

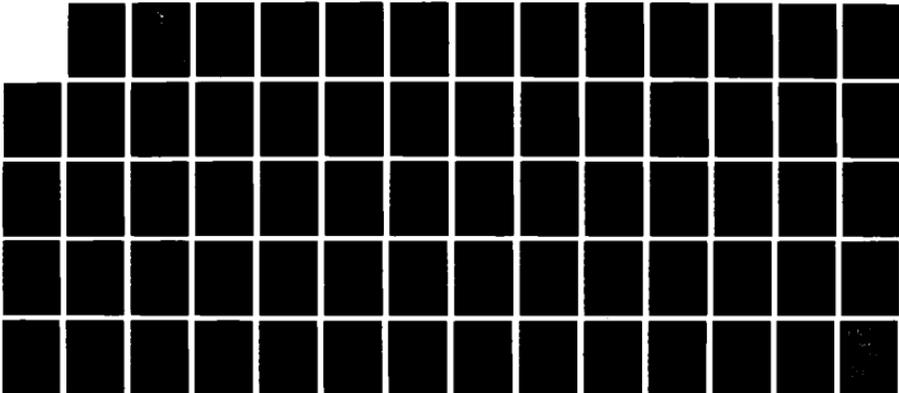
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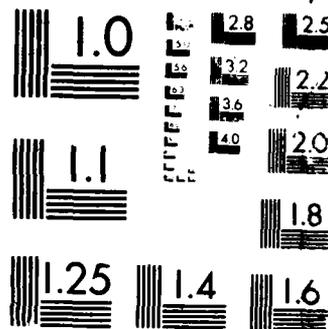
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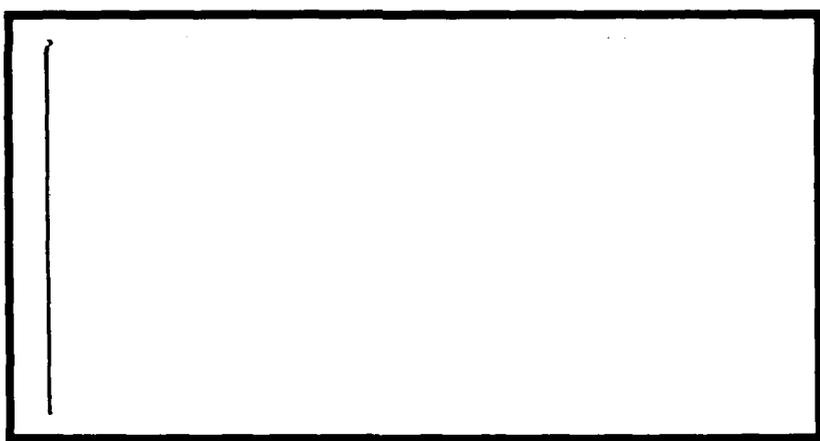




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CONTINGENCY MOTOR CARRIER TRANSPORTATION

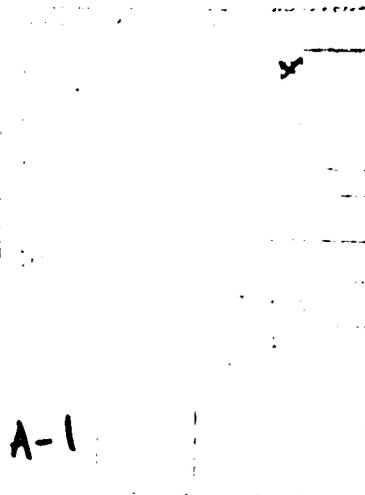
IN A DEREGULATED ENVIRONMENT

THESIS

Douglas Tazoi
Captain, USAF

AFIT/GLM/LSMA/87S-75

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AFIT/LS/GTM/87S

CONTINGENCY MOTOR CARRIER TRANSPORTATION
IN A DEREGULATED ENVIRONMENT

THESIS

Presented to the Faculty of the School of Systems and
Logistics of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Logistics Management

Douglas Tazoi, B.S.

Captain, USAF

September 1987

Preface

The purpose of this study was to examine the climate of the motor carrier industry on USAF contingency surface movements since enactment of the Motor Carrier Act in 1980. A second issue was to determine whether aggregate motor carrier industry data could be used to generalize about the carriers used by the Department of Defense.

The relationships between peace time efficiency and the need for effectiveness in mobilization formed the basis in evaluating the procedures prescribed for the USAF cargo shipper. Whether the USAF shipper can effectively manage contingency shipments in a low threat environment, that is, state of emergency is not declared, is still doubted. However, there are steps being taken to reduce the problems service shippers face in coordinating shipments, both in the peacetime environment and in the mobilized environment.

In performing this analysis, I wish to thank the many people who helped me. The first is my faculty advisor Major Kent Gourdin for providing timely and insightful guidance. I also wish to thank Mr Arnold Ostrum from HQ MTMC and Mr Brinkley Garner from ICC for providing me with much needed data. Lastly, I wish to thank my friends, whose comments and thoughts helped me complete this project.

Douglas Tazoi

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Abstract

The purpose of this study was to examine the impact of the Motor Carrier Act (MCA) of 1980 on the ability of USAF cargo shipping agencies to expedite shipments under contingency conditions. In addition to the primary focus, the study also examined whether certain characteristics of the subset of for-hire motor carriers of property for the DOD corresponded to the aggregate industrial trends.

To determine the impact of the MCA on the service shippers, the study evaluated the process of contracting cargo shipments. The study examined the two basic rate categories for making shipments, LTL and TL. The process of contracting a shipment differs for LTL or TL loads under existing guidance. While the shipping process operates reasonably well under peacetime conditions, a low level conflict or declared mobilization could present problems for service shippers based on changes in the motor carrier industry since the MCA.

HQ MTMC data was analyzed for differences between two periods, pre-MCA and post-MCA. The nonparametric analyses examined the number of carriers seeking DOD shipments; the number of distinct carriers who actually performed shipments for the DOD; and the number of carriers who discontinued DOD service. A final analysis examined whether the total for-

hire motor carrier population differed significantly between the two eras.

The analyses yielded the following outcomes regarding the DOD shipping environment. One, the number of carriers seeking carriage business with the DOD did not significantly differ. Two, the actual number of carriers actually conducting business and discontinuing service could not be ascertained due to the inability to capture the necessary data from records. Three, the for-hire motor carrier population has significantly increased since passage of the MCA. Stratified by ICC class, the preponderance of the increased population is in the class III category, which is assumed to be correspond with the TL industry.

The author recommends three subsequent areas for further actions. First, that the specialized equipment assets capability in the industry be examined relative to the known and projected needs of the service shippers in contingencies and mobilization. Second, that in addition to known procedural enhancements, some of the procedures used incorporate electronic listing, data extraction and monitoring to expedite shipment confirmation. Last, as a condition of service with the DOD, the carriers identify available assets and each be assigned an identifier which can subsequently be used for contingency planning to enhance planning and execution, when tied to known shipping requirements.

CONTINGENCY MOTOR CARRIER TRANSPORTATION
IN A DEREGULATED ENVIRONMENT

I. Introduction

General Issue

There are some contingency plans which have been developed to support forces stationed abroad and other plans which, as a tactic of survivability, require forces of a host base to relocate to a reception base within the continental United States (CONUS). One of the elements of programmed execution both of these types of plans have in common is the requirement for expedient surface transportation of logistical support equipment. Since these movements are only initiated in times of mobilization, planning, in as much detail as possible, will reduce the likelihood of human error and delays in completing stages of the contingency plans (9:55; 36; 39).

