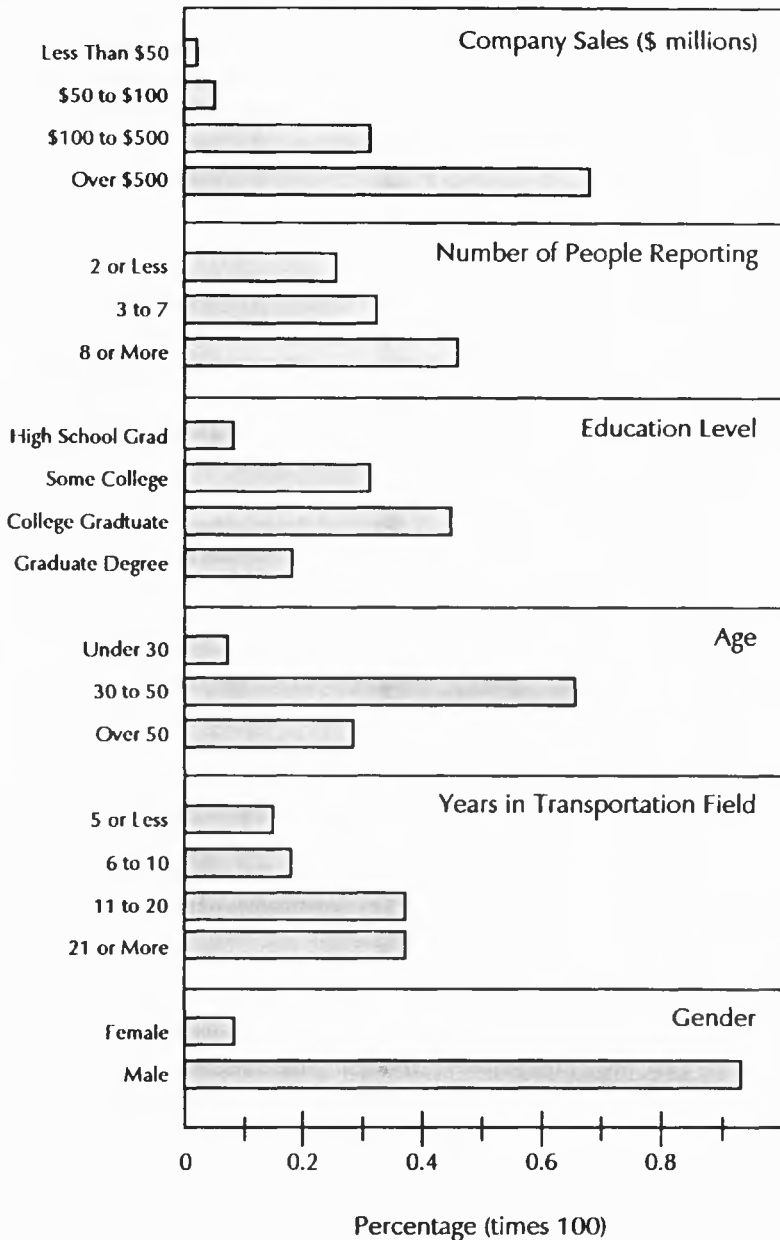
RESEARCH METHODOLOGY

A sample survey was conducted to identify traffic managers' overall level of job satisfaction and related opinions. The sampling frame consisted of all industrial companies represented in Value Line Investment Survey. After eliminating all companies in various service industries (e.g., air transport, banking, broadcast), an initial sample of 500 firms was selected at random from among the remaining industrial concerns.

A questionnaire was then sent to the "Corporate/General Traffic Manager" in each company along with a cover letter explaining the nature of the study and requesting the respondent's cooperation. Although the budget for the survey precluded any additional follow-up contact, a total of 215 traffic managers responded to the survey, representing a response rate of 43 percent. Given that there are an estimated 1,200 industrial firms included in Value Line, a sample of 215 traffic managers offers a margin of error of no more than plus or minus six percent at the 95 percent confidence level. Thus, all cited percentages are correct to within, at worst, ± 6.0 percentage points. Indeed, as reported percentages depart from 50% in either direction, the actual margin of error decreases, dramatically so for percentages in the 20% or lower (80% or higher) range.

Exhibit 1 presents a graphical summary of these 215 traffic managers and their companies. Reflecting the composition of firms in Value Line Investment Survey, the companies represented in the sample tended to be rather large. Indeed, from Exhibit 1, nearly two-thirds (65.6%) of them have annual sales over \$500 million, and 95.4% have annual sales over \$100 million.

**EXHIBIT 1
RESPONDENT DEMOGRAPHICS**



Despite the fact that the firms in the sample were mostly large ones, the traffic managers themselves comprised a diverse group. For example, the sizes of their staffs varied considerably. Just under half (44.0%) of the managers had at least eight people reporting while, at the other end, one in four (25.0%) managers had fewer than three people reporting.

The traffic managers in the survey also differed by educational background. While most of them (92.2%) had at least some college background, just six in ten (61.8%) had college degrees or better, and fewer than one in five (17.1%) had a graduate degree.

Regarding age and experience, the majority (66.2%) of the traffic managers were between 30 and 50 years old, and another 28.6% were over 50. Very few (5.2%) were under 30. Similarly, almost three-fourths (70.4%) of them had at least eleven years experience in the transportation field, and half of those had over twenty years experience.

Finally, while the profession is still predominantly male, it is interesting that nearly ten percent (8.0%) of the traffic managers surveyed were women.

DEREGULATION'S IMPACT ON TRAFFIC MANAGERS

Each respondent was asked, "Has deregulation of transportation made your job: much more challenging, more challenging, less challenging or much less challenging." Almost half of the traffic managers [46.9%] answered "much more challenging" and an even higher percentage [47.5%] selected "more challenging." Finally, 5.6% of the traffic managers selected "less challenging." In addition, each respondent was asked to elaborate, using his/her own words, WHY they had selected the answer they did.

Because almost 95% of the respondents found their positions either much more challenging or more challenging, we have combined their comments. It was found upon analysis of these 203 comments, five general categories of answers emerged-from the respondents' comments. These five general reasons accounted for 187 of the 203 statements. The remaining 16 comments were only mentioned once or twice and are not included in the analysis. Each of the five main factors that have rendered the traffic management position more challenging will be discussed in the decreasing order of frequency that they were mentioned. (Please note that in a few cases it was difficult to categorize the respondent's answers because their comments overlapped more than one point. In these cases, the response was categorized by the factor which the respondent seemed to be emphasizing.)

BECAUSE THERE ARE MORE OPTIONS AVAILABLE, THE JOB IS NOW MORE COMPLEX

Fifty-six respondents [26.0%] noted that as a result of deregulation, there has been an influx of new carriers and there are additional options available from existing carriers. The result is that there are many new alternatives and variations available to traffic managers compared to when the government tightly controlled the transportation industry. Here is a sample of verbatim statements from respondents explaining the new transportation environment.

- Deregulation has completely changed the game. There is so much variety available that I'm only limited by my imagination.
- Pricing of carrier services is more complex because each carrier can tailor make a rate/service package for us. Carrier bankruptcies have also further complicated my life. Finally, price stability is a thing of the past, which makes transportation cost forecasting almost impossible.

- There are so many more transportation companies available compared to before deregulation. I could spend every minute hunting and negotiating rates, verifying their insurance and financial condition, etc. I used to complain that the federal government held this industry in a straight jacket, but as I look back at it, at least it sure was an orderly situation compared to the chaos of today.
- Many new options, many different rates, less federal government rules and regulations means that there are many new rules of the game. My job has definitely become more complex as a result of deregulation. However, please note that I'm not complaining because like any other situation, I'm progressing rapidly on the learning curve.
- The new options available to us -- new carriers and the ability to negotiate rates and service levels -- have allowed the traffic function to become a significant player in the corporate race to increase productivity. Many of the new carriers require research on my part to make sure that they will not fail and are capable of providing the service levels they say they can. I really enjoy the myriad of new options available to me. My position is much more difficult than it used to be, but also much more interesting. I really believe I can make a difference compared to the old days when the real challenge was to interpret government regulations.
- Today I have more options to select from in terms of service availability, more vendors to select from, and the ability to be involved with price and service negotiations. These are all positive opportunities, but there is also the potential problem of bigger screw-ups because we are working with more carriers for which we have less prior knowledge.

- This industry is in a constant state of flux. At first I found it exhilarating, today I wish it were a little more predictable. Before deregulation this position was too dull, today it is too exciting. I wish we could find a happy middle-position.

TRAFFIC MANAGERS CAN BE INNOVATIVE AND CREATIVE

The second and third most commonly noted responses were each noted by 52 respondents [24.2%]. One was that because of deregulation, traffic managers now have the ability to be as innovative and creative as other functional areas in the company. Prior to deregulation, the ICC and CAB basically controlled innovation and these government agencies were inclined to move at glacial speeds when it came to authorizing innovative rates and services. Today, traffic managers have almost no restrictions in terms of finding the most innovative and creative solutions to distribution problems. Below are typical statements from respondents.

- The handcuffs have been removed! "If it is to be, it's up to me." In other words, deregulation has enabled transportation to become more involved in the management process and our function can become proactive in meeting corporate goals.
- It has allowed me to be more entrepreneurial in my personal approach to solving problems. The other side of the coin is that there is more risk for me to make errors and have to live with the consequences.
- Transportation is now a purchased service and no longer exists in a static environment. Today we can structure a program with a carrier that really meets my company's needs, as opposed to accepting what the carrier has to offer. Creativity is limitless.

- We now “purchase” transportation in a real competitive environment -- not just “account” for it as in the past.
- Rate and service levels are now an “open book.” A traffic manager today must be much more aware of the constant changes and innovations that are taking place in the transportation industry. I tend to think I am a relatively creative person, but I must confess I frequently talk to friends who have similar positions to mine in different companies and I am constantly amazed at some of the creative solutions they have come up with. My traffic department is slowly but surely losing the image that we are strictly technicians who completely lack creativity.
- The transportation industry should have been part of the free enterprise system a long time ago -- the challenge now is to find the best for the least!
- I am now able to exercise control over my destiny rather than be an interpreter of government regulations.

NEGOTIATION OF RATES AND SERVICES IS NOW A MANDATORY SKILL

The ability to successfully negotiate rate and service packages was also mentioned 52 times by respondents [24.2%]. Traffic managers in the first years after deregulation noted that while, this skill was essential, they often found it frustrating to learn.⁹ Now, however, respondents stated that they enjoy this new aspect of their positions. Here are representative comments.

- Deregulation has made negotiating a regular part of my job. It has become very interesting to see which carriers are willing to do their homework so they can determine their cost structure and hence how low their rates can go.
- I must do my homework when it comes to negotiating and I have to have a better general understanding of transportation costs and the industry in general.
- The sky's the limit when negotiating with carriers as far as rate structures and service and additional contract terms, such as penalties for noncompliance, rewards for superior service, etc.
- Deregulation has allowed freedom to negotiate transportation service contracts that are specifically designed to meet the exact needs of my company. As I look back over the years, I wonder why this didn't take place years ago!
- Deregulation has given us the opportunity to negotiate rates with carriers, and I believe it has made the carriers more responsive to shipper needs. Transit times are much better now than before deregulation.
- After deregulation in 1980, I have the ability to deal directly with carriers on a one-to-one basis. This makes my job more challenging as well as more exciting.
- Negotiations are fun. Rates are now freely negotiated where in the past they were "locked-in."

TRAFFIC MANAGERS ARE LESS "TECHNOCRATS" AND MORE LIKE OTHER MANAGERS

Sixteen traffic managers [7.4%] stated that what made their positions more challenging was that with less governmental rules and regulations, they were able to become less "technocrats" and more like other managers in the company. Here are respondent quotes expressing their pleasure at being liberated from excessive governmental rules and regulations.

- The free enterprise system can now be found in transportation versus the old system of lethargy. I no longer have the primary goal of complying with all the governmental rules and regulations.
- Regulations no longer make everything "set," what you now get out of the transportation system is up to you.
- It has given me personal control and allowed the rule books to gather dust. I feel the regulation era was a wonderful time to learn about transportation because it was such a protected environment. In the old days I couldn't really make a mistake relative to a competitor because they were subject to exactly the same tariffs I was.
- I have the opportunity to negotiate various aspects of the transportation contract in a business-like manner instead of the old bureaucratic, uniform procedure. My contribution to the success of my company is the result of a real effort on my part that would not have been possible before deregulation.
- My managerial talents are no longer infringed upon by antiquated regulations.

TRAFFIC MANAGERS MUST INVESTIGATE CARRIER'S BACKGROUND

The last factor mentioned with some frequency was that because of the tremendous influx of new -- often underfinanced -- carriers, many of them operate in precarious financial condition. The problem is that if a carrier goes bankrupt when it possesses the shipper's freight, a complete breakdown of customer service standards takes place and the traffic department is castigated by the firm's marketing department. To prevent this situation, the traffic manager must become an amateur "Sherlock Holmes" in terms of doing research to ensure that the carrier being utilized is not on the brink of financial collapse. Here are typical statements from the eleven traffic managers [5.1%] that discussed this problem.

- Deregulation has brought about many new opportunities to save my company money. Also, deregulation has brought about the demise of many carriers. I have to be much more selective and careful about which carriers we use in terms of financial stability, insurance requirements, etc.
- There is so much price competition today that we almost have too much of a good thing. I really have to be careful when a carrier offers me an outstanding package that they can stand behind it and perform.
- Price competition is so severe that many previously sound companies have failed in recent years. Also, thousands of new companies have entered the TL market. While I enjoy the new options available, I must conscientiously check each carrier's background to make sure they won't go "belly-up" with my freight frozen in their system.

- Managing the efficient, timely and economical movement involves much more than previously during regulation. There are many more choices. Price is the biggest issue, however, carrier financial strength, which was never an issue with regulation, is now an important part of the selection process.

THE CONTRARIAN'S POINT-OF-VIEW

Finally, it should be noted that twelve traffic managers [5.6%] stated that in their judgment transportation deregulation had made their positions "less challenging." Ironically, there is some logic to what the respondents were saying. Here are illustrative statements.

