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A MARKETING ANALYSIS OF PIGGYBACK OPERATIONS

With Special Emphasis on Functional Relationships

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

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* * * * * * *

The Ohio State University
1965

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I. Introduction

Since the middle 1950's, students of marketing and practitioners in the field of marketing have sensed a new awareness regarding the importance of the physical distribution functions of marketing. It is generally accepted that this is a fruitful area for research and possible contribution to the advancement of marketing knowledge. The institutions providing physical distribution services have been much maligned because of alleged lack of study, absence of innovation in services rendered, and high costs of service.

According to an Industrial Marketing survey, the nation's physical distribution experts generally agree that

Sales are being lost and advertising claims are falling on deaf ears because of faulty physical distribution; and marketing men are primarily to blame for permitting this situation to exist. . . . They say that marketing men have sadly neglected this important facet of their job -- despite the fact that in the area of physical distribution there exists industry's finest opportunity to improve customer service and reduce costs. ¹

The transportation industry itself has not been exempt from criticism on various counts.² It appears that the greatest amount of


criticism has been focused upon the railroads. It has been implied that the railroad industry was a sleeping industrial giant, a decaying transportation media, and a massive complex machine accepting decline as given. However, during the past decade, railroad executives have shown new initiative, a willingness to innovate, and a determination to reverse the trend. "The roads appear to have reached their vital turning point. For the railroadmen after so many years of sleeping at the switch, are realizing the truth... that they need volume to survive--and they know they can get that volume only by winning the favor of the shipper."

A survey of marketing and, more specifically, transportation literature, reveals that studies and writings about transportation media, and their services rendered, have shown little, if any, relationship between transportation and other marketing functions performed by producers and middlemen. It is interesting to note that the recent innovations in railroad transportation services have been accorded similar narrow treatment. A few exceptions to such analysis have appeared in textbooks covering the principles of marketing where it was impossible to deal with this area of study extensively. Further, it was


noted that only minor reference has been made in any marketing literature to the various forms of trailer-on-flat-car (hereafter referred to as TOFC) and container-on-flat-car (hereafter referred to as COFC) movements of merchandise by rail carriage, later defined and explained. A few basic marketing textbooks mention combined motor-rail movements; however, some only devote one sentence to this development. Advanced textbooks on specific functions or institutional studies have failed to include this important innovation. In addition, textbooks on transportation principles or the economics of transportation have failed to analyze this relatively new form of merchandise movement except for a few which have dealt briefly with the historical development of piggyback operations and predictions of future growth. Moreover, these transportation textbooks did not examine the relationship between (TOFC and COFC) piggyback movements and marketing functions. The newest physical distribution textbooks concerned with the logistics of commodity movement have limited their study to lower inventory requirements because of faster freight movement but specific reference to piggyback utilization was included in only a few instances and not in detail. It is believed that emphasis on ends rather than means is the reason for such treatment.

Periodical and newspaper articles pertaining to marketing and transportation have adhered generally to information about equipment innovations, historical development, regulation, industry problems, and opinions of the present status and future utilization of TOFC and COFC services. It appears that none of the articles or books have related
this method of shipment to the over-all marketing strategy of firms utilizing the service.

This study partially fills the void in past and current writings on the subject of piggybacking and suggests areas for future evaluation. More extensive quantitative data collection by railroads, shippers and government agencies should aid future studies. It is believed that this study indicates that continuous evaluation will be necessary because of the dynamic nature of the subject.

Although early applications of (motor-rail) piggyback services were evident in the late 1920's, no significant results were obtained from the productive thought and effort of railroads attempting to use this service as a competitive tool until the middle 1950's. It is considered a timely subject for investigation because of the relatively new emphasis given to this method of transportation.

Statement of the Problem

The growth and complexity of marketing activities, in a free enterprise economy, stemming from mass production and mass movements of goods to satisfy the ever increasing and changing demands of an expanding and more affluent society, have led many to believe that the over-all efficiency of marketing must be improved. Some improvements may be accomplished by applying automation, reducing clerical work, improving inventory control, lessening damage in transit and in the handling of goods, reducing handling activity, increasing speed in transit, lowering storage requirements, alleviating financial burdens, providing
for a reduction of risks, solving standardization and service problems,
and coordinating buying and selling activity. These possible improve-
ments are being investigated generally by persons focusing upon the
current development of business logistics and by those advocating
better physical distribution management.

The primary problem, then, is to examine the past and present
applications of TOFC and COFC in merchandise movement for the purpose
of analyzing their relationship to the marketing activities performed
by firms using this method of transportation. The secondary problem
is to examine the historical development of piggyback operations and to
devise methods for predicting its future growth. The general investi-
gation and evaluation provides a setting for the more specific and
detailed analysis of selected manufacturers, and merchant middlemen
utilizing piggyback.