The Military Traffic Management Command (MTMC) is the Transportation Operating Agency (TOA) overseeing, among other things, surface cargo movements within the (CONUS) (2:47). MTMC's charter includes managerial and operational roles in both peace and war. In the contingency environment mentioned earlier, which involves moving equipment and personnel from CONUS locations to aerial and sea ports of embarkation (POE)

or CONUS beddown locations, MTMC provides the interface between the military service shippers, military carriers, and the civilian transportation industry. MTMC directs and controls the freight and passenger movements for efficiency and effectiveness (2:47-9). Most of these expected contingency surface freight movements are projected to involve commercial carriers (15:28). The Motor Carrier Act of 1980 (MCA) deregulated the commercial motor carrier industry, which comprises a portion of a national voluntary contingency response program, managed by HQ MTMC, called Contingency Response (CORE) (21; 37).

CORE is an assemblage of senior transportation management officials who function as a rapid response team to prevent or overcome DOD transportation resource problems. CORE members represent the military transportation manager, federal agencies, and the commercial transportation industries. CORE is organized as four committees under the direction of a Steering Group, chaired by the Vice Commander, MTMC. The four committees are: the Freight Executive Committee; the Infrastructure Executive Committee; the Passenger Executive Committee; and the Port Executive Committee. Of the four committees, the Freight Executive Committee, under the chairmanship of the Director of Inland Traffic would be concerned with, among other things, motor carrier service. Other representatives within the Freight Executive Committee are: the American Trucking Association, Inc.; the Air Transportation Association of America; the

Association of American Railroads, the Munitions Carriers Conference; the National Tank Truck Carriers, Inc.; the Specialized Carriers & Rigging Association; and the Interstate Commerce Commission (ICC) (8; 21).

CORE, once activated, operates in three phases. In the situation of a potential contingency, Phase I (Warning) is called by the Joint Chiefs of Staff (JCS). This phase is used to notify the transportation managers of activities which could affect the transportation industry. Phase II (Alert) of CORE activation would signal actual deployments and CORE members could authorize repositioning at deploying sites. During these two phases, all commercial carrier movements are voluntarily accepted and executed. At these two levels, CORE committees oversee national operations without active intervention. Phase III (Directed Action/Implementation) only occurs if voluntary industry support or CORE committee coordination with individual carriers does not fulfil DOD requirements in Phases I or II. Phase III is legally directed support for DOD requirements arising from Title 1 of the Defense Production Act of 1950 through the applicable federal regulatory agency for the mode of transportation needed. In the case of motor or rail transportation, the ICC is the regulatory agency (21). Although this program addresses the declared emergency procedures, there may be critical situations where these provisions do not apply and peacetime operational guidelines must be used (8; 21; 33).

The MCA relaxed the provisions for carrier entry and exit in the motor carrier industry. In this respect it is referred to as deregulation. Some of the other basic provisions were to allow carriers to independently set their own rates rather than requiring strict adherence to those specified by a rate bureau; and to relax merger restrictions (2; 11).

The impact of deregulation on MTMC has been an administrative burden since the single role of rate bureaus has essentially been usurped and individual tenders, rate bureau tariffs, and tender adjustments must be processed and maintained for each of these ICC rate actions (34). Truck-load (TL) carriers are differentiated from Less Than Truck-load (LTL) carriers within the MTMC administrative structure and this TL-LTL distinction is maintained at the service shipper level. Although HQ MTMC approves all TL and LTL motor carrier rates, they maintain control over TL shipments by requiring service shippers to seek routing authority through the appropriate MTMC area command, Western or Eastern. The MTMC regional office maintains a listing of approved TL carriers and their rates and provides the routing authority to the shipper along with the names of several approved carriers. The service shipper is then allowed to contact carriers until one of them meets the service shippers needs for service and rates. In the case of the LTL shippers, HQ MTMC approval of the LTL carrier is designated by stamping each tender or independent rate action submission

with a unique number and then returning it to the LTL carrier who now has the opportunity to seek whatever market the carrier feels is warranted simply by presenting a copy of the approved rate tender to the service shipper. Each military installation the carrier wishes to serve is forwarded a copy of the HQ MTMC approval as notification of availability to serve. Each installation shipping agency is required to maintain a listing of the possible LTL carriers and is forbidden to use non-approved carriers. The Traffic Management Office (TMO) is encouraged to use all the carriers available and is prohibited from guaranteeing traffic to any carrier or mode. As of yet, this filing and cataloging process between HQ MTMC, the individual carriers and the individual shipping installations has not been completely automated (8; 10; 11; 12; 14; 30; 36; 37).

The procedure a service shipper uses for making a shipment is determined mainly by the its size, TL or LTL. Since the governing regulations allow the service shippers to arrange their own shipments of LTL size cargo and they maintain a list of the available LTL carriers, it is relatively easy for the shipper to contract these movements (31). MTMC regional offices are involved with the movements if a service shipper has TL volume traffic, oversized, overweight, special items which may require routing authority or lists of acceptable carriers, or upon request by the service shipper for other reasons. Service shippers are requested to notify their servicing MTMC regional office for assistance as far

in advance as possible. If the shipment required delivery date (RDD) obviates the normal processing time, then the service shipper request can be transmitted electronically and the list of possible TL carriers will be forwarded to the shipper via a similar means. In extremely time sensitive movements, the list of potential TL carriers can be relayed to the shipper telephonically at the time of request. However, this is considered unique and is not the normal procedure. The shipper, regardless of whether it is a LTL or TL shipment, short or long lead time notification, must still contact the available carriers to confirm lift capability, to verify shipment acceptance, and to coordinate shipment movement information. The majority of LTL shipments do not involve MTMC regional offices (7; 8; 29; 30; 35; 36).

Literature Review

The effects of the Motor Carrier Act of 1980 have been discussed from many perspectives. Before the actual enactment date, there were projections regarding the impact to shippers and to the carriers both large and small. Some writers gave updates of the regulatory and operational changes, while later on, other writers reviewed projections concerning the MCA and analyzed the effects to date. Most of the authors approach this topic from the national perspective, while some narrow their focus to regional discussions or specific topics within the industry. There are very few pieces which specifically focus on the effects of the MCA on

the military. The first section of this review will deal with the general issue, then the focus will narrow to those works specifically addressing the military concerns.

From the industry perspective, there have been many articles written regarding the impact of deregulation. They address the impact upon the carrier, the customer and the adaptive measures taken by the industry in general. Beilock and Freeman write that although there was initial concern about the level of service in rural areas, their study indicates that in general, service has not declined and in some cases even improved. They also write that the common carriage criteria of non-discriminatory rate practices between the rural and urban shipper may not necessarily hold. They indicate that the marginally higher rates for the rural shipper is an indication that cross-subsidy is not used and that the level of service is an accurate reflection of market forces (3).

Schumacher wrote in 1985 that in California, there was a 100% turnover rate in the industry about every five years. He states that the number of carriers stay the same, just the names change. His point is that there should be some stability in the industry to maintain an adequate service level (32). Analysis from Dun & Bradstreet seems to indicate that the number of bankruptcies may be levelling off after a rapid increase following the MCA (4). Labich discusses the topic from another perspective, the structure of the motor carrier industry. He states that the motor carrier industry

always maintained a level of overcapacity but the proliferation of new carriers aggravates the cost of sustaining overcapacity, since the profit margin of each carrier, in general, is reduced. His belief is that the trend will be for the larger LTL carriers to get larger as they refine their hub and spoke network operations and use their economies of scale to advantage. He does indicate that there are successful niche operations, well run regional carriers and those in specialized markets, which should remain viable (19).

Kevin Horn researched the topic of carrier entry into the industry. His conclusions were basically that the perception of a market prospect drew new carriers, despite the realities of the shippers' prerogatives which often reduced the actual market for the new carrier. He concludes that despite the appearances of limited success for the new carriers, their entry is not precluded nor hampered by shipper support (16).