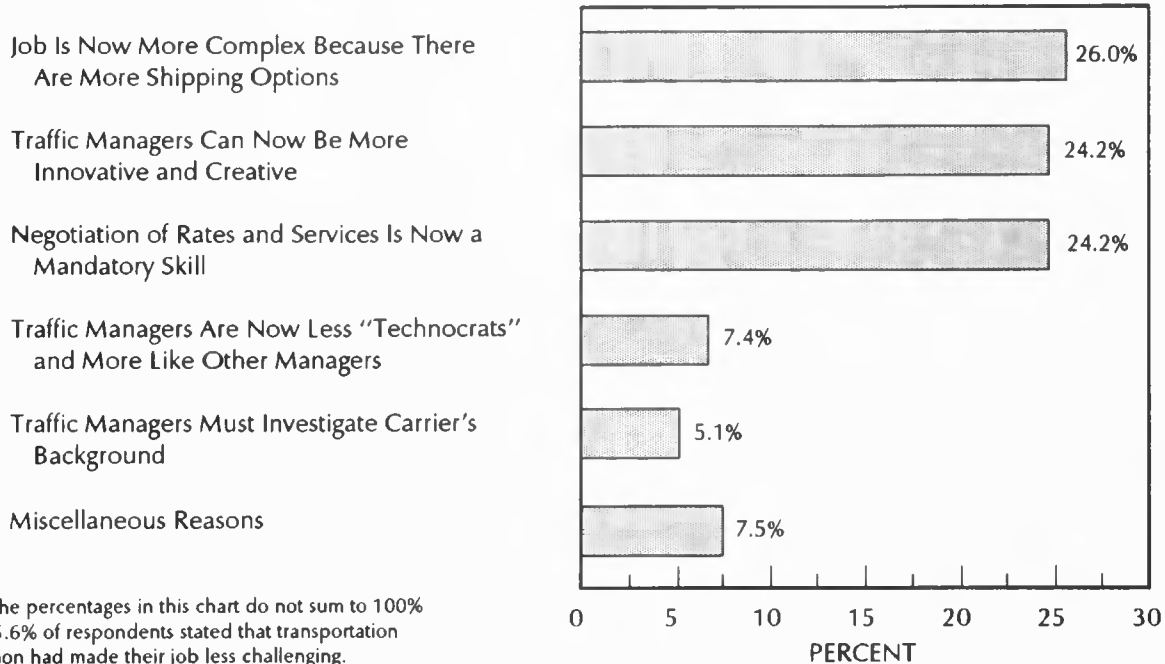
- In recent years I have been recognized by senior management for my ability to drastically decrease transportation rates while also providing improved ontime delivery schedules. What top management doesn't know, and I'm not going to tell them, is that I had next to nothing to do with these improvements. The transportation market is now so competitive that these changes took place automatically and I was the benefactor.
- Carriers compete with themselves so vigorously that rate negotiations are a breeze. This job is easier today than ever before.
- It's easy to look good when the environment is changing -- which I can't control -- and the result is that what I'm judged on, rates and service levels, are drastically improving. This job is less demanding because carriers are competing so aggressively for my tonnage.

CONCLUSION

The traffic management function has been significantly -- and irrevocably -- changed as a result of transportation deregulation. Nineteen of every twenty traffic managers surveyed stated that deregulation had made their positions either "much more challenging" or "more challenging." They indicated that there were five major factors (see Exhibit 2) that have substantially changed as a result of deregulation, with the most common reason being that the traffic management position is now much more complex because there are so many more shipping options available. Finally, a few traffic managers stated that deregulation had actually made their positions easier, since they were credited for cost reductions and/or improved service levels that resulted from deregulation.

Transportation deregulation, more than any other factor in the history of traffic management, will be seen by future transportation historians as the most important single event that liberated traffic managers from being "technocrats." While technocrats are essential managers, their skills are typically so narrowly focused that they are perceived by senior management to be incapable of being promoted to positions of greater responsibility requiring more generalized management skills. Today's successful traffic manager must be a generalist. To be effective, they must be analytical in their abilities to study problems and implement creative solutions. This typically involves negotiating with carriers so that "win-win" solutions are created in which both the carrier and the shipper benefit from the negotiated rate/service agreement. Traffic managers are now ideally situated to be promoted to positions of increasing responsibility. Why? Because they can clearly demonstrate to senior management the improvements they have achieved regarding increased customer service levels and/or freight rate reductions. These achievements will propel them into positions of greater responsibility both in logistics and marketing. We foresee the day when former traffic managers regularly compete for top management positions.

EXHIBIT 2
REASONS WHY TRAFFIC MANAGERS BELIEVE THEIR JOB IS MORE
CHALLENGING SINCE TRANSPORTATION DEREGULATION



*Note: The percentages in this chart do not sum to 100% because 5.6% of respondents stated that transportation deregulation had made their job less challenging.

A precautionary note is advisable regarding the relatively few traffic managers that stated that their positions had become easier because of deregulation. They noted that deregulation had made the entire transportation industry so much more competitive, that they looked highly competent because service levels had substantially improved and rates had often drastically decreased. These managers stated that these changes took place, not because they were such effective traffic managers, but because the entire industry was now so much more competitive. Therefore, they appeared very efficient when, in fact, they were often not directly responsible for the improvements. This situation is changing. In both the trucking and air freight industries, rates have finally bottomed-out and in many situations and are starting to slowly increase. Clifford Sayre, director of logistics at DuPont Corporation, declared, "Demand has caught up with supply of certain types of freight transportation and rates are starting to move up" at a rate "close to or slightly more than the inflation rate."¹⁰ Robert Delaney, a transportation consultant for Arthur D. Little, Inc., made a similar observation. "We've gotten all the benefits of deregulation in freight-cost reductions. Now we are starting to see real freight rate increases as carriers replace equipment, pay higher fuel costs and pay more for labor. You'll see carriers try to recoup some of the price cutting that occurred previously."¹¹ Therefore, traffic managers can no longer expect market conditions to be as favorable as they have been during the previous decade. Future improvements in service levels and rates will be harder to come by and will require skillful analysis and negotiation by traffic managers.

In conclusion, the traffic management function has been irreversibly altered as a result of deregulation. Undoubtedly, traffic managers were apprehensive about the myriad of changes brought about by deregulation. They would have concurred with John Adams, who in 1776 [he became president in 1797] wrote to his friend James Warren and stated, "All great changes are irksome to the human mind, especially those which are attended with great dangers and uncertain effects."¹² Nevertheless, a decade after

deregulation, traffic managers are not only coping with the new transportation environment, but it appears they are revelling in their new-found freedom from the straight-jacket of government rules and regulations. Traffic managers are now managers in the true sense of the word. Further they welcome this opportunity to prove themselves. To borrow a literary metaphor, deregulation has presented traffic managers with new mountains to climb. Based on the results of this survey, traffic managers are apparently well past "base camp" and, it would seem, very much enjoying this new set of challenges.

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STRATEGIC AIRLIFT: A CASUALTY OF DEREGULATION

by
Kent N. Gourdin
University of North Carolina at Charlotte

INTRODUCTION

In any society, logistics is the means for bridging the gap between the national economy and a planned military operation. However, in a democracy, logistics planning must compete with other national objectives for an equitable distribution of that society's scarce resources. The share allocated to logistics must be effectively utilized to create and sustain military forces in support of National policies and objectives. Towards that goal, logistics is comprised of four principal processes: requirements determination, acquisition, distribution, and conservation. The suboptimization of one of these components can adversely effect the entire logistics function which would have severe consequences for the defense effort as a whole. In other words, it makes little sense to procure sophisticated equipment (acquisition), but lack the ability to expeditiously move it to the front lines (distribution).¹

This paper will focus on the transportation component of the distribution process, specifically addressing the contention that the U.S. commercial aviation sector is no longer capable of fulfilling its wartime mission. The implication is that, without a fully responsive contingency distribution system, the logistics element would be unable to support national defense objectives. Clearly, without logistics a sustained war cannot be fought, let alone won. In a broad sense, this article will examine the deteriorating linkage between civilian wartime transportation providers and users (the Department

of Defense). Specific areas to be addressed include military transportation, strategic airlift, and several peripheral concerns of importance.

MILITARY TRANSPORTATION

Transportation has historically been recognized as a critical factor in the success (or failure) of military campaigns. During the War of 1812, the United States incurred enormous costs associated with transporting men and material, due to inadequate facilities and transportation routes. In fact, the almost universal opinion at the time was that those facilities could have been built for what it cost to cope without them.² Sokol notes that, once the situation has become stabilized, the logistics problem, primarily one of transportation, becomes of primary concern.³ Similarly, General Douglas McArthur realized the importance of establishing and maintaining a viable logistical chain, stating that tactics can be decisively influenced by the means at hand for maneuvering, supplying, and controlling combat forces.⁴

Rather than investing in, and maintaining, transport resources necessary only for war, the U.S. policy has been to rely on the nation's commercial transportation industries to make their personnel and equipment available to the DOD should the need arise. This is in contrast to the Soviet Union, which maintains military airlift and sealift assets beyond those required to meet peacetime needs. The transport aircraft carry the livery of Aeroflot, the national airline, while the ships fly the flag of the merchant marine, but they are, in actuality, intended to satisfy contingency transport needs. In fact, our government has repeatedly turned to the civilian sector for its contingency transportation needs. Early in American history, the military practice was to contract with civilians for the provision of support functions such as transportation.⁵ With the outbreak of World War I, the nation found itself with a private rail network unable to meet wartime transport demands. In order to win that

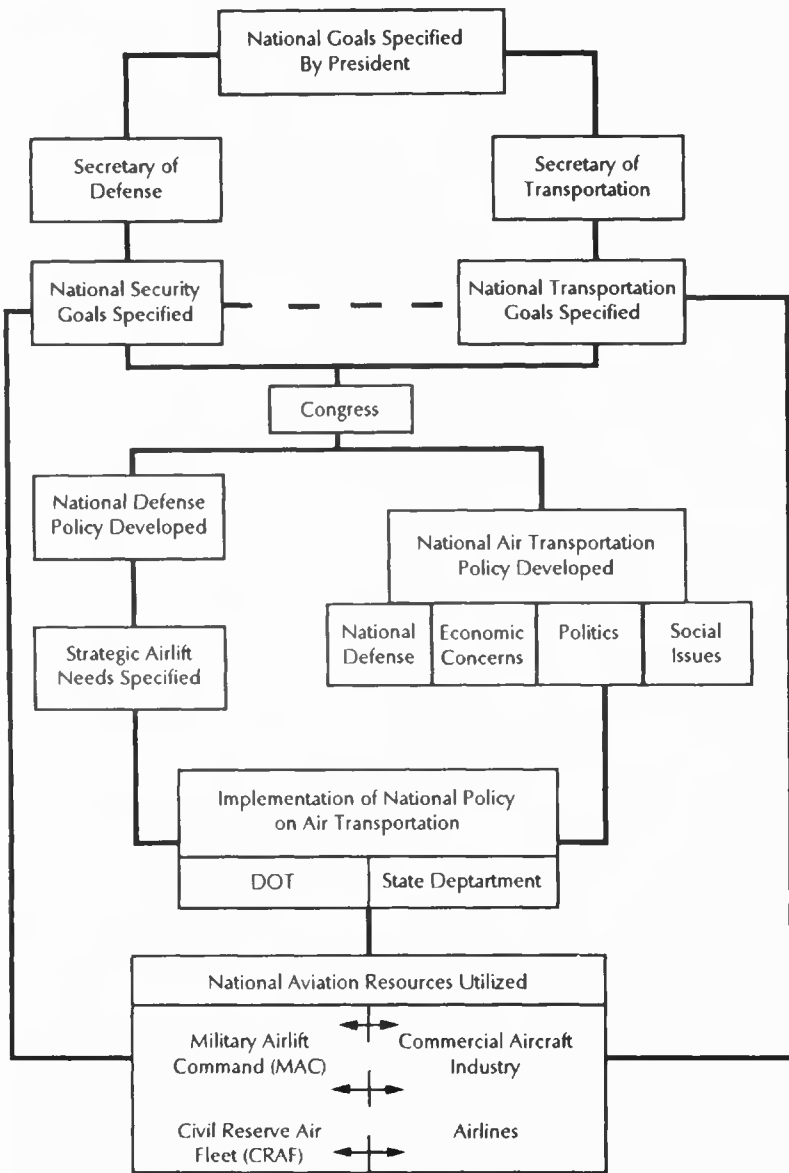


FIGURE 1. Air Transportation Policy Formulation & Implementation

conflict, the federal government took over the railroads in 1917 and ran the system until 1920.⁶ This linkage between defense and commercial transportation interests continues to exist today, and forms the foundation for much of our total wartime movement capability.

An important characteristic of this relationship is that the government has exerted very little influence over the equipment developed for, and operated by, transport companies. Rather, the DOD "makes do" with planes, ships, and vehicles operated by firms whose profit-driven needs may be significantly different from those of defense planners. As an example, two mechanized air cargo handling systems have evolved over the years, one developed by the military and one by the civilian air carriers. The two are partially, though not totally, compatible, a situation that could be extremely limiting in a contingency. However, a larger and more serious problem arises when the needs of the carriers no longer coincide with those of national defense. For example, one of the initial results of airline deregulation was that carriers began operating smaller airplanes over shorter routes, often replacing larger aircraft with these new fuel efficient aircraft. Unfortunately, these new planes were of little use to the DOD, which still required large, long-range aircraft. We will return to this commonality question later.

The formal institutional relationship between national security and air transportation goals is depicted in figure 1. Haefele notes that it is national purpose--as articulated and expanded in national goals--that determines the structure of supporting policies.⁷ Thus, the various cabinet Secretaries are concerned with establishing policies and objectives within their respective departments that will contribute to the attainment of the overall national objectives as specified by the President. However, the specification of national security goals also influences the development of transportation goals insofar as the nation's transport is expected to support the DOD. This may be, unfortunately, a one-way street. While national transportation policy includes a commitment to meet the needs of

national defense, defense policy is often developed with little regard for the availability of adequate transport resources. The result is that the transportation system must often react to, rather than evolve with, DOD policy since it is not until national transportation policy is implemented that the specific needs of one sector relative to the other are actively considered. The intended objective should be to utilize the nation's transportation resources so as to meet the needs of both. However, the actual results may be quite different, as the following example will readily illustrate.

Design on the Army's new M1 tank was begun in 1973. The full production run called for 7,058 vehicles to be manufactured at a unit cost of \$2.68 million. It was not until mid-1981 that the Army rigorously addressed the transport problems inherent in the movement of the 60 ton behemoth. The Pentagon noted that a standard rail car could only handle one M1, so the proposed solution was to build 569 stronger, more expensive flatcars that could accommodate 2 tanks each.⁸ Similarly, air transportation is constrained in that the C5 wide-body airlifter can only carry one vehicle, effectively limiting the weapon's usefulness as a part of a short-notice deployment.

STRATEGIC AIRLIFT

The entire concept of strategic airlift (i.e. between the United States and overseas areas) was formulated with the start of World War II.⁹ Since the military had little long-range air transport experience, the domestic airline community was pressed into service to fill the void. Though operating under the auspices of the Army's Air Transport Command and the Naval Air Transport Service, the carriers used their own equipment, facilities, and personnel to provide the capability for long-haul, rapid movement of men and equipment so desperately needed. In essence, the airlines themselves built and operated the wartime strategic airlift organizations. Following the war, the Air Force's Military Air Transport Service (MATS) became the permanent strategic air movement arm of the

United States military establishment. In 1965, MATS became the Military Airlift Command (MAC), which continues to perform as the single DOD manager for airlift. Strategic air movement is provided with an organic fleet of 96 C-5 wide-body aircraft, and 267 narrow-body C141s.¹⁰

To augment this capability in time of war or national emergency, the Civil Reserve Air Fleet (CRAF) Program was created in 1951, whereby civilian air carrier aircraft were identified by tail number and allocated for national defense at three levels of need which will be explained in detail later.¹¹ There was, and still is, no legislative basis for the CRAF; its success depends upon the cooperation of the airline industry.¹² To foster that spirit of voluntary participation, as well as to familiarize civil carriers with the handling of military passengers and cargo, MAC awards yearly contracts to CRAF participants for the provision of international air services. For Fiscal Year (FY) 89, \$310 million worth of airlift will be provided for MAC by commercial carriers.¹³ The CRAF as of August 1989 is depicted in Table 1. (It is worth noting that the exact size and composition of the CRAF fluctuates from month to month as carriers add and drop aircraft due to maintenance, sales, or equipment acquisitions.) By far the largest and most important portion of the CRAF is the Long-Range International Segment, consisting of 400 aircraft. This is the element that supports MAC strategic operations, and necessitates the use of aircraft capable of extended overwater operations with a productive payload.

