A SURVEY OF INTERMODAL EQUIPMENT USAGE
AND PERCEPTIONS IN 1992

AN HONORS THESIS (HONORS 499)
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Thesis Abstract

This thesis presents the results of a survey that was mailed to 200 companies who purchase transportation in one form or another. The purpose of the survey is to present an accurate representation of United States intermodal equipment users and what their perceptions are of the equipment.

The next and last part of the thesis is an interpretation of the survey results. The results will be used to make recommendations to transportation companies regarding what type of equipment should be offered. In addition, if the shippers are saying things about the equipment based on a lack of knowledge, some recommendations will be made to help the sellers of transportation improve the shipper understanding of available equipment.

Introduction

The field of transportation has undergone many changes in the last ten years. This should not be surprising considering the tremendous technological advancements that have been made from the very early days of transportation to the present time. However, the last ten years in particular have seen transportation rise to new heights in the areas of
technology, pricing, efficiency, and effectiveness in moving the nation's freight.

Prior to 1980, all modes (air, water, rail, pipeline, and truck) of transport were regulated by the federal government. Carriers, the companies who provide the transportation, were told the rates they could charge their shippers. As a result, there was little or no incentive for the carriers to provide exemplary service. If they did, they still could only charge the same rates they would charge if poor service was provided. The railroads in particular found it very difficult to compete under these regulations. They steadily lost business to the other modes.

At the end of the Carter administration in 1979, the framework was set in place for deregulation. The year 1980 is generally acknowledged as the year that transportation was set free from the bonds of regulation. The rate regulation that remains to this day is mainly intended to determine if a transportation company is taking unfair advantage of a shipper based on the fact that the company has a monopoly advantage. In addition, the area of safety is still heavily regulated with respect to all the modes.

The 1980's saw competition between carriers of the same mode and among carriers of different modes rise to new heights. The latitude in pricing that was allowed caused many carriers to search for new ways to compete. One way to compete is intermodal transportation. Intermodal means
equipment that can be loaded with cargo and then transported across more than one mode of transportation without the cargo being unloaded. A conventional railroad boxcar, for example, can only be used on a railroad. To move its contents via another mode all the crates or boxes must be unloaded from the boxcar and then reloaded onto a ship, truck, airplane, etc.

The uniqueness of intermodal equipment is that the only time the loading/unloading process need take place is the origin and final destination of the cargo. The advantages are many including time savings, labor savings, and loss and damage savings, among others.

The idea of intermodal is not new. As quoted by writers Johnson and Wood in their book, Contemporary Logistics, the U.S. Army used containers to transport household goods of military personnel after World War II (123). But, prior to the 1980's the concept never came close to reaching the widespread use it enjoys today. The carriers have come to see intermodal transportation as a way to serve shippers better. By the same token thousands of shippers have embraced intermodal transportation as an integral part of their daily transportation operations.
Types of Intermodal Equipment

There are three basic types of intermodal equipment available today. They are containers, piggyback truck trailers and RoadRailers. Each of these equipment types has its own physical characteristics and each has a different group of present and potential users. Each equipment type will be explained in detail.

Container Equipment

A container can best be thought of as a box. This box can be set on a railroad flatcar, the deck of a ship, the hold of a cargo plane, or a flatbed truck trailer. This versatility between four of the five available modes makes it very attractive.

According to Dan Croes of the Association of American Railroads, the length of containers can be 20, 28, 35, 40, 45, 48, or 53 feet. They can be a maximum of 102 inches wide and are a minimum of 8 feet high. The 45-, 48-, and 53-foot containers, when empty, weigh 9000, 9800, and 10,965 pounds respectively. These three sizes are the most popular today for intermodal transportation.

Shippers that ship and/or receive goods from and/or to foreign points prefer containers for the transportation of these goods. This is because the air and water modes are necessary to transport freight to and from foreign countries, particularly on the Asian and European
continents. More and more shippers are switching to containers for their international moves.

Piggyback Equipment

The piggyback trailer is a highway truck trailer that can be loaded onto a railroad flatcar. This provides for flexibility between the rail and truck modes. The trailer must be reinforced to withstand the rigors of rail travel and must be within any clearance restrictions the railroad may have.

There are several dimensions of piggyback trailers available. Croes of the AAR cites trailers of 40, 45, and 48 feet as being the most popular. Like the containers, the trailers are restricted to 102 inches in width and, in general, can not stand more than 13 feet, 6 inches above the ground. The empty weights for the above mentioned lengths are, respectively, 14500, 15,000, and 15,400 pounds. One can see by comparing trailers and containers of the same length how much weight is added by the highway running gear.