Purpose of Study

This study was undertaken in an attempt to add new knowledge about
an important developing phase of transportation. This development may
have progressive, major effects on the physical distribution of goods
in our economy and directly or indirectly affect some of the marketing
functions performed by firms utilizing this method of shipment. The
need for narrowing the information gap is obvious. It reveals other
promising areas of study and evaluation for those inclined to pursue
them.

More specifically, this study focuses upon an analysis of the
following hypotheses, listed in an assumed order of importance:

1. Firms utilizing piggyback service in the future will need to evaluate the merits of it by actual application or simulation in each instance, relating such factors as plant and warehousing locations, markets, inventory requirements, total physical distribution costs, buying activities, and the risks involved.

2. The volume of merchandise shipped by piggyback has increased substantially and this method of transportation should affect the marketing activities of firms utilizing it, particularly the physical distribution functions.

3. Rates, storage, speed, and merchandise handling receive the greatest amount of attention and analysis when piggybacking is considered as an alternative method of transportation.

4. Proponents of piggyback have tended to overemphasize its growth, resulting in unrealistic predictions of usage.

5. The use of carloading data is both inadequate and inaccurate for comparisons and predictive purposes.

Limitations

This study does not focus attention upon the complicated technological aspects of the equipment being utilized. Uses of the equipment are explained in brief, but no attempt will be made to single out a particular make or model or to imply which devices would prove best in any instance.

The study is limited to the marketing of merchandise having those
characteristics which make it possible to apply the piggyback method of movement and specifically examines piggyback operations of firms using the service from a marketing viewpoint. No attempt is made to examine in detail the effects of piggyback on the marketing of rail cars, trailers, containers, or industries providing materials for their construction. Further, no extensive analysis is made of motor carrier operations or freight forwarder operations except where incidental to the study.

Moreover, the study is limited to Class I railroads originating piggyback services and does not include intermediate carriers which do not have loading or unloading facilities. It is assumed that Class II railroads would operate in a similar manner.

The role of agencies and associations pertaining to transportation is not a major consideration in the study except where deemed essential to the explanations. The following agencies and associations were utilized for information-gathering purposes: American Association of Railroads, National Industrial Traffic League, American Truckers' Association, Transportation Association of America, Teamsters' Union, and the Interstate Commerce Commission. No attempt is made to examine fishyback or birdyback movements, auto-rack cars, or the detailed

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aspects of coordinated rail-motor-water movement.

The dynamic nature of such a study was realized, and the cut-off date for comparative statistical material was January 1, 1963. Other information gathered by letter and personal interview in 1963 and 1964, pertains to specific operations of the firms.

Research Methods

The information available from secondary sources was gathered primarily by library research. The Kent State University Library was utilized whenever possible and included most of the periodicals needed as well as government documents and books. One division of the Kent State University Library has been declared a government depository, and some government publications were obtained through this source. In addition, the public libraries of Akron and Cleveland were utilized as well as the Akron University Library. Information from railroad agencies, government agencies, such as the Interstate Commerce Commission, private firms and associations was assembled by correspondence and personal contact. Letters were sent to the sixty-one railroads originating piggyback traffic and replies were received from twenty-nine. Replies were also received from The Interstate Commerce Commission, Association of American Railroads, Automobile Manufacturers Association, National Industrial Traffic League, Railroad Presidents' Conference, university libraries, equipment manufacturers, university business research bureaus, and trade magazines. The data so gathered were analyzed and interpreted to form the basis for Chapters II, III,
and IV of the study dealing with the history and present status of piggybacking. Quantitative data available were included and comparisons and relationships shown by table and graph form. Chapters II, III, and IV, therefore, provide a setting for the chapters that follow. The methodology for gathering primary data from specific firms is presented in Chapter V.

Chapters VI and VII relate the utilization of piggyback by manufacturers, wholesalers and retailers to physical distribution functions and to other marketing activities of the firms. A limited amount of the information needed for this part of the study was available in the current literature.

Definitions

Piggybacking

The term piggyback or piggy-back has been used by some to denote the unit of movement of one form of transportation being carried by the unit of movement of another form. More recently the term specifically refers to Trailer-on-Flat-Car (TOFC), where the trailer includes the chassis and wheels licensed for road travel.

The term containerization may refer to very small cardboard packages, but here it refers to huge van-size containers detachable from chassis and wheels primarily used for transporting tons of packaged goods and known as Container-on-Flat-Car (COFC). For purposes of this study, it is believed that the present functions of TOFC and COFC are utilized to gain substantially the same results. The term
piggy-backing, therefore, will be used synonymously with "TOFC" and "COFC" except where specific reference is made to either TOFC or COFC for purposes of emphasis. It also will include rail-van, a special type of rail car capable of over-the-highway movement having different sets of retractable wheels, but only used by the Chesapeake and Ohio Railroad as a special form of piggyback service. Other terms pertaining to specific services of some railroads are flexi-van, auto-van, true-train, and rail-highway systems. The term piggyback will not include references to auto-rack rail cars or rail-auto vans which are designed specifically for carrying autos on long-distance movement by rail, but are not detachable for movement over the highways.

