3-2007

Commercial Firm Training Practices versus Aerial Port Hazardous Cargo Frustration

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COMMERCIAL FIRM TRAINING PRACTICES VERSUS AERIAL PORT HAZARDOUS CARGO FRUSTRATION

THESIS

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AFIT/GLM/ENS/07-08

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AFIT/GLM/ENS/07-08

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THESIS

Presented to the Faculty

Department of Operational Sciences

Graduate School of Engineering and Management

Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

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March 2007

AFIT/GLM/ENS/07-08

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Abstract

The military is dependent on commercial vendors to augment their supply system, to include hazardous materials. Hazardous materials must be packaged and labeled differently than general cargo for shipment in the defense transportation system. Previous research showed there is an increase in frustration levels at Aerial Ports of Embarkation. The reasons for frustration range from minor discrepancies to improperly completed shipping documents. This research investigates if commercial companies are a cause of the frustration problems.

A case study methodology was used to investigate training practices of companies that had frustrated hazardous cargo at either Charleston or Dover Aerial Ports. The companies were selected using a 2^4 factorial design. The design focused on company size, volume shipped, internal or external training program, and whether the company had a government contract. The data was collected by using historical information, and interviewing commercial company training managers.

The analysis of the study made comparisons between the requirements of the companies and those established by the Department of Transportation, the Department of Defense, and international regulations. The research gave insight into commercial training habits. It helped identify discrepancies between the regulations that govern commercial companies and the military, including possible ways to reduce the discrepancies.

Acknowledgments

I would like to express my sincere appreciation to my faculty advisor, Dr. Alan Johnson and Lt. Col John Bell. The guidance, motivation and support of both gentlemen throughout the course of this thesis were exceptional and inspirational. I would also like to thank the individuals that assisted me in my research efforts. Without the help of the Customer Service Sections at Charleston and Dover Air Force Base, this thesis would not have been possible. In addition, I would like to thank my sponsor, the Air Force Material Command, Logistic Support Office for being as interested in the research topic as I was. Also, I would like to thank MSgt Veronica Sowers; she is well versed in the air transportation career field and I appreciate her help in clarifying the military hazardous material training process.

Lastly, I will be forever indebted to my husband, family, and friends. They were able to help me through the highs and lows of this research project. They encouraged me every step of the way and helped me push through to the end.

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I. Introduction

Background

Deployed military forces rely on state-side support for their supplies. The needs of the troops are fulfilled by several government agencies and commercial vendors. Hazardous materials (HAZMAT) constitute an important category of supplies requested by the troops. The Code of Federal Regulations 49, Subsection 171.8, defines hazardous materials as "a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and has designated as hazardous under Section 5103 of Federal Hazardous Materials Transportation Law (49 U.S.C. 5103)." (49 CFR, 2007) Due to the circumstances in deployed locations HAZMAT, even though highly regulated, is an integral piece to the success to the war fighters. These items can be as simple as cleaning supplies to as vital as a bullet. Every function within the military relies on HAZMAT to complete its mission. As long as conflicts are being waged the need to transport HAZMAT to the war fighter will remain an obligation.

Problem

The Air Mobility Command (AMC) has been investigating the efficiency of cargo movement for decades. In the past few years, the movement of hazardous materials (HAZMAT) has become a topic of discussion. There has been a trend in HAZMAT cargo destined for overseas locations arriving at Aerial Ports of Embarkation (APOE) that

are not ready for shipment, or as the military deems 'frustrated' (Ellison, 2004, Christensen, 2006). APOEs are locations that military units, government agencies, and commercial vendors send cargo that is destined for overseas locations. The items are then accepted into the defense transportation system for airlift on military aircraft. There are regulations and guidelines that dictate how HAZMAT will be shipped. HAZMAT shipments entered into the defense transportation system require the shipper to be trained and certified; the items packaged correctly, and arrive at the APOE with the proper documentation. The Air Mobility Command has four major APOEs, which mean the amount of frustrated cargo within the command at any given time can be quite high. The frustrated HAZMAT slows down the system and delays the timely delivery to the war fighter. The focus of this research looks at one of the possible causes for the high frustration levels.

Previous Research

Although this has been an interest item for AMC, there has been limited research on the topic (Ellison, 2004; Christensen, 2006). Ellison (2004) and Christensen (2006) investigated the frustration problems from different views; however, the studies were not all inclusive and further research is needed. Ellison (2004) investigated the impact the use of the Government Purchase Card (GPC) has on the frustration levels. She tracked frustrated hazardous cargo at Dover Air Force Base and determined which items were frustrated and used the GPC. Ellison's research also included those companies that had a contract with the Department of Defense as the contract would obligate the company to follow the same regulations. Her investigation included government agencies and

commercial vendors. She found that there was a clear lack of communication between the military member ordering the items and the shipper (Ellison, 2004).

Christensen continued with Ellison's research focusing on the main causes for frustration at the APOEs (Christensen, 2006). He retrieved data from Dover Air Force Base and Charleston Air Force Base. Christensen (2006) also investigated the procedures at the APOEs once a frustrated piece of cargo arrived. He noted that the Customer Services Sections at the locations had different management styles. Dover AFB would require the vendor to fix all problems with the frustrated hazardous cargo, while Charleston AFB would make minor corrections after speaking to the vendor to expedite the process (Christensen, 2006). The analysis of his research showed the most common reason for frustration and the vendors associated with the problems.

The research efforts of Ellison and Christensen began the process of determining the cause for the increase in frustration levels at APOEs. Although research is needed to investigate all the small areas that could be causing this problem, they have began assembling the puzzle pieces that will eventually open communication and provide a better understanding of the requirements to the commercial vendors. This understanding will improve the quality of products sent to the APOEs and in return decrease the amount of frustrations and get the items to the war fighter in a timely manner.

Research Problem

The scope of this research investigates how commercial companies train their employees to ship hazardous materials (HAZMAT). The research includes how companies train employees to ship HAZMAT through both the commercial airlift system

and the defense transportation system. The research question that guides this investigation is:

How does training at commercial hazardous material companies affect frustration levels at APOEs?

The research question can be investigated in several different ways; four sub-questions were created to focus in on specific research areas. Since the research involves both commercial and military members the first sub-question, *What significant differences exist in the way military and commercial industry personnel are trained on how to ship hazardous cargo?*, was created to identify any the similarities or differences in the training requirements.

Once the regulation requirements have been identified, further research is needed to identify any further training requirements placed on the commercial industry to ship HAZMAT on military aircraft. The second sub-question: *What are the training requirements for commercial industry personnel to ship within the defense transportation system?,* investigates these further requirements.

In addition to following commercial regulations, shippers need to be able to understand the requirements of the military. The third sub-question: *What standardized guidelines (instructions or checklists) are established for the shipper for completing the shipping documentation prior to shipping to the APOEs?,* identifies what tools are available to the shipper to assist with the documentation.

The fourth sub-question was included to identify weaknesses in the process. Commercial vendors may not be directly associated with the military; therefore research was conducted to see if creating training courses that incorporated both military and

commercial training requirements and used standard documentation would increase efficiency. The fourth sub-question assists in that research: *If not standardized, how would establishing strict guidelines for military and/or commercial hazardous cargo training reduce documentation frustration levels at the APOEs?*

The overarching research problem is investigating the training requirements of commercial companies. The sub-questions identify the relationship between the military and commercial requirements to transport hazardous materials by air. The research also identifies any commonalities that can be benchmarked to develop a successful training course. Comparisons were made to previous research to identify key areas of improvement and areas that still need to be addressed.

Methodology

The research was conducted using a case study methodology. Although each sub-question was addressed in a slightly different manner, following case study ideologies made the conclusion drawn from each area cohesive. The companies that were queried to provide current training practices were chosen using a factorial experiment design. A list of commercial companies that had a shipment of hazardous materials frustrated at either Charleston or Dover Air Force Base was obtained. The companies were called and selected based on fitting the criteria within the factorial experiment design. The factors of interest were: the volume of shipments, the size of the company (number of employees), where the training was conducted (internally or externally), and if the company had a current government contract. The companies were then given an alphabetic code to keep anonymity. The theme of the case study methodology was maintained while investigating the sub-questions with the identified sample group.

The first two sub-questions were investigated by researching both commercial and military regulations. Since the study focused on shipping hazardous materials through APOEs destined for international locations, international guidelines were also scrutinized. There are a plethora of regulations promulgated by the Department of Transportation, the Department of Defense, the United Nations, and other international airlift organizations.

The third and fourth sub-questions were researched by conducting interviews with the qualifying commercial companies. Each company's training manager was contacted to investigate how their employees were trained, along with any unique characteristics they use to keep their employees informed. Data was also collected on how the companies interact with APOEs and specifically the Customer Service Sections.

In addition to contacting the companies directly, the Customer Service Sections from Charleston and Dover Air Force Bases, provided data on the number of frustrations each company had along with the reason for the frustration. Once the companies were selected and interviewed, they were realigned with their frustration habits. The information about each company was compiled together for further analysis and to obtain more precise conclusions about the success of each company's training practices.

Data Analysis

The analysis of the data stayed in line with the methodology that was used. Case study methodology is used to gather qualitative data. Once the data is gathered it is analyzed by comparing the information and investigating the differences found. This study focused on gathering information on commercial companies' training programs. After the data was gathered it was analyzed by comparing the results between the

different commercial companies and military and commercial regulations. The first two sub-questions were addressed by comparing the data found in the military and commercial regulations. Although the military and commercial regulations are similar, the military has additional requirements and uses slightly different forms. The last two sub-questions were analyzed by using the commercial company interviews. A break down of each company's size, volume, and training program was created to allow differences to be recognized. Information obtained from the regulations, interviews, and customer service sections at Charleston and Dover AFB were compiled to allow a conclusion to be drawn about the research problem.

Scope and Limitations

The scope of this research is limited to commercial vendors that have shipped frustrated cargo through either Charleston or Dover Air Force Bases. The research does not include data from any other AMC APOE. Although the companies selected had shipped cargo frustrated cargo through one of the mentioned APOEs between August 2005 and August 2006, the total volume each company sent through the APOE is unknown. The only data available at the time of research was the number of items frustrated along with the reason.

Another limitation is that hazardous materials can be frustrated by mistake or by no fault of the commercial vendor. Since there is a large volume of hazardous cargo that enters an APOE, shipments are sometimes placed in a frustrated status by accident. Although port information systems are continuously improving, human error still plays a factor when accepting shipments into APOEs. Additionally, commercial vendors can have items frustrated due to improper or insufficient documentation. Documentation can

get lost in transit. Although the vendor is responsible for providing the documentation when the hazardous materials arrive at the APOE, sometimes it is out of their control.

There were also limitations when conducting the interviews. Since the interviews were conducted via phone or email, it is assumed the information being provided is factual. Companies may protect proprietary information to stay competitive in their industry.

The information provided was assumed to be factual and a true representation of the problems being addressed. In order for the information gathered to be more generalizable to the population of commercial vendors that ship to APOEs, there would need to be more time allowed to conduct the research and there would need to be participation by all the AMC APOEs.

Summary

A special relationship exists between deployed military troops and commercial hazardous material vendors. In order for this relationship to be successful, the military troops need to receive their ordered items in a timely and efficient manner. The cornerstone to providing satisfactory results is proper training. Military troops are relying on their ordered items to be processed and shipped through the defense transportation system. This unique and time sensitive relationship cannot afford to have any mishaps. By analyzing the training practices of both the military and commercial vendors, this partnership will obtain an insight into ways to improve the process and reach their goal. In Chapter 2, previous research about training and benchmarking is reviewed. In addition to previous studies, the regulations of all the participating agencies will be outlined and detailed. The review of literature within Chapter 2 helps develop the

methodology for the study. Chapter 3 describes the methods that were used to collect and analyze the data. The last two chapters will take the data collected and answer the four sub-questions. The four sub-questions will then be assessed and conclusions drawn from the analysis will answer the overall research question.

II. Literature Review

Identified Problems

The United States is currently involved in several conflicts in the Middle East. These conflicts have placed additional strain on the logistical procedures of the military. The conflicts have also identified several areas that need to be improved to keep up with the demands of the war fighter. An increase in frustrated cargo at Aerial Ports of Embarkation (APOE) has been identified. An increase of frustrated items at APOEs means that cargo that is needed by the war fighters is being held up due to companies not following standard procedures to ship cargo via the defense transportation system (DTS).

This problem was brought to the public with a letter establishing Business Rules for commercial companies shipping cargo through DTS (Wynne, 2003). The smooth and efficient movement of cargo through DTS is one goal of the Department of Defense's Future Logistics Enterprise (Wynne, 2003). It has been four years since the Business Rules were established, and there are still numerous items frustrated prior to being placed in the DTS.

Ellison began researching frustrated hazardous cargo in 2004 (Ellison, 2004). Her research investigated frustration problems associated with the use of the Government Purchase Card (GPC). Ellison focused her efforts on frustration problems located at Dover Air Force Base. She tracked the cargo that entered the DTS for four months. She analyzed how often items were frustrated, the reason they were frustrated, and whether the items were purchased using the GPC.