Piggyback trailers are used for domestic transportation. Often, either the origin or destination of a shipment is not served by rail. To avoid the costly transloading process, the trailer can be sent to a ramp and loaded onto a railroad flatcar or vice-versa. The use of piggyback is very widespread in the United States. Most of the large railroads operate trains with nothing but piggyback trailers on flatcars. As many unprofitable
branchlines continue to be abandoned and rail service is subsequently cut off, many shippers may be forced to use this equipment. The alternative is to use trucks exclusively from origin to destination, which some shippers have done.

RoadRailer Equipment

The third equipment type is the RoadRailer. RoadRailer is a registered trademark of the RoadRailer Division of the Chamberlain Group, Inc. RoadRailer Equipment is patented, built and marketed by Thrall Equipment Company of Duchossois Industries, Chicago.

Conventional highway trailer manufacturers build the bodies and apply the RoadRailer underframe, running gear and hardware. The equipment looks like a conventional highway truck trailer except for the running gear. On the Mark IV-type trailer, a single-axle railroad wheelset is mounted between the two highway axle wheelsets of the trailer. When on the highway, the railroad wheelsets lift up by air suspension between the highway axles and the trailer rides like an ordinary truck trailer. But, when on the railroad, the railroad wheels are lowered by air suspension onto the rails to such a degree that the highway axles are lifted clear.

The Mark V trailer is designed differently. Because a disadvantage of the Mark IV trailer is the extra weight the
railroad wheelset adds at the highway weighing stations, the Mark V trailer railroad running gear is detachable. When the trailer goes from the highway to rail mode, it is lowered onto a free-standing, air suspension, two-axle railroad wheelset that is waiting at the rail/truck transfer site.

Only one company currently provides RoadRailer service in this country -- the Norfolk Southern Corporation, a large eastern railroad. According to statistics provided by Triple Crown, the Norfolk Southern subsidiary who operates the RoadRailer service, two trailer sizes are available. Mark IV trailers are 48 feet long and are 102 inches in width. The empty weight of Mark IV 48-foot trailers is 17,900 pounds.

Mark V trailers are available in 48- and 53-foot lengths. Like the Mark IV equipment, they are 102 inches wide, but the empty weights for 48- and 53-foot equipment are, respectively, 16,400 and 17,800 pounds. The difference in weights between the same-length trailer that has fixed versus detachable railroad wheels is substantial.

Although current RoadRailer use is limited in comparison to containers and piggyback equipment, the chief advantage is obvious. To transfer containers and piggyback trailers from mode to mode is expensive, and slow lift equipment is necessary. Not so with the RoadRailer equipment. Until recently, Triple Crown, at their hub in Fort Wayne, Indiana, simply piled up gravel between the
rails and the truck drivers drove their tractors right up on the railroad tracks and either picked up or dropped off trailers. A transfer site can be established practically anywhere there is adequate land, preferably near major highways or interstates. RoadRailer service has gained, and is continuing to gain, many followers who are eager to harness this important advantage.

Survey Methodology

To gain an understanding of current intermodal equipment usage patterns and shipper perceptions regarding the equipment, a survey form was used. This survey, a copy of which is included in Appendix 1A, was mailed to 200 users of transportation across the United States and Canada.

The list of company names was taken from a reference book called The Official Directory of Industrial and Commercial Traffic Executives, popularly known as the "Bluebook." The Bluebook lists companies two ways -- alphabetically and by the kind of products they manufacture or produce. This survey focused on those companies that were listed under headings that would put them in the consumer products categorization. The consumer products categorization was used because consumer products favor intermodal or highway forms of shipping.
The Bluebook lists a total of 12,033 companies that would fit into the consumer products categorization. In order to generate a large enough survey sample from which to draw significant conclusions it was decided to mail a copy of the survey to 200 companies. As a result it was determined that every 60th name \((12,033/200=60)\) would be sent a survey. To determine a starting point for the process a random number of 41.7 (or 42) was generated on a scientific calculator. Therefore, the 42nd name on the first category of consumer products was chosen, and then every 60th name thereafter.

Each company in the product listing has a number to the side of it. This number corresponds to its location in the alphabetical section of the Bluebook. Since the company address and list of traffic managers is only in this section, the reference number was written down as each 60th name was found. The reference number was used to find the full company listing in the alphabetical section.

Four databases, each with 50 names and addresses, were compiled. Each of the company entries had the full company address and the chief traffic or transportation executive listed. A cover letter explaining the nature of the project, a copy of the survey, and a self-stamped addressed envelope were mailed to each of the 200 companies surveyed.

The shippers were asked questions of three major categories. The questions asked what type of transportation equipment they use now; what they thought they would use in
the future; and most importantly, their perceptions of the three major types of intermodal equipment -- containers, piggyback trailers, and RoadRailer equipment. The responses to all of these questions have been tabulated and can be found in Appendix 1B.