Coordination

For purposes of this study, the term coordination will mean any joint effort applied by carriers in different modes or the same mode of transportation in transporting freight in domestic land transportation. Although the term may also apply to joint water-air-rail-motor cooperative efforts, it is limited here in most cases to rail and truck movements. The rail and truck operations may or may not be owned and operated by one firm.

This interpretation is believed necessary because of the confusion arising from the historical development of the term and the past utilization of it. In some instances it is apparent that the term has been used synonymously with consolidation or integration. Coordination could thus be interpreted as referring to those transportation functions performed under one ownership, management, or control, but such is not the case generally.
The term has also been used in a restricted sense to mean the coordination of services and facilities of two or more carriers of the same mode. The latter meaning is alleged to have occurred because the early efforts of the Interstate Commerce Commission were concerned generally with the regulation of railroads. When the railroads were taken over by the government in World War I, attention was focused on the most efficient use of transportation facilities, and the "coordination of facilities" meant joint and cooperative use of railroad facilities.

There was some use of the coordination terminology in dealing with the creating of the unified service by the use of two or more types of transport in dealing with regulation problems under the Transportation Act of 1920. In 1928 the commission concluded that the railroads should be encouraged to create a coordinated service by the use of motor vehicles on the highways. The report said, "as far as practicable there should be a definite coordination of all existing transportation agencies on land, water, and air." (140 I.C.C. 685, 745.) This was brought forth in similar fashion in later statements from the commission. (182 I.C.C. 263, April 6, 1932.)

The term was used more often in transportation literature with the enactment of the Emergency Transportation Act of 1933. Section 4 of the act set forth its purposes, one of which was to secure more efficient use of the transportation system under a Federal Coordinator of Transportation. The national transportation policy of 1940 "...
concludes its several objectives with the following statement, "all to the end of developing, coordinating, and preserving a national transportation system by water, highway, and rail, as well as by other means, adequate to meet the needs of the commerce of the United States, of the Postal Service, and of the national defense."\(^8\)

\(^8\) Ibid., p. 1.
II. The History of Piggyback Prior To 1955

The history of piggyback operations prior to 1955 is clouded because of the various concepts which evolved concerning this method and phase of physical distribution. The term piggyback has been construed broadly to denote the movement of a loaded transportation unit of one form being transported by the unit of movement of another form. It is therefore impossible to substantiate its origin with any validity when using the broadest concept of such movement. It is believed that even in ancient times large sealed trunks or containers were often moved by water and land transportation from origin to destination without rehandling the contents enroute.

Piggyback has been conceived more narrowly as the movement of a loaded highway vehicle transported on railway equipment. With the development of motor vehicles and later motor tractor-trailer combinations, motor-rail movements of freight were designated as trailer-on-flat-car transportation. This very narrow concept (TOFC) of piggybacking was adhered to by many until the early 1950's when container-on-flat-car (truck-size van container) movements were included in the piggyback statistics.

This study is concerned primarily with trailer-on-flatcar (TOFC) and container-on-flatcar (COFC) movements, following the middle viewpoint on piggybacking operations. However, for purposes of establishing a proper perspective, the first section of this chapter
reviews the early variations of so-called piggyback systems before motor vehicle transportation was available.

Before Motor Vehicles

The available literature on the historical developments of piggy-backing is inconsistent when referring to its earliest development or the beginning of such service. In many instances the dates are recorded erroneously or are not substantiated. One study mentions an early variation, not generally included in most historical accounts, followed by mention of a domestic service recorded in several sources.

The concept of containers and the idea of containerization is by no means new. Historically, this principle was recorded by Dr. James Anderson, an Englishman, in 1801. Thirty-three years later the state-owned Main Line of Public Works in Pennsylvania, ultimately acquired by the Pennsylvania Railroad, began shipments of canal boats in detachable sections without breaking bulk between Philadelphia and Pittsburgh and maintained the operation until 1857.

The Illustrated London News of June 29, 1846, showed illustrations of containers utilized on highway movement when attached to the flat bed of a four wheel, horse-drawn wagon. The container was utilized as the body of the wagon. The container was transferred from the wagon

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to railway flatcars and between railway flatcars moving on different gauge tracks without breaking bulk. The container was equipped with small rollers which ran easily on rails attached to the wagon bed and flatcar bed to facilitate transfer. This variation was used as a convenient and economical way to transport less-than-carload shipments.