Participation in the CRAF involves a commitment on the part of the carriers to respond to varying emergency situations incrementally, based on three levels of urgency. Stage I may be employed by the Commander-In-Chief of MAC (CINCMAC) to maintain cargo and passenger backlogs at MAC air bases within acceptable limits. Carriers have 24 hours to make an aircraft available for missions.

- Stage II includes those airplanes in Stage I, and is for expanded airlift, approved for use by the Secretary of Defense in providing capability for a contingency not warranting a declaration of national emer-

TABLE 1
CIVIL RESERVE AIR FLEET (CRAF)

<u>Aircraft Allocated As of August 1989</u>					
Domestic Segment (39)					
B727			8		
DC-9			3		
L-188			11		
L-100			17		
Alaskan Segment (7)					
L-100			3		
L-188			2		
DC-6			2		
Short-Range International Segment (30)					
B-737			4		
B-727			21		
B-757			5		
Long-Range International Segment (400)					
	<u>Passenger (271)</u>		<u>Cargo (129)</u>		
DC-8/B-707	20	+	51	=	71
B-747	109	+	52	=	161
DC-10	57	+	26	=	83
L-1011	38	+	0	=	38
B-767/A310	47	+	0	=	47

(Source: MAC HQ Form 312, Monthly Civil Reserve Air Fleet (CRAF) Capability Summary, 1 August 89)

TABLE 2
CARRIERS PARTICIPATING IN THE CIVIL RESERVE AIR FLEET

As of August 1989

Domestic Segment

Evergreen International
Southern Air Transport
TPI International
Zantop

Alaskan Segment

Markair
Northern Air Cargo
Reeve

Short-Range International Segment

Aloha
Eastern
Transocean
Joint Venture 1: Key/American Trans Air

Long-Range International Segment

American	Pan American
Continental	Southern Air Transport*
Delta	TWA
Hawaiian	United*
Northwest*	
	Joint Venture 2:
Joint Venture 1:	World
Flying Tiger*	Rosenbalm*
Tower	American
UPS*	Evergreen*
United	Emery*
	Joint Venture 4:
Joint Venture 3:	Pan American
Northwest*	Evergreen*
Federal Express	Tower
	Joint Venture 6:
Joint Venture 5:	Pan American*
Pan American	American Trans Air
American	Connie Kalitta*
Connie Kalitta*	
	Joint Venture 7:
Joint Venture 7:	Rosenbalm*
Rosenbalm*	CF Air Freight*
CF Air Freight*	

*Airlines providing cargo aircraft

(Source: MAC HQ Form 312, Monthly Civil Reserve Air Fleet (CRAF) Capability Summary, 1 August 89)

gency. As in Stage I, carriers have 24 hours to make an aircraft available. Stage III may be implemented by the Secretary of Defense, only after a national emergency is declared by the President or Congress. Carriers have 48 hours to respond to his call, which results in the commitment of all long-range cargo aircraft. Even though Stage III utilizes all CRAF line-haul resources, it is still not sufficient to meet wartime air cargo requirements, a shortcoming that will be discussed in more detail later.¹⁴ Carriers participating in the CRAF as of August 1989 are shown in Table 2.

Presently, the U.S. wartime airlift requirement for military cargo is 66 million ton miles (MTM)/day, a figure that takes account of our sealift capability and - the prepositioning of equipment at various overseas locations. MAC organic aircraft (C-141/C-5) will provide 32.7 MTM/day capability, while the KC-10 (an aerial tanker/transport based on the commercial DC-10) will generate an additional 4.5 MTM/day of military airlift.¹⁵ A Stage III CRAF activation would result in approximately 16 MTM/day capability, based on the CRAF composition in August 1989.¹⁶ Thus, out of the 66 million ton miles/day that must be moved in wartime, the U.S. can, at best, hope to support only 53 million ton miles/day in the foreseeable future, leaving a 13 million ton miles/day shortfall.

The shortage of required airlift was discussed earlier. Of critical importance is the fact that this shortfall is exacerbated by a CRAF now subject to the vagaries of the free market. Deregulation of the airline industry led to a dramatic increase in air carrier competition. Coincidentally, costs (particularly for fuel) were rising while the nation's economy faltered and fewer people travelled by air. The airlines moved to adopt hub-and-spoke systems serviced by smaller aircraft; carriers like Pan Am, United, and American abandoned all-cargo service and sold off their freighter aircraft; new carriers entered the industry, squeezing profits still further and, in some cases, failing quickly. Complicating the situation for our international airlines was the fact that, while we had deregulated our commercial air industry, the rest of the world had not. Thus, U.S.

airlines faced the added burden of having to compete with overseas carriers owned or largely controlled by their respective governments, and, in many cases, operated for reasons other than profit. The result was a decade of upheaval in the air carrier industry that directly impacted the Long-Range International segment of the CRAF as well. The smaller airplanes being adopted by the carriers were not suitable for long-haul overwater transportation, and, in fact, were replacing older aircraft that could fulfill that mission. Braniff International went bankrupt in 1981; Flying Tigers came perilously close to following suit in 1986; and Pan American, after losing \$72.7 million in 1988 (its 11th moneylosing year out of the past 17),¹⁷ is now actively seeking some sort of merger partner.¹⁸

The 1980's saw other developments of importance to the CRAF. In 1983 the Air Force implemented the CRAF Enhancement Program whereby convertibility features could be retrofitted (at government expense) to existing passenger airplanes that would allow them to transport military cargo in time of war. Of the 19 B747s committed to the program, 15 have been modified as of late 1988.¹⁹ Another DOD effort to address the declining number of long-range airliners in the CRAF took the form of a joint venture (JV) Program initiated by MAC in 1986. The intent of the program was to bolster the CRAF by bringing in operators and/or carriers previously excluded from participating. Should the need arise, aircraft and crews from the joint venture firms would be pooled and utilized as though they were being supplied by a single entity.²⁰ This enabled MAC to utilize the significant cargo fleets of companies such as UPS and Emery, something it had not been able to do before. Finally, growing concern about the increasing age of the airliner fleet led foreign and domestic carriers to embark on an unprecedented aircraft buying spree. Boeing received orders for 636 aircraft valued at \$30.1 billion in 1988,²¹ while McDonnell-Douglas logged \$15.6 billion in firm backlogs for the year.²² Of importance to this discussion is the fact that included in those figures were firm orders for 172 B747-400²³ and 103 MD-11 wide-body transports.²⁴

However, whether or not the CRAF will benefit by these developments is uncertain. While the CRAF Enhancement Program resulted in the addition of valuable wartime cargo-carrying capability, Pan Am was the only carrier willing to participate. Thus, there is no ongoing stream of existing aircraft being modified; in fact, the B747 lost over Scotland in December of 1988 was a CRAF enhanced plane. The airline was contemplating putting twelve more aircraft through the program, but the revenue capacity eliminated as a result of the accident may necessitate postponement of that decision.²⁵ Another area of concern centers around the wartime management of the CRAF and its various component parts. A full-scale activation would involve coordinating the efforts of 29 airlines and eight joint ventures. Of the seven long-range international segment joint ventures shown earlier in Table 2, three are made up of three carriers each, while two more are comprised of four and five carriers respectively. Notification procedures alone would be daunting; while the task of providing ongoing leadership in a contingency environment would appear to be virtually impossible. Finally, the growth in wide-body aircraft orders is a mixed blessing. For the first time in over a decade, U.S. airlines are committing to wide-body long range jets in appreciable numbers. American Airlines, for instance, recently ordered eight MD-11s and optioned 42 more,²⁶ while Delta ordered nine and optioned 31.²⁷ But these are all passenger versions that will provide no cargo carrying capability even if they do eventually find their way into the CRAF. Furthermore, tax law changes have combined with airline consolidations and mercurial market conditions to force a shift in transport aircraft purchasing and ownership patterns. Carriers are finding short-term leases (i.e. 5 years) an increasingly attractive alternative to ownership.²⁸ In fact, 30% of the U.S. commercial fleet is now leased, and that figure could increase to 60-70% in the next decade.²⁹ This gives the airlines tremendous flexibility to change aircraft types in response to competition and market opportunities, and eliminates the large capital costs associated with purchasing their own aircraft. However, one of the largest leasing companies in the world is GPA Group Ltd, which is an Irish firm.³⁰ This raises the specter of a further decline in

the CRAF, since foreign-owned aircraft are excluded from participating. In addition, the flexibility inherent in the leasing option will work against the fleet stability so essential to the CRAF. Programs like CRAF Enhancement are predicated upon maintaining the modified aircraft in the U.S. fleet for considerably longer than five years.

The preceding discussion has served to illustrate a crucial fact: the needs of the airlines no longer parallel those of national defense. This is not, necessarily bad. However, there is no mechanism in place to insure the maintenance of that industry/government linkage forged during, and after, World War II. Indeed, we can't even "draft" the carriers as we did then because their emphasis on smaller aircraft makes that proposition of limited value. Thus, it is that missing link that is the crux of the problem. The Airline Deregulation Act of 1978 makes essentially no mention of national defense, retaining the position underlying previous aviation legislation that a sound commercial air transport system would insure an adequate reserve of airlift capability in the event of war. Thus, it would be inaccurate to say that deregulation, in and of itself, placed the CRAF in jeopardy. Rather, the move away from economic regulation graphically illustrated that airline interests and defense transport interests may not, for whatever reason, coincide. The implication is, then, that in the absence of some mechanism to insure defense transport needs are met, managerial responses to future environmental developments (advanced aircraft technology, noise and pollution concerns, further market changes) could prove just as detrimental to wartime airlift capability as deregulation has today.

Unfortunately, policy makers have not handled this divergence very well. The perception is that the best way for the government to foster support for the CRAF is within the confines of the free market, as opposed to some sorts of more direct action that will delineated later. Thus, after ten years of trying to negotiate the CRAF Enhancement Program, the end result was the large-scale participation of only one carrier. Similarly, the almost inescapable conclusion is that the Joint Venture program would, if implemented, prove to be an

administrative and logistical nightmare. Finally, after almost four decades, airline participation in the CRAF is still voluntary. In sum, MAC and the DOD seem content to react to environmental changes after they occur, rather than pushing for a more proactive approach that does not rely solely on the vagaries of the free market.

PERIPHERAL ISSUES

It is important to realize that the use of civil air transport resources for military purposes is, at best, a compromise. The C141 and the C5 were specifically designed to carry cargo and are characterized by a high wing design; that is, the fuselage is suspended from the wing. This places the cargo compartment close to the ground, and provides the drive on/drive off capability so essential to the mass movement of wheeled equipment. The civilian air cargo industry on the other hand uses aircraft that are derivatives of passenger planes. The B747, the DC10, the B707 and the DC8 were not designed for freight transportation. They have a low wing design which places the fuselage above the wing, effectively eliminating any possibility for drive on/drive off vehicle handling. In addition, the two systems each utilize cargo pallets that are fundamentally different in design. Those used by the military measure 88 inches by 108 inches, while civilian pallets are either 88 or 96 inches by 125 inches.

Shipping military cargo aboard civil airliners presents some unique problems, even in peacetime. Military aircraft and materials handling equipment (MHE) are designed to handle DOD pallets widthwise (i.e. the long edge is perpendicular to the aircraft's line of flight). Narrow body airliners, as well as the DC10, are loaded from the side, which means the pallets must first be placed into the CRAF airplane, then manually spun 90 degrees before they are pushed down the fuselage. On those B747s designed for loading through the nose, the pallets must enter the aircraft lengthwise (i.e. the long edge parallel to the line of flight). Hence, they all must be turned 90 degrees before they are put onto the loader. When this is done,

military loading vehicles can carry only four pallets versus the five for which they are designed. It is worth noting here that, while military pallets can be transported on civilian airplanes, commercial pallets and containers are virtually unusable on military aircraft. The rail and locking systems aboard civilian aircraft can be adjusted to accommodate both types of pallets, while military planes can only accept Air Force pallets. Unfortunately, when airliners are used to transport military cargo, suboptimal aircraft utilization can result from the smaller size and reduced load bearing strength of DOD pallets relative to airline pallets

Another problem is that extremely large pieces of cargo, particularly rolling stock, are very difficult to handle via civilian aircraft. When utilizing sideloading planes, they payload has to be small enough and/or maneuverable enough to make the 90 degree turn from the loader into the fuselage. In addition, the narrow cabin of the DC8 or the B707 effectively limits the size and shape of the shipment, as does the nose opening in the wide body. Finally, the lack of a drive-in/drive-off capability proves to be a very limiting factor, especially in the context of a wartime scenario. Of equal concern is that military and civil loaders are basically restricted to servicing their respective aircraft. That is, Air Force loading vehicles were designed to handle aircraft having a cargo floor essentially at truckbed height above the ground. While this equipment can also service narrow-body airliners, it, cannot interface directly with wide-body Freighters. An elevator of commercial design must be utilized as a bridge between the aircraft and the loader; the plane simply cannot be worked without it. Similarly, civilian loading equipment is intended for use on aircraft having a cargo compartment that is ten to fifteen feet above the ground. The cab is generally designed to fit under the fuselage, something the low-slung military transport aircraft does not allow.

The inescapable conclusion is that military and civilian cargo handling systems are fundamentally incompatible. The two function together in peacetime because there is sufficient time to overcome

the constraints delineated earlier. But in a contingency situation those limitations could prove crippling. Essentially, military pallets and materials handling resources will be tasked to fulfill all wartime requirements because of the incompatibilities previously mentioned. Limitations on the type and size of cargo that can be moved aboard civilian aircraft would necessitate a horrendous scheduling effort intended to insure that aircraft and cargo are matched correctly. The commercial elevator required for wide-body loading/unloading is an obvious weakness since those aircraft cannot be serviced without it. Although MAC has prepositioned 116 of these elevators throughout the airlift system,³¹ there is no guarantee that commercial cargo missions will be, or can be, limited to those fields having an elevator on station. Finally, the lack of a drive-on/drive-off capability severely limits the effectiveness of civil airliners in a contingency situation.

RECOMMENDATIONS

It is absolutely imperative that the nation's air transport resources become more responsive to the needs of national defense. One long range solution to the airlift problem would be for both MAC and the airlines to fly the same type of airplanes in the future. This could lower the per plane cost to each group, and would provide for a common cargo handling system while insuring a steady growth in usable CRAF capability. Of course, the introduction of the new C-17 widebody military transport (like the C-141 and C-5, also a high-wing design) in the mid 1990s will go a long way towards eliminating the airlift shortfall discussed earlier. But it will do nothing to address the deteriorating condition of the CRAF. Similarly, MAC has been working for years to put together a NATO "CRAF" comprised of suitable aircraft from nations belonging to that alliance, with little success. In truth, such a show of unity from countries of widely, disparate cultures and ideologies seems doubtful. Another, more immediate, alternative may be to capitalize on the renewed interest being shown by US airlines in wide-body planes, and CRAF

enhance all long range passenger aircraft before they come off the assembly line. This would keep modification costs down, and would provide a flow of contingency capability into the civil fleet. Admittedly, the carriers might have some reservations about the effect of the increased weight on aircraft's productive range, but the impact of this could perhaps be minimized through some sort of abbreviated enhancement package that would limit the wartime cargo payload slightly in exchange for reduced structural strengthening.