A total of 68 surveys were returned for a 34% response rate. However, 8 surveys were unusable for a variety of factors, including incompleteness and companies going out of business. Thus, the survey results were compiled from the 60 complete and usable surveys returned. Of the 43 companies that responded to question 6 concerning current intermodal usage, containers were the equipment of choice with almost 91% using them. Piggyback was used by 26, or 61%, of the respondents, to this question. RoadRailer equipment lagged far behind with only 25.6% of respondents reporting usage. No doubt this can be explained by the fact that RoadRailer service is only provided predominantly east of the Mississippi River and has limited available routes within that area.

Survey Responses

The response to questions 8 through 10 which asked about anticipated equipment changes revealed only one shipper who said he planned to change equipment. A shipper of a company with sales greater than $100 million reported receiving and/or shipping over 100 intermodal movements per
day. They currently use all three types of intermodal equipment, however, it only accounts for 5% of total traffic. They plan to divert much more of their traffic to the three intermodal equipment types in the next six months. The respondent listed cost as being the reason for the anticipated change. Obviously they plan some major equipment shifts.

Questions 11 through 13, which dealt with equipment perception, generated a wide range of responses. A total of 59 respondents answered the question dealing with containers. One area in which containers seemed to excel was protection of merchandise with 38, or 64.4%, of respondents ranking this aspect as excellent or very good. Containers did especially well in this area as compared to piggyback. This may reflect the fact that containers are locked into place better on railcars than trailers are. The containers also have a lower center of gravity which tends to prevent swaying and rocking. The survey did not attempt to examine the railcar type (i.e. conventional flatcar, articulated spinecar, etc.) since shippers, generally, have no control over the loading of the vehicle onto railcar types.

Piggyback equipment did poorly in the areas of merchandise protection and equipment cleanliness. Each of these categories were rated excellent by only 1, or 2%, of respondents, out of a total of 51. This was substantially
less than the other two equipment types. Piggyback did the poorest in these two areas of all the equipment types.

The RoadRailer equipment enjoys a good reputation overall. Of the 41 respondents to this question, there were more excellent ratings than either of the other two equipment types. The RoadRailer equipment did particularly well in the area of flexibility from road to rail and vice-versa. Five respondents, or slightly over 12%, gave it the excellent rating. The possibility exists that because of its limited use and geographical area shippers gave it the benefit of the doubt on the survey.

Survey Interpretation

A conversation recently reported in "Intermodal Service As Some Tough Customers See It," at the 1991 meeting of the National Industrial Transportation League made the point "that there can be differences between what's perceived and what is." One major shipper noted that, in his experience, intermodal performance "is very comparable to truck performance." However, it was brought up that surveys show "most shippers don't have that perception." Yet the shipper responded: "People tend to measure the hell out of intermodal, and just assume things about truck service. It is not as well measured" (Railway Age 12).

This exchange between a consultant and a shipper demonstrates an important point. Despite the fact that
intermodal performance is comparable to truck performance, shippers have the perception that truck service is superior. Why the difference between reality and perception? Most of the difference is accounted for by communication gaps and, in some cases, miscommunication between carriers and shippers. The carriers can make definite improvements in communication, but also need to make physical changes in equipment offerings.

Perceptions: Capacity

On both aspects of capacity, cubic capacity and gross weight, there were no surprises. As expected, containers did slightly better than the other two types of equipment in the area of capacity. Because piggyback and RoadRailer equipment is restricted by dimension and gross weight on the highway to such a degree, the only way to improve this situation is to continue lobbying the Federal Government for relaxed restrictions. The carriers are very limited in the equipment improvements that they can make here.

Perceptions: Flexibility

Shipper perceptions in the area of flexibility were surprising. Containers did no better in the area of flexibility despite the fact that they can be shipped by air, rail, sea, and highway. Piggyback and RoadRailers, on the other hand, are only interchangeable between rail and highway. International use of piggyback and RoadRailer
equipment is not practical, but it can be used on roll on-roll off ocean vessels or barges. One recommendation to carriers who are marketing container service is to stress to shippers the tremendous flexibility that containers have, not just for international transportation, but also for domestic transportation. This flexibility is advantageous to domestic shippers because as international business boundaries continue to disappear, a need may arise quickly to ship and/or receive from an international point. Containers will allow for this quick change.