"The mechanics of T.O.F.C. was demonstrated . . . in the U.S. when the Spaulding and Rogers circus took to rails in 1856. . . ."

Another account maintains that the earliest recorded example of this type of carriage was when farmers' wagons were hauled by the Nova Scotia Railway, now a part of the Canadian Pacific Railroad's Dominion Atlantic, in 1858.

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Most historical references acknowledge the existence of a type of piggybacking movement on the Long Island Rail Road but in most cases cannot agree on whether it was in 1884 or 1885. One reference reads as follows:

Piggybacking had its beginning in 1884, when the Long Island Rail Road moved farmers' wagons from eastern Long Island into the city at a flat rate of $4 for the wagon, two horses, and a driver. Demand for this service died out by the middle of the following decade.\(^5\)

Utilization of Motor Vehicles

Except for a general mention in a recent ICC annual report supplement, the literature does not disclose any specific attempts to transport highway equipment by rail. "A rail wagon for combining pick-up and delivery service with a rail line-haul was tried in 1898, 1914, and again in 1930."\(^6\)

Another variation of a combination vehicle, rather than piggyback as it is generally known today, was in operation in California in 1917.\(^7\)

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Early containerized shipments

Little more than short-lived experiments were carried out during and immediately following World War I while the railroads were under government control. In 1921, however, a combined motor vehicle-rail containerized system designed especially for express service was put into use. "The American Railway Express Company operates an experimental car between New York and Chicago . . . . Each container is removable so that it may be transported by motor truck between stores or factories and the railroad." 8

Nine of these containers were loaded on a gondola type rail car which had low sides. The low sides held the containers in place and they were lifted on and off the trucks and rail car by crane or hoist mechanism. "It is expected that this container car system will be expanded by the New York Central to completely co-ordinate the steam railroad, the motor truck and the electric railway." 9

In December of 1921 R. H. Newcomb of the Boston and Main Railroad told of experiments with container cars which were proceeding according to plan up to that time.


9 Ibid., p. 316, see also, "The Container Car Applied to L.c.l. Freight Handling," Railway Age, April 8, 1929, p. 905.

Also, in November of 1922, predictions were made concerning the expansion of container systems for less than carload as well as car-load shipments.

Early trailer-on-flatcar shipments

The majority of articles appearing in periodicals pertaining to the historical development of trailer-on-flatcar service allege that the origin of this type of merchandise shipment was in 1926. Books, pamphlets, and ICC annual reports appear to be in agreement on this point, as indicated by the following statement:

The Chicago, North Shore & Milwaukee instituted a trailers-on-flats service on May 1, 1926, between Chicago and Milwaukee as a means for improving the handling of its own rail l.c.l. The service was originally offered to shippers moving 6,000 lbs. or more in one shipment to one or two consignees. At the time it used specially designed and built trailers which fitted three to a specially constructed flat car.

This service initiated by the CNS & M was designated as "the first equipment of its kind ever placed in service in the United States, differing from equipment somewhat similar in nature in that the trailers are mounted on the flatcars without the wheels being removed."\(^\text{13}\)

\(^{11}\) F. S. Gallagher, "Recent Developments In Use of Container Cars," Railway Age, November 4, 1922, p. 833.

\(^{12}\) Highway Trailers on Flat Cars, Railroad Superintendents' Association Meeting, August 6, 1953, p. 2.

\(^{13}\) "North Shore Electric Handles Trailers Intact," Railway Age, November 13, 1926, p. 938. See also, "Tractors and Trailers Used by North Shore Line," Railway Age, October 22, 1927, pp. 808-809.
"Another early and unsuccessful T-O-F-C Service was that of the Pacific Northwest Traction Company, and Electric Inter-Urban Line which transported trucks on flatcars between Bellingham and Mount Vernon, Washington in 1927."14 This latter service is normally overlooked or disregarded by other historical writings as was the "Freightainer" service on the Boston and Maine which started in 1926.

"Freightainer" service is a new transportation facility which provides for the movement of l.c.l. freight without re-handling from door of the shipper to the door of the consignee... The first operation of Freightainers has been that of the Freight Container Service Company, Boston, Mass., which operated over the rails of the Boston & Maine between Boston, Mass., Worcester and Springfield, for about a year.15

Two sources stated that specially designed highway trailers and flat cars were used successfully between Cleveland and Toledo by the Lake Shore Electric in 1931 and known as the Bonner Railwagon.16

The Chicago North Shore and Milwaukee provided shippers with semi-trailers about two years after its first service was offered, and on April 1, 1932, they invited over-the-road motor carriers to ship loaded or empty trucks or trailers.17


This followed the report by examiner Irving Koch of the ICC which was made public on January 13, 1932. Findings of the Commission were that rates, charges, rules, regulations and practices of the Chicago North Shore and Milwaukee on its ferry-truck service had not been shown to be unlawful in any respect.  