Ellison's research was expanded upon by Christensen. Focusing on items frustrated at Charleston and Dover Air Force Bases, he analyzed over 400 data points to search for trends in the reason items are frustrated and also to identify the companies with recurring problems. In addition of focusing on recurring problems, Christensen also investigated the organizational structure of each base's respective Customer Service Section. He noted that although there are regulations governing the scope and responsibility of the section, each base had a different organizational structure (Christensen, 2006). Christensen's research provided insight into areas that need addressing and possible ways to improve the movement of hazardous cargo through the DTS (Christensen, 2006).

Although the definition and scope of logistics within the military and commercial industry is changing, the needs of the customer must come first. It has been several years since an increase in frustrated cargo was first identified; however, it is still a problem today. The high world-wide military operations tempo drives the need to resolve the problems with shipping HAZMAT cargo.

Effective Training

One of the early pioneers in evaluating training programs and procedures was Donald Kirkpatrick. From November 1958 to February 1959, Kirkpatrick published four articles discussing his four-level model for evaluating training programs (Kirkpatrick, 1996). In 1996, Kirkpatrick began looking back at the literature he had written over the past four decades and reevaluated his four-level model. His model was directed to the individuals administering the training programs. He wanted a tool for the teachers to use

to ensure the content they were teaching was being absorbed by their pupils. Kirkpatrick's four-level model is (Kirkpatrick, 1996):

Level 1 - Reaction: This level measures how the student felt about the training. The instructor must know what he or she wants to measure, design a questionnaire that can quantify the items of interest, and keep the student's comments anonymous so the student has the ability to speak freely and give constructive criticism.

Level 2 - Learning: This level provides the instructor with the students' feedback and gives them the ability to determine which parts of the program are effective and which need to be improved or removed. It is important that instructors focus on the positive remarks, as these comments hone in on the areas that the students paid the most attention to and learned from. These favorable characteristics can be applied to the entire program making it more appealing to the students. Another area to learn from is the student's performance, pre and post-tests can be administered to discover how much knowledge was retained. Control groups can also be used to help explain or understand statistical correlations that were discovered within the feedback.

Level 3 - Behavior: In this level the instructor has to decide how the feedback will be used. It is beneficial to obtain the information but if the instructor is unwilling to accept the criticism and adjust; then the information was gathered for no reason. The instructor must be willing to accept the flaws within the program and find new ways to adapt the program. This level is not the easiest to address as it takes the most effort from the instructor. Feedback about the program should

be gathered from numerous levels (trainees, supervisors, peers, etc). By gathering information from several levels the instructor can make a sound decision on which items need to be adjusted to ensure the information is being taught properly and retained by the students for future use.

Level 4 - Results: In a training environment, this level may be the hardest to evaluate. As instructors attempt to perfect their training programs, other factors may be affecting the outcome. There are other variables that account for the total make-up of a training class. These include the environment, the technical difficulty, the individual's personality, to the time of day the class is taught. It is best if the instructor decide what they would like the end result to be, whether it is higher productivity or reducing costs. Once a defined result has been established the instructor has a quantifiable way of determining if the program is successful and how to improve the training program to meet the end goal.

After Kirkpatrick wrote these four articles he went on to write more articles, several books, and conducted case studies further investigating how to evaluate training programs. When he revisited his original four-level model decades later, he commented that although literature had been written on the subject through the years, the original ideas and basic model have remained the same (Kirkpatrick, 1996). He did note that in the fast paced world of today, some of the levels are not given as much attention or they are completely omitted. Companies and trainers are more interested in the results. They are interested in learning how to obtain the results they want to determine if the company is spending too much money on the program, if similar programs should be developed, or

if the program is effective and worth keeping. Kirkpatrick does note that if it is practical all four levels should be addressed by the instructor to obtain the best results.

Kirkpatrick's last observations have given cause for investigators to research the best way to ensure training programs are meeting objectives of the company. Companies spend billions of dollars on training each year, but a recent study has shown that unless a company's training program is aligned with the department's goals the training could be a waste of the employees' time and the company's money (Clark and Kwinn, 2005). In 2005, Ruth Clark and Ann Kwinn collaborated with their colleagues and developed seven different routes companies can take to ensure they develop programs that will best suit their needs. Since each company has different needs the routes offer a guideline for training mangers to follow, they are easily adaptable to any given situation. It was stressed that direct communication with the Chief Executive Officer (CEO) and upper management are key to the success of any program. The seven routes are (Clark and Kwinn, 2005):

> **Route 1 - Become the Organization's Global Positioning System (GPS)**: The trainer needs to discuss with the CEO where he envisions the company going in the future and what parameters he has set to know when the goal has been achieved. Once these questions have been answered, the trainer needs to visit each department within the company and address the same questions. This provides insight to the trainer and allows them to develop programs that will meet the needs of the company for today and the future. It should be noted this is an evolving process, the relationship between the trainer and the department heads is

on-going so that courses can be adjusted when the direction of the company is adjusted.

Route 2 - Alleviate the Pain Points: Trainers need to investigate what the current problems are within the company. This should be discussed again with each department to ensure everyone's needs are being met. A plan can be developed outlining the expectations of the departments with the goals of the training programs.

Route 3 - Work in the Squeeze Zone: This route identifies the priority training has within the company. With the business industry facing mergers, outsourcing, and quicker turn around times, trainers are placed in a unique situation. Companies need to deliver their product in order to make money, trainers are faced with time, budget, and retirement constraints. It is imperative that trainers know the priority of training within the company and keep addressing current and future constraints they may encounter to provide the best training to the employees despite the limitations they are facing.

Route 4 - Make Lemonade: This route takes the constraints of the company and turns them into opportunities. Although the trainer may have obstacles to overcome, if they approach them with an open mind, anything can happen. The authors suggest being innovative, or become a lean department. This includes finding ways to save money or developing a more effective training program. They also suggest being fast. In today's fast paced world training needs to be quick and to the point so employees can get back to work. With advances in technology training time can be reduced. Also, by using work examples

employees have the ability apply the knowledge directly to their work instead conceptualizing it while in a classroom setting.

Route 5 - Mine and Distribute the Best: This route sets out to benchmark the best processes and people throughout the company. The trainer needs to identify which processes are done effectively so they can be replicated in the training programs. To be the best we must learn from the best, take from the knowledge within the company and pass it on for others to emulate.

Route 6 - Plan for the Future – Today: This route focuses on problems that are arising in certain industries. The best way to learn from your mistakes is not to repeat them; however, this line of thinking can be applied to your competitors' mistakes. It is important to stay abreast in current topics in the industry in which you work. The trainer not only has the ability to address problems within their company but also some that have been addressed by the industry. This not only helps to correct a company's current training deficiencies but can also stave off future dilemmas.

Route 7 - Partner with Management: This route addresses the need for the training manager to form partnerships with management so that training becomes a priority and he becomes an integral cog within the company. By forming the partnerships, the training manager has access to all the information they need to perform their job efficiently. Not only does management reap the benefits of effective training programs, but the training manager obtains a working knowledge about company. This allows the key players to discuss issues and opportunities for training in a common language.

Clark and Kwinn honed in on the last level Kirkpatrick discussed, giving training managers different avenues to follow to ensure the goals of the company and training are aligned. The overarching theme of all the routes put the training manager in direct contact with a company's upper and departmental management. The only way to effectively train employees is to ensure that the proper skills are being taught to them, when the company needs them to have those particular skills (Clark and Kwinn, 2005).

In the past there was plenty of research conducted on how to effectively develop a training program that would satisfy the objectives set forth. Kirkpatrick focused on the different levels in developing a training program while Clark and Kwinn directed their efforts to what should be taught to ensure the company obtains the results it needs to succeed. The missing link in this research is that none of the researchers investigated how the employees retained the information they were taught. A properly developed training plan could provide all the desired information and teach the proper skills; however, if the students do not retain these pieces of information both time and money are wasted. In 1992, a group of researchers from Michigan State University investigated how well students retained information from a technical school when given an opportunity to perform the tasks (Ford et.al., 1992). The group studied how often the individuals had the opportunity to perform learned tasks, focusing on breadth, activity level and in what capacity the task was performed. They also looked at the factors that affected the students from performing the activities, specifically organization, work context, and individual characteristics. The researchers noted that performing a task includes not only the knowledge but a certain level of self-efficacy. If an individual has high self-efficacy they are more likely to seek out opportunities to perform tasks, thus

being more aware of the proper techniques (Ford et al, 1992). The results of the study showed that not all students have the same opportunity to perform the tasks they were taught and that the level of difficulty varied. This does not mean that the training they received was inadequate and did not properly prepare them for the tasks they needed to perform; it simply demonstrates that there are different levels of expectation when attending a training program (Ford et al, 1992). This observation needs to be taken into consideration when students attend initial or refresher training courses. If an employee is trained on a task and that training is valid for twelve months then it is expected the employee can perform the task proficiently for all twelve months. However, if the employee does not complete that task until eleven months after the training, there should be a lower expectation of the proficiency.

Although their analysis did not focus on how a company's training plan was developed or how often the tasks are performed, it is important to note that these areas are being researched further and have an impact on how employees perform. Companies in today's market must overcome several obstacles to stay competitive (Clark and Kwinn, 2005). There is an ever increasing demand for perfection; companies need to be aware of this facet when sending their employees to training classes. The employees need to understand if the training is to be for immediate or future use (Ford et al, 1992).

Hazardous Materials Procedures

Commercial companies and government agencies abide by numerous hazardous material regulations (HMR). These regulations vary depending on which mode of transport is being used and which agency the company falls under. Since this research

focuses on the transport of hazardous materials to overseas locations via airlift we will investigate the training requirements for these items.

Department of Transportation: The Department of Transportation follows the Code of Federal Regulations (CFR) Title 49, Subpart H, Part 172, for their hazardous materials training requirements (CFR 49, 2006). The employer is responsible for training their employees in the area of hazardous materials. The employer has the option to train their employees in-house or send them to an external program. Internal and external training will be discussed later in this chapter; however, it should be noted that regardless of where the employee is trained it is the responsibility of the employer to ensure the employee meets the standards and is tested appropriately (CFR 49, 2006). Employees that handle, package, or ship hazardous materials will be trained in the following areas (CFR 49, 2006):

General Awareness and Familiarization: This training provides the employee the ability to recognize and identify hazardous materials.

Function-specific: This training focuses on the specific job functions that require an employee to handle hazardous materials. This also includes those training requirements that deal with international shipments following additional regulations.

Safety: It is the responsibility of the employer to ensure that employees are trained on the safe handling of hazardous materials, including how to avoid accidents, personal protection, and emergency response procedures.

Security Awareness: As of March 25, 2003 all employees are required to be trained on the risks of hazardous materials and how to recognize and respond to security threats.

In-depth Security: Each company is responsible for having a security plan. Employees need to be trained on the procedures to recognize and respond to security threats according to the company's security plan. The employee must be able to implement the procedures upon realization of a suspected breach.

Labor requirements: Employers are responsible to ensure employees are trained in accordance with labor laws and regulations.

Employees are required to complete their initial training within 90 days of starting their job (CFR 49, 2006). An employee must be trained in the above mentioned areas every three years. The employer is responsible for keeping up-to-date records on all employee training. These records include the location and date the training occurred along with the name of the trainer that approved the certification (CFR 49, 2006).

Commercial companies that want to ship hazardous materials through the defense transportation system must also be trained on their duties related to military air transportation (AFMAN 24-204, 2004). In addition the training must coincide with the nine Business Rules set forth by the Under Secretary of Defense (Wynne, 2003).

Department of Defense: The Department of Defense (DoD) provides hazardous materials training to military and DoD civilians at designated training sites. The requirements for training individuals on hazardous materials are agreed upon in the Interservice Training Review Organization Task Group on Hazardous Materials Training Memorandum of Understanding (AFMAN 24-204, 2004). This memorandum of

understanding ensures that all the military services and different organizations that belong to the DoD are being trained to the same standards. The courses that are offered include training for handlers, inspectors, and certifying officials. Since the certifying official is responsible for ensuring all the documentation and packaging is correct prior to shipment this section will only cover those requirements. There are three types of certifying officials per the DoD (AFMAN 24-204, 2004):

Preparers – They are trained on all hazardous materials. This training course is 80 hours long and requires an 80% score on the final exam to receive certification.

Technical Specialists - These individuals can certify hazardous materials that they are qualified to maintain. They are trained by a preparer and then identified by the Commander to represent their particular unit. Technical Specialists are only able to certify materials for tactical or contingency operations and channel movement.

Medical Personnel – These training courses are for medical personnel that handle and ship laboratory samples and specimens. The course that is offered encompasses all modes of transport.