Perceptions: Ease of Loading/Unloading

Containers did the best in the area of loading/unloading. This is understandable for several reasons. One reason may be that piggyback and RoadRailex equipment is tied up while the loading/unloading process is taking place. Containers are placed on chassis frame trailers and treated as highway trailers during the loading/unloading process. They are not removed from the chassis trailers until they arrive back at the rail yard, airport or pier. With containers, only the container box is needed and the flatbed truck trailer, railroad flatcar, ship, or airplane can be hauling other loads while that box is being loaded/unloaded. Since container and chassis trailers generally are accompanied by tractors and drivers for loading or unloading, detention accrues for both the truck tractor and the shipping container. Since there is
quicker turnaround of the container equipment, there often is no demurrage charged by the railroad or ocean carrier. Demurrage and detention charges refer to the penalty payments that shippers must pay when they hold equipment beyond a certain length of time, usually 48 hours. In this way, the increased ease of loading and unloading containers allows for better equipment utilization. The carriers should reinforce this strong point of containers but should also make an effort to alleviate some of the demurrage and detention charges on the piggyback and RoadRailer equipment.

Perceptions: Protection of Merchandise

Containers and RoadRailer equipment did the best in the area of merchandise protection. This is predictable considering the swaying and rocking that often occurs when the trailers sit on conventional railroad flatcars.

One shipper, a manufacturer of electronics, felt that merchandise protection was a problem with all three equipment types. To quote the respondent, "the nature of our product and our customer base dictates that the majority of our shipments move via padded, air ride [highway] service and largely within North America. We have never considered rail as a common mode due to added expense (crating and loading) and added exposure (rougher handling) compared with padded/air ride." To improve the merchandise protection of all three modes the carriers need to continue to provide incentives to their own employees to protect the shipper's
freight. To prevent damage from occurring in the mode-to-mode transition time the lift operators need to be carefully instructed on how to minimize damage. While in transit, for example on a railroad, the train crews need to be instructed on how to most gently stop and start their trains. The maximum speeds for coupling cars that have been established must be enforced.

Because piggyback inherently causes more damage, my recommendation is for the carriers to encourage shippers, where possible, to change from piggyback to either container and/or RoadRailer. One shipper surveyed agreed stating that, "containers seem to be so advantageous over TOFC [trailer-on-flatcar or piggyback] both for shippers and the RR's [railroads], I'd like to someday see a system set up for domestic containers to be routinely shipped within all points of the U.S., not intended for ocean use but intended as replacements for piggyback trailers."

However, with the newer articulated, spine flatcar that is in common use today, the argument put forth above is becoming increasingly invalid. This new flatcar eliminates the swaying and slack action of conventional flatcars. Trailers ride lower on the cars, which allows for a low center of gravity. The ride is identical to double-stack train equipment which refers to the practice of stacking containers two high on five-car sets. Railroads are only buying the spine flatcars now. The conventional car will soon be obsolete.
Perceptions: Cleanliness of Equipment

The area of cleanliness revealed some serious problems with piggyback equipment. Of the 51 respondents who answered the piggyback perception question, only 22 respondents, or 43%, ranked the cleanliness as excellent or very good. Only one respondent ranked cleanliness as excellent. The perception may have something to do with the fact that refrigerated piggyback trailers are used for food transportation. Although refrigerated trailers are a very small percentage of the total piggyback fleet, this equipment could affect shipper perception. The movement of the trailers is such that the trailer needs to be washed on the interior after one use. If this washing doesn't occur for a period of time, the smell and cleanliness of the trailer leave much to be desired. Cleanliness is very important to shippers and receivers of goods because the materials are either going directly into a sensitive production process or to retail outlets. If the merchandise shipped is visibly unclean or smells badly it could effect the receiver's perceptions of the company that sold them the goods.

One way to solve this problem is for the carriers to concentrate on quality control at the transfer site (ramp, pier, etc.). The person in charge of the transfer or unloading of the car should be required to check the interior of the piggyback trailers to ensure its basic cleanliness before sending the trailer on for loading at
the next shipper. The idea is to never allow an unclean trailer to reach a shipper's facility. Based on the results of the survey, the carriers particularly need to stress this with the piggyback equipment.

The overall perceptions of the three equipment types indicated that shippers thought the RoadRailer equipment was the best based on the evaluated criteria. The container equipment ranked a close second and the piggyback equipment was a distant third. Overall, the piggyback equipment garnered very few excellent rankings on any of the categories. Of 51 shippers who answered the piggyback perception question, no more than two answered excellent in any one category.

Recommendations

As mentioned previously, the overall ratings for the Triple Crown RoadRailer service were the highest of the three equipment types. Despite the fact that only 11 respondents, or 25.6%, of a total 43 who answered question 6 currently use RoadRailer equipment, it was, overall, perceived as better than container or piggyback equipment. Triple Crown has done an excellent job of instilling the positive aspects of RoadRailer equipment in the minds of shippers. One exception was a shipper based in the Northwest with a plant in Chicago who didn't know what RoadRailers are, despite the presence of a RoadRailer
facility in the Chicago area. However, this lack of familiarity was the exception, not the rule, since he had never had sales contact by a Triple Crown representative.