In October of 1932 the Chicago and Alton which is now the Gulf, Mobile and Ohio was alleged to have established a service which was suspended one year later. The Wabash operated a flat car handling two trailers between New York and Chicago for a forwarder in 1934. This service was discontinued because of an imbalance in traffic. It is interesting to note that not all the historical accounts agree on the original dates when service of a piggyback nature was established. In addition letters received from the Wabash Railroad Company, The Gulf, Mobile and Ohio Railroad Company and the Boston and Maine Railroad set the beginning dates of TOFC services as July, 1954, April, 1960, and 1956 respectively. The earlier accounts evidently do not appear in present historical accounts of the railroads. The establishment of TOFC services by the Chicago Great Western Railway Company on

18"Examiner Finds Ferry-Truck Rates Not Unlawful," Railway Age, January 6, 1932, p. 139.


20Highway Trailers on Flat Cars, op. cit., p. 4.

July 7, 1936 was acknowledged in a short article entitled "C.G.W. Begins Truck Ferry Service." This beginning date on the C.G.W. was mentioned in other subsequent reports and historical writings and substantiated by a letter and a report received from the Chicago Great Western Railway Company.

The service initiated in 1936 by the Chicago Great Western Railway Company is one of the two early services to survive until the present time. The other was that of the New York, New Haven and Hartford which began TOFC operations in December of 1937. In its first year of operation the NY, NH & H handled about 1500 trailers.

Several historical accounts set the alleged beginning date of piggyback services in 1937 on The Chicago, Rock Island and Pacific inaugurated a limited service in 1938, which was discontinued some four years later.

Other railroads did not inaugurate either form (TOFC or COFC) of piggyback services until after World War II, and by far the majority of

22 "C. G. W. Begins Truck Ferry Service," Railway Age, August 22, 1936, p. 292.


these services were established following a renewed interest in 1953, as explained in Chapter III.

Factors limiting early growth of piggyback

Some of the major factors limiting the growth of piggyback (TOFC and COFC) movements during the first half of the twentieth century were questions of regulation, lack of adequate equipment, two world wars, a recession, and a depression. In addition, a decided lack of incentive to expand and innovate was apparent for different reasons in each ten-year period beginning in 1910. The competition between the railroads and motor trucks was not recognized as a limiting factor except in a few cases until the years following World War II, when the railroads percentage of total intercity freight ton-miles carried continued to decline.

Other factors leading to the abandonment of many of the early piggyback experiments were the absence of a balanced movement of loaded trailers or containers in both directions of traffic, some cases of insufficient demand for the service, the lack of standardization and interchange of equipment between carriers, the lack of proper terminal facilities, the lack of loading and unloading equipment, and the lack of packaging and loading instructions. These latter reasons are still apparent problems today and will be examined in greater detail later in this study.

Most railroads appeared to be satisfied to secure long haul traffic with the use of their present equipment and terminal facilities. The two railroads (Chicago Great Western and the New Haven) whose pioneer-efforts in piggybacking survived until the present time were harassed continuously by complaints brought before the Interstate Commerce Commission on rates and method of shipment. It is believed that the many inquiries and hearings on rates and legality of shipping in this manner discouraged some railroads from attempting piggyback service.

Equipment and Competition

The early trucks had large inefficient engines, developing low horsepower in relation to size. The small amount of pulling power restricted load size and they were impractical for hauling large amounts of tonnage, particularly in any geographical area having steep grades. The trucks were used basically for short intracity hauls and posed little threat to the railroad industry. As late as 1920, motor carriers of intercity freight handled only a little more than 1 per cent of this traffic which increased to 3.29 per cent in 1929 (Tables 1 and 2 and Charts 1 and 2). As larger and more powerful trucks were used in intercity freight movements, tractor-trailer rigs were originated.

The Chicago North Shore and Milwaukee Railroad, because of its short ninety-mile-haul, was one of the first railroads to feel the pinch of motor truck competition, particularly on its less-than-carload traffic. Another specific example of the truck competition in the 1920's and 1930's was the reduction of less-than-carload traffic hauled by the Chicago Great Western Railroad. This was a major factor in their decision to enter into piggyback service:

The decrease in the Great Western’s revenue on less than carload traffic in 1935 from the average annual revenue for the five year period, 1921 through 1925, was $1,445,051.00 or 70.4 per cent. 28

The railroads' share of total intercity freight traffic showed a steady decline from 1926 to 1940. In 1929 the railroads transported about 78 per cent of the total intercity freight traffic (Table 2) but by 1940 the percentage moved by rails dropped to about 62. During the depression years of the 1930's, total freight tonnage declined, and although some railroads were willing to gamble, innovate and attempt to regain lost traffic, most were reluctant to do so. Motor trucks with improved performance and capacity for longer hauls increased their percentage of total intercity freight haulage.