From the standpoint of military airlift alone, the first solution delineated above is the preferred one since it dramatically increases not only capacity, but much needed drive-on/drive-off capability. Unfortunately, the cost of this option is tremendous, and it does little to address the ongoing health of the CRAF. Rather, the third alternative seems the smarter choice. By enhancing new civil aircraft, increased contingency airlift can be obtained at a reasonable per-plane cost. While these airplanes could not provide drive-on/drive-off flexibility of their military counterparts, perhaps bulky vehicles and other large cargo could be earmarked for MAC. Alternatively, funds could be spent to develop loading equipment that would allow roll-on/roll-off loading and unloading of civil aircraft. At any rate, a continuous CRAF enhancement program sensitive to the revenue needs of the carriers, seems to offer the most promise for sustained CRAF growth.

CONCLUSIONS

Prior to 1978, the moods of the DOD tended to coincide nicely with those of the airlines. The latter wanted bigger, faster, longer-range aircraft, which was exactly what the former desired. The airlines could afford to buy those aircraft and were, by and large, perfectly willing to commit them to the CRAF. But while their collective enthusiasm for the CRAF remains just as strong today, the realities of the free market have made them less able to participate.

MAC approached one large US carrier several years ago, requesting that several new B747s be CRAF enhanced while still on the assembly line. The airline declined, citing range/payload penalties resulting from the weight of the modifications that would have rendered them less competitive over their long-haul routes. To put it bluntly, we simply do not have the means to rapidly transport the men and equipment needed to support DOD contingency plans. This, in turn, places the entire logistics effort at risk, a situation with grave implications for the nation's defense posture. Recall that the purpose of logistics is to create and sustain military forces to support national policy and objectives. Unless the relationship between the industrial providers and government users of air transportation is redefined to reflect the changing needs of both, America's strategic airlift capability will become a casualty of deregulation. The loss of such an important national resource must not be allowed to happen.

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"AN INSIDE LOOK AT DELTA NU ALPHA MEMBERSHIP"

by
Roger E. Jerman and Ronald D. Anderson
Indiana University School of Business

INTRODUCTION

Delta Nu Alpha is one of the largest fraternities for persons in the traffic, transportation, and logistics industry. Delta Nu Alpha was founded in 1940 to facilitate and promote greater knowledge of traffic and transportation, to develop an appreciation of the traffic profession as a motivating factor in industry and commerce, and to encourage young persons of ability to enter and remain in the field as a life's work.

The purpose of this report is to provide demographics, statistical characteristics, and professional viewpoints of the 1988 membership of Delta Nu Alpha. Specifically, the objectives are to:

1. Summarize professional characteristics and develop comparisons with a similar 1976 study,
2. Summarize salary levels by management position and level of decision-making responsibility,
3. Analyze the impact of deregulation on perceptions of stress and prestige,
4. Summarize the preferences for decentralized salesmarketing functions, centralized shipper traffic-distribution functions, and national accounts selling,
5. Develop profiles of decision making styles.

METHODOLOGY

In late Spring of 1988, 3,500 mail questionnaires were sent to a systematic sample drawn from a list of approximately 9,000 members of Delta Nu Alpha. This resulted in 920 usable returns or a response rate of 26.3 percent. The survey was, in part, a replication of a 1976 survey which was the basis for a previously published report on Delta Nu Alpha.¹ A single mailing of 2,000 questionnaires in 1976 to the then approximately 11,000 members of Delta Nu Alpha resulted in 664 usable returns for a response rate of 33.2 percent.

RESPONDENT CHARACTERISTICS

The mixture of carriers and shippers has remained relatively constant from 1976 to 1988, as shown in Table 1. However, the relative number of rail carriers has decreased four percent while motor carriers have grown eight percent. Manufacturing oriented shippers remain the overwhelming majority of shipper membership and grew by two percent. Whereas, wholesaling oriented shipper grew by four percent, and retail oriented shippers lost one percent over the time period.

The most pronounced changes in the profiles from 1976 to 1988 are shown by Table 2, which portrays changes in age, education, and growth in female membership. The 1988 membership is significantly better educated than the 1976 membership. Further, approximately sixty-two percent of the 1988 respondents are under age forty-five, compared to fifty percent of the 1976 respondents under age forty-five. This implies that the major educational programs of Delta Nu Alpha can be geared to an increasingly sophisticated audience. This also suggests that the organization is not plagued with an "aging fleet", and offers strong leadership potential for younger members.

TABLE 1
BUSINESS COMPOSTION: 1976 vs 1988

Carrier mode	1976	1988	Change
Motor	75%	83%	8%
Rail	16%	12%	-4%
Other	9%	5%	-4%
N	314	433	

Business type	1976	1988	Change
Carrier	48%	47%	-1%
Shipper	43%	43%	0%
Other	9%	10%	1%
N	664	920	

Shipper business	1976	1988	Change
Manufacturing	76%	78%	2%
Wholesaling	7%	11%	4%
Retailing	7%	6%	-1%
Other	10%	5%	-5%
N	282	388	

TABLE 2

RESPONDENT CHARACTERISTICS: 1976 vs 1988

Age	1976	1988	Change
Under 35	26%	22%	-4%
35-44	24%	40%	16%
45-54	33%	24%	-9%
55-64	16%	13%	-3%
65-Up	1%	1%	0%
N	649	811	

Education	1976	1988	Change
High School	12%	8%	-4%
Some College	47%	41%	-6%
College Graduate	24%	32%	8%
Some Graduate Work	10%	13%	3%
Graduate Degree	7%	6%	-1%
N	662	782	

Sex	1976	1988	Change
Male	96%	75%	-21%
Female	4%	25%	21%
N	654	782	

The most significant demographic change was the astounding growth of women membership. In 1976, there were hardly enough responding female members to count. In 1988, twenty-five percent of the responding members were female. This is a whopping twenty-one percent growth. Delta Nu Alpha is to be commended for its successful recruitment of women members and also for getting them involved at the officer level. The future Delta Nu Alpha member will most likely come from the ranks of the college graduate. Since the present undergraduate School of Business programs have over fifty percent women enrollment, Delta Nu Alpha seems to be on the right strategic track for long term growth in recruiting the female segment for membership.

Transportation and distribution executives have long suffered from somewhat of an identity crisis. Part of this, no doubt, comes from the wide variety of job titles given very similar functional assignments. The most common position titles given by survey respondents are shown in Table 3. The levels of management responsibility indicated by the respondents are given in Table 4. These levels of responsibility will be used in the following sections in the analysis of perceptions of stress and prestige and decision making styles.

TABLE 3
POSITION TITLES

Title	Carrier	Shipper	Other
President/Vice President	13%	2%	25%
Director of Physical Distribution		13%	
Terminal Manager	16%		
Traffic Manager		53%	
Other Middle Managers	8%		
Sales Manager	15%		
Sales Representative	34%		
Transportation Analyst		11%	
Other	14%	21%	75%
N	433	394	93

TABLE 4
MANAGEMENT LEVEL

Level	Rail	Motor	Shipper	Other
Strategic	10%	17%	7%	12%
Tactical	58%	42%	73%	58%
Operations	32%	41%	20%	30%
N	50	355	384	789

PROFESSIONAL MEMBERSHIPS

Table 5 shows the absolute number and the percentage of the responding Delta Nu Alpha membership that belong to various other related professional organizations. The biggest overlap is with the American Society of Transportation and Logistics. A smaller percent of 1988 survey hold multiple professional memberships in comparison to the 1976 survey. This leads to speculation that companies are probably sponsoring fewer memberships, and many may support only a single membership.

Table 6 shows the self-indicated management level in relation to professional organization membership. For example, Table 5 showed that ninety-one survey respondents or approximately ten percent Delta Nu Alpha members also belong to the American Society of Transportation and Logistics. Table 6 indicates that of

these ninety-one dual members, sixteen were at the strategic management level, sixty were at the tactical level, nine were at the operations level, and six did not provide their level of management.

Sixty-four percent indicated that membership dues were fully supported by their employers. Twenty-two percent indicated that membership dues were only partially supported, and thirteen percent stated that their employers provided no support. The differences in financial support across level of management responsibility are shown in Figure 1. As one would expect, the higher the level in the managerial hierarchy, the greater the company sponsored support. At the strategic level, seventy-seven percent were fully supported, eighteen percent were partially supported, and only five percent paid for their own professional activities. At the tactical level, sixty-seven percent were fully supported, twenty-three percent were partially supported, and ten percent provided their own support. While at the operations level, fifty-one percent received full support, twenty-five percent were partially supported, and twenty-four percent have no company support for professional memberships.

TABLE 5
PROFESSIONAL MEMBERSHIPS

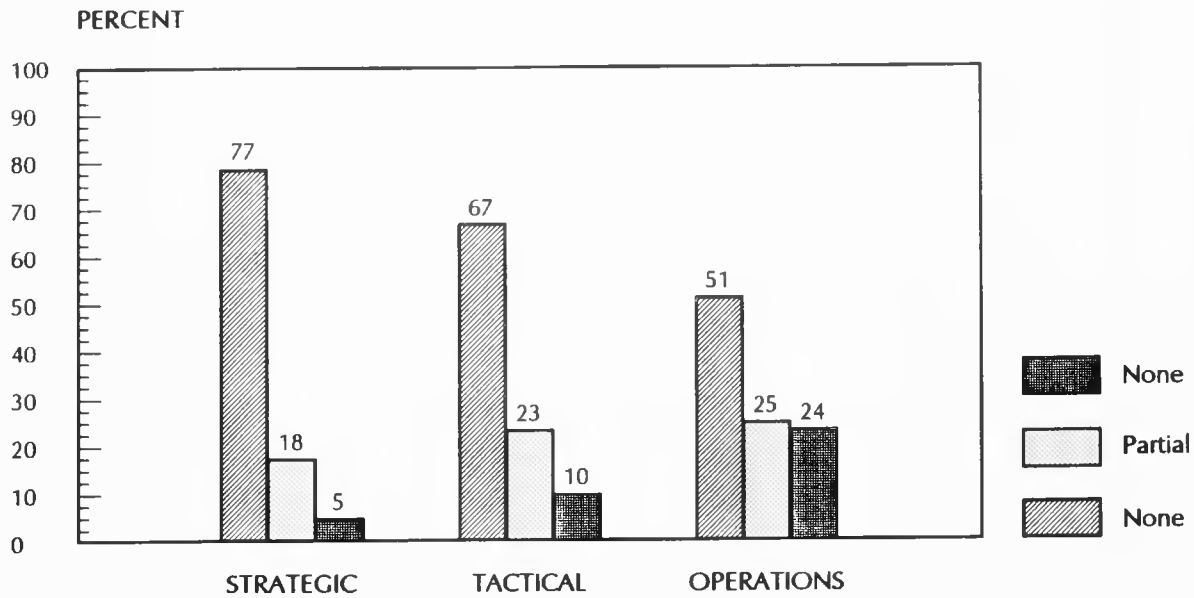
Organization	Number	Percent
American Society of Transportation and Logistics	91	10%
Council of Logistics Management	78	8%
NIT League	66	7%
Association of Transportation Practioners	51	5%
Transportation/Public Utilities Group - AEA	29	3%
Purchasing Management Association	18	2%
American Production and Inventory Control Society	17	2%
Transportation Research Forum	7	1%
Transportation Research Board	7	1%

TABLE 6

PROFESSIONAL MEMBERSHIPS BY MANAGERIAL LEVEL

Organization	Total Number	Strategic	Tactical	Operations	Not Stated
American Society of Transportation and Logistics	91	16	60	9	6
Council of Logistics Management	78	18	49	8	3
NIT League	66	18	41	6	1
Association of Transportation Practitioners	51	14	32	2	3
Transportation/ Public Utilities-AEA	29	7	13	9	0
Purchasing Management Association	18	3	13	2	0
American Production and Inventory Control Society	17	3	12	2	0
Transportation Research Forum	7	1	3	1	2
Transportation Research Board	7	0	5	1	1

FIGURE 1
COMPANY PAYS MEMBERSHIP DUES



Salary Levels

Comparative salary levels by position title and in total for carriers and shippers are displayed in Tables 7 and 8. Table 9 shows the salary distribution by level of management. Fifty-two percent of the respondents at the operations level reported salaries between \$30,000 and \$50,000. At the tactical level, forty percent reported salaries between \$40,000 and \$60,000. The greatest variance in salaries was at the strategic level, where thirteen percent had salaries of \$100,000 or more, but thirty-eight reported levels from \$40,000 to \$60,000.

TABLE 7
CARRIER SALARY LEVELS BY MAJOR JOB TITLE

Salary Level	President/ V.President	Terminal Manager	Operations Manager	Sales Manager	Sales Rep.
20000-29999	3%	16%	41%	7%	12%
30000-39999	13%	31%	32%	29%	48%
40000-49999	16%	20%	15%	23%	28%
50000-59999	22%	20%	3%	25%	9%
60000-69999	9%	11%	6%	9%	2%
70000-79999	15%	2%	3%	2%	1%
80000-89999	3%				
90000-99999	6%				
100000-UP	13%			5%	
N	68	64	34	56	128

TABLE 8
SHIPPER SALARY LEVELS BY MAJOR JOB TITLE

Salary Level	President/ V.President	Director of Physical Distribution	Traffic Manager	Transportation Analyst
20000-29999	0%	4%	22%	45%
30000-39999	11%	4%	39%	33%
40000-49999	11%	32%	26%	17%
50000-59999	11%	28%	6%	5%
60000-69999	33%	19%	4%	
70000-79999	11%	6%	2%	
80000-89999	11%	2%	1%	
90000-99999	11%			
100000-UP		4%		
N	9	47	189	42

Delta Nu Alpha demographics show a mature, experienced, well-educated work force with upward tending salaries. The salary increases appear to exceed inflation and cost of living increases, pointing to the growing status of transportation and distribution professionals.

TABLE 9
SALARY LEVELS BY MANAGEMENT LEVEL

Salary Level	Strategic	Tactical	Operations
20000-29999	6%	13%	37%
30000-39999	11%	37%	33%
40000-49999	19%	25%	19%
50000-59999	19%	14%	8%
60000-69999	15%	6%	2%
70000-79999	11%	2%	1%
80000-89999	3%	1%	
90000-99999	3%	1%	
100000-UP	13%	1%	
N	128	432	243

Status and Stress

Agreement concerning whether the deregulation movement has improved the status and role of a career in transportation and distribution management is summarized in Figure 2. Rail carriers expressed agreement with improved status. Also a strong majority of shippers agreed that deregulation had improved their status. The perception of change in status increased with managerial responsibilities for shippers. However, the perception of change in status was markedly different for motor carriers. Nearly, half of the motor carriers disagreed that deregulation had improved their status. In addition, motor carrier managers at the strategic and tactical management levels indicates less improvement in status than those at the operations level.