In addition to stressing the physical advantages RoadRailer equipment has over containers and piggyback, Triple Crown should make the point in their brochures and sales contacts that they are the only service of their kind in North America. Although several railroads have experimented with, and are planning to use, the equipment, Triple Crown is currently the sole user. Despite the fact that this uniqueness is temporary, this uniqueness would help demonstrate to their customers their commitment to innovation and their desire to develop better transportation equipment. Some shippers indicated in the survey that they were unsure of whether or not Norfolk Southern operated the only RoadRailer service. One shipper, who currently uses RoadRailer equipment stated, "As a shipper, I hope that other RR's [railroads] initiate the road-railer system, or if they have they should market it better so I'd be aware of its availability. The only one I'm using or am aware is in operation is the NS [Norfolk Southern] Triple Crown Service." Triple Crown needs to make sure everyone knows that they are the only service of this type in operation. They have the opportunity to turn this exclusiveness into an important competitive advantage against other carriers.

There seems to be some serious misconceptions about the service that intermodal-using carriers provide. Service has
become more important with the advent of "Just-in-Time" inventory systems. A case in point is a discussion reported in the intermodal article mentioned above. One large domestic/international shipper said that transportation companies, especially those future multimodal ones, "will be judged on performance and then on economics." Another said, "We know that inherently intermodal should cost less than truck. But you have to sell the user on performance before you talk price" (Railway Age 12).

At least two shippers surveyed expressed complaints and concerns in the area of service. One company who ships and receives steel, plastics, and chemicals stated that, "Intermodal moves are more difficult to trace, expedite or obtain promised delivery dates/times." A shipper of food products and seasonal gifts remarked, "Time sensitivity and product perishability reduces the effectiveness of intermodal delivery for our business." The problem is that the carriers have either not communicated with these shippers regarding intermodal or the communication that did take place was not accurate or clear. Another possibility is that a certain level of service was promised and not delivered.

It is possible, and if the shipment volumes are large, it is likely that at one time or another a carrier will not be able to keep their side of the transportation agreement. What is needed is more than a flow of information from the carrier to the shipper. Information, in the form of
performance evaluations, needs to flow from the shipper to the carrier. This way the carrier will know two things: what the performance criteria are and how the carrier ranks on each of the evaluated criteria.

The need for two-way communication applies to all three equipment types. Based on the answers to the perception questions in the survey, there is room for vast improvement in every criteria of every equipment type. Yes, many of these answers were based on perception and not actual usage, but if a shipper has a poor perception of an equipment type, they will not use it. Further equipment improvement will be hard to come by if shippers do not begin to consistently and regularly evaluate carriers on their current equipment. Only by receiving and evaluating shipper feedback can carriers give shippers the intermodal equipment that they must have to satisfy their transportation needs.
February 29, 1992

Dear:

My name is Steve Marshall and I am a senior at Ball State University in Muncie, Indiana. As an honors student enrolled in Ball State's Honors College, I am required to complete a senior thesis project. The subject of my senior thesis will be a look at shipper's perceptions of different types of intermodal equipment. Intermodal equipment includes containers, piggyback truck trailers and Road Railer equipment (ie. highway to rail).

Questionnaire recipients were chosen entirely at random from The Official Directory of Industrial and Commercial Traffic Executives. All individual questionnaires returned will remain confidential. Results will be tabulated based upon total returns only. No further attempt will be made to contact you. Please feel free to verify the nature of this research by contacting myself at 317-288-5046 or my advisor, Michael Johnston, Division Transportation Manager, Delco Remy, at 317-646-3488.

The questionnaire consists of 13 questions. Please return your questionnaire to me by March 20, 1992.

Thank you for taking the time to assist me in my research.

Sincerely,

Steve Marshall
1. What type of raw materials and finished products do you receive or ship?

2. Please check the approximate sales level of your company (optional).

   - $200,000 or less
   - $200,000 - $1M
   - $1M-$5M
   - $5M - $20M
   - $20M-$100M
   - above $100M

3. How many plants or locations does your company ship or receive from?

4. Does any of your traffic (inbound and/or outbound) move in intermodal equipment?

   - Yes
   - No

   If not, please skip to question 11.