Once a member has completed the training for their respective certification, a notation should be placed in their training record to verify the training occurred at a certain date and location. The training is good for 24 months, at that time it should be determined if the training is needed or if the member's services are no longer needed (AFMAN 24-204, 2004). If the member's services are still needed, they must complete a refresher training course. This can be completed by attending the initial training course

again, or completing a refresher training exportable course (AFI 24-101, 2004). If circumstances preclude the member from completing the refresher training prior to their expiration date, an extension may be granted. The exemption is granted through the member's respective service's major command focal point (AFMAN 24-204, 2004). A notation is required in the member's training records detailing the level of training the completed.

International Civil Aviation Organization: The International Civil Aviation Organization (ICAO) is comprised of delegated members that develop the standards of international air navigation and encourage planning and development of future endeavors. ICAO focuses on safety, aircraft and airport development, and cohesiveness between the contracting states (Wells & Wensveen, 2004). The ICAO also agrees upon shipping standards and practices involving hazardous materials. These guidelines are updated yearly by ICAO and published in *Technical Instruction for the Safe Transport of Dangerous good by Air* (ICAO, 1996). The guidelines that ICAO sets for commercial companies to follow when training their employees on how to ship hazardous materials are (ICAO, 1996):

General Familiarization: Provide employees with an understanding of the overall provisions and familiarity with the hazardous goods.

Function-Specific: This gives the employee detailed information and requirements of the hazardous good they are most likely to handle.

Safety: Provides the employee with the proper handling and safety techniques of a particular hazardous material. It also trains the employee on the emergency procedures required for that hazardous material.

It is the employer's responsibility to ensure their employees have this initial training prior to allowing them to handle hazardous materials. Once the initial training has occurred a refresher course is required every 24 months (ICAO, 1996). The familiarity training is outlined by ICAO depending on the function of the employee. ICAO has seven categories of personnel, for the scope of this study we are interested in shippers and shippers' agents. ICAO states that shippers and shippers' agents should be familiar with classification of dangerous good; list of dangerous goods; prohibitions; packing instructions; labeling and marking; shippers' responsibilities; dangerous good transport documents. The guidelines are established by ICAO; however, they are enforced by the national or state authorities (ICAO, 1996).

International Air Transportation Association: The International Air Transportation Association (IATA) member's are nominated by individual airlines and are governed by an executive committee which has elected members (Wells & Wensveen, 2004). This organization meets to agree upon monetary compensation for the different airline carriers. This can only occur after each member's government has a formal agreement to provide services to another. After the agreements have been made, IATA establishes guidelines for all air transport operations (Wells & Wensveen, 2004). IATA publishes the Dangerous Goods Regulations on a yearly basis. This publication outlines the requirements that companies must abide by when shipping dangerous goods. The training requirements established by IATA for commercial companies are (IATA, 2006):

General Familiarization: Provides employees with general knowledge and provisions of the hazardous materials they are handling.

Function Specific: Provides information on the particular hazardous the employee is responsible for within their area. The requirements of function specific training are outlined in Table 1.5.A.

Safety: Provides training of the hazards associated with each dangerous good including proper handling procedures. Emergency response procedures are instituted and each employee must be familiar with them.

IATA requires the employer to ensure their employees have had the required initial training prior to handling hazardous materials. Also, the employee is required to have recurrent training every 24 months to stay and informed (IATA, 2006). Recurrent training can occur sooner at the employer's discretion. In addition to the training the employee is tested on their knowledge and issued a certificate of completion. Employer's are required to keep training records on their employees which contains the location of the training, training dates, and a copy of their certificate (IATA, 2006). The training program and folders are subject to review by the appropriate national or state representatives. As stated in the function specific training, Table 1.5.A has four categories of employees (IATA, 2006). For the scope of this research we are interested in shippers and packers requirements. The Dangerous Good Regulation requires shippers and packers to be trained in the following areas: general philosophy; limitations; general requirements for shippers; classification; list of dangerous good; general packing requirements; packing instructions; labeling and marking; Shipper's Declaration and other relevant documentation; recognition of undeclared dangerous goods; provisions for passengers and crew; and emergency procedures.

Current Training Available

The Department of Defense has established training facilities that military members and their civilian counterparts attend to obtain their certification. These schools teach the material required by Department of Defense regulations. The same training plan is used at each location to ensure cohesiveness throughout the different military branches and locations (AFMAN 24-204, 2004 and MOU, 2003).

Commercial vendors must abide by the established regulations when shipping hazardous materials, as well as, the guidelines of each mode of transportation. Commercial companies have several options when training their employees. The training requirements for commercial vendor employees have already been stated; however, the Code of Federal Regulations (CFR) 49 states that training can be provided by the company or by an outside public or private agency (CFR 49, 2006).

External Training: The Department of Transportation website provides links to hundreds of companies that are qualified to provide hazardous material training. These training companies provide a wide range of training. Some training companies can train on all modes of transportation, while others may focus on a specific mode only. In addition to providing different training these companies also have a couple of ways to train the employees. After researching the links provide by the DoT, it was found there are two different ways a commercial hazardous material company could get their employees trained using an external company. The two ways are:

1. Location Training: This training requires hazardous material companies to send their employees to a specific training facility. The Department of Transportation sponsors several training classes at the Transportation Safety

Institute (TSI), located in Oklahoma City, Oklahoma. TSI provides initial and refresher training to commercial companies. They offer a three day training course that qualifies the students to ship hazardous materials via air. In addition to these three days, the students have an optional fourth day that will train them on military airlift requirements (Kramer, 2006).

2. In-House Training: This training is conducted at the commercial company. The commercial company hires an outside contractor to come to their facility to train their employees. The contractor uses their training plan and trains the company's employees on the hazards and modes the company requests. Kinetics Incorporated offers this type of training (Million Air Consultants, 2006). Kinetics will use their training program or tailor it to fit the company's needs.

Internal Training: Commercial companies also have the right to train their employees internally. This training is normally conducted by one of the currently trained employees. The individual teaching the class is following a training plan established by the company. There is no formal training requirement needed for the instructor to teach the class. However, research has found it is common that the instructor has attended one of the previously mentioned external training programs (Kramer, 2006). The instructor can train the employees either in a classroom or with on-the-job training. Another option for commercial companies to train their employees internally is to procure a training plan through an external training company. LabelMaster is an external training company that among other things, sells computer based programs that will train employees on hazardous materials handling and shipping requirements (LabelMaster, 2006). This allows commercial companies the flexibility to the train the employees professionally

without having the added cost of sending them to a different location. In addition to computer based training, other companies like Safety Video Direct, offer videos that employees can watch fulfilling their training requirements (SafetyVideoDirect, 2006).

Benchmarking

The term benchmarking can be heard in almost any boardroom today. It is a catch phrase that has a lot of people trying to develop and understand faster than their competitors. Along with all the other logistics terminology, benchmarking is hard to define. There are hundreds of definitions that have been developed by scholars, subject matter experts, businessmen, and consumers. However, others believe that benchmarking is not a single entity that can be defined by a process that a company must go through to obtain a competitive advantage. The definition that was used for the purpose of this study was developed by the AT & T Benchmarking Group. They state "Benchmarking is the continuous process of measuring your current business operations and comparing them to the best-in-class operations. Application of the knowledge gained from a benchmarking study provides a foundation for building operational plans to meet and surpass industry-best practices." (Korpela & Tuominen, 1996)

Management pioneer, Fredrick Taylor began to look at management from a scientific perspective at the turn of the century. Although his thoughts and concepts have been adapted over the years, his theories are similar to benchmarking. Taylor conducted several studies where the outcomes were goals or standards that employees were capable of meeting at work. It varied from how much coal a man could shovel in a day, to how many gadgets a person could put together in an hour. (Gibson et al., 2006) While Taylor's ideas looked at achieving employee goals, benchmarking is used by a company

to achieve the highest business goals to stay competitive and ensure success. There are several different concepts about benchmarking, each containing a different way of gathering information. Although some of these models would take decades to achieve, they are all founded on the same principles, which is for a company to learn from either itself or another to be the best-in-the-business. Watson believes that benchmarking is an evolutionary process (Watson, 1993). He believes that companies must first look internally, and then gradually proceed to looking globally for process improvements. Watson has five generations that a company must go though, each improving on the next, to achieve success (Watson, 1993). They are:

First Generation: Reverse Engineering

Second Generation: Competitive Benchmarking

Third Generation: Process Benchmarking

Fourth Generation: Strategic Benchmarking

Fifth Generation: Global Benchmarking.

Spendolini believes that benchmarking is a continues process that involves investigation, learning from others, and a quest for new ideas, all of which can take years and require intense dedication to obtain information that could be used to improve a company (Spendolini, 1992). Furey argues for an analytical approach both internally and externally to the company (Furey, 1987). He believes the goals of the process should be to identify measures for each operation, measure the levels of performance internally and externally, identify areas of excellence and weakness, and finally to implement the better practices of other companies to improve the internal weaknesses (Furey, 1987).

These men have developed sound approaches to implementing benchmarking. However, there are four common categories that benchmarking can be divided into. These categories, along with the previously mentioned strategies, are not the only answer but simply concept suggestions. The categories are: internal, competitor, functional, and generic. (Bendell et al., 1993) The first category is internal benchmarking which is conducted within a company. A company compares business practices within each division or department. They look for areas of improvement within each division. Once an overall best practice has been established the company applies it to the respective divisions. For example, the billing section could be good at filing, while the customer service section is good at dealing with people. The two sections would then train each other on how to incorporate and implement the best practice within their respective section. This allows the company to become the best from within and create synergy. Internal benchmarking should be the first step a company takes when implementing benchmarking (Bendell et al., 1993). Once the internal processes have been compared, a company can move to the second category, competitor benchmarking. The second category follows the same logic as internal benchmarking expect now the company looks to their competitor for comparison. This is slightly harder to accomplish as most competitors are not forthcoming with their information. While getting a competitive edge will likely result from this type of benchmarking, it is incredibly hard to achieve. The third category is functional benchmarking. This category allows a company to compare its ideas and practices to a company in which it does not compete with, but shares similar functions. For example, a clothing company and a car manufacturer both have customer service departments. Although they do not produce similar products the

company that makes clothes can learn from the success of the car manufacturer in the customer service area. This type of information is easier to obtain as there is no competitive advantage being gained. The fourth and final category is the generic benchmarking category (Bendell et al., 1993). This category allows a company to look at any industry and any section within that industry. Even though, this category provides the most range and allows for the most learning, it is often difficult to translate these ideas back into the original company. Overall, most benchmarking techniques are industry specific; however, with the proper adaptation any company can benefit and implement a lesson learned elsewhere in the business world. Although companies should start with internal benchmarking, the next three categories are not evolutionary (Bendell et al, 1993). It is the discretion of the company to decide which companies they would like to investigate. In recent years, while conducting benchmarking studies, several partnerships and mergers have resulted. This is mostly due in part to companies realizing they can compete better together (Foster, 1992).

The philosophy or concept that a company follows can be based off a model or developed from an established process. When conducting a benchmarking study, there are just as many processes as there are philosophies. Spendolini has a five-stage generic process (Spendolini, 1992). It is considered generic because all the details about a company are not known. It is most commonly used with competitor benchmarking; however, a company is only looking at it from an outside perspective. Certain information may not be obtainable or known, but the general idea can be recreated to improve a company's internal process (Spendolini, 1992). Christopher also uses a five-stage approach. While it is similar to Spendolini, Christopher focuses on the customer's

point of view. Ultimately a company is trying to improve their processes to meet their customer's standards and induce customer loyalty (Christopher, 1992). However, Schneider (2006) states that employees need to be engaged and willing to make customers happy for customer service benchmarking techniques to work. Watson uses four main steps. In his process, all the data can be collected and compared between the companies. The data can be collected either through internal channels or through customer data collection. He attempts to answer the basic questions of "How do we do it?" versus "How do they do it?" (Watson, 1993). Cavinato uses the same ideas and process as Watson; however, he uses eleven approaches and has a clearly stated objective (Cavinato, 1998).

Finally, there is the Analytical Hierarchy Process (AHP) that has been used and discussed by several subject matter experts. AHP uses a seven step process to help a team of professionals from within a company determine which best-in-the-business practices should be implemented. The difference between AHP and the other processes is that the group must decide as a whole which items to investigate and which items to implement. This allows for greater discussion and a broader range of ideas to be investigated. It also does not limit the group to look at just competitors or non-competitors. Different companies can be looked at across several spectrums resulting in the overall best fit for the company. Another important factor with AHP is that it has a better chance of the company implementing the ideas. Not only is the benchmarking process difficult to conduct, it is even more difficult for companies to implement. Sometimes this is due to employees being leery that the new process may not work (Korpela & Tuominen, 1996).