While the figures showing the decline in freight handled by the railroads are alarming, they do not tell the whole story. There has been an even greater decline in tonnage hauled by railroads in the high-rated commodity classification groups. . . . It seems clear, however, that any further decline in railroad traffic will lead to insolvency for most of the industry. 29


29 Domestic Land and Water Transportation, op. cit., p. 47.
To be sure, the meager efforts put forth by the railroads to stem the tide in the 1930's and their failure to secure a larger percentage of total tonnage may have been due to other factors.

Such efforts as the railroads had made prior to 1936 to recover or attract less than carload traffic from the motor carriers had not been productive of important results. Whether that failure was due to difference in rates, classification, packing requirements, service, convenience, or other causes, the fact was the motor carriers had the traffic.30

Motor trucks had the flexibility of movement, allowing for pick up and delivery. They established themselves as ideal carriers for freight originating at points not adjacent to rail tracks and developed an extensive dependable service. Expanding their door-to-door delivery service over longer distances, they became more and more of a threat to the inflexible rail lines limited to tracks in fixed locations. Attempts were made to create equipment and devices designed to regain some of this traffic during the 1930's. The side loading of containers onto flatcars from trucks was experimented with as early as 1936 by equipment manufacturers.31

The New Haven service was lightly patronized, about thirty trailers per week, when it began operations in 1937, but the New Haven overcame many obstacles and steadily increased this type of traffic. It served its own trucks as well as common, contract, and other private motor

30Hawkinson, A Compendium, op. cit., p. 1
### TABLE 1

INTERCITY FREIGHT TON-MILES FOR RAILROADS AND MOTOR TRUCK CARRIERS 1920-1962 (In Billions)

<table>
<thead>
<tr>
<th>Year</th>
<th>Class I, II, &amp; III Railroad</th>
<th>Motor Carrier</th>
<th>Year</th>
<th>Class I, II, &amp; III Railroad</th>
<th>Motor Carrier</th>
<th>Year</th>
<th>Class I, II, &amp; III Railroad</th>
<th>Motor Carrier</th>
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<td>4.5</td>
<td>1934</td>
<td>270.3</td>
<td>20.6</td>
<td>1948</td>
<td>647.9</td>
<td>87.6</td>
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<td>5.3</td>
<td>1935</td>
<td>283.6</td>
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<td>1949</td>
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<td>1950</td>
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<td>9.8</td>
<td>1938</td>
<td>291.9</td>
<td>37.0</td>
<td>1952</td>
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<td>11.4</td>
<td>1939</td>
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<td>1947</td>
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<td>77.9</td>
<td>1961</td>
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<td>1962</td>
<td>592.8</td>
<td></td>
<td></td>
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<td>320.0</td>
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**SOURCE:**
CHART 1

INTERCITY FREIGHT TON-MILES FOR RAILROADS
AND MOTOR TRUCK CARRIERS 1920-1962 (IN BILLIONS)

SOURCE: TABLE 1
<table>
<thead>
<tr>
<th>Year</th>
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<th>Motor</th>
<th>Year</th>
<th>Railroad</th>
<th>Motor</th>
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<td>1958</td>
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<td>1950</td>
<td>56.17</td>
<td>16.27</td>
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</tbody>
</table>

CHART 2
PER CENT OF INTERCITY FREIGHT
TON-MILES 1940-1962

SOURCE: TABLE 2
carrier operations. Some of the problems encountered included loading time and loading effort. In addition, truckers would move their older trailers by rail, as some of the newer ones were too large to be specially equipped and restricted to this type of service. 32

Standardization of sizes and of the types of handling mechanisms, which still plague the industry today, as well as non-uniform highway restrictions added to the problems which "were formidable enough to cause the demise of most systems before World War II." 33

During World War II, the use of trucks was restricted to the movement of military supplies and personnel, thus conserving gasoline and oil for the war effort. Railroads reached a peak in intercity ton-miles hauled in 1944 of 740.6 billions of ton-miles, which was approximately 70 per cent of total freight ton-miles hauled in intercity traffic (Tables 1 and 2). Cooperation rather than competition was a keynote, and little was done to improve piggyback equipment or terminal facilities as manpower and materials were concentrated on the war effort.