5. How often do you receive or ship materials or products using intermodal? (Check applicable level)

   - 4 or fewer times per year
   - 12 or fewer times per year
   - 4-8 times per month
   - 3-5 times/week
   - Average daily

6. What type of intermodal equipment do you use? (check all that apply)

   - Containers
   - Piggyback
   - Road-Railers

7. What percentage of your total traffic moves in each of these equipment types?

   Container:
   - 0-25%
   - 25-50%
   - 50-75%
   - 75-100%

   Piggyback:
   - 0-25%
   - 25-50%
   - 50-75%
   - 75-100%

   Road-Railer:
   - 0-25%
   - 25-50%
   - 50-75%
   - 75-100%
8. Do you plan to change to another type of shipping equipment within the next 6 months?
   __ Yes  __ No

   If not, please skip to question 11.

9. Why do you plan to change equipment? (Check all that apply)
   __ More effective for product
   __ New equipment perceived as being better
   __ Change in good being produced
   __ Cost

10. What type of shipping equipment do you expect to use in the future? (check all that apply)
    __ Containers  __ Boxcars  __ Airplane
    __ Piggyback  __ Covered hopper  __ Water vessel
    __ Road-Railers  __ Conventional truck trailer

    Please answer the following three questions regardless of whether you use these types of equipment.

11. Please indicate your perception of container shipping by marking the space that best represents your current appraisal of the equipment.

   
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<thead>
<tr>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
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</thead>
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<td>Capacity</td>
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<td>Cubic Capacity</td>
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<td>Gross Weight</td>
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</tbody>
</table>

   | Flexibility from mode to mode |
   | ___ |     |      |      |

   | Ease of loading/unloading |
   | ___ |     |      |      |

   | Protection of merchandise |
   | ___ |     |      |      |

   | Cleanliness of equipment |
   | ___ |     |      |      |
12. Please indicate your perception of **piggyback shipping** by marking the space that best represents your current appraisal of the equipment.

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<thead>
<tr>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
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<td>Ease of loading/unloading</td>
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<td>Protection of merchandise</td>
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<td>Cleanliness of equipment</td>
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13. Please indicate your perception of **Road-Railer shipping** by marking the space that best represents your current appraisal of the equipment.

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<tr>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
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<td>Cleanliness of equipment</td>
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</tbody>
</table>

Please note any other perceptions or comments you may have regarding intermodal equipment or shipping on the back of this page.

Thank you for your time and cooperation!
APPENDIX 1B

The following is an explanation of the intended meaning of the survey questions. A copy of the survey is in Appendix 1A.

Questions 1-3  The first three questions were intended to be general information questions for the purpose of categorization only. For example, if a company had no knowledge of Road-Railer equipment, answers $200,000 or less and 2 locations on question 2 and 3, this would help explain the lack of knowledge.

Question 4  This question was intended to determine the rate of present intermodal equipment usage. It also steered the respondent to questions 11-13.

Question 5  Attempted to determine usage rates for intermodal equipment.

Questions 6-7  These questions were intended to determine the type of intermodal equipment used and the amount of
current usage of each of the three types of equipment.

Questions 8-10

These three questions were intended to determine the intention to change equipment. The questions also tried to determine the reason for the planned change and to what type of equipment the change would be. Question 8, if answered in the negative, also served as a transition to Question 11.

Questions 11-13

These questions were intended to provide a measure of shipper perceptions of the three major intermodal equipment types. Perceptions of the physical aspects of the equipment, not cost or service characteristics, were the only factors measured. Respondents were instructed to answer these questions regardless of usage or first-hand experience. The questions were intended to measure perceptions.
Following is the tabulated responses of the 60 completed surveys. The percentages have been computed by dividing the number of respondents per answer by the number of total respondents (n number) to the question.
1. What type of raw materials and finished products do you receive or ship?

85% of completed surveys answered this question

2. Please check the approximate sales level of your company (optional).

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - $200,000 or less</td>
<td>6</td>
<td>11.3%</td>
</tr>
<tr>
<td>$200,000 - $1M</td>
<td>11</td>
<td>20.7%</td>
</tr>
<tr>
<td>$1M - $5M</td>
<td>28</td>
<td>52.6%</td>
</tr>
<tr>
<td>$5M - $20M</td>
<td>6</td>
<td>11%</td>
</tr>
<tr>
<td>$20M - $100M</td>
<td>11</td>
<td>20.7%</td>
</tr>
<tr>
<td>$100M - $200M</td>
<td>2</td>
<td>3.6%</td>
</tr>
<tr>
<td>Over $200M</td>
<td>1</td>
<td>1.9%</td>
</tr>
<tr>
<td>Over $1 billion</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

3. How many plants or locations does your company ship or receive from?

4. Does any of your traffic (inbound and/or outbound) move in intermodal equipment?

Yes: 41 (68.3%)  
No: 19 (31.6%)

If not, please skip to question 11.