The nature of the economy, not deregulation, affects movement of the total amount freight. But the percentage of available freight that a particular type of carrier receives is highly influenced by deregulation. Rail carriers have shown impressive profit gains under deregulation, and this enhanced economic performance has likely resulted in both increased status and stress. Whereas, the motor carrier industry has had mixed financial results. Early under deregulation, the industry suffered from the economic downturn, and the large number of new carriers permitted in the changed environment. This resulted in excess capacity and lead to wide spread discounting. While this excess capacity has partially been reduced and profitability has been resorted to some degree, the responding motor carriers still indicate little support for deregulation.

Shippers in the 1976 survey did not express support for deregulation, which implied the perception their status and role would not be improved under deregulation. Now, in 1988, over fifty-five percent of the shippers believe that their status has improved as a result of deregulation. One plausible explanation for this change is that traffic and distribution functions are still treated as expense centers, despite the conceptual arguments to convert to profit

FIGURE 2
AGREEMENT THAT STATUS HAS BEEN
IMPROVED DUE TO DEREGULATION

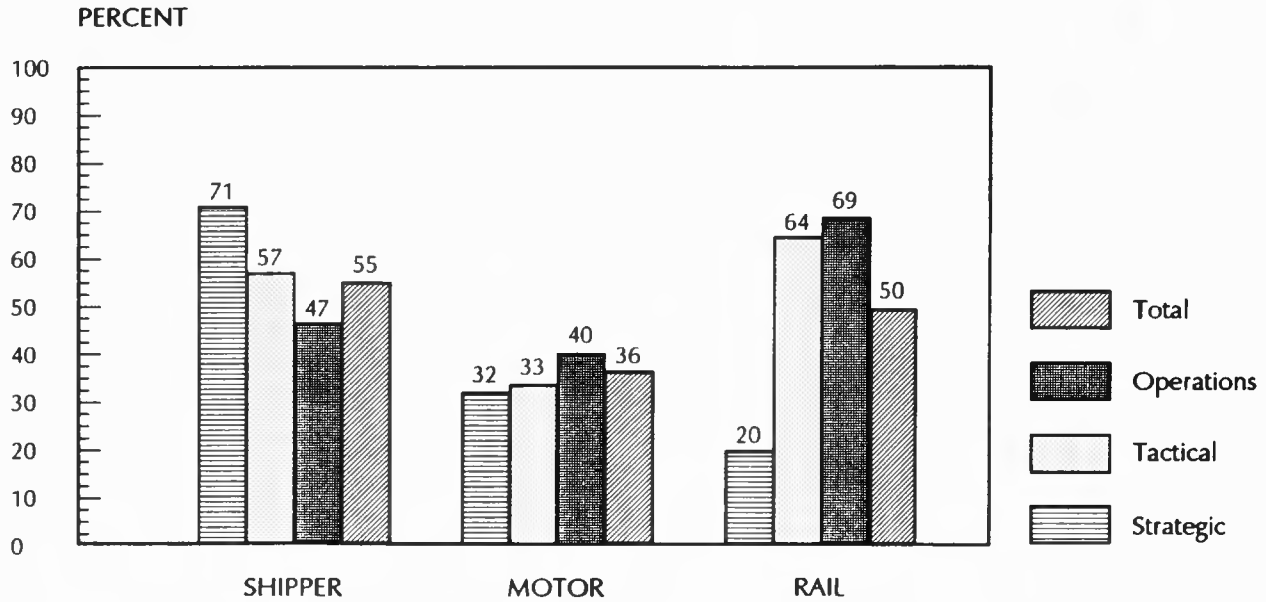
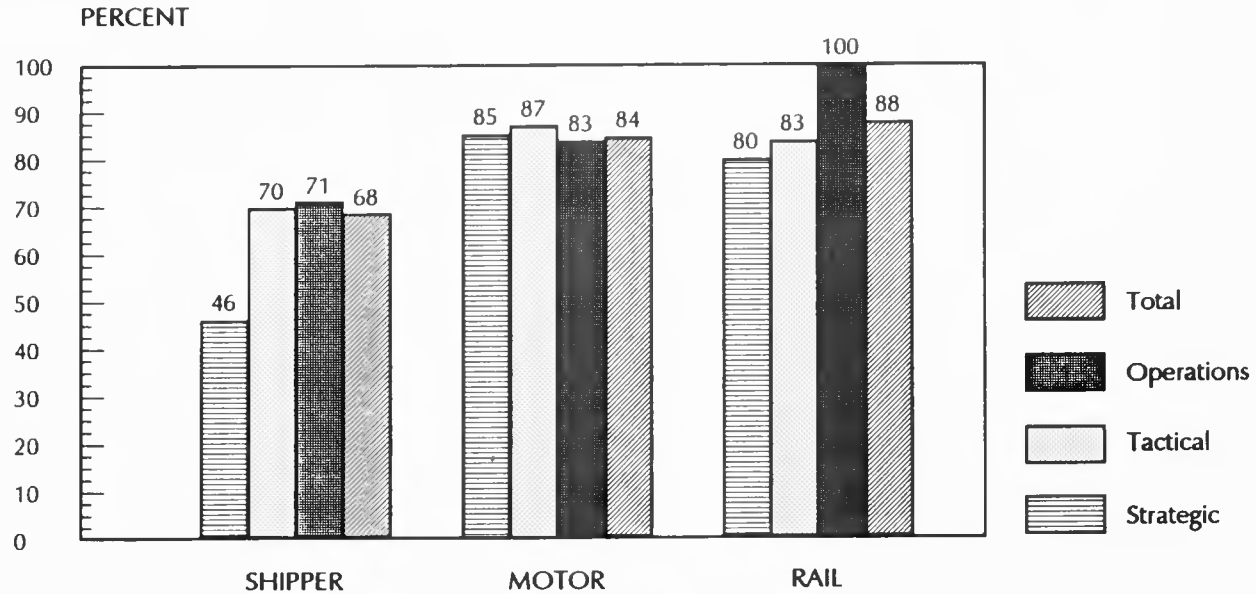


FIGURE 3
AGREEMENT THAT THE STRESS LEVEL
INCREASED DUE TO DEREGULATION



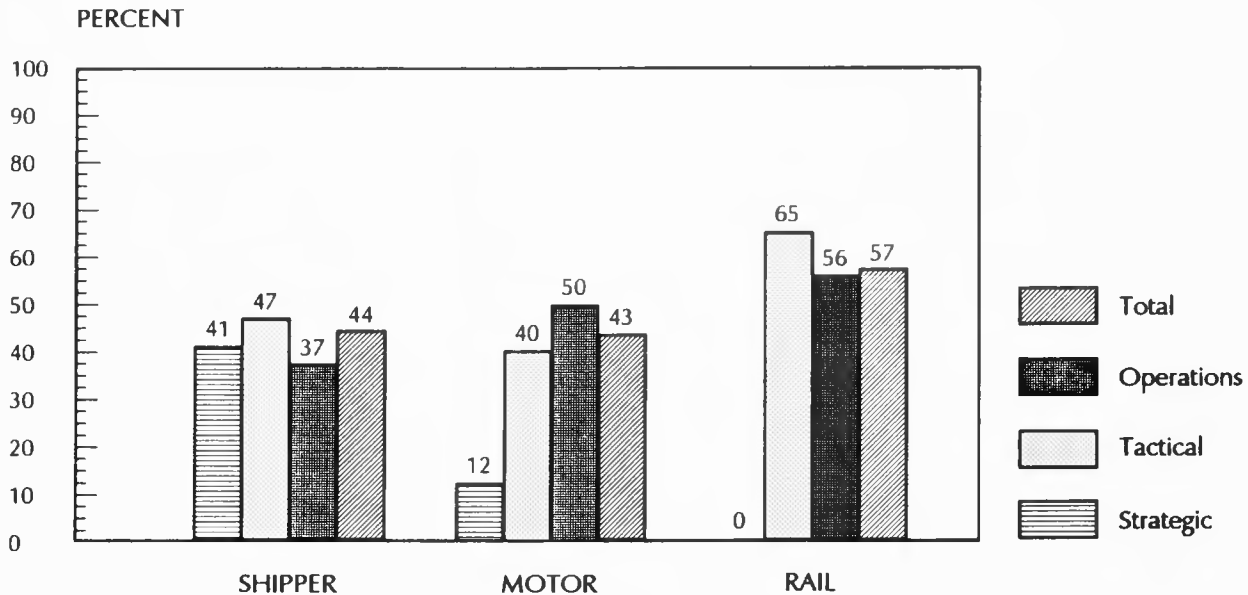
centers. The new pricing flexibility has allowed departments to move more freight through their systems at a lower unit cost, thus showing a very good expense performance.

All levels of management of motor and rail carriers indicated increased stress as shown in Figure 3. Overall, eighty-four percent of motor carriers and eighty-eight percent of the rail carriers agreed that deregulation has resulted in more stress. Shippers at the operations and tactical levels also considered the deregulated environment more stressful. However, less than half of the shippers at the strategic level viewed deregulation more stressful.

Organizational Issues

The survey made inquiry about preferences for decentralized carrier sales-marketing functions, centralized shipper traffic/distribution functions, and national accounts selling. For many years, the major carriers grew in size and moved from a centralized owner-operator orientation to a more decentralized management style. The implementation of this movement toward decentralized sales-marketing was often accomplished by a form of local territory or product management. Figure 4 shows that fifty-seven percent of all rail carriers preferred a decentralized sales-marketing function. It will be noted from Figure 4, that no rail managers at the strategic level preferred a decentralized sales-marketing function. However, this is a weak inference to all rail managers at the strategic level, in that this result is based on only five respondents. Overall, neither the motor carriers nor the shippers strongly supported sales-marketing decentralization. This implies that shippers want to deal with carriers at a higher managerial level. There was not much difference in shipper response by managerial level. However, motor carrier managers at the strategic level indicated much less support than those at the tactical and operations levels.

FIGURE 4
AGREEMENT THAT DECENTRALIZED CARRIER SALES OR
MARKETING FUNCTION IS PREFERRED TO A CENTRALIZED FUNCTION



Before the advent of the physical distribution concept, the distribution functions of traffic, inventory, and warehousing were scattered and decentralized, which resulted in the local carrier sales representative calling on the local traffic manager. But the new distribution concept called for the grouping of the distribution activity centers, and a centralization of responsibility control at either corporate headquarters or at a major distribution center. Rarely do textbooks or journal publications emphasize the potential benefits of distribution and customer service decentralization. The reason for this could lie in the many years spent in attempting to gain upper management's attention, while developing some form of control of the expenditures made to move products from the source of raw materials to the industrial user or ultimate consumer. Figure 5 shows that shippers strongly supported a centralized traffic-distribution function, with both rail and motor carriers being less supportive.

Shippers now tend to use significantly fewer carriers, and as a result, prefer to deal at a higher level in the carrier hierarchy. The organization charts of many carriers show that many have responded to this dilemma by establishing national account selling. While even the casual observer can see wide spread use of national account selling in this industry, Figure 6 shows that only a minority of both motor and rail carriers support this organizational form. Further, only approximately one-third of the shippers preferred national account selling.

FIGURE 5
AGREEMENT THAT CENTRALIZED SHIPPER TRAFFIC OR DISTRIBUTION
FUNCTION IS PREFERRED TO A DECENTRALIZED FUNCTION

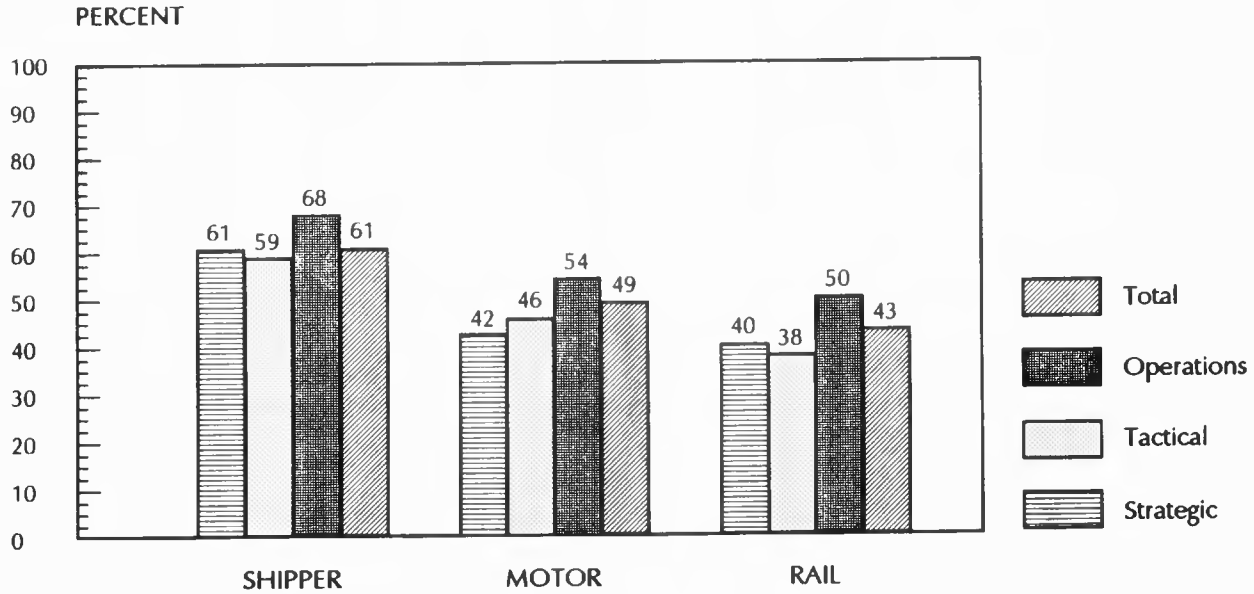
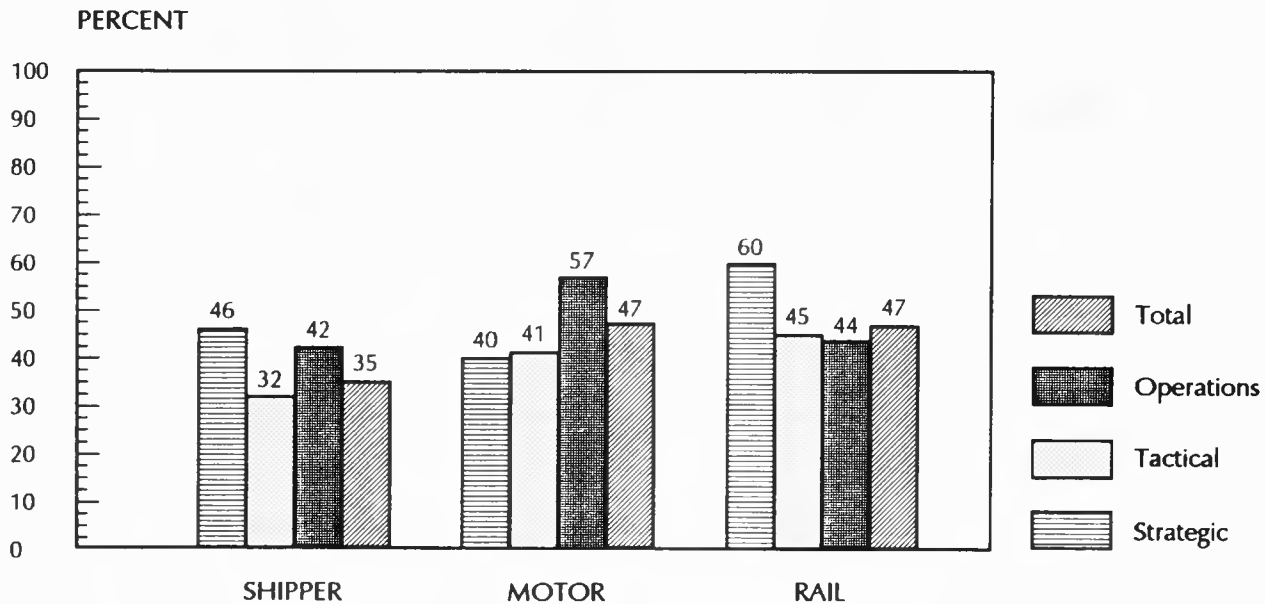


FIGURE 6
AGREEMENT THAT BETTER SERVICE IS
PROVIDED BY NATIONAL ACCOUNTS SELLING



Decision-Making Style

Table 10 displays profiles of decision-making style preferences. The four decision-making style categories were labeled as "supportive", "aggressive", "creative", and "cautious". The most frequent style was the "supportive" style which described thirty-one percent of the respondents. The profile of the "supportive" style manager includes "being best in my field" as the most common primary work objective, tending to "look for new ideas" in the job, preferring either a "creative approach" or "careful analysis" to problem solving, avoiding "conflict", and being good at "interacting with others".