The carrier's perspectives and approaches to MCA were outlined by Williamson, Singer, and Bloomberg. They found that carriers attempted to vary the type and level of service and that, in general, rates decreased more than they increased. Other findings were that, individually, carrier tonnage decreased while the number of their competitors increased. They point out that the belief of destructive competition in the motor carrier industry may not always be attributable to the newer entrants, as had been thought;

rather, it may be an indication of established carriers practicing predatory pricing when attempting to open new markets. They do conclude that carriers' attempts to improve their customer service performance may be attributable to some degree on the increased competitive pressures in the motor carrier market since deregulation (40).

However, a specific summary of deregulation's impact on the LTL motor carrier industry is concisely written by Glaskowsky. He focuses on the segment of the industry which appears to be somewhat economically stratified from the for-hire motor carrier industry as a whole. The larger carriers, in terms of gross annual revenues, are generally found in the LTL market. The Class III carriers, those with gross annual revenues less than \$1,000,000.00 are typically the owner-operator carriers who specifically target the Truck Load (TL) market. One of the problem issues raised in this study is that of liability insurance for the carriers. The increasing insurance rates are prompting some of the carriers to restrict or forgo their liability coverage. These rising costs may support a carrier's decision to withdraw from the industry (11).

The impact of the MCA on contingency surface transportation has not been discussed in as much detail as its effects in the commercial sector. Particular applicability towards the USAF is limited to an Air Force Institute of Technology (AFIT) product. Other writings from the military perspective includes one by Lt Col Hollingshead which addresses the

motor carrier industry. The last group of transportation writings address deregulation issues from the MTMC perspective. The final writing reviews the general concept of mobilization and national policies.

The first, an AFIT Technical Report, "The Defense Transportation System: Giving Direction Change", by Lt Col Thomas Harrington, et al, discussed the overall affects of deregulation in three modes: air, rail, and motor carrier. The authors' comments regarding the economic climates before and during the initial stages of the deregulated environment aid in analyzing the impact of the MCA to the USAF shipper. In particular, this writing addresses fuel costs as the primary obfuscating element when analyzing the overall impact of deregulation on the specific carrier industries. The report highlights the volatility of the motor carrier industry and alludes to difficulties which a service shipper may expect, such as organizing the large population of small carriers under situations of time sensitive military operations. Another problem they note is the likelihood of rising transportation costs due to increasing fuel and other operational costs, and the higher cost of new technology. They did not focus on the specifics of the motor carrier industry as did the Hollingshead article (2).

In "Motor Carrier Role In Mobilization" , Lt Col Hollingshead addressed the importance of the motor carrier industry to mobilization efforts. He pointed out the nature of the DOD as a shipping organization, as well as the

service characteristics and the industrial capacity of the motor carrier industry. Lt Col Hollingshead underscores the issue of excess lift capacity (unused or underutilized assets) as one premise on which the mobilization of forces must expect to rely upon. Two other capacity related issues that he addresses are the availability of specialized equipment and the geographical availability of the excess capability. Lt Col Hollingshead then points to the CORE program as the intended mechanism to merge mobilization requirements with excess lift capacity. He also addressed some of the problems encountered when attempting to evaluate CORE's effectiveness through exercises and concludes that there are two basic problems. First, that the service shipper demand levels for motor carrier lift assets during mobilization are incomplete; and second, that the nature of the motor carrier industry is so fragmented that it, "defies management". His recommendations are to refine the service shipper's demand levels for motor carrier lift and to restructure the present MTMC-motor carrier relationship by limiting the number of carriers serving the government (15).

From a much broader total surface transportation perspective, Major General Harold I. Small addressed some of impacts of the MCA on strategic surface mobility. One of the issues he points out is the sheer increase in administrative work brought on by receiving, evaluating, and returning tenders submitted by individual carriers. Prior to the MCA, a single rate bureau represented many carriers, so process-

ing tariffs and tenders remained well under control at MTMC. He also pointed out that since the deregulation of the airlines, rail, and motor carriers, there have been an unprecedented number of both carrier failures and disciplinary disqualifications. Because of all these changes and the administrative burdens caused by them, MTMC is reevaluating their operations and their relationships with the carriers of the different transportation industries to ensure efficient administrative operations and stronger ties to the industries (34).

Although not directly concerned with the MCA, an article by Foster and McPherson has relevance to the topic of this research, mobilization. They point out quite succinctly, that the burden on the national industrial base is highest in the stages of gradual buildup of mobilization activities, without an actual emergency declaration, when the nation attempts to simultaneously sustain both normal commerce and the mobilization. Next, they outline the various facets of a mobilization which can affect our adversaries, our allies, and ourselves positively and negatively. Foster and McPherson explain that the mechanism to declare a mobilization can be graduated and selectively applied. According to the writing, the military services, in general, presently emphasize recalling reserve forces as the foundation of their graduated response to a mobilization. The writing highlights the programs which exist to augment current strategic lift, such as CRAF and SRP. However, they did not list any

program for either the motor carrier or the rail industry (9).

As this review of literature indicates, there are several forces shaping the motor carrier industry. Of them, the force of competition among the carriers of all sizes is the most topical. As with any significant change in the manner of conducting operations, there will be a learning curve to overcome. From the writings, the industry and the DOD are adapting to the deregulated environment.

Specific Problem

The problem is that the deregulation of the motor carrier industry has adversely impacted the contingency transportation of USAF cargo (36; 39). Specifically, motor carrier turnover, or instability, in the post-MCA era adversely affects the service shipper's ability to meet short notice cargo shipment requirements.

Objectives

The primary goal of this research was to examine USAF contingency surface transportation requirements relative to the changes in the deregulated for-hire general cargo motor carrier industry. The research examined the process of routing normal peacetime movements of USAF general cargo and the differences in routing contingency movements. Secondly, the research compared the motor carriers serving the DOD with the for-hire general cargo motor carrier industry before

and after the MCA to determine whether inferences could be made regarding the experience of a single large shipper, the DOD, by utilizing the aggregate data pertaining to the trucking industry as a whole. The hypothesized relationship is that the size and complexity of the DOD, as a single customer, will attract a sufficiently large cross section of motor carriers to reflect the behavior of the national for-hire motor carrier industry. If this is correct, then conclusions drawn on the aggregate data may hold true for the DOD. Therefore, the conclusions which other authors derive regarding this segment of the motor carrier industry may apply to the DOD.

Research Hypotheses

Hypothesis One. The first hypothesis concerns the routing of solicitations for shipment from a specific shipper to an individual carrier. The hypothesis is that the deregulated motor carrier industry created an administrative burden for the service shipper, based on the existing procedures required to contract for a shipment. The administrative burden could create significant delays in the carrier selection process, both during peacetime and during a contingency, jeopardizing activities predicated on time sensitive movements. The remaining research hypotheses relate to comparisons of the for-hire general cargo motor carrier industry and the DOD.

Hypothesis Two. Second, regarding the overall number of motor carriers offering their services to DOD shippers prior to and after the MCA, the null hypothesis is that the mean number of pre-MCA motor carriers is less than or equal to the mean number of post-MCA motor carriers. The alternate hypothesis is that the mean number of post-MCA motor carriers is greater.

Hypothesis Three. Third, concerning the number of motor carrier companies actually providing services to DOD shippers prior to, and after the MCA, the null hypothesis is that the mean of the pre-MCA motor carriers is less than or equal to the mean of post-MCA motor carriers. The alternate hypothesis is that the mean number of post-MCA motor carriers is greater.