Benchmarking is discussed in every industry; however, like many other ideas benchmarking needs to be accepted throughout the entire company for it to work properly (Blanchard, 2005). The benchmarking process takes time and dedication. It involves collecting data, deciding which idea to implement, deciding on an implementation process, education on the new process, and finally waiting to see if the implementation was successful. Although a recent survey stated 65% of Fortune 1000 companies stated they used benchmarking strategies, it also showed that the definition of benchmarking was not clear to everyone that used it. It has been shown that most companies are using functional benchmarking, which compares a certain section within their company to a non-competitor to find improvements (Foster, 1992). In an interview with Thomas Foster (1992), Roger Camp of the Xerox Corporation stated he believes benchmarking is both strategic and operational. Xerox has been able to implement benchmarking with great success over the past decade. Camp also stated that the entire company should commit to the benchmarking process (Foster, 1992). At the operational level are the separate divisions within the company. While benchmarking can be seen more effectively at these levels, it is just as important at the strategic level. The upper management is located within the strategic level. The upper management needs to take ideas from other companies and learn to adapt them to their own, rather than just try and implement them the same way the other company. The underlying goal of benchmarking is finding the best practices within the industry and adapting them to work for the company conducting the research (Foster, 1992).

The advantage of having numerous companies investigating and pursing benchmark studies is that several councils have set standards for all companies to follow.

Although the standards are not all inclusive, they establish and discuss how companies within different industries are overcoming common obstacles and meeting the goals of their customers. The Supply Chain Council (SCC) has recently procured the Supply Chain Operations Reference (SCOR) model (SCC, 2006). Companies that subscribe to SCC have access to the SCOR model along with the process in which it can be implemented. SCOR contains management descriptions, metrics, standard functional alignments and management practices that produce the best result (SCC, 2006). There are also companies that partner with their suppliers and distributors using an Enterprise Resource Planning (ERP) system. This allows for total visibility within each of the companies to better serve their customers. Although an ERP will not define the best practices within the companies, it does provide a set of metrics that has been predetermined by the companies involved (Lawrence et al, 2005).

Benchmarking has been around for decades and is still actively used. Although there are several concepts and processes that can be used to find the best practices within each industry, it is up to the company to choose their own path. Industry standards are being established using overall corporate approaches and defining commodity specific best practices. All companies are trying to improve their bottom line and the only way to do this is to introduce the best practices in their respective industry. Benchmarking, if defined, researched, and implemented correctly can allow a company to gain a competitive advantage. This advantage may be found in a specific section within the company or at a particular plant that is part of a larger corporation. The overall theory is that benchmarking is a continuous process, while a company is producing the industry

best practice today; there is another company that is researching and discovering how to do it better tomorrow.

Summary

The literature review for this research question includes a broad spectrum of topics. It is important to investigate the foundation of the training programs which begins in the regulations. The commercial companies abide by the CFR 49, IATA, and ICAO regulations. Although these regulations do not give specific curriculum for companies to follow when training their employees; however, they do provide solid guidelines. The military approaches their training requirements in a different manner. AFMAN 24-204 provides clear definitions of where military members will be trained, while the MOU the various branches of service agree to, provides the different locations with the required training curriculum. In addition to reviewing regulations, it is important to look at previous studies that include training.

There have been several studies completed on training that will assist when conducting the interviews and analyzing the training programs. Kirkpatrick was the founder of training studies. He developed the four stages to developing a training program. Clark and Kwinn have taken Kirkpatrick's ideas a step further by including company's needs into the training equation. Benchmarking techniques were also investigated to understand how companies choose which ideas to accept and which ones to discard. These ideas are important to understand how companies train their employees. A company may find the best way to train employees with a more effective approach. These ideas should be shared throughout the company and with their partners. However, for a company to stay competitive they must find a way to keep their

benchmarking ideas to themselves without the competition to find out. There are numerous benchmarking ideas that allow competitors to acquire new techniques and milestones.

Overall, the literature review investigates all the areas involved with the study. The information obtained in this chapter will make it easier to determine which areas are researched and analyzed. Chapter 3 takes the information gathered in the literature review and develops the plan to research how commercial companies train their employees on how to ship hazardous materials through the defense transportation system.

III. Methodology

The nature of this research requires a case study methodology to successfully collect, interpret, and compare the various types of training that occur in commercial shipping companies dealing with hazardous materials. This chapter includes the reasons for selecting a qualitative methodology, the criteria for using a case study methodology, a description of the research design including methods of data collection and analysis, and concludes with a description of the study's assumptions and limitations.

Qualitative vs. Quantitative

Quantitative research has been accepted in the research community for over a century. However, it wasn't until the mid-1960s that qualitative research emerged as another valid means of research. During this time, a debate occurred between the promoters of each research method (Cook & Reichardt, 1979). Although in today's society both research methods have been accepted, qualitative research must provide more evidence of credibility and reliability as they are often seen as the least perspective. (Leedy and Ormrod, 2005).

Although the methods can be used separately or in conjunction, they each have a distinct set of assumptions and reasons for selecting a particular paradigm (Creswell, 1994). Qualitative studies can assist any career field in determining the ideas that need to be investigated to ensure pertinent information can be gained from a situation (Leedy and Ormrod, 2005). The distinction between using qualitative methods as a means to ensure the correct ideas are being researched and those of developing qualitative methods as a

form of research are different. Creswell (1994) and colleagues state the assumptions of a qualitative study are:

> 1. Qualitative researchers are concerned primarily with process, rather than outcomes or products.
> 2. Qualitative researchers are interested in meaning- how people make sense of their lives, experiences, and their structures of the world.
> 3. The qualitative researcher is the primary instrument for data collection and analysis. Data are mediated through this human instrument, rather than through inventories, questionnaires, or machines.
> 4. Qualitative research involves fieldwork. The researcher physically goes to the people, setting, site, or institution to observe or record behavior in its natural setting.
> 5. Qualitative research is descriptive in that the researcher is interested in process, meaning, and understanding gained through words or pictures.
> 6. The process of qualitative research is inductive in that the researcher builds abstractions, concepts, hypotheses, and theories from details.

Qualitative studies "focus on phenomena that occur in naturals settings" and they "study those phenomena in all their complexity." (Leedy and Ormrod, 2005) Qualitative research can be further drilled down into five different types of designs (Creswell, 1994, Leedy 2005). These different designs are used based on the researcher's goal of investigation. A case study focuses on a particular object depending on the field of study for a specific period of time. Yin (2003) proclaims a case study method is used to describe actual real-world events using "how" and "why" questions. He also emphasizes that the researcher has little control over a setting or a participant's emotions while in a real-world situation (Yin, 2003). In addition to having different types of qualitative research, there are also different strategies within case studies. They include but are not limited to exploratory, descriptive and explanatory approaches. Yin describes three conditions to consider when determining the strategy: "the type of research questions posed, the extent of control an investigator has over actual behavioral events, and the

degree of focus on contemporary as opposed to historical events" (Yin, 2003). The basis of this study is to examine the effects certain actions have on events, looking at both current and historical data coupled with interview questions. This is more exploratory in nature. It is attempting to discover any deficient areas in the commercial industry's HAZMAT training programs.

The research question of this study *"How does training at commercial hazardous material companies affect frustration levels at military APOEs"* is investigated using a qualitative exploratory case study research method as per the requirements stated above. Four sub-questions assist in establishing the main areas of concern. The sub-questions are:

1. *What significant differences exist in the way military and commercial industry personnel are trained on how to ship hazardous cargo?*
2. *What are the training requirements for commercial industry personnel to ship within the defense transportation system?*
3. *What standardized guidelines (instructions or checklists) are established for the shipper for completing the shipping documentation prior to shipping to the APOEs?*
4. *If not standardized, how would establishing improved guidelines for military and/or commercial hazardous cargo training reduce documentation frustration levels at the APOEs?*

The research question in conjunction with the sub-questions identifies the focus and scope of this study. The case study explores the reasons behind high levels of frustration at APOEs and to determine the frustration levels are in fact due to training deficiencies at commercial training companies. Although federal regulations exist governing the way

materials are shipped within the defense transportation system, there is no metric directly linking APOE frustration levels to a respective company's training program. The research question identifies the area of concern while the sub-questions stay within the established guidelines of an exploratory case study.

Research Design

Since it has been established there are numerous hazardous material shippers within the United States, a multiple case study is used to develop logic replication and to provide more meaningful findings. Researchers have accepted multiple case studies as being more compelling, meaning the overall study is more robust (Yin, 2003). Multiple studies follow replication logic instead of a sampling logic (Yin, 2003). Replication logic in qualitative studies follows the same guidelines as quantitative research uses when conducting multiple experiments. In a multiple-case study, the researcher must select cases that predict either similar results, referred to as literal replication, or contrasting results that are contrasting for predictable reasons, referred to as theoretical replication (Yin, 2003). The research study selected cases based off of theoretical replication. Although there are Air Force regulations that govern how hazardous material items shipped via military airlift, there are few commercial organizations that abide by all of the guidelines exactly. Therefore, the Air Force regulations are used as the ideal training program. In an effort to abide by the multiple-case study guidelines, sixteen cases were conducted and interpreted in the analysis chapter.

The hazardous material companies were chosen using a 2^k factorial experiment design. By definition a factorial experiment is when every factor-level combination is used (McClave et al, 2005). There are 4 factors with two levels for each factor, resulting

in sixteen treatments The companies were chosen using four factors which include: the company's volume output, the number of employees the company has, the type of training program (internal or external), and whether the company had a government contract. These four factors were each then specified at two levels. The volume output was divided into large or small: large output volume was anything greater than 100 tons, and small output was anything less than that. The number of employees was also either large or small: large companies were more than 100 employees and small was than 100 employees. The training programs were divided into internal or external. The final factor was divided into two categories: those with contracts and those without. Since these four factors each had two level it created a 2^4 factorial experiment. This meant that of the 100 companies that had shipped frustrated hazardous material through Charleston or Dover Air Force Base, sixteen were interviewed. The matrix that assisted in selecting the companies is seen in Table 3.1.

Table 3.1 Sixteen Company Data Matrix

Number of Employees	Company Volume	Training Program	Government Contract
Large	Large	External	Yes
Large	Large	Internal	Yes
Large	Small	External	Yes
Large	Small	Internal	Yes
Small	Large	External	Yes
Small	Large	Internal	Yes
Small	Small	External	Yes
Small	Small	Internal	Yes
Large	Large	External	No
Large	Large	Internal	No
Large	Small	External	No
Large	Small	Internal	No
Small	Large	External	No
Small	Large	Internal	No
Small	Small	External	No
Small	Small	Internal	No

The sources that were used to collect the data were: interviews by phone and email and a comparative check-list of their training program were compared to that described in the Air Force, DoD, and commercial regulations. In addition the company's shipment history within the defense transportation system was used to identify trends, areas of improvements and possible benchmarking techniques. The interviews were used for clarification purposes and to address the overall company approach to the training programs, a list of the interview questions are shown in Appendix B.

Analysis of the training programs was achieved by comparing each program to the Air Force standard and then amongst each other. A break down of the comparison guidelines and established criteria is located in Appendix C. The programs are evaluated on the type of training program within the company and the ability to comply with Air Force, DoD, and DoT standards. The cross-sectional analysis of the cases investigates

common areas of deficiency and best practices within certain companies. This type of analysis allows us to use the benchmarking techniques discussed in Chapter 2, to develop a criteria matrix to be used by military members when selecting which hazardous material companies to order items.

This case study was developed from a customer perspective; therefore, the benchmarking process has been altered to represent this difference. The Air Force has established guidelines and standards that must be met to ship hazardous cargo via military airlift. The study investigated how well companies were meeting those standards. The benchmarking data obtained is discussed. The selection criterion identifies companies that were meeting the standards and the characteristics they possess that allow them to achieve this task. In Chapter 2 several benchmarking processes were discussed. Christopher (1993) developed a process that focused on customer service. However, Schneider (2006) argues that customer service satisfaction starts with the employees. Although the DoD is the customer, it is beyond the scope of the research to determine the willingness employees have to meet customer satisfaction; therefore, excluding the processes developed by Christopher and Schneider. Spendolini's (1992) five-stage generic process was chosen because it is easily adaptable and can be completed using established guidelines. The generic process is shown below:

> Stage 1: Identify customers for information including requirements. Define the subject matter to be benchmarked and how the information will be obtained.
> Stage 2: Identify a benchmarking team
> Stage 3: Identify sources for information
> Stage 4: Collect information according to developed procedures and analyze
> Stage 5: Implement recommendations

The first stage of his process was altered by comparing the companies training programs. The data was collected directly from the companies rather than from an outside perspective. To ensure anonymity of the companies, an alphabetic code was used to distinguish between them. Key components of different processes were used in the analysis section to demonstrate which companies had the most success in specific areas. The areas of interest considered were:

- *Reliability:* the efficiency, or length in time, in which a company reacts to an item that is frustrated
- *Military Support:* the amount of business that the company provides to the military
- *Compliance:* the degree to which the company is in compliance with DoD and DoT training regulations, the checklists are provided in Appendix C.

Validity and Reliability

When a research study has validity and reliability it is shown to be concluding theory based on facts rather than stating opinions gathered from the data. Validity implies that a researcher has used the correct measurement, or data collection process, to capture the process that is being investigated. Reliability refers to the acceptance of those results by that particular measure (Kirk and Miller, 1986). These definitions apply to both quantitative and qualitative research; however, it is easier to prove validity and reliability in quantitative research. Creswell (1994) describes having internal and external validity and reliability. He claims internal validity addresses the accuracy of the data collected and whether the data coincides with reality. External validity entails the limited universal assumptions that can be taken from the conclusions of the study.