The "aggressive" style applied to twenty-seven percent of the respondents. The profile of the "aggressive" style manager includes "status or recognition" as the most frequent primary work objective, seeking the "best solutions" in the job, using "careful analysis" in problem solving, avoiding "long debates", and being good at "solving problems". The largest percentage of females were classified as having an "aggressive" decision-making style.

The "creative" style also described twenty-seven percent of the respondents. The profile of the "creative" style manager includes "being the best in my field" as the most frequent primary job objective, looking for "new ideas" in the job, adopting a "creative approach" to problem solving, avoiding "incomplete work", and being good at both "solving problems" and "seeing possibilities". The "creative" style had the smallest percentage of respondents at the operations level and the largest percentage at the tactical level within a given category.

The "cautious" style had the least number of respondents at fifteen percent. The profile of the "cautious" style manager includes "being the best in my field" as the most common primary job objective. However, it should be noted that thirty-five percent of those in this category stated that "security" was the prime objective.

TABLE 10
DECISION-MAKING STYLE

Indicator	"Supportive"	"Aggressive"	"Creative"	"Cautious"
Primary Objective:				
Be the best	50%	37%	54%	54%
Status	28%	47%	30%	11%
Security	22%	16%	16%	35%
Look for in my job:				
New ideas	41%	11%	55%	6%
Best solutions	34%	48%	31%	43%
Good environment	15%	10%	5%	14%
Practical results	10%	31%	9%	37%
Problem solving:				
Creative approach	40%	12%	49%	7%
Careful analysis	39%	51%	40%	54%
Feelings	13%	12%	5%	14%
Proven approach	8%	25%	6%	25%
Like to avoid:				
Conflict	52%	28%	9%	56%
Incomplete work	25%	31%	48%	25%
Long debates	17%	37%	33%	10%
Using numbers	6%	4%	10%	9%
I am good at:				
Interacting	60%	28%	9%	34%
Solving problems	20%	36%	42%	28%
Seeing possibilities	13%	15%	37%	17%
Dates and facts	7%	21%	12%	21%
Management level:				
Strategic	16%	18%	17%	11%
Tactical	54%	50%	61%	49%
Operations	30%	32%	21%	40%
Sex:				
Female	27%	30%	20%	20%
Male	73%	70%	80%	80%

Forty-three percent look for "best solutions" in their job, while thirty-seven percent look for "practical results". The approach to problem solving is "careful analysis", "conflict" is avoided, and are good at "interacting with others" and "solving problems". This "cautious" style had the largest percentage at the operations level within a category.

SUMMARY

The Delta Nu Alpha membership is predominantly male, with nearly an equal split between shipper and carriers. Compared to the 1976 survey, the number of rail carriers has declined, the number of motor carriers has increased, and the percentage to shippers has remained approximately the same. The most significant demographic change is the growth of the female membership. It appears that Delta Nu Alpha has capitalized on the growing number of women employed in transportation and distribution. The membership has a higher education level than twelve years ago, and is younger. In total, Delta Nu Alpha demographics show a mature, experienced, and increasingly well-educated work force with upward trend in salaries.

The present Delta Nu Alpha membership does not have a large overlap of memberships with other professional organizations. The largest cross-membership is with the American Society of Transportation and Logistics. Two-thirds of Delta Nu Alpha members are fully supported by their employers for membership dues, with higher level managers receiving substantially more financial support than those at the tactical and operations levels.

Rail carriers and shippers consider the deregulation movement to have improved their career status. Motor carriers did not agree. All three groups were in general agreement that deregulation has significantly increased job stress, especially at the operations level of management.

Rail carriers indicated a preference for a decentralized sales-marketing function, but the motor carriers and the shippers did not. Shippers preferred a centralized traffic-distribution function, while carriers gave much less support to this issue. Although national account selling is widely used in the industry, preference for this type of selling organization was weak from both carriers and shippers.

Four categories of decision style were identified and profiled. These profiles reflect differences in job objectives, what is looked for in a job, the preferred approach to problem solving, what is to be avoided, and what managers feel they are good at. Different styles are related to managerial level, and to a lesser extent, sex.

ENDNOTE

¹Roger E. Jerman, Ronald D. Anderson, and James A. Constantin, "Delta Nu Alpha Membership Profile," The Alphan, Volume 30, Number 7 (November, 1977), pp. 24-25.

AN EVALUATION OF MOTOR CARRIER SALES REPRESENTATIVES: THE PERSPECTIVE OF CARRIER SALES MANAGERS

by

Peter M. Lynagh, University of Baltimore,
Paul R. Murphy, John Carroll University and
Richard F. Poist, University of Maryland

INTRODUCTION

The growing body of literature on services marketing increasingly recognizes the crucial role played by salespeople in the marketing of services. For example, early writings pointed out that salespeople could be helpful in reducing customer anxiety associated with the purchasing of services, which tend to be intangible in nature.¹ More recent work suggests that service firms utilize sales representatives to communicate customer service policies to their customers.²

However, it appears as if motor carriers have been slow to recognize the importance of a well-managed sales force. For instance, a leading distribution executive has asserted that a professional and knowledgeable motor carrier sales force can lead to increased market shares for individual motor carriers in part by attracting business from competing firms.³ In addition, an annual survey conducted by *Distribution Magazine*, which asks users of trucking services to rate individual carriers along the dimensions of service, price, convenience and sales, has consistently found motor carriers to be ranked lowest on the sales component.⁴

In many instances, the task of improving sales force performance falls to sales managers. While motor carrier sales managers have a number of responsibilities, certainly some of the most important

involve the recruitment, selection and training of sales personnel. Poor recruitment and selection, along with inadequate training, increase the likelihood of sales force turnover; the out-of-pocket costs of such turnover in the motor carrier industry have been estimated at nearly \$40,000 per sales representative.⁵

Moreover, the recruitment, selection and training of new sales representatives will reflect the sales manager's perception of various attributes that should be possessed by individual salespeople. If a sales manager feels that a salesperson should be outgoing, then selection techniques, such as psychological testing, might be utilized to learn about the personality of each recruit. Similarly, training programs will be structured to feature the types of knowledge that a sales manager deems necessary for successful sales force performance.

The purpose of this paper is to learn more about characteristics associated with successful performance by motor carrier sales personnel, as perceived by motor carrier sales managers. Specifically, this paper will investigate the following issues:

1. What are the absolute and relative importance of various salesperson characteristics in the selling of motor carrier services?
2. Are there statistically significant relationships between responses to these attributes and selected demographic variables?
3. Have motor carrier sales managers altered their perceptions of desirable sales force characteristics between the mid-1970s and the late 1980s?
4. What implications do the findings of this study have for sales force management in the motor carrier industry?

METHODOLOGY

Four hundred U.S. motor carriers, randomly selected from a recent edition of the Official Motor Carrier Directory, were sent a survey dealing with the importance of selected sales force characteristics. A concerted effort was made to address the survey to the highest ranking sales executive at individual firms. One hundred seventy-nine usable returns were received, for a response rate of 44.8%. This response rate was considered high for a mail survey of this type and indicated an apparent interest in the study topic.

A demographic profile of respondents is presented in Table 1. The one hundred and seventy-nine responding companies represent a variety of size categories; 53% have annual revenues of under \$25,000,000, while 19% of the responses came from motor carriers with annual revenues in excess of \$100,000,000. Respondents appeared to be well-compensated (75% earn at least \$40,000 per year) and fairly well-educated (45% possess at least a four year college degree). Likewise, survey participants were overwhelmingly male, with only six of the 179 respondents being female. The remainder of the paper will be devoted to a presentation and discussion of other empirical findings.

IMPORTANCE OF SALESPERSON CHARACTERISTICS

One portion of the survey asked sales managers to evaluate the importance of 26 salesperson characteristics along a five point scale ranging from 0 = "no importance to" 4 = "maximum importance"; twenty-two of these attributes were drawn from a similar study conducted in the mid-1970s.⁶ Four characteristics (knowledge of electronic data interchange (EDI), knowledge of the deregulated transportation environment, knowledge of intermodal transport opportunities, and communication skills) were added in this study to reflect changes in both the transportation industry and overall business environment since the mid-1970s.

TABLE 1
DEMOGRAPHIC PROFILE OF RESPONDENTS (n = 179)

AGE							
	<u>20-29</u>	<u>30-39</u>	<u>40-49</u>	<u>50-59</u>	<u>60 and over</u>		
	3.9%	33.0%	30.7%	18.4%	14.0%		

ANNUAL SALARY:								
	<u>Under</u>	<u>\$30,000-</u>	<u>\$40,000-</u>	<u>\$50,000-</u>	<u>\$60,000-</u>	<u>\$70,000-</u>	<u>\$80,000-</u>	<u>\$100,000-</u>
	<u>\$30,000</u>	<u>\$39,999</u>	<u>\$49,999</u>	<u>\$59,999</u>	<u>\$69,999</u>	<u>\$79,999</u>	<u>\$99,000</u>	<u>and over</u>
	7.0%	17.4%	15.7%	20.9%	9.9%	8.7%	7.6%	12.8%

EDUCATION LEVEL:						
	<u>High</u>	<u>College</u>	<u>4 Year College</u>	<u>Graduate School</u>	<u>Master's</u>	<u>Ph.D</u>
	<u>School</u>	<u>No Degree</u>	<u>Degree</u>	<u>No Degree</u>	<u>Degree</u>	<u></u>
	17.3%	37.4%	36.9%	3.4%	5.0%	0.0%

SEX:	
<u>Male</u>	<u>Female</u>
96.6%	3.4%

n = Number of Respondents

TABLE 1 Continued
 DEMOGRAPHIC PROFILE OF RESPONDENTS (n = 179)

ANNUAL FIRM REVENUES:					
Under	\$25,000,000-	\$50,000,000-	\$100,000,000-	\$500,000,000-	
<u>\$25,000,000</u>	<u>\$49,999,999</u>	<u>\$99,999,999</u>	<u>\$499,999,999</u>	<u>and over</u>	
52.6%	17.9%	10.4%	11.0%	8.1%	

YEARS WITH PRESENT EMPLOYER (Company Tenure):					
Less than	1 - 5	6 - 10	11 - 15	16 - 20	Over 20
<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>
3.4%	24.0%	25.7%	17.3%	9.5%	20.1%

YEARS IN PRESENT JOB (Job Tenure):					
Less than	1 - 5	6 - 10	11 - 15	16 - 20	Over 20
<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>	<u>years</u>
4.5%	44.1%	24.0%	9.5%	7.8%	10.1%

n = Number of Respondents

The results for the twenty-six characteristics, presented in Table 2, show that the most important attribute is ethical conduct by the salesperson. Ethical behavior, such as fairness and honesty, is also important to shippers. A recent study conducted by Traffic Management found that users value motor carrier honesty above all other traits.⁷

This emphasis on ethical behavior is an interesting finding, given the questionable tactics that have been employed by some carriers and their salespeople in the past, most notably with respect to the undercharge issue.⁸ In addition, false or misleading presentations by carrier sales personnel appear to be a common complaint in the less-than-truckload (LTL) segment of the motor carrier industry.⁹ The fact that 75% of this study's respondents feel that ethical sales force conduct is of maximum importance, is a clear indication that most truckers want harmonious relationships with their users.

Moreover, the commitment of sales managers to ethical conduct by their sales personnel is seen in the response to gratuities (or gifts) offered by salespeople. This attribute is the lowest ranked of the 26 characteristics; nearly 60% of the respondents indicate that gratuities are of no importance or of slight importance for effective sales performance. These gratuities, which can take many forms, such as meals and entertainment, may be viewed as an attempt to "buy" clients. Although this trait is the least importance of those investigated, it is interesting to note that roughly 10% of the respondents feel that gratuities are of great or maximum importance for successful performance by motor carrier sales representatives.