Hypothesis Four. Fourth, the null hypothesis regarding the topic of carrier discontinuance from DOD shipping prior to, and after the MCA, is that the mean number of carriers discontinuing service prior to MCA will be less than or equal to the mean number of carriers discontinuing service after MCA. The alternate hypothesis is that the post-MCA mean is greater than the pre-MCA mean.

Hypothesis Five. Lastly, the null hypothesis for the motor carrier industry's capability, as measured by the total number of carriers, is that the mean number of carriers prior to MCA is greater than the mean number of carriers after MCA. The alternate hypothesis is that the mean number of post-MCA carriers is less than or equal to the pre-MCA carriers.

Scope of the Research

The research focused only on the CONUS USAF bases, not on the USAF commands stationed outside the contiguous United States. Although both the national and the MTMC data includes Alaska and Hawaii and this data is used in the analyses, the conclusions drawn in this research do not inherently rely upon the discrete values of the data for their validity. The findings are not biased by the inclusion of this data, nor would they be biased by their omission. The applicability of the economic conditions of the MCA do not apply to foreign industry nor to the use of completely organic operations. Subsequently, the research examined the study's implications on two major commands, Strategic Air Command (SAC) and Air Training Command (ATC) (36; 39). Due to the nature of some SAC or ATC tasking for intra-CONUS surface deployments, these two commands will serve as examples.

The specific time frame for these proposed motor carrier shipments will not be defined but is generally assumed to be short notice or within the first 30 days of a declared emergency. The time allowed for the service shipper to react to, and contract for, movement requirements may, however, be limited to a matter of hours, in certain circumstances.

Although other modes of lift qualify as surface movements, such as rail, they will not be addressed. The primary focus of this research is the impact of the MCA on the USAF as an element of the DOD. Therefore, even though USAF

installations may have organic assets and access to LOGAIR, they are not going to be addressed. Rail deregulation, similar in nature to the MCA, was enacted in other legislation and could be examined as a separate issue.

Motor carrier statistics were collected over extended periods of time up to the present but not all of the data fields used in this research correspond to the same time frame. In order to adjust the available data to fit the time horizon of this research, 1970 was selected as the initial starting point of data collection.

Assumptions

One of the key assumptions is that during a contingency, time is one of the most critical factors to successful conducting the military operation. The time frame of contingency plan execution is similar for both a declared or an undeclared mobilization. Utility is a user determined attribute which describes when an asset can be used. Place utility during contingencies, means that the assets are in the right place at the right time. Timetables of execution are fabricated on the time and place utility of forces and assets.

Motor carriage, as a lift mode, displays specific characteristics which make it well suited for deployments of relatively small size and short distances. In the commercial industry, motor carriage dominates the LTL market for moves under 100 miles and for the 30,000 to 60,000 pound move-

ments of 300 or less miles (6:122). Motor carriage has a high level of inherent flexibility. This flexibility comes from the ability to match carriage equipment with the cargo size and from the ability to travel on the national highway system, which traverses the entire nation and provides access every city in the CONUS (6:122-133).

There is a fundamental assumption that, at least at the national level, the motor carrier industry has sufficient excess capability to respond to USAF contingency requirements, which would be additional tonnage requirements above routine commerce (15:29). Other assumptions regarding motor carrier responsiveness are that all surface movements of USAF cargo by individual carriers will be voluntarily accepted by the carriers and the carriers would be tendered payment for the shipments. That is, these shipments would not fall under the provisions of CORE Phase III, directed carrier support of the DOD by Interstate Commerce Committee (ICC) authority.

For the purposes of the research, the type of cargo moved in a contingency will be assumed to be general cargo, which neither requires specially configured equipment nor special material handling equipment (MHE). Overweight, oversized, and driveaway cargo requirements will not be addressed either. These shipments may however, include both hazardous and classified cargo (39). There are requirements for specialized equipment such as "air ride" trailers for jet engines, but this issue cannot be adequately addressed in the scope of this analysis (35). Additionally, it will be

assumed that adequate MHE and trained MHE operators will be available for any and all on and off-loadings. Likewise, it will be assumed that all public highways are accessible and that motor carrier operations will not be hampered nor constrained by unusual activities, such as interdiction or sabotage.

Another of the assumptions is that over the period of time covered in the analysis, the relative proportion of USAF cargo movements in number and tonnage remained relatively constant within the context of total DOD shipments made. It is to be assumed that there may be fluctuations in both the quantity and tonnage of shipments over any period of time but pre-MCA and post-MCA levels remained within statistically significant levels, i.e., 95% confidence interval of the mean. It is therefore assumed that the conclusions drawn regarding the analysis of data even though performed on DOD data will hold valid for USAF. Although not included as part of this research testing, statistical analysis was conducted to verify this point. Wilcoxon tests for LTL shipments and tonnage as well as TL shipments and tonnage were conducted. Spearman's correlation was conducted between LTL shipments and LTL tonnage as well as TL shipments and TL tonnage. The results of the Wilcoxon tests and Spearman's correlations are included as Appendix C.

Limitations

The scope of the research will not address surface deployments involving concurrent cargo and passenger movements. Passenger movements would entail either surface movement such as commercial bus, commercial air travel, or a combination of both. Other surface passenger movements may involve the use of organic assets. Commercial bus transportation could be scheduled as a convoy movement along with the cargo; however, this type of situation is not under evaluation. Military personnel accompanying a cargo movement acting as couriers or escorts for the shipment may be required and will not be considered passengers.

Regarding the availability of data pertaining to the number of motor carriers of property, the ICC-established classifications of Class I, II, and III (based on the annual gross revenues) changed twice during the period of analysis. Prior to 1979 Class I carriers were those whose annual gross revenues equalled or exceeded \$1,000,000.00, while Class II carriers were those under the \$1,000,000.00 cutoff but over \$200,000.00. Class III carriers were those whose gross revenues were less than \$200,000.00. In 1979 the criteria for the classes were changed to greater than or equal to \$3,000,000.00; greater than or equal to \$500,000.00 but less than \$3,000,000.00; and less than \$500,000.00 respectively for classes I, II, and III. In 1981, the criteria changed again. Now a class I carrier must have revenues equal to or greater than \$5,000,000.00. A class II carrier had

revenues greater than or equal to \$1,000,000.00 but less than \$5,000,000.00; while the class III carrier had revenues less than \$1,000,000.00 (10; 22; 23; 24).

For the period of time under analysis, HQ MTMC did not possess data automation capability for the entire period and therefore could not readily nor easily provide the requested data regarding the number of carriers conducting business with the DOD. Furthermore, the structure of rate bureaus and their relationship with MTMC, in the pre-MCA era, did not lend itself to monitoring individual carriers. There was no need to monitor individual carrier participation in different rate bureaus (30). For the purposes of this analysis, the data of voluntary (unsolicited) tenders submitted to HQ MTMC will be used to approximate the number of carriers serving DOD shipping activities (18; 35).

II. Methodology

Particular Methods

The scope of the methodology will entail two procedures. The first procedure is used for research hypothesis one only. Research hypothesis one will contrast the differences and similarities of normal peacetime shipments processed by the service shipper to those processed under various levels of contingencies. It will involve reviewing the governing regulations for the procedures a service shipper will use under different circumstances. The second basic procedure is used for the remaining hypotheses. Research hypotheses two through five involve statistically testing variables of populations over a period of time. Therefore, only research hypotheses two through five will require decision rules.