Reliability is easier to achieve in quantitative studies as experiments can be easily duplicated (Creswell, 1994). In qualitative research there are human subject limitations to replicating case studies, which lessens the study's reliability (Creswell, 1994). These statements are echoed by Leedy and Ormrod (2005), who suggest that only internal and external validity should be considered when conducting qualitative research. They also note that validity should be addressed in the planning stages to overcome later obstacles (Leedy and Ormrod, 2005). Yin (2003) believes that a researcher must ensure construct validity, internal validity (within explanatory studies), external validity, and reliability in case study research for it to produce factual results.

Construct validity involves selecting the correct criteria to measure the research concepts. In case study research construct validity has often been challenged, stating that that an investigator uses their judgment rather than actual fact to make their assessments. Since the researcher is seen as an instrument, this is a problem that needs to be addressed prior to starting the research (Leedy and Ormrod, 2005). Two steps must be addressed to meet the guidelines of construct validity. They are 1) choose the specific ideas or concepts that are to be studied, while relating them to the overall research questions, 2) and prove that the ideas being studied mirror those ideas that have been selected for study (Yin, 2003). Within the forthcoming analysis, construct validity is developed with the help of subject matter experts as well as technical advisors.

External validity looks into how easily a study can be related to other areas of similar interest. When there is external validity, conclusions of a study on a single concept can be applied to concepts that have the same structure. There are three strategies that can be put into effect to improve the external validity of a qualitative study.

They are conducting the study in a real-life setting, capturing a representative sample, and allowing for replication (Leedy and Ormrod, 2005). These items are easily achieved in quantitative studies but much more emphasis and focus should be given to them in qualitative studies in order to strengthen the conclusions drawn from the findings. This research accounts for all three of these strategies. The study was conducted using companies that are currently transporting hazardous material and have shipped to APOEs within the last year. The study could be replicated with proper approval. To ensure a company's anonymity has been protected, the selected companies were alphabetically labeled and not named in the analysis. There is one potential limitation that affects all studies and that is the question of generalizability. Although the analysis is based on the data collected, some generalizability is possible since the sixteen companies chosen were selected from 100 companies across the United States. Even though the list of companies did not encompass the entire population, the assessments and conclusions drawn do reflect a sample of those companies shipping to APOEs.

Reliability is of great importance in any research design. This allows another researcher to use the same tactics as prior investigators to reproduce the same case study. Reliability is used to reproduce the same study not to replicate the study on another group. The overarching goal is to reduce the number of errors that occur in the study and to also eliminate any researcher bias that may occur. The procedures followed when conducting a case study should be clearly documented. This not only helps future researchers but also keeps guidelines clear when conducting a multiple case study (Yin 2003). The outline for this research is located in Appendix A: Research Outline. The procedures were developed with thoroughness and simplicity in mind. The intent of the

study is not to dig too deeply into transportation regulations but to meet the objectives needed to reach valid conclusions and to provide an overall answer to the Research Question.

Limitations and Assumptions

The limitations and assumptions of this study are minimal but do have an impact on the analysis and conclusion. This research includes a representative sample of companies but only investigates their level of effectiveness over a twelve month period. The companies were selected because they shipped frustrated cargo through either the Charleston or Dover Air Forces Bases during the research period. There is an assumption that these companies ship at least one piece of frustrated cargo through either of the ports at some point during each year. This assumption might only be cleared if the length of the investigation were changed to encompass several years.

Another limitation to this study is that it only investigates a company's internal training program. Hazardous material companies have the option of sending employees to an external training program. There are several well established external training programs available to companies throughout the United States. These companies provide location training as well as on-site training. The study will identify areas of concern with the company's training plan; it will not address the training plans of any external training facilities. Also, it is assumed that the company has an internal program that is actively used and enforced. A mixture of companies using internal and external training programs will be interviewed. The objective is to ensure that the company is getting the required training for their employees. Since a majority of the interviews are conducted over the

phone, a copy of the training plan can only be reviewed when the company agrees to send it to the interviewer.

In addition to only addressing internal training plans, the interviewer must assume they spoke to the training managers when a phone interview was conducted. The companies were contacted by the interviewer, and they were asked to direct the interviewer to the hazardous material training manager. Even though the interviewer requested to speak to the hazardous materials manager or department head, it was assumed that the individuals that answered the questions were in fact the people in charge. Phone interviews were conducted due to the budget and time constraints of the study, and the only way to overcome this limitation would have been to conduct all interviews on-site.

The interviewer must also assume that all the data collected from the interviewee were accurate and truthful. Since the interviewer is conducting a study on the effectiveness of training programs, the interviewee may not be forthright about the status of the company's current training program. Even though the identity of the company is hidden in the analysis portion of the study, some companies do not like to discuss their problem areas. It is assumed that the training statistics and data being provided by the interviewee are factual. Although the Department of Transportation does conduct periodic inspections on shipping companies, there is no way to verify the validity of the information being provided.

The final assumption is that the list of companies provided by the APOEs was accurate and up to date. The frustration codes identified by the APOEs were legitimate; however, there are times when the paperwork could be correct and the piece was

accidentally frustrated. These instances are hard to prove even with today's data systems. Once an item is frustrated and a code has been given, the package needs to be corrected and placed in the proper bay before it is taken off the frustration list. Although every attempt was made to prove the companies interviewed had legitimate frustrations, it is still possible that their cargo was falsely frustrated.

Summary

Yin concluded that there are five essential components that should be considered in a research design. These components offer a basic outline for case study methodology research. They are a study's questions; its propositions; the unit(s) of analysis, the logic linking the data to the propositions; and the criteria for interpreting the findings (Yin, 2003). This study's questions were introduced in Chapter 1. The research propositions or rationale for the study was determined by the top level military interest in the frustration levels at APOEs and reasons causing delays of hazardous materials to the APODs. Although the commercial industry ships hazardous materials by various modes of transportation daily with only minor incidents, the need to ship items properly via military airlift has become highlighted as a problem. With the current military situation in the Middle East and an increased dependency on commercial suppliers, it is imperative that commercial companies follow not only their standards of shipping but also abide by those of DoD when shipping items within the defense transportation system. The unit of analysis that is used to determine the level of effectiveness each company has complying with DoD standards is each company's internal training procedures. The fourth step in Yin's outline is based on the comparison of each companies program to that of DoD standards. It looks at deficiencies and best practices within each company. The criteria

in which the sixteen cases are interpreted is based on the DoD hazardous materials requirements and the impact the deficiencies have on the overall flow of hazardous material cargo from the shipper, to the APOE, and finally to the final destination.

The methodology outlined in this chapter provides the foundation for answering the research question. This chapter describes how the data will be collected and analyzed in Chapter 4. In the next chapter the information gathered by following the steps that were just described will be analyzed. The methodology assisted in investigating each sub-question which led to answering the overall research question in Chapter 5.

IV. Data Analysis

The methodology described in Chapter 3 was followed by collecting the data necessary to make valid conclusions to answer the research question. The following chapter examines the information that was obtained and collected during the research process. There were a few minor set backs and obstacles that occurred during the collection process. The chapter describes these obstacles and how they were addressed. Following an explanation of the obstacles the analysis is broken down by sub-question.

Data Analysis

During the data collection process some observations and obstacles were identified. The first major obstacle occurred early in the data collection process. It was identified that the Air Force does not have a central data base that collects the names of the companies that have caused hazardous cargo to be frustrated. There are a few databases that are available to list the reasons that the hazardous piece was frustrated at each APOE. However, this database requires the hazardous material company to be part of the program and it also requires active use by the APOE's Customer Service Sections. It was found that using the database is not mandatory by either the DoD or the vendor. Due to the lack of a central database, the total amount of cargo that each company ships to a particular APOE could not be determined.

The second obstacle was merging the list of companies obtained from the Charleston and Dover AFB, Customer Service Sections. The lists that were provided contained the company's name and the reason the piece of hazardous cargo was frustrated. Some of the companies listed had an address and telephone number included with the discrepancy. However, a majority of the information about the company was

simply the company name. This caused problems for two reasons. There are several large hazardous material companies that have smaller subsidiaries across the United States. The corporate headquarters were originally called for each company, and although it was possible to speak to someone at the corporate level it was difficult to determine which subsidiary the frustrated piece originated from. Although information was obtained about the training programs from a corporate level, it is difficult to determine if the training practices are identical at each subsidiary.

The third obstacle also dealt with merging the two lists obtained from Charleston and Dover's Customer Service Sections. Although the Customer Service Sections have contact numbers for each piece when a shipment arrives, they do not keep this information for each frustrated piece. The companies that did not have contact information provided were researched on the internet. Not all companies have a website for on-line use. For these two reasons twenty-six companies were excluded from the master list provided by the Customer Service Sections. In addition to having no contact information, companies that were located outside the United States were also excluded from the list. The international companies' hazardous cargo would have originated from another country. Although ICAO and IATA regulations are recognized in all of the countries where the companies were located, it was determined that enforcing DoD regulations on a foreign country was outside the scope of the research. There were five companies listed on the original list that were located outside the United States.

The fourth reason it was difficult to merge the list was because some of the companies on the list had been merged with larger corporations over the year. This created difficulties in obtaining correct phone numbers and locating the correct person

within the business that dealt with training. Although this obstacle was listed as a limitation, it became clear that it was more than a limitation. The contact numbers for each company directed me to either the company's operator or secretary. Once the company was contacted the researcher asked to be directed to either the company's training manager or someone in the hazardous materials shipping department. When the company's operator or secretary answered, they speculated which person within the company was best suited to be interviewed. The researcher was either led to the correct person or had to be transferred to another person after explaining the intent of the interview. This process caused delays in the interviewing process. The researcher was directed to a person that was away from their office, and it took several days to make direct contact with the individual. At that time, it was either confirmed the correct person had been reached, or the researcher was transferred to another person to conduct the interview. The second part of this obstacle was that the company's operator or secretary would not allow the call, stating it was against company policy to allow solicitation calls. This excluded the company from the list, unless a direct number to the training manager could be obtained. Since no previous information about the company was known, this obstacle excluded six companies from the list.

The fifth obstacle was contacting the right mix of hazardous material companies that would fulfill the requirements of the sixteen company data matrix introduced in Chapter 3. Due to the previously mentioned obstacles the original list of 100 companies was reduced to sixty-three. A total of twenty-two companies agreed to be interviewed. Of the twenty-two, fourteen interviews were conducted. There were eight that did not complete an interview. Three of the companies agreed to respond via email; however,

the information was never received and follow-up phone calls were not returned. The other five companies agreed to a phone interview. Dates and times for the interviews were set; however, the individuals were not available at the scheduled time and could not be reached again to reschedule. Table 3.1, located in Chapter 3, is the original matrix that was developed for this research study which included sixteen companies. Since only fourteen participated in the study, each category of the matrix was not filled. In addition to not having sixteen companies, there was only one company included in the study that did not have a government contract. The other thirteen had a government contract, either short or long term. When a company has a contract with the DoD they are obligated to abide by the business rules that were signed by the Under Secretary of Defense, which instructs them to follow military regulations when completing shipping documents. The criteria used to separate the companies into the matrix that was mentioned in Chapter 3 had to be altered slightly. The company volume in Chapter 3 separated companies into large and small by the amount of cargo they sent out monthly. The companies did not send out shipments that were a standard size or a standard weight. The personnel being interviewed also did not have accurate weight amounts for all their shipments. Although attempts were made to contact other company employees to obtain accurate information, it was not always possible. Since each company was able to provide an approximate number of shipments they sent out monthly, it was determined to use that as a basis for separation. Therefore a company was considered large if they had 100 or more employees and if more than fifty shipments were shipped out per month. Incorporating the previously mentioned obstacles and the new factor criteria Table 4.1 categorizes the companies that were researched.

Table 4.1 Selected Companies

Number of Employees	Company Volume	Training Program	Government Contract	Company
Large	Large	External	Yes	D,E,M
Large	Large	Internal	Yes	C,G,K
Large	Small	External	Yes	L
Large	Small	Internal	Yes	
Small	Large	External	Yes	I
Small	Large	Internal	Yes	A
Small	Small	External	Yes	B,J,N
Small	Small	Internal	Yes	F
Large	Large	External	No	
Large	Large	Internal	No	
Large	Small	External	No	
Large	Small	Internal	No	
Small	Large	External	No	
Small	Large	Internal	No	
Small	Small	External	No	
Small	Small	Internal	No	H

Table 4.2 details the specific characteristics of each company:

Table 4.2 Company Characteristics

Company	Number of Employees	Company Volume	Training Program	Government Contract
A	35	100,000 lbs monthly – ½ military	Internal	Yes
B	22	4 shipments monthly- 95% military	External	Yes
C	800	10-20% military	Internal	Yes
D	350	1800 weekly – 4 shipments monthly to military	External	Yes
E	300	10-15 packages daily - 60% to DLA & 40% to military	External	Yes
F	15	15 shipments monthly – 6-12 to military	Internal	Yes
G	900	50,000 lbs daily- 2 shipments monthly to military	Internal	Yes
H	90	20 shipments monthly – ½ shipments to military	Internal	No
I	9	45,000 lbs weekly – military orders vary	External	Yes
J	35	2 skids per month- a skid a month to military	External	Yes
K	4000	10,000 shipments annually	Internal	Yes
L	100	1-10 shipments monthly	External	Yes
M	100	40-80 skids weekly- 1% of shipments are military	External	Yes
N	100	500 pounds monthly	External	Yes

The internal and external program of each company is further analyzed while addressing each of the four sub-questions. The division of the information into each sub-question provides a better understanding of how commercial companies use military regulations and train their employees on how to ship hazardous materials. The analysis of each sub-question also assists in answering the overall research question which is discussed in Chapter 5.