The survey results also suggest that a salesperson's promptness in dealing with customers is the second most important characteristic, with nearly two-thirds of the respondents assigning this trait to the "maximum importance" category. One explanation for this finding is that sales managers have recognized the importance of customer service in a deregulated environment, and that in service industries (such as trucking) customer service arises from frequent contact between the customer and the supplier.¹⁰

TABLE 2
ABSOLUTE AND RELATIVE IMPORTANCE OF SALES FORCE CHARACTERISTICS (n = 179)

Characteristic	Of No Importance	Of Slight Importance	Of Moderate Importance	Of Great Importance	Of Maximum Importance	Mean Score ^a
Ethical conduct by salesperson	0.0%	0.0%	1.15%	22.9%	76.0% ^c	3.749 ^b
Promptness in overall dealings with customers	0.0%	0.0%	1.7%	31.8%	66.5%	3.648
Knowledge of carrier's operating schedules	0.0%	0.6%	6.7%	34.6%	58.1%	3.503
Self-confidence	0.0%	0.6%	5.6%	39.3%	54.5%	3.478
Knowledge of carrier's route structure	0.0%	1.5%	6.7%	44.1%	47.5%	3.409
Communication skills	0.6%	0.0%	5.0%	51.4%	43.0%	3.363
Knowledge of carrier's equipment	0.0%	1.1%	11.2%	40.8%	46.9%	3.335
Neat appearance	0.0%	0.0%	6.7%	54.2%	39.1%	3.324
Knowledge of customer's logistics system	0.0%	0.6%	10.1%	48.0%	41.3%	3.302
Willingness to arrange expedited service	0.6%	1.7%	11.2%	41.8%	44.7%	3.285
Knowledge of carrier's rates	0.0%	0.0%	9.5%	54.2%	36.3%	3.268
Information feedback provided by salesperson	0.6%	1.1%	10.6%	50.3%	37.4%	3.229
Friendly personality	0.0%	0.0%	15.6%	49.2%	35.2%	3.196
Knowledge of customer's product	0.0%	1.1%	20.7%	47.5%	30.7%	3.078

TABLE 2 Continued
 ABSOLUTE AND RELATIVE IMPORTANCE OF SALES FORCE CHARACTERISTICS (n = 179)

Characteristic	Of No Importance	Of Slight Importance	Of Moderate Importance	Of Great Importance	Of Maximum Importance	Mean Score ^a Importance
Willingness to discuss rate change proposals	0.0%	2.8%	19.6%	51.4%	26.3%	3.011
Knowledge of carrier's competitors	0.6%	3.9%	16.2%	54.7%	24.6%	2.989
Knowledge of the deregulated transportation environment	0.6%	4.5%	23.5%	44.7%	26.8%	2.927
Claims assistance	0.0%	5.6%	39.7%	44.7%	10.0%	2.592
Ability to influence loss and damage	0.0%	10.6%	34.6%	41.3%	13.4%	2.575
Knowledge of overall transportation industry	0.6%	5.1%	42.0%	44.4%	7.9%	2.539
Knowledge of interline connections	9.0%	9.0%	34.3%	28.7%	19.0%	2.399
Knowledge of electronic data interchange	1.1%	12.3%	41.9%	36.3%	8.4%	2.385
Education level achieved	5.0%	6.7%	58.1%	25.7%	4.5%	2.179
Knowledge of intermodal transport opportunities	3.9%	16.3%	50.0%	24.2%	5.6%	2.112
Attendance at professional meetings	4.0%	26.6%	52.5%	15.2%	1.7%	1.842
Gratuities offered by the salesperson	30.9%	28.7%	32.0%	6.2%	2.2%	1.202

^aMean score based on 0 = no importance and 4 = maximum importance

^bCharacteristics are presented from highest mean score to lowest mean score

^cPercentages may not add up to 100% due to rounding

The information in Table 2 further indicates that motor carrier sales managers feel that their sales representatives must be knowledgeable about carrier operations, specifically carrier schedules, routes and equipment. For example, knowledge of operating schedules emerges as the third most important attribute, with nearly 60% of respondents indicating that such knowledge is of maximum importance for successful sales force performance. One explanation for this finding is that the motor carrier industry's increasing involvement with Just-in-Time inventory systems places high priority on reliable operating schedules; irregularity can lead to stockouts and/or production line shutdowns, both of which create customer dissatisfaction.

The increasing motor carrier participation in JIT traffic also provides an explanation for the importance of sales force knowledge of carrier equipment (mean score = 3.35). For instance, one equipment consideration involves the average fleet age for individual carriers; older equipment is more likely to break down, which obviously impacts transit time reliability. In addition, a number of large LTL carriers are adding smaller trailers (e.g., 28 ft. trailers known as "pups") to their fleets, due in part to the smaller, more frequent orders associated with JIT systems.

Survey participants also suggest that sales representatives should be knowledgeable as to their carrier's route structure. There are several explanations for this finding, with one being that since passage of the Motor Carrier Act (MCA) of 1980 many shippers have reduced the number of carriers they use; one factor in this decision is the scope of geographic coverage. Secondly, shippers are actively seeking to reduce interlining due to the slower transit times and increased handling of goods. Since shippers generally prefer those carriers with the ability to provide direct service between particular city pairs, motor carrier sales representatives need to be cognizant of their carrier's route structure.

Furthermore, the information in Table 2 suggests that sales managers emphasize personal characteristics of sales representatives, with self-confidence ranked fourth most important, communication skills as sixth in importance, and neat appearance ranked as the eighth most important attribute. This might influence the practices used in the selection of motor carrier sales representatives; for example, personal interviews would appear to be an excellent method for evaluating a candidate's self-confidence, appearance and communication abilities.

Turning to low-ranked attributes, respondents assigned low importance to a salesperson's attendance at professional meetings (mean = 1.842) as well as his/her educational history (mean = 2.179). The finding on professional meetings is not surprising in that many motor carriers have reduced their participation at such events because of potential antitrust (e.g., collusion with shippers) concerns. However, the results on education are somewhat unexpected, given that universities are the recruiting source most likely to be added by LTL motor carriers over the next several years ¹¹

In addition, two of the least important sales force characteristics, knowledge of intermodal transport opportunities (ranked 24th out of the 26 traits) and knowledge of electronic data interchange (ranked 22nd) had been included in this study to reflect changes in the transportation industry and American business since the mid-1970s. The finding on intermodal knowledge may be a reflection of the fact that motor carriers are not considered major players in the marketing of intermodal services and that brokers, railroads and third party agents are more likely to dominate this phase of intermodal activities.

The relative unimportance of EDI is an unexpected result, given the increasing use of computers in American business. In fact, the mean score of 2.385 indicates that survey participants feel that EDI knowledge is only of moderate importance for successful sales force performance. One explanation for the low rating and ranking of this

attribute is that EDI utilization appears to be in the early stages at many trucking companies.¹² As EDI becomes more commonplace in the motor carrier industry, salesperson knowledge of EDI should become a more valuable attribute.

A review of the literature as well as consultation with industry experts indicated that the 26 salesperson characteristics evaluated in this study could be divided into three distinct categories... Personal, Service, and Knowledge. Personal characteristics represent those factors relating to an individual salesperson, their character and professional background. Service-related characteristics represent factors which provide service, assistance or tangible value to the shipper. Finally, Knowledge-related characteristics represent types of information possessed by salespeople relating to the carrier, customer and industry. These three groupings, presented in Table 3, indicate that motor carrier sales managers place heaviest emphasis on personal attributes, with a median category score of 3.324. In addition, five of the seven personal attributes have a mean rating of 3.000 ("great importance") or better. The information in Table 3 also suggests that service (category median = 3.011) and knowledge (category median = 3.035) characteristics are of roughly equal importance.

As previously discussed, personal characteristics of sales personnel may best be addressed in the selection of sales representatives, whereas service and knowledge attributes might be associated with sales force training practices. The fact that respondents, on the whole, favor personal attributes over service and knowledge characteristics might suggest that extra attention is devoted to selection techniques, with a lesser emphasis on training. This subject will be addressed again in the summary, and implications section of the paper.

TABLE 3

IMPORTANCE OF PERSONAL, SERVICE AND KNOWLEDGE-RELATED CHARACTERISTICS

PERSONAL		SERVICE		KNOWLEDGE	
Characteristic	Average Rating	Characteristic	Average Rating	Characteristic	Average Rating
Ethical conduct by salesperson	3.749	Promptness in customer dealings	3.648	Carrier's operating Schedules	3.503
Self-confidence	3.478	Arrange expedited Service	3.285	Carrier's route Structure	3.408
Communication skill	3.363	Information feedback	3.229	Carrier's equipment	3.335
Neat appearance	3.324	Discuss rate change proposals	3.001	Customer's logistics system	3.302
Friendly personality	3.196	Claims assistance	2.592	Carrier's rates	3.268
Educational level Achieved	2.179	Loss and damage	2.575	Customer's products	3.078
Attendance at professional meetings	1.842	Gratuities offered	1.202	Carrier's competitors	2.989

TABLE 3

IMPORTANCE OF PERSONAL, SERVICE AND KNOWLEDGE-RELATED CHARACTERISTICS

PERSONAL		SERVICE		KNOWLEDGE	
Characteristic	Average Rating	Characteristic	Average Rating	Characteristic	Average Rating
				Deregulated transportation environment	2.927
				Overall transportation industry	2.539
				Interline connections	2.399
				Electronic data interchange	2.385
				Intermodal transportation opportunities	2.112
Category Median: ^a	3.324		3.011		3.035

^aThe median represents the middle score in a set of numbers arranged in ascending or descending order.

DEMOGRAPHIC RELATIONSHIPS

Table 4 provides information on the statistically significant relationships, at the .05 level or better, that were discovered when the 26 sales force characteristics were analyzed in terms of six selected demographic variables. Twenty-eight of the 156 (17.95%) possible relationships emerged as statistically significant. The results in Table 4 represent the maximum number of significant relationships that could be identified within a particular demographic variable. For example, although only five significant relationships appear when respondents under 50 years of age are compared to those over 50, other age dimensions (e.g., under 40 vs. over 40) generated fewer statistically significant relationships.

The remainder of this section will focus on the significant differences involving salary and annual revenues because these variables show the highest number of significant relationships when compared to the 26 salesperson characteristics. With respect to salary, t-tests of mean equality for respondents earning less than \$60,000 against those earning \$60,000 or more revealed nine statistically differences, with six of these attributes being more important to respondents with annual revenues of \$60,000 or more. In fact, all four of the significant knowledge attributes are more important to the higher-salaried sales managers. Given that salary often acts as a surrogate for job title and managerial level (i.e., higher salary associated with more prestigious and senior-level jobs), the salary t-tests suggest that motor carrier sales managers increase their opportunities for advancement by developing sales representatives who deal promptly with customers and who are knowledgeable about their company's, rates, routes and operating schedules. In contrast, the lower-salaried sales manager respondents attached greater importance to claims assistance, attendance at professional meetings, and gratuities offered by their salespeople.

TABLE 4

T-TEST OF RELATIONSHIPS BETWEEN SALESFORCE CHARACTERISTICS AND DEMOGRAPHIC VARIABLES^a

AGE (< 50; ≥ 50)	SALARY (< \$60,000; ≥ \$60,000)	REVENUES (<\$25,000,000; ≥ \$25,000,000)
Claims Assistance (2)	Promptness in Dealing w/Customer (2)	Self-confidence (2)
Knowledge of EDI (1)	Knowledge of Carrier's Route Structure (2)	Knowledge of Carrier's Route Structure (2)
Education Level (2)	Communication Skills (2)	Communication Skills (2)
Knowledge of Intermodal Opport. (2)	Knowledge of Customer's Products (2)	Knowledge of Customer's Logistics Systems (2)
Gratuities (2)	Knowledge of Carrier's Rates (2)	Claims Assistance (1)
	Claims Assistance (1)	Knowledge of EDI (2)
	Attendance at Professional Meetings (1)	Attendance at Professional Meetings (1)
	Gratuities (1)	
	Knowledge of Carrier's Operating Schedule (2)	

^aOnly those relationships statistically significant at the .05 level (or better) are listed in this table.

(1): Indicates that higher mean score was associated with Group 1.

(2): Indicates that higher mean score was associated with Group 2.

TABLE 4 continued

T-TEST OF RELATIONSHIPS BETWEEN SALESFORCE CHARACTERISTICS AND DEMOGRAPHIC VARIABLES^a

EDUCATION (< 4 year college; ≥ 4 yrs)	COMPANY TENURE(≤ 10 years > 10 years)	REVENUES (≤5 years; > 5 years)
Knowledge of Carrier's Equipment (1)	Knowledge of Carrier's Operating Schedule (2)	Ethical Conduct (1)
	Friendly Personality (2)	Knowledge of Customer's Logistics Systems (1)
	Knowledge of Interline Connection (2)	Knowledge of Carrier's Rates (1)

^aOnly those relationships statistically significant at the .05 level (or better) are listed in this table.

(1): Indicates that higher mean score was associated with Group 1.

(2): Indicates that higher mean score was associated with Group 2.

The information in Table 4 also indicates that seven of the 26 sales force characteristics have significantly different means when respondents are classified according to annual firm revenues. Three of the differences involve personal traits, one involves service attributes, and three are concerned with knowledge characteristics. Moreover, in all but two cases, (i.e., claims assistance, and attendance at professional meetings), larger firms indicate that the particular attribute is of more importance than do smaller companies.

For instance, larger carriers (mean = 2.683) place much heavier emphasis on a salesperson's EDI knowledge than do smaller carriers (mean = 2.143), which is in line with the fact that the so-called "Big Three" LTL carriers--Yellow Freight, Roadway, Consolidated Freightways--have been industry leaders in EDI implementation.¹³ It is also noteworthy that larger carriers place more importance on certain personal attributes, such as self-confidence and communication skills. This may be an indication that the larger motor carriers have better developed sales force selection programs, because as previously mentioned, personal attributes can be somewhat controlled through selection practices.

HISTORICAL PERSPECTIVE

As mentioned earlier, twenty-two of the characteristics in this study were also analyzed in a similar project conducted in the mid-1970s; this section discusses the results that emerge from a comparison of these 22, traits. While the sampling procedure was identical, the individual respondents and the carriers they represented did vary between the two studies. A major rationale for this comparison is that the MCA of 1980 has been acknowledged as causing profound changes in the trucking industry. The literature points out that major organizational change, such as deregulation, creates corporate upheaval. As a result, firms can be expected to adjust to change, because failure to do so will increase the length of organizational

uncertainty and instability.¹⁴ For example, recent research has suggested that those motor carriers which have been slow to adapt their sales force management practices to meet the new, competitive environment are characterized by less productive sales forces.¹⁵

A comparison of the 1975 and current studies, presented in Table 5, indicates minor differences in both the absolute and relative importance of the 22 characteristics. With respect to absolute results, the overall mean score for the 1975 study (2.952) differs from that of the current study (2.961) by less than .01. In addition, the mean scores for several attributes are nearly identical in the two studies. For example, the mean rating for information provided by a salesperson in the current study, 3.229, is but .008 lower than the average score for this trait in 1975. Similarly, the differences in mean ratings for promptness in dealing with customers is only .009. Because only summary results exist for the 1975 study, statistical tests for mean differences could not be performed between the two studies.

Analysis of the relative importance of the 22 characteristics also reveals a high degree of similarity between the two studies. As pointed out in Table 5, the Spearman correlation between the 1975 rankings and current rankings generated a coefficient of .898, which is statistically significant at the .001 level and indicative of minimal ranking differences between the two studies. In fact, eight of the 22 attributes have the same rankings in both 1975 and at present; ethical behavior is most important in both studies, while gratuities are least important.

Nevertheless, several of the characteristics exhibit notable rating and ranking differences, with the most prominent involving pricing issues. In the 1975 study, a salesperson's willingness to discuss rate change proposals had an average score of 2.115 and was ranked twentieth in importance. This attribute's mean rating in the present study was 3.011 (an increase of .896) and was ranked 14th (an increase of six positions). In a similar vein, a salesperson's knowl-

TABLE 5
COMPARISON OF 1975 AND CURRENT STUDIES^a

Salesperson Characteristic	1975 ^b Mean (Rank)	Current Mean (Rank)
Neat appearance	3.305 (7)	3.324 (7)
Knowledge of carrier's equipment	3.321 (6)	3.335 (6)
Friendly personality	3.237 (11)	3.197 (12)
Knowledge of carrier's operating schedules	3.603 (3)	3.503 (3)
Attendance at professional meetings	1.939 (21)	1.842 (21)
Knowledge of customer's logistics system	3.206 (12)	3.302 (8)
Education level achieved	2.351 (19)	2.179 (20)
Willingness to discuss rate change proposals	2.115 (20)	3.011 (14)
Ability to influence loss and damage	2.382 (18)	2.575 (17)
Willingness to arrange expedited service	3.450 (5)	3.285 (9)
Knowledge of carrier's competitors	3.168 (13)	2.989 (15)
Knowledge of customer's products	3.252 (9)	3.078 (13)
Gratuities offered by the salesperson	1.344 (22)	1.202 (22)
Knowledge of overall transportation industry	2.626 (16)	2.539 (18)
Ethical conduct by salesperson	3.771 (1)	3.749 (1)
Self-confidence	3.565 (4)	3.478 (4)
Promptness in overall dealings with customer	3.656 (2)	3.648 (2)
Claims assistance	2.771 (15)	2.592 (16)
Information feedback provided by salesperson	3.237 (10)	3.229 (11)
Knowledge of carrier's rates	2.527 (17)	3.268 (10)
Knowledge of carrier's route structures	3.298 (8)	3.408 (5)
Knowledge of interline connection	2.809 (14)	2.399 (19)
OVERALL MEAN	2.952	2.961

^aInvolving characteristic used in both studies.