Justification

Hypothesis One. The basic regulations for guiding the Air Force traffic manager shipper are elucidated in two documents. AFR 75-1, Transportation of Material covers the unique areas of USAF shipments, and pertains to the overseas areas, which the basic regulation, AFR 75-2, Defense Traffic Management Regulation, does not. AFR 75-2 is a joint service regulation which takes precedence over AFR 75-1 concerning CONUS operations (8:1). Each of these regulations covers shipments made during normal operations and specifies the procedural and administrative concerns the TMO must

address. AFR 75-2 however, also addresses movements made during contingencies and emergencies. It refers to emergency situation procedures and to a specific emergency program, CORE, which has been established for coordinating the various modes of CONUS transportation with government shipping activities during a declared emergency. Highlighting these procedural steps will lay the foundation for analyzing if or where the service shipper may encounter difficulties in contracting shipments under emergency conditions (7; 8).

Since the remaining four hypotheses compare two populations for statistically significant differences, it is appropriate to address the source and the nature of the data, and the intended analytical technique.

Hypothesis Two. Hypothesis two attempts to determine if the population of carriers seeking to provide carrier service to the DOD changed since the MCA. The source of the data would come from HQ MTMC files, 1970 to 1986. Under the pre-MCA era, the actual number of carriers offering their services can neither be accurately determined nor reliably estimated since the use of rate bureaus tended to obscure the identity of the individual carriers within the bureau (35). Membership in a particular rate bureau did not prohibit a motor carrier from subscribing to another one. Also, the author believed that attempts to contact each rate bureau for their membership roles for the period 1970 to the present would be futile (33). Therefore, a data surrogate, the number of unsolicited tenders received by HQ MTMC, would be

used to approximate the number of individual carriers offering to serve the DOD (18). Unsolicited tenders are those voluntarily submitted by carriers without a specific request for transportation services by the shippers, or those completed through negotiations. Even the use of the data surrogate is not without some question since there are no provisions to prevent a single carrier from multiple tender submissions (35).

This test compares two relatively small populations, the number of unsolicited tenders received by HQ MTMC from 1970 to 1979 against those from 1980 to 1986. Each of these populations have an unknown distribution. The Wilcoxon test between two population samples is a nonparametric test which maintains statistical rigor when used for small n, sample sizes. It is used when the n value for the two samples differs, otherwise the Wilcoxon Rank Sum test could be used (13:247-255,547-8; 20:343-8,736-741). As stated in Statistics for Business and Economics:

The nonparametric counterparts of the t and F tests compare the probability distributions of the sampled distributions, rather than the specific parameters of these populations (such as the means or the variances) [20:736].

Unlike the Student's t statistic, which requires assumptions of normality, equal sample variances, and independent samples, the Wilcoxon test requires none of these to sustain inferential validity. The requisite assumptions for using the Wilcoxon test are that the two samples are random and independent, and that the observations obtained

can be ranked in order of magnitude. Differences in the distributions, as determined by the Wilcoxon test, allows one to make inferences about the distributions. Typically, the decision maker consults a critical values table for a Wilcoxon test of determinant sample size and predetermined alpha to find T_L and T_U which are the lower and upper limits. A calculated value lying within the T_L and the T_U indicates similar distributions (13:547; 20:348). Although manual calculation can be accomplished, the author chose to use automated methods to derive the test statistics.

The SAS programming language was used in computing this statistical test. The procedure requires specification of a "class", which is a category defining the sample or population variable against which the test is being made. In this case, "year" is the class of the variable. The variable is the number of unsolicited tenders. The outputs of the SAS procedure includes, among other things, a "z score" and the probability of that particular "z score" occurring due to chance alone. The output in this format obviates the need to consult a Wilcoxon critical values table to determine a rejection region based on a predesignated alpha level. The probability calculated by the SAS procedure is a one-tailed value. As a standard value, the alpha level chosen by the author is 0.05, ($p < .05$), for determining whether to reject the null hypothesis (5).

Hypothesis Three. Many of the same conditions that applied to hypothesis two apply to hypothesis three. The range of this variable, the actual number of carriers serving the DOD, will lie in the yearly populations 1970 to 1979 and 1980 to 1986. HQ MTMC source files extracted from Government and Commercial Bills of Lading (GBL or CBL) would be used to derive the data. The distribution of the population is unknown and of unequal size. Therefore the same test procedure and alpha level, ($p < .05$) will be used for this hypothesis as was used in hypothesis two.

Hypothesis Four. As in the previous two hypotheses, the distribution of the populations cannot be assumed to be normal. The variable, the number of carriers discontinuing DOD service, follows the yearly class grouping criteria used in the previous two tests and the source of data would be derived from HQ MTMC sources, GBL and CBL data. Therefore the Wilcoxon test is appropriate for this hypothesis as well using ($p < .05$) to reject the null hypothesis.

Hypothesis Five. The final test involved the use of a different source of data, ICC reports. It tested the population differences between the for-hire motor carriers of property, classes I, II, and III motor carriers of property, Standard Industrial Classification 4213 (27:224), before and after the enactment of the MCA. This data does not include freight forwarders. Again, the assumption of a normal distribution could not be made for this test. Also, as with the previous statistical tests, the population sizes were

not identical and the class groupings remained the same as the previous three hypotheses. Alpha remained at ($p < .05$). The Wilcoxon test was the appropriate statistical test method.

Decision Rules

Hypothesis One. For the first hypothesis, there will be no decision rule directly applicable. Conclusions for the hypothesis will be premised on the restructuring of the industry, the number of carriers available for any given shipment, and the procedures in force for the shipper to follow in attempting to secure a carrier for a shipment. It is implicit in the analysis that the staff size of most organizations remains somewhat static and that, pending a change in mission or in the manner of conducting operations, the output of a work force is also reasonably static. In substantiating the hypothesis that there may be difficulties in contracting a shipment with a shipper, the statements of USAF traffic managers will be used.

Hypothesis Two. The decision rules for this research hypothesis will be based on the Wilcoxon test. The test is a single tailed test with ($p < .05$). The dependent variable under analysis is the number of unsolicited tenders received by MTMC during that period. Both the "z score" and the probability of the "z score", $p(Z)$, from the SAS output will be used. If the ($p(Z) < .05$), then the null hypothesis is rejected.

Rejecting the null hypothesis, that the number of carriers seeking to serve in the DOD market is the same as before the MCA would indicate that there is a significant increase in the number of carriers following MCA. It would not necessarily imply that there is enough traffic to support all of the intended carriers based on the provisions that the traffic manager attempt to distribute his traffic over all modes and to all carriers subject to economic limitations (8). The author's belief that there is an increase in the number of carriers in the industry (also a research hypothesis, number five) corresponds to the number of carriers seeking to serve the DOD. It is the author's intent to demonstrate that the general trend of growth in this industry is reflected in the number of carriers who view the DOD market as a perceived opportunity for business. Conversely, failing to reject the null hypothesis will be inconclusive regarding the number of carriers intending to secure DOD traffic.

Hypothesis Three. This test concerns the individual carriers actually providing for-hire motor carrier service to the DOD. The Wilcoxon test would be used to compare the two populations. The same population size used in research hypothesis two is used in this test. The dependent variable is the number of individual carriers actually conducting business with the DOD. If the $(p(Z) < .05)$, then the null hypothesis is rejected.

If the MCA has not effected DOD shipping, then it would be expected that the level of carriers involved in DOD shipping would remain constant. If the individual carriers remaining in the industry bears any correlation to the number of carriers serving the DOD, then it is assumed that the amount of business available for each carrier should be prorated accordingly since there would be little reason to deny a tender for shipment to any carrier. However, a caveat to this type of statistical inference is that a service shipper may have offered a shipment to a carrier but for various reasons, such as the limited number of assets available for the shipment or notification problems, the desired carrier may have been unable to accept the offered shipment. This type of inference could also be weakened by the carrier's tendered rates for shipment, which may not have been competitive enough for the service shipper to select him. If the number of carriers increased, then the number of carriers receiving tenders for shipment may be expected to demonstrate a similar trend.