World War II To 1955

From the close of World War II until the publication of statistics covering piggyback carloadings in 1955, there was a period of unrest and questioning interest. Only two additional railroads inaugurated this type of service before 1954. Equipment changes were few in


33 Holmes, op. cit., p. 5.
number but consisted of many types, sizes and methods of operation. Motor carriers, however, were advancing in a technological evolution. Better highways were being developed and they were transporting a larger share of total intercity freight tonnage. A period of renewed interest caught railroad management, truckers, transportation associations, equipment manufacturers and others in its grasp in 1953, and piggybacking became the major topic of the day. This renewed interest and the Interstate Commerce Commission's answer to the famous "twenty questions" proposed by the New Haven Railroad, and discussed later in this chapter, established the setting for the five basic plans of piggybacking now in operation.

**Development of motor carriage**

With the close of hostilities, industrial interests turned to serving the needs of a peacetime economy. The automobile industry quickly and efficiently converted its massive facilities and personnel to automobile and truck production by using dies and equipment stored during the war years. The intercity freight ton-miles hauled by motor carriers increased from 56.1 billions in 1945 to 223.3 billions in 1955, or about four times (Table 1). Motor carriers increased their percentage of total freight ton-miles from 5.58 per cent in 1945 to 17.5 per cent in 1955 (Table 2). During this same ten-year period, the percentage of total intercity freight ton-miles handled by railroads declined from approximately 68 per cent in 1945 to less than 50 per cent in 1955. The railroads were hauling some fifty-three billions of ton-miles less in 1955 than in 1945 (Tables 1 and 2). Thus while
motor carriage increased its ton-miles hauled by some 167 billions, railroads declined in haulage by 53 billions and thus did not share in the traffic growth of the surging postwar economy. This trend continued until 1962.

The average miles per haul by common carrier trucks increased from 177 miles in 1945 to 235 in 1955. The total vehicle mileage traveled by trucks increased from 45.9 billions in 1945 to 111.4 billions of miles in 1955. These figures indicate a trend that was to perpetuate.

Continued emphasis on the use of trucks for haulage of intercity freight brought forth new technological advances in truck efficiency of operation and capacity. Tractor-trailer combinations were commonplace on United States highways. In 1946, 91.6 per cent of the trailers in use were less than thirty feet in length and 50 per cent were under twenty-six feet in length. In 1956, however, 92.1 per cent were over thirty feet in length and the majority or 68.6 per cent were from thirty-four to thirty-six feet long. This continued growth in increased capacity meant that trucks could compete more readily with the railroads for intercity freight tonnage. Industry had begun to seek new plant locations, and firms were no longer limited to on-track sites, for they could be served adequately by motor common and contract carrier or in some cases provide their own truck fleets.


Motor carriers were more flexible and thus able to adjust to changes in physical distribution methods.

Faced with the increased competition from the motor truck, some railroads renewed their interest in piggyback movements. Many believed such a move would help them regain some of the traffic which had been diverted to trucks.

Interest renewed

One of the basic reasons for the renewal of interest in piggy-backing by the railroads and shippers in 1953 was the unveiling of two larger flatcars. The first was announced by Pullman-Standard which was a specially designed seventy-five foot flatcar capable of handling two thirty-five foot trailers and equipped for side loading. The second was the new General Motors Corporation flatcar which also permitted side loading with a special loader-tractor and could accommodate two thirty-five foot trailers. Special terminals were suggested which would employ depressed tracks or raised platforms.

The "Traileramp" designed by the Brandon Equipment Company was announced in March, 1954. It was a welded magnesium portable ramp

36"Piggyback Car Loads Over Sides," Railway Age, June 1, 1953, p. 19.


38"New Terminals for Piggybacks," Railway Age, October 5, 1953, p. 82.
which could be used in conjunction with the Brandon "yardmobile" to 39
turn idle trackage into a piggyback terminal.

Other special equipment was being discussed and placed on the
drawing boards, including patents for the Clejan (French System) cars
which were to be tried out in the United States after proving themselves
for fourteen years in France. The Clejan type car was to become one
of the most successful systems of piggybacking. Most of the containers
utilized prior to 1954 relied upon lifting devices which were not
40
capable of handling some of the van-size containers.

The renewed interest in piggyback in 1953 had been indicated by
the new equipment designs, particularly low flatcars, and by the inaug­
41
uration of new services. In addition many articles and editorials
appeared in periodicals, many of which indicated the proportions of the

In September of 1953 the New Haven Railroad presented a series
of twenty questions to the Interstate Commerce Commission. The New

39 "Ramp to End Load Trailers on Flats," Railway Age, March 22, 1954, p. 65.

40 "Another Idea in Piggyback," Railway Age, August 9, 1954, p. 59;
Age, January 11, 1954. See also 67th Annual Report of the Interstate

41 "Piggybacks - Good or Bad?," Railway Age, April 20, 1953, p. 80;
"Piggyback Brightest Hope," Railway Age, October 19, 1953, p. 15;
Haven had been offering piggyback services since 1936 and had shown substantial growth in the amount of services rendered. It believed that certain questions concerning regulations and limitations of its actions and obligations with respect to TOFC services should be answered.