5. How often do you receive or ship materials or products using intermodal? (Check applicable level)

(7.1%) 3 4 or fewer times per year
(23.8%) 12 12 or fewer times per year
(16.7%) 7 4-8 times per month
(9.5%) 4 Average daily

written responses: 10/day, 15/day, 20/day, 30/day, 100+/day, and 25-30 times per year

6. What type of intermodal equipment do you use? (check all that apply)

Containers: 39 (90.7%)  
Piggyback: 26 (60.5%)  
Road-Railers: 11 (25.6%)

7. What percentage of your total traffic moves in each of these equipment types?

<table>
<thead>
<tr>
<th>Equipment</th>
<th>0-25%</th>
<th>25-50%</th>
<th>50-75%</th>
<th>75-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>39</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Piggyback</td>
<td>22</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Road-Railers</td>
<td>2</td>
<td>2</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>
8. Do you plan to change to another type of shipping equipment within the next 6 months?

(2.3%) __ Yes (97.3%) __ No

If not, please skip to question 11.

9. Why do you plan to change equipment? (Check all that apply)

___ More effective for product
___ New equipment perceived as being better
___ Change in good being produced
___ Cost

10. What type of shipping equipment do you expect to use in the future? (check all that apply)

___ Containers ___ Boxcars ___ Airplane
___ Piggyback ___ Covered hopper ___ Water vessel
___ Road-Railers ___ Conventional truck trailer

Please answer the following three questions regardless of whether you use these types of equipment.

11. Please indicate your perception of container shipping by marking the space that best represents your current appraisal of the equipment.

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
<th>no answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubic Capacity</td>
<td>___3 (5.1%)</td>
<td>37 (62.7%)</td>
<td>14 (23.7%)</td>
<td>4 (6.8%)</td>
<td>1</td>
</tr>
<tr>
<td>Gross Weight</td>
<td>___4 (6.8%)</td>
<td>35 (59.3%)</td>
<td>13 (22%)</td>
<td>3 (5.1%)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Flexibility from mode to mode</strong></td>
<td>___4 (6.8%)</td>
<td>28 (47.4%)</td>
<td>23 (39%)</td>
<td>1 (1.7%)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Ease of loading/unloading</strong></td>
<td>___3 (5.1%)</td>
<td>42 (71.2%)</td>
<td>12 (20.3%)</td>
<td>2 (3.4%)</td>
<td></td>
</tr>
<tr>
<td><strong>Protection of merchandise</strong></td>
<td>___7 (11.9%)</td>
<td>31 (52.5%)</td>
<td>18 (30.5%)</td>
<td>1 (1.7%)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Cleanliness of equipment</strong></td>
<td>___4 (6.8%)</td>
<td>30 (50.1%)</td>
<td>20 (33.9%)</td>
<td>3 (5.1%)</td>
<td>2</td>
</tr>
</tbody>
</table>
12. Please indicate your perception of piggyback shipping by marking the space that best represents your current appraisal of the equipment.

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
<th>no answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubic Capacity</td>
<td>2 (3.9%)</td>
<td>36 (69.2%)</td>
<td>9 (17.6%)</td>
<td>2 (3.9%)</td>
<td>2</td>
</tr>
<tr>
<td>Gross Weight</td>
<td>2 (3.9%)</td>
<td>33 (63.5%)</td>
<td>13 (25.5%)</td>
<td>1 (2%)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Flexibility from mode to mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>32 (61.5%)</td>
<td>15 (29.4%)</td>
<td>3 (5.9%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Ease of loading/unloading</strong></td>
<td>2 (3.9%)</td>
<td>34 (66.7%)</td>
<td>13 (25.5%)</td>
<td>1 (2%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Protection of merchandise</strong></td>
<td>1 (2%)</td>
<td>24 (41.1%)</td>
<td>20 (39.2%)</td>
<td>5 (9.8%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Cleanliness of equipment</strong></td>
<td>1 (2%)</td>
<td>21 (41.2%)</td>
<td>26 (51%)</td>
<td>1 (2%)</td>
<td>2</td>
</tr>
</tbody>
</table>

13. Please indicate your perception of Road-Railer shipping by marking the space that best represents your current appraisal of the equipment.