Sub-Question 1

Sub-Question 1, *What significant differences exist in the way military and commercial industry personnel are trained on how to ship hazardous cargo?,* was initially addressed in the literature review. There are guidelines established for how the military will train personnel in AFMAN 24-204. There are five designated locations that military personnel are trained, the locations are listed in AFMAN 24-204 (AFMAN 24-204, 2004). The curriculum taught at each location is agreed upon by the Hazardous Materials Training Working Group (HMTWG). This group meets annually to discuss changes or update the required curriculum for certifier training (MOU, 2002). Once the requirements have been agreed upon, a Memorandum of Understanding (MOU) is signed between each branch and facility. It is possible for a training facility to add more content to their courses; however, the MOU establishes the mandatory minimum requirements to ensure consistency across the different branches of service (AFMC/LSO, 2007).

The literature review examined the commercial training requirements outlined in CFR 49, IATA, and ICAO regulations. These three regulations state the training requirements for individuals certifying hazardous materials. The commercial industry has numerous hazardous material training courses to choose from. The Department of Transportation, which governs CFR 49, has over 500 listed on their web-site for commercial company's convenience. As stated in Chapter 2, companies can choose to train their personnel internally or externally. The military requires their members to be trained at one of the five designated areas and to pass two tests with a 75% or better. The fourteen companies that were interviewed were asked similar questions of their training

programs. Table 4.3 is a break down of both the type and requirements of training that each interviewed company uses.

Table 4.3 Training Programs

Company	Training Program	Reason for type of training	Location	Test Requirement
A	Internal	Small Company	Classroom/ on-the-job	80%
B	External	Outside company met their needs	On-site/ classroom	Decided by training company
C	Internal*	Large number of employees to train	Classroom presentations	75% or better
D	External	Used for years	On-site training	Decided by training company
E	External	Encompassed all the requirements	Off-site training	Decided by training company
F	Internal		On-the-job	Test not developed- estimated Jan 2007
G	Internal*	Numerous personnel	Classroom presentations	No standard- has monthly refresher
H	Internal	Outside contractor working for larger organization	Classroom setting	70%
I	External	Price and a small company	On-line	Decided by training company
J	External	Good relationship with training company	On location and off-site	Decided by training company
K	Internal*		Classroom and on-the-job	70%
L	External	Close and good reputation	Off-site	Decided by training company
M	External	Prior individual choose	On-site	75%
N	External	Small Company	Off-site	Decided by training company

* The trainer and some employees were trained externally

Table 4.3 provides a general overview of each companies training programs and practices. Although some of the companies choose an internal or external program there were no similarities in the courses chosen or the way the courses were developed.

Commercial companies are obligated to follow CFR 49, which requires them to ensure their employees are trained within 90 days of employment, meet the established guidelines and can pass a standardized test with a 70% or better. To get a better understanding of each company we will look further into their training practices and how they were developed. The information below was obtained from each of the companies. Their identity will remain anonymous to protect the company's anonymity.

Company A: The company uses an outside agency to train their medical personnel on the safety and handling of blood born pathogens. Their training was developed over time but is based on the requirements listed in CFR 49. The company trains on the general awareness of all hazardous materials while providing additional training on the specific hazards the employees handle.

Company B: The company uses an outside agency because it was convenient for the trainers to travel to the company. The training company they hired also trains on the requirements for shipping within the Defense Transportation System (DTS).

Company C: The trainer for the company is trained by an outside agency. The trainer takes the information that is learned at her courses and develops an internal training program in conjunction with the regulation requirements. Company C follows both the CFR 49 and IATA regulations.

Company D: The company uses an outside agency to fulfill their training requirements. The training agency is chosen when employees need training. The company ensures the training agency can come to their facility and meet the requirements established in CFR 49. They do not receive training on military

shipments. A third-party logistics coordinator fills out all military documentation for Company D.

Company E: The company has an internal safety program but relies on an outside training agency for training on hazardous materials. The company looks for a training agency that trains on both CFR 49 and IATA regulations. The employees are sent to the closest training location when they are due for training.

Company F: The company uses an internally developed training program. The program is based of CFR 49 regulations. At the time of the interview a standardized test had not been developed; however, the employer was developing one and would implement its use in January 2007. Although follow-up calls were placed in 2007, the use of the test could not be confirmed. In addition, the personnel handling military shipments did receive some training from an outside source whose name was withheld.

Company G: The trainer and employees that handle military orders are trained through an outside training agency that comes to the company upon request. The trainer then trains the company employees on the proper handling of hazardous materials per CFR 49 and IATA. Although general familiarization is given, training is geared more towards the hazardous materials the company handles the most. Although there is a standardized test the company uses, there are no passing requirements. In addition to the initial and refresher training, the trainer is in the process of developing a monthly refresher course.

Company H: The company hires a contractor to fulfill their shipping requirements. The contracted company is responsible for all their training needs

and requirements. The internal training program is based off of CFR 49. The training takes place in a classroom setting and requires at least a 70% on the final test to pass.

Company I: This company is very small and requires only two personnel to receive hazardous material training. The two employees take on-line courses to fulfill their training requirements. They selected this course because it was inexpensive and met the requirements outlined in the regulations. They are fully trained on all hazardous materials.

Company J: The company has been using the same external training agency for years. The company has a solid reputation and works well with their needs. They offer courses on-site and at the agency's training facilities. The company has also worked with the training agency to send their employees to classes offered at other companies. They follow both CFR 49 and IATA regulations.

Company K: The company is rather large so the training is conducted both internally and externally. The trainer has received external training along with six other hazardous material certifiers. The internal training plan is based off the information given by the external agencies and the regulations. The company's trainer trains the employees in a classroom setting. The training is geared towards the requirements of the different sections within the company. There is a standardized test given with a 70% passing requirement. However, if an employee misses more than four questions on the test, the trainer requires them to complete the course again.

Company L: The company is a subsidiary of a larger organization. The external training agency they use was chosen at random. The employees go to the training agency to be trained when it is needed. Company L follows the training requirements outlined by CFR 49, which requires employees to be trained every three years.

Company M: The company is rather small and chose to use an external exportable course to meet their training requirements. The course can be taken at the company or at the employee's home. At the end of each section there are tests that must be passed with at least a 75% before the employee can move to the next section. The course fulfills the requirements of CFR 49, IATA, and IMDG regulations.

Company N: The company receives their training from the two carriers they ship their items through. The employees complete the training on an annual basis at the shipping company's facilities. The training encompasses the CFR 49 and IATA regulations.

The training programs of the fourteen companies follow the same regulations; however, each does it in a different manner. With the exception of Company L, all the companies require refresher training to be conducted every two years. Company L follows the recommendation in CFR 49, and provides refresher training every three years.

Even though the training for the military and commercial industries varies, the documentation requirements are the same. Both the military and commercial industries must keep a training folder on each individual trained. It must include the individual's name, the location of the training, the type of training, and a completed training

certificate (CFR 49, 2006 and AFMAN 24-204, 2004). Commercial industries are required to keep training documentation on hazardous materials only, whereas the military requires the member to keep documentation on any training course they have completed. In addition to the documentation requirement, both the military and commercial industry requires a standardized test to be given at the end of the training. The military has a very strict policy; a test is given at the end of each week of training. If a member does not pass both tests with a 75% or better they will not be certified as a hazardous material certifier (MOU, 2003). The commercial industry is required to give a standardized test, ensuring their employees pass with a 70% or better; however, this is not strictly enforced. These two aspects are the only common thread between the military and commercial industry's training programs.

The information outlined above indicates there are vast differences in how the military and commercial industries train their personnel. The military uses a standardized curriculum, while commercial companies base their curriculum off of the guidelines in the regulations. The emphasis in the commercial training industry is geared toward the proper handling, security, and safety of the hazardous materials and there is little emphasis put on the shipping documents. The military trains on the safe handling and security of hazardous materials as well as the proper way to complete the documentation. The differences in training were identified during the data collection to investigate Sub-Question 1, these differences in training and training requirements lead us to investigate the next sub-question.

Sub-Question 2

Sub-Question 1 focused on how the military and commercial industry trains their employees on shipping hazardous materials. The information collected for Sub-Question 2, *What are the training requirements for commercial industry personnel to ship within the defense transportation system?,* investigates further how commercial companies prepare to ship hazardous cargo through the DTS. The requirements for commercial industry personnel to ship hazardous cargo through the DTS are outlined in AFMAN 24-204. The literature review in Chapter 2 of AFMAN 24-204 explains in A25.7 that all Non-DoD personnel preparing and shipping hazardous cargo through the DTS must do so according to the regulation (AFMAN 24-204, 2004). Although commercial companies are not required to attend the courses listed in AFMAN 24-204, they are required to be trained per the CFR 49, Part 172, Subpart H, which outlines the training requirements. In addition to the guidelines in CFR 49, commercial companies wishing to ship items through the DTS must have training on their specific duties related to military airlift. AFMAN 24-204 does mention that if companies would like to attend one of the courses listed in the regulation they are required to contact their contracting office. After speaking to one of the training facilities, if a commercial company would like to send one of their employees to a military training course they must be sponsored by a government agency. Each year there are a specific number of billets assigned to each of the courses offered by the DoD. Each of these billets is requested by a certain government agency; a commercial company cannot call the school directly and request a billet (345 TRS, 2007).

All of the fourteen companies interviewed were aware of the training requirements established by the military for shipping hazardous cargo through the DTS.

Company's B and F had taken the extra step to receive additional training to meet the military requirements. In addition, Companies G and D had a separate department within the company that dealt with military shipments. It was also discovered that Companies B, E, and F shipped 50% or more of their hazardous materials to a Defense Logistics Agency (DLA) location. DLAs are agencies located throughout the United States that provide support to all branches of the service. The support could be in the form of parts, supplies, or maintenance. Company F stated that the DLA requesting hazardous material from them completed all the documentation necessary for shipment within the DTS. Company F also stated that a small percentage of their cargo was shipped directly to an APOE for further shipment.

These discrepancies in the training requirements shed light on another observation. In 2003 the then Acting Under Secretary of Defense Wynne created a document listing Nine Business Rules as part of the Future Logistics Enterprise goals (Wynne, 2003). These business rules are applicable to companies that ship both hazardous and non-hazardous cargo through the DTS. Also, with the exception of Company H, all the company's interviewed had either a short or long term contract with the DoD. Therefore in addition to following AFMAN 24-204, the company's are required to abide by the Nine Business Rules established by the Secretary of Defense (Wynne, 2003). In addition to following the regulations listed above, each company that has a government contract must sign documentation that details the items they are responsible for accomplishing. Since the companies interviewed were located across the United States, there was not sufficient time to review each company's contract.

The training requirements guiding how commercial companies ship hazardous materials through the DTS are not that same as those required by military members. However, military members are trained by and required to use AFMAN 24-204, which is also a requirement of commercial companies. The investigation of Sub-Question 2 shows that five of the fourteen companies interviewed were making an attempt to abide by the military regulations. The first two sub-questions investigated how military and commercial companies are trained. The data has proved there are differences in the training requirements. Even though the training requirements are slightly different Sub-Question 3 investigates how the training practices affect the completion of hazardous materials documentation.

Sub-Question 3

After reviewing the training requirements the investigation of the research question led to documentation procedures. Sub-Question 3, *What standardized guidelines (instructions or checklists) are established to the shipper for completing the shipping documentation prior to shipping to the APOEs?,* reviews what items commercial companies use to complete military hazardous material documentation. Although some of the documentation required by the military is similar to the commercial sector, there are specific guidelines that need to be followed when completing military documents. For example, the Shipper's Declaration form is used by both the military and commercial sectors. However, the military Shipper's Declaration is arranged in a different format and it will not be accepted unless it is properly completed. Unlike the military, the commercial industry will take the form as long as the information is stated clearly. The military requires that the proper shipping name be typed in all

capital letters. The other difference between commercial and military Shipper's Declaration is that the packaging paragraphs that are used. The commercial industry follows the IATA paragraphs which are separated by weight (IATA, 2005). The military packaging paragraphs are separated by they type of container the hazardous material is shipped in (AFMAN 24-204, 2004). Even though there are slight differences there are several opportunities for commercial companies to access the information needed to complete a military Shipper's Declaration.