Hypothesis Four. This also uses the Wilcoxon test in determining whether the number of carriers discontinuing DOD service changed. As in the two previous hypotheses, $(p(Z) < .05)$ is sufficient to reject the null hypothesis. The dependent variable is the number of carriers who discontinue DOD carriage. If the null hypothesis is rejected, it indicates that the number of carriers discontinuing DOD carriage increased from the pre-MCA era. Failure to reject

the null hypothesis is inconclusive regarding the number of individual carriers discontinuing DOD carriage for any reason, voluntarily or involuntarily.

It is assumed that there is a relationship in between the number of carriers discontinuing operations and the motor carrier market forces, such as economic competition, which the MCA altered. The author believes that the aggregate number of carriers discontinuing operations corresponds to the MTMC data of those carriers discontinuing DOD service. Another manner of phrasing this hypothesis is that the profile of carriers who conduct business with the military shipper does not differ significantly from the non-DOD carriers. One of the implications of this hypothesis is that if the number of carriers discontinuing service to the military market increased significantly, then the individual shippers would have increasing difficulty in finding a carrier for each shipment since, for the most part, discontinuance of service is not publicly announced unless it is a bankruptcy. Even in the case of a bankruptcy, the booking agent may not notify the shipper until a tender of shipment is offered (30). The carriers discontinuing service due to attrition in the competitive market may not appear as a captured statistic of any of the monitoring agencies, i.e., Dun & Bradstreet (1; 35). The number of carriers discontinuing service to the military market may be involuntary, such as suspension, or it may be voluntary, resulting from bankruptcy or changes in the firm's market strategy. For

the shipper, carrier suspensions are announced by MTMC however (8; 30), the shipper is generally unaware of the other types of discontinuance of service until he attempts to procure the carriers service (29; 31; 35). The implications of these administrative delays in securing carriage during peacetime are not as severe as that of a contingency movement.

Hypothesis Five. The Wilcoxon test is used for this hypothesis. This test concerns the number of carriers in the industry and whether their numbers changed significantly. The n values remain the same as the other tests. The dependent variable is the number of Class I, II, and III motor carriers of property. Therefore, ($p(Z) < .05$) is required to reject the null hypothesis. Rejecting the null hypothesis indicates that the number of carriers did not change significantly from the pre-MCA era to the post-MCA era. Failure to reject the null hypothesis would be inconclusive regarding this variable.

The author believes that, in aggregate, the population of the for-hire motor carrier of general property industry remained relatively stable over the period of time in analysis, 1970 to 1986. Despite the relaxation of barriers to entry brought on by the MCA, transportation analysts report that the number of bankruptcies climbed as well (4). It is believed that the growth in the industry has been simultaneously offset by the decline and that the decline has been significant enough to maintain carrier population at

stable levels. A secondary assumption is that this high level of rapid turnover mentioned by Schumaker permeates the entire industry, not just one region or one class of carrier.

Rapid carrier turnover within the industry can cause trauma to the managers and the users of the industry, not to mention the trauma to the individual carriers involved. For MTMC, rapid turnover means industrial instability which can present difficulties in keeping the administration records current. For the service and commercial shippers, turnover can equate to unproductive time and possible shipping delays when attempting to locate viable carrier companies.

On the other hand, if the hypothesis test indicates that there is a statistical difference in the carrier population, it may not yield any information unless the ICC classes are analyzed separately. As stated earlier, the restructured classes made class by class analysis unfeasible.

Regarding the comparison of hypotheses two, three, and four to the national motor carrier industry, it may be viewed as follows. Hypothesis two may loosely correspond to the number of carriers entering the market and therefore show a positive correlation to the population of carriers examined in hypothesis five. The writer believes that the effects of competition and the relative instability of the motor carrier industry would not be immediately reflected in annual statistics. There is likely to be a delay before the effects of the free market manifest themselves in the captured statistics. The same caveat and correlation would also

apply to that of hypothesis three, the number of carriers actually serving the DOD, and the number of carriers, in aggregate found in hypothesis five. It is believed that there may be some relationship between the number of carriers discontinuing DOD service and the number of bankruptcies in Standard Industrial Code (SIC) 4312, but the lack of data precluded this test from being conducted (1; 4). It seems tenuous at best whether a correlation could be drawn between the aggregate national data and the DOD as a single large volume shipper but the trends between the two populations may indicate similarities.

III. Analysis

Introduction

Evidence that the commercial motor carrier environment, altered since the passage of the MCA, could delay the USAF service shipper in processing surface shipments during contingencies is not clearly indicated in the analysis, nor is the correlation between the carriers serving the DOD and that of the national industry statistically supported. Regarding the service shippers, they have been placed in a situation where the peacetime policies and accepted practices may not be the most effective or responsive during a low level conflict. Low level conflict is a situation characterized by the absence of a formal declaration of mobilization. Without the formal declaration of an emergency or mobilization, the service shipper's ability to use formal emergency procedures is restricted. Secondly, there does not appear to be a significant increase in the number of carriers seeking DOD shipments despite the increased motor carrier population during the same period. Third, whether there is a higher number of carriers actually serving the DOD and whether there is a higher number of carriers discontinuing service to the DOD as evidenced in GBLs could not be tested. Lastly, the population of carriers is significantly larger since the MCA. Therefore, it appears that any correlation between aggregate motor carrier industry data and the carriers serving the DOD does not support consideration.

Research Hypothesis One

The Motor Carrier Act of 1980 did have an effect on the motor carrier industry and the relationships between carriers and shippers, including the DOD. The individual service shipping agency, such as a base level TMO, appears to have more difficulties in finding suitable carriers for some of their shipments. The author did not attempt to explore the causal relationship between the number of carriers offering to serve a single shipper and the amount of time necessary to process a shipment from notification of the requirement to ship to the actual shipment confirmation.

Some senior base level traffic managers assert that the number of carriers they contact for shipments, who are unavailable or unable to accept these shipments appears to be higher than before MCA. They also assert that the overall reliability of the scheduled pickups by carriers has decreased since the enactment of the MCA. Another problem both the service shipper and the area MTMC commands face is contacting carriers who had previously been approved and listed as available for carriage, but had subsequently ceased operations since certification. Some of these defunct carriers announce their discontinuance of service, some do not. The individual service shippers and the area MTMC commands often discover the attrition of the carriers only at the time of the attempted contact for shipment. However, the time required to locate a suitable carrier is not something that either area MTMC commands or service shippers would have

been able to quantify since they did not attempt to monitor the time it took to confirm a shipment either in the pre-MCA era nor in this post-MCA era (35; 36).

In the event of a declared national or regional emergency, MTMC remains involved as the routing authority for all intra-CONUS shipments. However, unlike peacetime movements, the lead time notification requirement to MTMC for shipment requests will be reduced to a minimum 16 working hours, or four hours in an extreme emergency. This only applies to shipments considered in the national interest and, unlike normal shipments which require cost to be the primary consideration, utilize service as the primary requisite for determining suitable carriers although cost is still considered important (8; 28).

Although the directives outline procedures service shippers must follow in a nationally or regionally declared emergency, such as a mobilization, there is some doubt that in a contingency, a declaration of emergency would be forthcoming. Foster and McPherson's argument regarding the reluctance of national leaders to declare mobilization appears sound. Furthermore, they argue that the types of military movements this research focuses on should not be the primary mobilization actions. Foster and McPherson believe that deliberate measures to activate the industrial base would better serve the national interests, both as a demonstration of national resolve and to bolster a weakened defense industrial base (9). The statements of the Lt Col

Hollingshead regarding the sustainment of commerce in addition to mobilization and the comments of Foster and McPherson regarding the industrial and procedural strain of the initial phases of a mobilization appear to be corroborated by the comments of traffic managers regarding the ability of service shippers to quickly locate a suitable carrier in peacetime. The CORE program is designed to handle the situations which lie between peace and the declaration of emergency (37; 8; 15; 9).