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very Good</th>
<th>Fair</th>
<th>Poor</th>
<th>no answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubic Capacity</td>
<td>2 (4.9%)</td>
<td>28 (68.3%)</td>
<td>8 (19.5%)</td>
<td>2 (4.9%)</td>
<td>1</td>
</tr>
<tr>
<td>Gross Weight</td>
<td>1 (2.4%)</td>
<td>25 (61%)</td>
<td>8 (19.5%)</td>
<td>5 (12.2%)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Flexibility from mode to mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 (12.2%)</td>
<td>20 (48.8%)</td>
<td>13 (31.7%)</td>
<td>2 (4.9%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Ease of loading/unloading</strong></td>
<td>4 (9.8%)</td>
<td>23 (56.1%)</td>
<td>13 (13.7%)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Protection of merchandise</strong></td>
<td>4 (9.8%)</td>
<td>21 (51.2%)</td>
<td>15 (36.6%)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>Cleanliness of equipment</strong></td>
<td>4 (9.8%)</td>
<td>19 (46.3%)</td>
<td>16 (39%)</td>
<td>1 (2.4%)</td>
<td>1</td>
</tr>
</tbody>
</table>

Please note any other perceptions or comments you may have regarding intermodal equipment or shipping on the back of this page.

Thank you for your time and cooperation!
APPENDIX 2B

Extra written responses to survey.

1. As a shipper, I hope that other RR's initiate the Road-Railer system, or if they have they should market it better so I'd be aware of its availability. The only one I'm using or am aware is in operation is the NS Triple Crown Service.

   Also, containers seem to be so advantageous over TOFC both for shippers and the RR's, I'd like to someday see a system set up for domestic containers to be routinely shipped within all points of the U.S., not intended for ocean use but intended as replacements for piggyback trailers.

2. The use of containers in stack train service is too limited and needs to be greatly expanded to realize its full potential.

3. Time sensitivity and product perishability reduces the effectiveness of intermodal delivery for our business.

4. Intermodal moves are more difficult to trace, expedite or obtain promised delivery dates.

5. Due to the secure nature of the majority of our larger shipments, transit times and traceability of our product require us to steer away from multi-modal freight services.
6. Our company uses very little intermodal (unless you consider that our forwarders are using intermodal consolidations on our behalf.)

I am familiar with some of the advancements in the Road-Railer area, but not as a firsthand experience.

Majority of intermodal has been sea containers moving finished product in full containers from West Coast to Far East, Australia and New Zealand, some to Latin America.

Perceptions of equipment availability:

<table>
<thead>
<tr>
<th></th>
<th>Sea</th>
<th>Pig</th>
<th>RoadRailer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi Cube</td>
<td>few</td>
<td>some</td>
<td>many</td>
</tr>
<tr>
<td>Hi Gross</td>
<td>some</td>
<td>many</td>
<td>few</td>
</tr>
</tbody>
</table>

The nature of our product and our customer base dictate that the majority of our products move by a padded, air ride service and largely within North America. We have never considered rail as a common mode due to added expense (crating and loading) and added exposure (rougher handling) compared with padded\air ride.
APPENDIX 2C

Unusual responses or problems with the survey

The major problem was that many of the survey respondents failed to follow directions. Many of them did not skip questions when instructed and some did not answer questions 11 through 13 despite being instructed to. Since the thesis focused on equipment perception, every survey on which questions 11 through 13 were answered was considered valid. The fact that directions were or were not followed prior to these questions was not felt to skew the results of questions 11-13.

The 60 surveys or 30% of the total sample that responded and were valid for use was a large enough percentage for the purpose of this thesis. Conclusions about the whole population could be drawn based on this percentage.
### APPENDIX 3

**List of states from which valid surveys were received**

<table>
<thead>
<tr>
<th>State</th>
<th>No. of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>1</td>
</tr>
<tr>
<td>California</td>
<td>3</td>
</tr>
<tr>
<td>Connecticut</td>
<td>2</td>
</tr>
<tr>
<td>Florida</td>
<td>1</td>
</tr>
<tr>
<td>Georgia</td>
<td>2</td>
</tr>
<tr>
<td>Illinois</td>
<td>2</td>
</tr>
<tr>
<td>Indiana</td>
<td>2</td>
</tr>
<tr>
<td>Iowa</td>
<td>2</td>
</tr>
<tr>
<td>Kansas</td>
<td>1</td>
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<tr>
<td>Massachusetts</td>
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<tr>
<td>Michigan</td>
<td>4</td>
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<td>Minnesota</td>
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<td>Mississippi</td>
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<td>Missouri</td>
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<tr>
<td>Nebraska</td>
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<td>New Jersey</td>
<td>4</td>
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<td>New York</td>
<td>4</td>
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<td>North Carolina</td>
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<td>Ohio</td>
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<td>Oklahoma</td>
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<td>Ontario, Canada</td>
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<td>Oregon</td>
<td>1</td>
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<td>Pennsylvania</td>
<td>3</td>
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<td>Quebec, Canada</td>
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<td>Rhode Island</td>
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<tr>
<td>No postmark</td>
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</tr>
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Total 60
Works Cited