The military also requires that a military shipping label (MSL) accompany shipments being through the DTS. This label states the organization the shipment is destined to, the shipping company's information, and the transportation control number (TCN). This label should be placed on the outside of the package item and easily identifiable. Although all this information is contained in the shipping documentation, it is required in case a smaller package is separated from a larger shipment.

The commercial industry has access to the Air Mobility Command, the Air Force Material Command, and the Department of Transportation websites which all provide links to military regulations. The regulations are available on-line or can be downloaded for personal use. Nine of the fourteen companies interviewed were aware of the websites or regulations available to them for use. Table 4.4 demonstrates which items assist the companies in completing military documentation.

Table 4.4 Regulation Use

Company	Aware of Regulation Access	Regulations Not Used	Phone DoD installations	On-line Regulations	Military Regulations On-Site
A	Yes	X			X
B	Yes	X	X		
C	Yes			X	
D	Yes			X	
E	No				
F	Yes		X		
G	Yes				X
H	Yes			X	
I	Yes		X		
J	Yes				X
K	No				
L	No				
M	No				
N	No				

Although there were five companies that were not aware that the regulations could be accessed for their use, Companies F and K kept the shipping documentation from previous shipments to use as references when completing new paperwork. The number of hazardous shipments that each company had frustrated was obtained from the Charleston and Dover Customer Service Sections. This information is displayed in Table 4.5. It does appear that the five companies that were not using the regulations had the least amount of items frustrated throughout the year. Due to the lack of information available about the total amount of cargo each company shipped through the two APOEs it can not be concluded that those five companies have the best performance.

Table 4.5 Reasons for Frustration

Company	Shippers Declaration					No Military Shipping Label	APOE
	Unknown Reason	*Proper Shipping Name*	*Packaging Paragraph*	*No Transportation Control Number*	*Missing*		*D=Dover C=Charleston*
A					1		D
B	1						C
C	5			1*		2*	C/D
D					1		D
E					1		C
F		4	3		10	1	D
G	1				1		D
H	1						C
I		1			1*		D
J						1	D
K	2*					2*	D
L			1				C
M					1*	1*	D
N					1		D

* Indicates one or more shipments had multiple problems

Table 4.6 shows that the three previously identified differences in commercial and military documentation, the packaging paragraph, proper shipping name, and military shipping label, was an identifiable problem for Company F. Also, they had the highest number of times that the Shipper's Declaration was missing. It should be stated again that due to the lack of information on the total amount of cargo shipped yearly by each

company broad assumptions should not be made. However, in the case of Company F it is interesting that they have a high number of discrepancies. This company reported that they ship a majority of their items to a local DLA location. The DLA in turn completes the paperwork required for the shipment to be sent through the DTS. Therefore, it is unclear if Company F is to blame for the frustrated cargo or if the DLA location they ship their cargo to should be held accountable. For documentation purposes at the Customer Service Sections at the APOEs, Company F would receive the frustration because they would be listed as the shipper and the point of contact.

The fourteen companies interviewed were aware of the shipping requirements the military has to ship hazardous items through the DTS. Also, the military has several websites available for commercial company to use as a reference. In addition, some of the companies chose to contact the APOE or DLA location directly for assistance. Although it cannot be shown which method is the best for completing hazardous material shipping documents, it is clear there are opportunities available to commercial companies to fill out the information correctly. The discrepancies listed above leads us to the fourth and final sub-question.

Sub-Question 4

It has been established that there are standardized guidelines that govern how military and commercial companies will ship hazardous cargo through the DTS. However, it is important to examine Sub-Question 4, *If not standardized, how would establishing strict guidelines for military and/or commercial hazardous cargo training reduce documentation frustration levels at the APOEs?*, from an objective manner.

First we need to look at the differences in how the military and commercial industry is trained. The military has stringent regulations they follow. However, the commercial industry is given only guidelines on their training requirements. Also, through the research in this study, there is no governing body in the commercial industry that investigates the training practices of the commercial industry. During the interview each company was asked if they had ever been inspected by the Department of Transportation (DoT). Eight of the fourteen companies had been inspected by the DoT in the past; however, the companies were inspected on other areas of their operation besides training. Two of the companies had been inspected by the Federal Aviation Administration on their shipping procedures but not on their training. Finally there was one company that was inspected by a DoD employee to ensure they were abiding by their contract. Even though governmental agencies had visited the companies, their training programs were never investigated.

The second area that is a major difference between the commercial and military requirements is documentation. Currently, the Shipper's Declaration is required for both commercial and military shipments. However, the documentation is filled out differently. After speaking to AFMC/LSO, which is the DoD agency responsible for writing AFMAN 24-204, steps are being made to improve this dilemma. Eventually the commercial and military Shipper's Declaration forms will be identical. The new Shipper's Declaration has already been put into circulation, and the new revision of AFMAN 24-204 will be distributed later this year making the use of the new form mandatory (AFMC/LSO, 2007). Although the effects of this change will not be seen for months to come it is a step in the right direction. The primary identified reason

hazardous cargo is frustrated is the lack of the MSL. Through proper training and education this can be easily alleviated.

Even though there are regulations that govern the military and commercial industry there needs to be some sort of cohesion. There have been attempts by the Under Secretary of Defense and the military contracting officers to ensure that commercial companies comply with the shipping requirements of hazardous cargo. However, there are still frustrated pieces of hazardous material arriving at APOEs. Sub-Question 4 cannot be answered without further investigation into the different governmental agencies. The Department of Transportation and the Department of Defense are federal agencies that need to have open communication lines. However, there was no link found between the two agencies during this research process.

Summary

The scope of the research focused on how commercial companies train their employees to ship hazardous materials. Each of the sub-questions investigated the affect commercial companies have on frustration levels at APOEs. Although the sub-questions were answered using companies that did not completely fulfill the intent of the methodology, there were valid conclusions drawn. Each company represented themselves in a different way. No two companies handle government shipments the same way. Although there were some similarities in how the commercial companies trained their employees, none of them had the same training plan. This demonstrates that the employees of each company have a different understanding of the proper way to ship hazardous materials especially through the DTS. The curriculum taught to military members is the same at each training facility. The analysis in this chapter provides

information to solve the research question. The data collected from the sub-questions will be used to answer the research question in the next chapter.

V. Results and Conclusions

The research conducted over the last ten months was focused on discovering if the way commercial companies train their employees on how to ship hazardous materials affected frustration levels at Aerial Ports of Embarkation (APOE). After reading previous research on training and reviewing the current regulations to determine if both the military and commercial companies are held accountable, a sound methodology was developed to investigate the research question. As Chapter 4 explained, the data was obtained using the methodology laid out in Chapter 3. The data was then broken down to address each of the sub-questions. Now that the data has been collected and analyzed it is time to determine if the information gathered provides an insight into the research question.

Research Question

The goal behind the research study was to provide insight into the research question:

How does training at commercial hazardous material companies affect frustration levels at APOEs?

The four sub-questions that accompanied the overall research question were examined and answered in Chapter 4. The sub-questions can be categorized in two areas, investigation into the regulations and performance of the companies. Sub-Questions 1 and 2 were:

1. *What significant differences exist in the way military and commercial industry personnel are trained on how to ship hazardous cargo?*

2. What are the training requirements for commercial industry personnel to ship within the defense transportation system?

These two sub-questions investigated the differences in the training requirements of the military and the commercial companies. The analysis discovered there are major differences in how the military and commercial company's train. Military regulations are more detailed and stringent whereas the commercial companies follow the CFR 49 which provides only training guidelines. The commercial companies choose how to train their personnel and there numerous way of accomplishing this task. Even though there are differences between the military and commercial regulations, each party is abiding by the regulation that governs them.

Sub-Questions 3 and 4 examined the procedures in which military and commercial companies must follow to ship hazardous materials through the DTS. The sub-questions are:

3. What standardized guidelines (instructions or checklists) are established for the shipper for completing the shipping documentation prior to shipping to the APOEs?

4. If not standardized, how would establishing improved guidelines for military and/or commercial hazardous cargo training reduce documentation frustration levels at the APOEs?

These two questions established that AFMAN 24-204 does provide the guidelines for how to complete hazardous material documentation for transport through the DTS. However, five of the companies did not have access nor did they know how to obtain a copy of AFMAN 24-204. Company F, did have access to the regulations; however, they were in contact with other organizations to confirm their documentation was completed

correctly. Also, AFMC/LSO stated that the new addition of AFMAN 24-204 will make the military documents mirror those of the commercial industry. It could be years before it is known if changes in the shipping documentation will have an affect of frustration levels at APOEs. In addition to military regulations the DoT should develop a standard curriculum for commercial companies to comply with to ensure employees that handle hazardous materials are trained properly. By developing a standard curriculum, the DoT would have a better way of inspecting commercial companies to validate their training programs. The lack of consistency in the commercial companies training programs causes for discrepancies and uninformed decisions.

The analysis of the sub-questions brings us back to the overall research question. The scope of this study was focused on commercial company's training programs. Although the full intent of the study was not completed, the research question can be answered with some certainty. Since commercial companies train their employees to different standards than the military it is assumed that commercial companies' employees have less knowledge of the proper shipping requirements through the DTS. Although commercial companies have access to military regulations, they do not fully understand the rigidness of the military requirements. The lack of experience with the military regulations is translated into the hazardous shipping documents that are completed. In addition, there is no cohesive link between the military and commercial industry. Although, the contracting office does act as a liaison between the commercial company and the government, government contractors are not subject matter experts with hazardous materials. The military depends on the commercial industry to provide needed items when the operations tempo increases. However, until there are regulations and

guidelines established that work to meet the demands of the military and commercial industry, it is believed there will also be frustrated hazardous material items from commercial industries at the APOEs.

Benchmarking

The scope of the research study included obtaining the total amount of cargo each company shipped through an APOE. This information would have allowed for more definitive conclusions to be drawn about the performance of the companies. However, there was no database or sets of databases at the companies or at the APOEs that allowed for this information to be obtained. The data matrix that was described in Chapter 3 can not be completed due to the lack of information. There were three areas that were going to be investigated reliability, military support and compliance. The companies were in compliance with CFR 49, with the exception of Company's F and G. These two companies have not developed a standard test that is given to their employees to test their competence on hazardous materials. Each company did convey an estimate of the support provided to the military; however, these levels could not be validated. Lastly the reliability of the company could not be determined. Company's A, B, H, K and M did not know that they had shipped cargo to an APOE that had been frustrated upon arrival to the APOE. Company's G and D had a separate department that handled military transactions. While the remaining seven companies had been informed their hazardous shipments had been frustrated and expedited the needed information to the APOE.

The benchmarking outline established in Chapter 3 was intended to provide information to the war fighter so they could make a more informed decision about which commercial company to order items from. If the total volume of each company could be

obtained, the analysis of each company could produce a valid data matrix using the benchmarking techniques from previous studies. However, because the information was not obtained any conclusions drawn about the reliability, military support, or compliance of each company can only be considered speculation.

Future Research

The full expectations of this research study established in the methodology were not met due to unforeseen circumstances. However, there were several observations made from the research that was conducted and there are several areas of research that could provide further insight into the high frustration levels at APOEs. The first area for future study is to help clarify the performance of commercial companies, by creating a tracking system that would tabulate the amount of cargo each company ships to a particular APOE would benefit trend analysis and performance greatly. This study would help establish the total amount of volume each company is providing and determine in what areas they are deficient. In an effort to maintain efficiency, it would be best if there was a central process owner. The United States Transportation Command (USTRANSCOM) is ultimately responsible for all items being sent through the DTS, it would be logical for them to assist in the database development. The overall trends of the commercial industry and each company would provide insight to the war fighter when choosing a company to purchase items. It would also give the APOEs a means to identify and correct problems with the shipping companies.

A second area of study is to investigate the communication lines between the Department of Defense (DoD) and the Department of Transportation (DoT). These two federal agencies are writing and enforcing regulations on the shipment of hazardous

materials. However, the DoD has stricter restrictions governing their transportation. Although the DoT governs companies that ship hazardous materials that are found in everyday items like aerosol sprays, cleaners, and fuels, these items still find their way inside the Defense Transportation System (DTS). The DTS is governed by the DoD, and therefore it can be seen there is some overlapping of responsibility by each Department; however, during the research of this study there was no agency or liaison that interacts between the two Departments.

A third research possibility would be to investigate how each Defense Logistics Agency (DLA) handles their shipments of hazardous materials to the APOEs. When the list of companies for this research study was obtained, there were a large number of frustrated items that originated from the DLAs. This research study showed that Company F shipped a large amount of cargo through the DLAs. It was also noted that the DLA had agreed to complete the hazardous materials documents. Although the total amount of volume shipped from this company could not be obtained, it does raise questions about the training practices and hazardous materials procedures at the different DLAs. This topic also coincides with the second research topic since DLAs are a military agency which deals with an abundance of commercial companies for their supplies.