As previously noted in chapter I, the CORE program relies upon voluntary support by the commercial industry for military shipments. The essence of the CORE program is non-intervention by the executive committees in the interaction between the motor carriers and the service shippers. The area MTMC command is still involved in TL routings. The service shipper, who may be required to ship cargo in the earlier stages of a low level conflict, without the enactment of formal emergency procedures, must essentially operate under peacetime guidelines.

Research Hypothesis Two

The findings for the number of carriers participating with the DOD was derived using the Wilcoxon test. The findings compared the years of 1970 through 1979 against 1980 through 1986. The category of the unsolicited tenders to MTMC yielded the z value of -0.3416 with a probability of that z value occurring strictly by chance at $p(Z) = 0.7327$.

In applying the results to the decision rule, it fails to reject the null hypothesis that the populations differ, ($p(Z) > .05$). It may not be concluded that the number of carriers voluntarily requesting business with the DOD has changed from the pre-MCA era. However, use of the surrogate data to complete this hypothesis test must somewhat temper the failure to reject the null hypothesis.

Research Hypothesis Three

Although the number of shipments of LTL and TL size were summarized in reports, the population of distinct shippers receiving business from the DOD is not monitored by HQ MTMC. The shipper is a data field on a GBL and could yield the desired data should the researcher have access to every GBL filed for the time period in analysis. Archive GBL data did not include this information. The difficulty in ascertaining discrete counts for the numbers of carriers making DOD shipments for each year by examining every GBL filed would exceed the value of the information. Thus, research hypothesis three could not be conducted.

The results of the test, if conducted may have been able to demonstrate the number of carriers which the DOD could support. The test may have indicated that all carriers who sought to serve the DOD were in fact receiving shipments and that there could be some correlation between the averaged tonnage of the shipments made by each carrier and that of the averaged tonnage of the industry, both TL and LTL.

Research Hypothesis Four

Since research hypothesis three could not be conducted, research hypothesis four could not be accomplished. The same data from GBLs would be used for both of the tests. The focus of the test is comparison of the number of carriers discontinuing DOD service, before and after the MCA.

The results of this test may have been able to indicate the negative aspects of the post MCA economic environment within the subset of DOD carriers against that of the aggregate motor carrier industry. It may also have been used against the outcomes of the previous two tests to indicate the approximate population of carriers which the volume of DOD shipment could sustain.

Research Hypothesis Five

The subsequent analysis was to calculate the mean number of carriers for the periods prior to and after MCA and perform an analysis of the means for similarity by using the Wilcoxon test. The sum of Class I, II, and III motor carriers of property was used as the dependent variable of comparison. The data used in this analysis was common ICC records of the number of Motor Carriers of Property. Again, this is a single tailed test using ($p < .05$). Although the changing classification criterion for entry into the ICC classes precludes direct ICC class to class comparison, these individual classes will be analyzed for possible support in Chapter IV.

The output of the Wilcoxon test for the number of motor carriers of property was inconclusive. The $z = 3.3669$, with the probability of that z score occurring by chance at 0.008. However, the calculated output measured the hypothesis that the populations differed; therefore, the null hypothesis that the total number of carriers prior to the MCA is the same as the total number of carriers after the MCA was not rejected since the decision rule made it necessary for $(1 - p(Z) > .95)$. There does appear to be a significant change in the carrier population.

Summary

For the service shipper, the proliferation of service-rate combinations are not as varied as they appear to be in the commercial sector, since some of the regulatory criteria adds structure to published tariffs, and MTMC acceptance criteria for tenders still focuses primarily on rates. If service, time and place utility, is the primary consideration, in a contingency, then rates, at best, will be secondary. Contingency shipments could conceivably all be routed by MTMC, but still require the service shipper to interact with each carrier for shipment confirmation. The level of service a carrier can provide a shipper will have to be determined by direct communication between the shipper and the carrier. Low intensity conflict, which will likely not require CORE Phase III intervention, will still require the base shipping agency to conduct the administrative process

of locating a carrier to meet his "service" requirements. The time it requires to locate an appropriate carrier whether it be an LTL or a TL shipment may be a significant factor in surface movements during a contingency. In a mobilization, the inconsistent criteria between MTMC and the service shipper and the time required for selecting a TL, and possibly a LTL carrier, could jeopardize timetables of execution and deployments to ports of embarkation.

A more detailed analysis of class I, II, and III carriers, although statistically unsound, may yield some useful practical conclusions. Wilcoxon tests on class I indicates that these populations did not significantly differ. Class I z value was $-.2441$ at $p(Z) = .8071$. Conversely though, class II and III populations did significantly differ. The class II values were $z = -2.5861$ at $p(Z) = .0097$, while the class III z value was $z = 3.3669$ at $p(Z) = .0008$. This analysis indicates that the increase of class II and III carriers influenced the statistics of the industry in aggregate. As industry analysts have remarked, the class III carriers are generally associated with the TL industry. The previous Wilcoxon tests for the TL shipments and tonnage did not indicate a significant difference in pre-MCA from post-MCA levels as it did for LTL tonnage and shipments. This would help to explain why the total number of carriers attempting to serve the DOD market did not appreciably change since the market that the class III carriers were attempting to enter had already stabilized. As evidenced by the

hypotheses testing, there are some distinctive changes in the motor carrier industry since the Motor Carrier Act of 1980. However, those changes are not consistently reflected in an analysis of those carriers serving the DOD.

IV. Conclusions

The effects of the MCA on the industry and its relationship to the DOD appears to have degraded the service shippers ability to efficiently locate a suitable carrier during a low level conflict, when efficient and effective operations are most important. Service shippers perceive delays in contacting carriers for shipment during peacetime as degraded support for their organization, but they become acutely aware of the degradation under the pressures of a contingency and the resulting short RDD. Carrier turnover under conditions of normalcy is viewed by a service shipper more as an annoyance than a serious problem. A service shipper maintains frequent contact with LTL carriers servicing his installation in the course of daily commerce, and would be able to use his knowledge of current carrier conditions to cope with carrier turnover. However, he may not be completely aware of the turnover in the TL market, since this program is centralized at the area MTMC command centers. As mentioned in Chapter III, carrier turnover is an insidious problem at the HQ MTMC level as well, since they are not always notified of service discontinuance. It is a problem caused by the carriers and by service shippers alike.

The potential problems are contingent upon factors such as the size of the shipments, the RDD of the shipments, and the geographic locations of both the shipper and the consignee. The high turnover rate appears as a problem when making TL shipments, a process which links service shippers to the

area MTMC command before the service shipper can attempt to contact the carrier(s). There could be other problems if a service shipper is not located in or near high density traffic corridors, where an abundance of carriers may reduce a service shipper's difficulties in confirming shipments. The competitive market appears to sustain fewer carriers in low traffic areas so that, should the low level conflict's increased requirement exceed the capabilities of the endemic carriers, there could be significant delays in supporting quick RDD, high priority shipments without active federal intervention, such as CORE activation. However, HQ MTMC has efforts underway to minimize delays in processing TL/routing authority requests by employing automated carrier data bases to quickly identify eligible carriers (26). Another HQ MTMC program being addressed is one which will identify a carrier's lift assets to help MTMC determine the suitability of each carrier in fulfilling the needs of the service shipper (17; 30). These two initiatives should decrease the amount of time a service shipper spends confirming shipments and will be especially important when a short RDD is required (30).