^bPoist, Richard and Peter Lynagh, *The Motor Carrier Salesman*, (Washington, D.C.: American Trucking Association), 1975.
Spearman coefficient of rank = .898, significant at $p < .001$.

edge of rates had a mean of 2.527 in 1975 and was 17th in importance. In the current study the mean rating had risen to 3.268 (an increase of .741) and was ranked tenth in importance, representing an improvement of seven positions. These results support previous assertions that deregulation has caused motor carrier pricing practices to assume higher priority as a carrier selection tool.¹⁶

Another characteristic exhibiting marked change between 1975 and at present involves a salesperson's knowledge of interline connections. Unlike the pricing attributes discussed in the previous paragraph, both the absolute and relative importance of interline knowledge has decreased since the mid-1970s. The mean rating for interline knowledge dropped from 2.809 in 1975 to 2.399 currently, a decrease of .410; likewise, the 1975 ranking of 14th is five places higher than today. These findings are due likely to the increased route freedoms fostered by the MCA, which have made it easier for carriers to operate over broader geographic areas, thus reducing the need for interlining.

The preceding paragraphs suggest that both the absolute and relative importance of many of the 22 attributes common to both studies remain virtually unchanged, an indication that motor carriers may have been slow to adapt to the opportunities and challenges of the contemporary trucking industry. This, in turn, can have important strategic implications, not the least of which is that tentative reaction to major change hinders the chances for organizational growth and survival.¹⁷ In this vein, work by Smith and Grimm has found that railroads pursuing the same strategy prior to and following deregulation had noticeably inferior performance to those that changed their strategies in response to the Staggers Act.¹⁸

SUMMARY AND IMPLICATIONS

The purpose of the study was to identify characteristics associated with successful performance by motor carrier sales representatives. Armed with this information, carrier sales executives can design more effective selling strategies as well as improve recruiting and training practices.

In terms of designing sales strategies, the study findings should prove valuable in several ways. First, the results provide insight as to the types of salesperson characteristics perceived to be most and least important by a large sample of sales executives. For individual sales managers and representatives this information should provide a useful benchmark with which to compare one's own opinions. Likewise, relatively unexperienced sales managers can benefit from the opinions of their more experienced peers.

Secondly, the results provide insight as to the distinctive features of selling strategies traceable to demographic differences of respondents. For, example, the result suggest that sales managers of larger carriers are emphasizing effective salesperson communication skills as well as knowledge of the customer's logistics system and EDI to set them apart from smaller carriers in their sales efforts. In contrast, sales managers from smaller carriers are stressing claims assistance and sales rep attendance at professional meetings in differentiating their sales efforts. While space does not permit a more elaborate discussion, similar distinctions in strategy can be observed with respect to other demographic variables by referring to Table 4. For the carrier sales executive who wants to keep abreast of what other carriers are thinking and doing, such information can prove useful in gaining and/or maintaining a competitive edge.

Likewise, the study results should prove useful for improving recruiting and training practices. For example, sales manager respondents indicate that the most important sales force characteristic is ethical behavior, such as honesty and fairness. The importance

of ethical conduct is further emphasized by the fact that a salesperson's usage of gratuities emerged as the lowest ranked attribute in this study.

One ramification of these findings is that sales force training programs should devote time to learning about ethical behavior, perhaps through the use of case studies. In addition, motor carrier sales executives might explore selection techniques, such as psychological testing, that offer indications on the ethical makeup of sales recruits. It has been suggested also that a strong code of ethics be adopted to govern shipper-carrier relations.¹⁹

Sales manager respondents also point out that motor carrier salespeople need to be knowledgeable about various aspects of carrier operations, specifically with respect to equipment, route structure and operating schedules. At a minimum, these findings suggest increased training content devoted to operations information. In addition, these findings illustrated the interfaces that exist between the selling and operations functions; as a result, it is important for sales representatives to be aware of carrier operational capabilities so that unrealistic service promises are not made to customers. One way of ensuring this is through a job rotation or exchange program involving the sales and operations departments. Likewise so-called "Quality Circles" might be created to discuss problems of mutual interest and thereby improve communications among sales and operations personnel.

Moreover, it can be postulated that a major environmental upheaval, such as the MCA of 1980, should result in changes in sales force practice. However, one of the key findings of this study is that the motor carrier industry's perception of desirable sales force attributes have changed minimally between the mid-1970s and the present. One explanation for this is that deregulation has encouraged greater emphasis and change regarding pricing and new service offerings at the expense of personal selling efforts.

Likewise, during this timespan, sales managers continued to place heavier emphasis on a sales representative's personal characteristics than on either service or knowledge attributes. For example, such personal attributes as ethical conduct, self-confidence, communication skills, and neat appearance were rated as being of "maximum importance" by 40 percent or more of respondents. As previously mentioned, this emphasis on personal characteristics might suggest that greater attention is currently being devoted to the selection process with regard to sales reps with a lesser attention to training. This may help to explain the fact that recent research has indicated that average sales force training in the trucking industry is noticeably shorter than in many other service industries.²⁰

At the same time, there is strong evidence to suggest that shippers are dissatisfied with the lack of customer orientation displayed by motor carrier sales representatives. This was true prior to deregulation as well as at present.²¹ As previously mentioned in the introduction to this paper, *Distribution's* annual shipper survey consistently finds motor carriers to be weakest on the sales dimension. In the magazine's 1988 survey, it was reported that "Shippers are nearly unanimous in their panning of carrier sales reps. Many shippers complain that they never see a sales rep; others say the ones they see are woefully unfit for the job"²²

Other anecdotal evidence also exists. For example, a top distribution executive at Computerland Corporation was quoted as saying "...today's carrier representatives need to be more professional and businesslike in their approach... the day of 'Polyester Harry' with a cigar and a bottle of booze are passe." This executive also indicated that personal characteristics such as neat appearance are part of professionalism, but stressed that sales reps need to be more knowledgeable about rates and pricing and need to do their homework before visiting customers.²³

In essence, it appears that shippers would prefer to deal with more knowledgeable and professional sales personnel, whereas motor carriers appear to be emphasizing style (i.e., in the form of

personal attributes) over substance in their current sales practices. Consequently, sales force practices in the motor carrier industry need to be reviewed and perhaps, revised. The successful motor carrier of the future will be one that thoroughly understand its shippers' need and preferences and is able to tailor its services and sales efforts accordingly.

The key to this success is for carriers to modify the "operations orientation" which has been so prevalent in the past and combine it with a strong "customer orientation". A number of carriers are actively striving to achieve such an orientation. For example, Yellow Freight has developed a Quality Assurance Program that stresses the following principles: (1) Teamwork, (2) Doing the basics right the first time, (3) Productivity improvement, (4) Customer satisfaction, (5) Improved communication, (6) Continuous training and education, and (7) Searching for continuous improvements for the good of the carrier and its customers²⁴

Regarding the importance of customer satisfaction, Craig Cina, Director of Market Planning for Yellow states "Now, more than ever before, it's essential that we listen to our customers, understand what they're saying as it applies to serving them better, and then respond to what they tell us."²⁵ To facilitate these efforts, the carrier is developing a quantitative customer satisfaction measurement and feedback system to demonstrate their commitment to listening and improving.

Finally, this study also has implications for shippers or users of trucking services by providing greater insight into the training and selection of sales reps as well as identifying sales preferences based upon demographic variables. Moreover, if their needs are to be met, shippers must communicate their wants and expectations regarding carrier salespeople. In other words, shippers should play an active role in helping carriers assess and define what is lacking in current sales relations.

In turn, carriers must make a commitment to listen and strive to address deficiencies if they are to be truly dedicated to a "customer orientation". Rather than adversaries working at cross purposes, shippers and carriers should view themselves as partners or allies striving for a mutual goal. It is this so-called "Win-Win" scenario in which both parties benefit that is required for success in today's highly competitive and rapidly changing transportation environment.

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BOOK REVIEWS

CONTEMPORARY TRANSPORTATION; Donald F. Wood and James C. Johnson, 3rd ed., New York: Macmillan, 1989.

This text has been vastly revised for the third edition and now includes some critical chapters that acknowledge the management problems in transportation in the post-deregulation era. While the world turned upside down in 1980, or thereabouts, the transportation principles texts did not necessarily do so. To some extent, they could not. How can one write about "principles of transportation" when the principles are no longer well established? Granting that many of the true principles of the discipline remain intact regardless of the deregulatory climate, much of what filled the pages of basic transportation books became dated. This new edition of Contemporary Transportation is one of the first general transportation texts to fully acknowledge the necessary changes.

The introductory section of the text contains a chapter that should be of particular assistance in building transportation undergraduate majors--"Transportation Employment and Careers," Chapter 3. Given the "will it get me a job" orientation of undergraduate business majors, this chapter helps to focus on what happens to transportation majors when they graduate. The carrier section of the text contains one chapter on each of the five modes, plus a chapter on intermodal and auxiliary carriers. It also incorporates Chapter 11, "Pricing, Rates, and Negotiations," a specific area omitted from some of the major texts currently on the market. The shippers' section has a chapter on inbound logistics, as well as the traditional physical distribution and traffic management chapters. The final section, Carrier Management, looks at public sector, private sector, and international transportation. A new chapter has been added on the increasingly important area of the emerging or en-

trepreneurial carrier or logistician. Each chapter has some mini-cases at the end which help to emphasize some of the points related to the subject matter in the chapter.

One approach that the authors use in the text seems to be of increasing importance: computer screens as graphics to support text material. They show Yellow Freight's ZIP rating system in their discussion of pricing, rates and negotiations. If any criticism can be made of this approach, it is that it should be used more and used in other areas than rates. One reality of the post-deregulation era in transportation is the increasing use of computers in every aspect of the business.

While it would be nice to see more material on each of the five modes of transportation, that is not possible in a principles text that covers as much material as this one does. The book is well written, well-researched, and organized in a useful way. It is recommended for any undergraduate survey course in transportation, or as a supplement in an introductory graduate course.

Stephen A. LeMay
Mississippi State University

LAW AND ECONOMIC REGULATION IN TRANSPORTATION;

by Paul Stephen Dempsey and William E. Thoms.

(Quorum Books, 1986). Pp. xi 349. ISBN #0-89930-138-X

It has been over a dozen years since the first signs of economic deregulation surfaced in the transportation industry. The regulatory reform movement brought major policy changes to the once static operating and pricing environments. Even though many segments of the industry were deregulated, there are still several important reasons why practitioners as well as students might find an examination of past laws and regulatory practices valuable. First, despite deregulation, it must be realized there are still major portions of the transportation legal structure which remain intact. More importantly, recent changes in the competitive structure of the transportation industry have focused new attention on the results of deregulation. These events may force a policy shift away from the free market toward some form of economic reregulation of select modal segments.

It is difficult to resolve current policy problems without a thorough knowledge of the history of transportation legislation and regulatory environment. The text, Law and Economic Regulation in Transportation, provides an easy, readable, and practical format to build this comprehensive understanding of the past, present, and future transportation policy direction.

The book contains eight chapters examining three separate but interrelated topics. The general subject matters include: (1) the history of transportation regulation, (2) a detailed examination of economic regulation, and (3) select topics in transportation law.

Chapter 1 provides a brief synopsis of the growth of domestic transportation law. The text does an adequate job of providing a legislative framework for understanding the economic regulation of

all modes of transportation. The discussion begins with the public toll roads of the late 1700's and traces current regulation up to the legislation of the early 1980's.

The next three chapters detail the legislation, court cases, and rules which supply the basis for economic regulation. Chapter 2 covers current and past policies involved with entry, exit, and adequacy of service for the various modes. This chapter provides insight into policy decisions related to the competitive structure of the transportation industry. Chapter 3 is an overview of rate regulation for all the individual modes. This chapter examines the rationale for rate regulation and the changes to pricing policy as a result of deregulation. Chapter 4 examines issues surrounding antitrust practices and financial regulation of the modes. This chapter is extremely useful in understanding today's complex regulatory environment. Currently, there is confusion over the changing role of rate bureaus, application of antitrust regulations and the reversal of several recent merger decisions.

The last four chapters cover select subjects of law and economic regulation in transportation. These include: liability, government involvement in rail operation, labor legislation, and mass transit. Chapter 5 explores liability issues in transportation beginning with its evolution from common law. This topic could be of particular interest to practitioners since it describes changes in liability caused by regulatory reform in the rail, motor, and air segments.

Chapter 6 examines the role of the government in the operation of the nation's domestic rail system. Specifically, the chapter describes the past and present government involvement with Amtrak, commuter passenger services, and ConRail.

No text written about transportation law is complete without a brief survey of labor legislation. Chapter 7 provides a concise explanation of the legislation utilized in the resolution of transporta-

tion industry labor disputes. Topics include a brief summary of the pertinent labor laws as well as a discussion of specific labor issues such as the protection of the transportation employees jobs.

The final chapter includes subjects which are often times not covered in a text of transportation law and regulation. Chapter 8 provides an overview of the origin and structure of mass transit's legal environment.

Law and Economic Regulation in Transportation can be effectively utilized as an introductory transportation law text as well a supplement to advanced transportation policy seminars. The material has application for students with limited knowledge of transportation law as well as industry practitioners who require more specific and detailed information.

Overall, Law and Economic Regulation in Transportation provides a useful, practical, and comprehensive understanding of the legal and economic regulation in the transportation industry.

Gary S. Wilson
Assistant Professor of Transportation/Logistics
Western Illinois University



SPECIAL ISSUE

A special issue of the *Journal of Transportation Management* devoted to Air Cargo will be published in 1991. This future publication is being made possible as a result of a grant from Federal Express Corporation. Please contact the editors or publisher for additional information.

FUTURE EVENTS AND ACTIVITIES

Delta Nu Alpha's 50th Anniversary will be celebrated in Philadelphia on September 12-15, 1990 at the Fourth Annual Combined Education Conference co-sponsored with the American Society of Transportation and Logistics.

TRANSPORTATION RESEARCH FORUM

The Transportation Research Forum has announced their 32nd Annual Meeting will be held October 10-12, 1990 in Long Beach, California. For additional information, please contact the TRF National offices at Suite 905, 1600 Wilson Blvd., Arlington, Virginia 22209.