A fourth area of future research is to investigate the feasibility of commercial company employees attending military classes. Even though it is possible for government contracted companies to send their employees to a military training class, the employee must be sponsored by a federal agency. Since there are companies that ship to APOEs that do not have a government contract it may be in the best interest of the DoD

to have a couple classes a year that are reserved for commercial company employees only. There are numerous ways the classes could be taught; however, the other question this training raises is financially driven. There would have to be an agreement between the DoD and the companies that would establish the monetary settlement for attending the classes. This training would be beneficial to the commercial industry and also, to the commercial hazardous materials training industry.

A fifth area that would provide further insight into the habits of commercially trained employees would be to pick one company that had a government contract to investigate in-depth. The research study that was just conducted investigated fourteen companies and gathered only small insights into the companies training practices. However, if one company was chosen, the researcher would have the time to thoroughly investigate the training curriculum and also possibly determine volume amounts shipped for that company. This study could help determine characteristics that could help the war fighter when choosing a company to order items.

These five future research topics will assist in answering questions the current research could not and will also provide more valid information to the war fighter. Although the subjects are slightly different each would add its own piece of information to the puzzle. The shipments of hazardous materials to APOEs from commercial companies will continue. The best way to assist the war fighter is to research and determine the best way to train the companies so that the frustration levels will be reduced and the war fighter will receive their cargo in a timely and efficient manner.

Summary

This research study involved numerous agencies and companies. Although the military and commercial companies have a different mission, they depend on each other for support. It is not feasible for the military to stop requesting items from the commercial companies, and it would also be unfeasible to hold commercial companies to regulations that do not govern them. The levels of frustrated hazardous cargo need to be reduced to increase efficiency for the military and commercial industry. The intent of this study was to provide an insight into how commercial companies train their employees and also, benchmark some of the quality training practices from companies that successfully ship hazardous cargo. Even though the benchmarking process could not be completed, the research was able to gather some insight into the problems that cause frustration and the research question could be answered with valid information. Future research into this topic would provide more information and possibly improve the working relationships between the military and commercial companies.

Appendix A: Research Outline

I. Determine which part of frustrated cargo to investigate
    a. Conduct preliminary research on that part
    b. Narrow the topic of interest into a researchable problem

II. Develop a Research Problem
    a. Ensure the research problem adequately represents the research topic
    b. Include sub-questions that break down the research problem in logical portions

III. Review available research literature
    a. Search for past research on the frustrated cargo and associated regulations
    b. Search for past research on all applicable topics (training, benchmarking)

IV. Identify what data will be used for analysis
    a. Determine if commercial companies or military units will be investigated

V. Establish a timeline
    a. It is difficult to gather a complete listing of frustrated cargo from APOEs. An established guideline will assist the APOEs in giving the correct information

VI. Contact the APOEs and obtain a list of frustrated cargo and their respective companies within the specific timeline
    a. Identify the established timeline
    b. Identify the types of companies that are of interest (military, commercial, defense logistics agencies)
    c. Select the companies to be interviewed and verify with the APOEs they meet your selection criteria

VII. Develop a list of questions that will address the desired analysis
    a. Keep the questions simple, and allow them to be expanded on by the interviewee

VIII. Randomly select the companies that will be contacted.
    a. Alphabetize the companies in a spreadsheet
        1. Use a completely random factorial experiment design to select the companies
        2. If a company is contacted and does not want to be part of the study simply remove them from the list
    b. Once the companies have been identified, label each company with an alphabetic code to ensure anonymity.

IX. Conduct the interviews
    a. Ensure you are speaking to the desired person; take note of the duty title

X. Interpret that data
    a. Separate the answers into the sub-question categories
    b. Compare the data to the establish guidelines and regulations developed by governmental agencies.

XI. Analyze the data
    a. Identify trends
    b. Identify problem areas
    c. Identify strengths

XII. Results
    a. Identify industry problems
    b. Establish benchmarking techniques
        1. Develop a matrix to be used by military members

XIII. Future Recommendations
    a. Address areas that need follow-up work
    b. Address other areas that could affect these outcomes
    c. Address other problem areas that should be researched

XIV. Summary

Appendix B: Interview Questions

1. What is your primary mode of transporting hazardous materials?
2. How often do you ship to military installations?
3. How often do you ship to military installations overseas?
4. Are you aware of the different websites/offices that offer assistance for shipping military orders via military airlift?
5. Are military regulations easily accessible if items need to be shipped via military airlift?
6. Have you ever been informed that your hazardous shipments have been frustrated at an APOE?
    a. If so what were the means to correct the problem?
7. Do you have a company hazardous materials training programs? (Can I have a copy)
8. What was your training plan based off of? (another company, DoT, DoD, ICAO, IATA)
9. During training do you use class presentation, standard tests or company developed tests to ensure employees understand the concepts?
    a. What is the company's criterion for passing the course?
10. Is the information taught in a classroom setting or on the job?
11. Have you ever been inspected by DoT?
12. How many hazardous material certifiers does your company employ?
13. Does your company employ any prior military personnel with hazardous materials experience?
14. What is the average number of years your certifiers have been certifying materials?
15. Do you have a company hazardous materials training manager?
    a. If so, is hazardous material training their primary job?
16. Is the training manager certified in teaching?
17. Are training folders kept on all employees?
18. Is there a standard procedure for accepting military purchases?
19. Are on-line orders capable of getting enough information to properly ship hazardous materials through the defense transportation system?

Appendix C: Regulation Requirements

Requirement	**DoD**	**CFR 49**	**IATA**	**ICAO**
General Familiarization	X	X	X	X
Limitations	X		X	X
General requirements for shippers	X		X	X
List of dangerous goods	X		X	X
General Packing requirements	X		X	X
Packing Instructions	X	X	X	X
Labeling and Marking	X	X	X	X
Shipper's Declaration and other relevant documentation	X		X	X
Acceptance procedures	X		X	X
Storage and Loading procedures	X		X	X
Training Records	X	X	X	X
Function Specific	X	X		
Safety Training	X	X		
Emergency Response	X	X		
Security Training	X	X		
Test for Competency	X	X	X	X

Bibliography

354th Training Squadron. Instructor, Lackland Air Force Base. Personal Interview. 2 February 2007.

Bendell J.; Boulter L; Kelly J. Benchmarking for Competitve Advantage. London, United Kingdom: Pitman, 1993.

Blanchard, Dave. "The Trouble with Benchmarking" Logistics Today, Jun 2005, Vol 46 (6)(7).

Cavinato, J. "How to Benchmark Logistics Operations." Distribution, 1998, Vol 7 (8)(93-96)

Christensen, Neil. Hazardous Material Cargo Frustration at Military Aerial Ports of Embarkation. MS thesis, AFIT/GLM/ENS/-06. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, March 2006.

Christopher, M. Logistics and Supply Chain Management. London, United Kingdom: Pitman 1992.

Clark, Ruth and Kwinn, Ann. "Aligning Training to Business Results." T +D, June 2005, Vol 59 (6)(34).

Cook, Thomas and Reichardt, Charles. Qualitative and Quantitative Methods in Evaluation Research. Beverly Hills, CA: Sage Publications, 1979

Creswell, John W. Research Design: Qualitative & Quantitative Approaches. Thousand Oaks, CA: Sage Publications, 1994.

Department of the Air Force. *Preparing Hazardous Materials for Military Air Shipments*. Air Force Manual 24-204. HQ USAF/ILG, 12 October 2004.

Department of the Army. Memorandum of Understanding between SMPT and DAC and NSCS and 345 TRS. 25 March 2002.

Eidson, Betty. Chief of Customer Service, Dover Air Force Base. Collected Data via email 27 October 2006.

Ellison, Vicki. Analysis of Frustrated Vendor Hazardous Material Shipments within the Defense. MS thesis, AFIT/MLM/ENS/04-04. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, April 2004.

Ford, Kevin; Quinones, Miguel; Sego, Douglas; Sorra, Joann Speer. "Factors Affecting the Opportunity to Perform Trained Tasks on the Job." Personnel Psychology, Autumn 1992, Vol 45(3)(511)

Foster, Thomas A. "Searching for the Best." Chilton's Distribution, March 1992, Vol 91(3)(30)

Furey, T. R. "Benchmarking: The key to Developing Competitive Advantage in Mature Markets." Planning Revolution, September/October 1987.

Hazardous Material Regulations, 49 CFR Parts 100-185, Collected Data 16 November 2006, http://www.nsc-dot.com/regs.html

Gibson, James; Ivancevich, John; Donnelly, James; and Konopaske, Robert. Organizations: Behavior Structure Processes (Twelfth Edition). New York: McGraw-Hill/Irwin, 2006

Headquarters Air Force Materiel Command. LSO/LOT, Wright-Patterson Air Force Base. Personal Interview. 17 January 2007.

International Air Transportation Association. "Dangerous Goods Regulations 47th Edition," Montreal-Geneva, September 2005.

International Civil Aviation Organization. Annex 18, Technical Instructions for the Safe Transport of Dangerous Goods by Air. 1995-1996 Edition.

Kirk, Jerome and Miller Marc L. Reliability and Validity in Qualitative Research. Beverly Hills, CA: Sage Publications, 1986.

Kirkpatrick, Donald. "Great Ideas Revisited: Techniques for Evaluating Training Programs." Training & Development, Jan 1996, Vol 50 (1)(54).

Korpela, Jukka and Tuominen, Markku. "Benchmarking Logistics Performance with an Application of the Analytic Hierarch Process" IEEE Transactions on Engineering Management, August 1996, Vol 43(3)(323).

Kramer, Peter. Director Transportation Safety Institute, Okalahoma City, OK. Personal Interview. 18 August 2006.

LabelMaster. Data Collected 27 November 2006, http://www.labelmaster.com/lmstore/default.aspx?screen=product/cataolg&cataloglevel=5981.

Lawrence, Barry; Jennings, Daniel, and Reynolds, Barry. ERP in Distribution. New York: South-Western, 2005

Leedy, Paul D. and Ormrod Jeanne Ellis. Practical Research: Planning and Design, (8th edition). Columbus OH: Pearson Education, Inc., 2005.

McClave, James; Benson George P.: Terry Sincich. Statistics: For Business and Economics, (9th edition). Upper Saddle River NJ: Pearson Education, Inc., 2005.

Million Air Consultants. Data Collected 27 November 2006, http://millionairconsultants.com.

Safety Video Direct. Data Collected 27 November 2006, http://www.safetyvideodirect.com/safetyvideos/safety-training-packages.asp.

Schneider, Benjamin. "Customer Satisfaction." Leadership Excellence, August 2006, Vol 23 (8)(13)

Simmons, Olivaras. Specialist Customer Service, Charleston Air Force Base. Collected Data via email 24 October 2006.

Spendolini, Michael. The Benchmarking Book. New York: AMACOM, 1992

Supply Chain Council. "Supply-Chain Operations Reference Model, Version 8.0". Collected Data 8 November 2006, http://www.supply-chain.org/cs/root/scor_tools_resources_score_model/scor_model.

Under Secretary of Defense, Acquisition Policy on Facilitating Vendor Shipments in the DoD Organic Distribution System, Memorandum for Secretaries of the Military Departments. Washington, DC 23 July 2003.

Watson, G. H. Strategic Benchmarking. New York: Wiley, 1993.

Wells, Alexander T. and Wensveen, John G. Air Transportation: A Management Perspective (5th Edition). United States: Brooks/Cole, 2004.

Yin, Robert K. Case Study Research: Design and Methods, (3rd edition, volume 5). Thousand Oaks CA: Sage Publications, Inc., 2003.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 074-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From – To)*
03-13-2007	**Master's Thesis**	Mar 2006 - Mar 2007

4. TITLE AND SUBTITLE
COMMERCIAL FIRM TRAINING PRACTICES VERSUS AERIAL PORT HAZARDOUS CARGO FRUSTRATION

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Maynard, Jill, L., Captain, USAF

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S)
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Graduate School of Engineering and Management (AFIT/EN)
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WPAFB OH 45433-7765

8. PERFORMING ORGANIZATION REPORT NUMBER

AFIT/GLM/ENS/07-08

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
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10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The military is dependent on commercial vendors to augment their supply system, to include hazardous materials. Hazardous materials must be packaged and labeled differently than general cargo for shipment in the defense transportation system. Previous research has shown there is an increase in frustration levels at Aerial Ports of Embarkation. The reasons for frustration range from minor discrepancies to improperly completed shipping documents. This research investigates if commercial companies are a cause of the frustration problems.

A case study methodology was used to investigate training practices of companies that had frustrated hazardous cargo at either Charleston or Dover Aerial Ports. The companies were selected using a 2^4 factorial design. The design focused on company size, volume shipped, internal or external training program, and whether the company had a government contract. The data was collected by using historical information, and interviewing commercial company training managers.

The analysis made comparisons between the requirements of the companies and those established by the Department of Transportation, the Department of Defense, and international regulations. The research gave insight into commercial training habits. It helped identify discrepancies between the regulations that govern commercial companies and the military, including possible ways to reduce the discrepancies.

15. SUBJECT TERMS
Hazardous Materials, Training, Frustration

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Dr. Alan W. Johnson (ENS)
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