The author was not able to assess the effects of the NCA on USAF surface movements under conditions of either a locally, regionally, or nationally declared emergency. The dispersal plans of some USAF units, such as SAC (39), would likely be activated in situations of national emergency, when the mechanism for implementing centralized nationwide

shipment control is planned. Whether emergency plans would be effective in meeting SAC needs is not clear since the deployment and coordination process has only been simulated in exercises.

Some USAF base level evaluations and inspections occasionally require simulated surface movements of TL quantity shipments but, due to operational constraints, simulations and preconditions are imposed on the actions of those being evaluated or inspected. Whether CORE or other national emergency plans are adequately represented in these USAF exercises is questionable. On the other hand, the low level conflict, which may require genuine "no notice" shipments could involve tasking some traditionally non-combat commands, such as ATC (36). There may be small, LTL sized, critical surface shipments required of an ATC unit, who would have to react within the peacetime guidelines. These situations represent the only real problem in the procedures now in effect. Whether or not ATC or a similarly tasked service shipper can overcome these hurdles pending adoption of more efficient booking procedures still remains in question.

There does not appear to be any reason to support the belief that the size and the diversity of the DOD sustains a motor carrier population which shares the same data trends as the aggregate trucking industry. The author believes the for-hire motor carrier industry is not homogeneous and appears to be stratifying along the TL and LTL lines of

carriage. However, the blurring of categories of regulated and unregulated carriage, i.e., contract and private, makes this perception difficult to defend.

Recommendation

There appears to be a need to continue examining motor carrier movements resulting from both the low level conflict and declared emergency. Further analysis may be useful in determining which specific DOD units or types of service shippers would be affected in these two situations. Only by fully exploring the operational environment in which these movements are made and clearly defining capabilities and shortfalls, may we be able to insure the expeditious response of the motor carrier industry in a contingency.

Appendix A: Definitions

Common Carrier: A transportation business operating under certificate of public convenience to provide services on demand, at reasonable rates, and without discrimination. They may serve either regular or irregular routes (6:118; 7:95; 15:188).

For-Hire Carrier: A carrier who provides service to the public for a fee. One of the classes of commercial carriers defined by the Interstate Commerce Commission (6:116; 15).

Government Bill of Lading (GBL): A government document used to procure freight and cargo transportation and services from commercial carriers at government expense (8:257).

Less Than Truckload (LTL): A shipment weighing less than minimum required quantity to qualify for lower truckload rates (6:509).

Mobilization: The act of preparation for war or other emergencies that involves manpower and material assemblage and organization (9:53).

Motor Carrier: a motor truck or tractor trailer combination which is designed primarily for cargo and freight transport (37).

Port of Embarkation (POE): An authorized point of departure from a country (7:96).

Routing Authority: An activity which is empowered to designate modes or provides routing instructions for

shipments requiring clearance prior to movement (7:97).

Tariff: A publication containing rates, rules, regulations and charges applying to transportation and accessorial charges (8:258).

Tender: A document specifying rates, charges, or arrangements made by a carrier for the carriage, storage, or handling of property, or the transportation of persons pursuant to the provisions of Section 10721 of the Interstate Commerce Act (8:258).

Transportation Operating Agency (TOA): A single manager operating agency for movement of military traffic. These agencies report directly to the Office of the Secretary of Defense. The single manager operating agencies are the Military Airlift Command (USAF), the Military Sealift Command (USN), and the Military Traffic Management Command (USA) (2:47-8; 8:258)

Truckload (TL): A quantity shipment qualifying for truckload rate discounts (6:513).

Appendix B: HQ MTMC Freight Shipping and Tender Data

<u>Year</u>	<u>LTL Shipments</u>	<u>LTL Tonnage</u>	<u>TL Shipments</u>	<u>TL Tonnage</u>	<u>Unsolicited Tenders</u>	<u>Negotiated Tenders</u>
1970	963000	586200	277700	6280100	25223	367
1971	825200	507000	236400	5394300	13868	367
1972	721400	424700	224600	5248700	15321	216
1973	639600	352400	250400	5333000	15445	340
1974	464100	282100	175000	4443500	15538	377
1975	446600	275500	175200	4331900	13262	52
1976	372100	222300	166676	3267597	9854	97
1977	539668	314992	143854	3412635	8927	76
1978	884243	536435	164096	4101980	8706	83
1979	825742	487567	166275	4220573	12519	101
1980	834966	486189	165590	5429785	11804	173
1981	882686	509213	176471	4694026	14399	219
1982	948910	540938	184809	4875893	17915	211
1983	1025143	576353	204189	5152099	12311	388
1984	1016141	589043	209949	5308895	11133	525
1985	949413	580707	220454	5314697	10836	1336
1986	908000	587000	237000	6012000	13018	1766

Appendix C: HQ MTMC Freight Shipping and Tender Data

<u>Test</u>	<u>variable</u>	<u>statistic</u>	<u>product</u>	<u>p of product</u>
Wilcoxon	LTL shipment	Z	2.7813	.0054
Wilcoxon	LTL tonnage	Z	2.4885	.0128
Wilcoxon	TL shipments	Z	0.3906	.6961
Wilcoxon	TL tonnage	Z	1.1223	.2617

<u>Test</u>	<u>variable</u>	<u>statistic</u>	<u>product</u>	<u>p of product</u>
Spearman	LTL ship:tons	S	.8799	.0001
Spearman	TL ship:tons	S	.9307	.0001

Wilcoxon tests compared the pre-MCA and post-MCA variables. The Spearman correlation tested the variables for the entire 17 year span of 1970 to 1986 based on the data in Appendix B: HQ MTMC Freight Shipping and Tender Data.

Appendix D: Motor Carriers of Property

<u>Year</u>	<u>Class I</u>	<u>Class II</u>	<u>Class III</u>
1970	1571	2061	11468
1971	1597	2169	11351
1972	1771	2202	11165
1973	1738	2026	11380
1974	830	2588	12230
1975	885	2670	12450
1976	889	2589	12984
1977	1052	3101	12453
1978	1045	2929	12900
1979	992	2754	13337
1980	947	2164	14610
1981	1031	2293	18563
1982	1144	2139	22059
1983	1139	1631	24411
1984	1088	1554	27370
1985	1013	1489	30337
1985	947	1387	33903

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VITA

Captain Douglas Tazoi was born on 20 December 1950 in Brigham, Utah. He attended the University of Utah and received a Bachelor of Science degree in Philosophy. After returning to the land of Zion from over two years in Malaysia with the Peace Corps as a Livestock and Fodder Production Specialist, he entered military service in 1978. He enlisted as a ground radar technician in 1978 and received his commission through Officer Training School in 1979, Class 79-16B. He has had assignments as a transportation officer at Mather AFB, CA; Randolph AFB, TX; and Yokota AB, Japan prior to entering the School of Systems and Logistics, Air Force Institute of Technology, in May 1986.

Permanent address: 13360 N. 6000 W.

Garland, Utah 84312

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This study examined the impact of the Motor Carrier Act (MCA) of 1980 on military service shippers under conditions of contingency. It also examined whether the commerce trends of the subset population of motor carriers serving the DOD corresponded to the national industry.

When comparing the impact of the MCA on the service shipper, the analysis determined the likely operational procedures for various situations, such as a national emergency and a low level conflict, without a declaration of emergency. It determined that the low level conflict without declaration of emergency poses problems for the service shipper in meeting shipment required delivery dates. Statistical tests were used to differentiate the pre-MCA and post-MCA motor carrier data populations. Four tests were proposed for the study. The net result of the tests do not support the hypothesis that the commerce trends of the subset of DOD motor carriers corresponds to the aggregate motor carrier industry trends.

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