In May, 1954, the Interstate Commerce Commission reduced the twenty New Haven questions to twelve, docketed the inquiry as Ex Parte 31375, and set the hearing date for June 28, 1954. During the interim, many questions arose as to who should piggyback what and how it should be done.

Railroaders across the country voiced their opinions regarding the alleged interference and believed they should be allowed to develop piggyback service unhampered. Articles in Railway Age indicated this: "Roads Want Piggybacking Unbattered," "This is Bi-Partisan Piggyback," "Don't Hog-Tie Piggyback," and so forth.

The hearings were delayed beyond the original June 28 date, and actually got underway on July 28, 1954.

After carefully analyzing testimonies given in the hearings, the Interstate Commerce Commission issued a declaratory order on July 3,

---


1954 (movement of Highway Trailers By Rail, 293 I.C.C.93). This decision on the so-called "Twenty Questions" case is believed to be the beginning of the modern legal history of TOFC operations. The clearest, concise resume of this important decision was presented by the Association of American Railroads in a news release, as follows:

A railroad is not required to hold a motor carrier certificate in order to haul trailers on flatcars. Thus a railroad is free to haul freight in its own trailers.

The railroads' practice of operating their own pick-up and delivery service in connection with piggybacking was approved.

Railroads may haul the trailers of private carriers, freight forwarders and common-carrier truckers. However, a restriction was placed on the transportation by railroads of contract operators' trailers, the ICC holding that they could be hauled only to points now served by the contract carrier.

Trailers of common-carrier truckers may be hauled under joint rail-truck rates and through routes. Utilizing the basic rules thus established, railroads pushed ahead with increasing enthusiasm to establish piggyback service. The Association of American Railroads started to gather piggyback car-loading data in 1954, and the five basic "plans" now in use were being formulated.

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45 "Background on Transportation" (prepared for editors), Washington, D.C.: Newservice of Association of American Railroads, October, 1960, No. 127321
III. Analysis of Service, Growth
And Present Significance

Five basic plans and other hybrid forms of piggyback service have emerged since the Interstate Commerce Commission's declaratory order in 1954. The ICC has investigated numerous complaints against the service and has initiated in the early 1960's an inquiry (Ex Parte 230) to study the plans being offered. The Commission will suggest changes which will make the plans more uniform and understandable if the study reveals such changes to be advisable. Piggyback carloadings have increased rapidly and steadily each year since 1954 but represent a small percentage of total carloadings.

Piggyback Plans and the ICC

Examination of the literature provides numerous illustrations of the various forms of piggyback movement. The industry has, however, accepted five basic plans which are offered in varying degrees by railroads initiating this service. The majority of railroads engaged in piggyback service have offered plans which fit its own needs and the needs of the shippers in its area, depending on location, topography, type of shipper (manufacturer, forwarder, association, motor carrier, etc.), competitive aspects, facilities and equipment available, and its financial condition.
Analysis of plans

Many concise explanations of the various plans in operation appear in the literature. A more detailed description is believed necessary for evaluation purposes.

Plan I

Plan I is often called "substituted service." The motor common carrier substitutes rail haul for highway haul for a portion of the trip. The trucker contracts with the shipper at motor rates and delivers the trailer or container to the rail carrier terminal where it is placed on a flatcar for the rail haul. The railroad rate charged to the motor carrier is a negotiated flat rate from terminal to terminal. The trucker arranges to pick up the trailer or container at the end of the rail haul and transports it by highway movement to destination.

Motor common carriers are allowed to ship by this method providing the railroad straight-line-haul is not less than 90 per cent of the distance covered by its authorized routing. The settlement of damage claims appears to be a major problem because of the many parties responsible for the shipment.

Plan II

Plan II is often designated as "all-rail plan." The railroad performs the pick up and delivery service in its own, or leased, trailers or containers. The railroad thus deals directly with the shipper and the goods move on the railroad's competitive truck tariffs.
Early controversy on Plan II was mainly concentrated on the railroad's right to provide motor carrier service. Later in individual decisions the ICC ruled a motor service could be substituted even where a rail service was being provided, upon proof of operating economies and efficiencies.\(^1\)

Plan III

Plan III is similar to Plan I in that the railroads furnish the flatcars. The trailers or containers are furnished (owned or leased) by the shipper. The railroad only furnishes the terminal to terminal line haul service at a published flat rate per mile regardless of the commodity carried in the trailer or container. This plan is designed to regain some of the traffic lost to private carriage. It is offered to private shippers, freight forwarders, and shippers associations.

A basic problem to shippers utilizing Plan III results from the 60/40 (mixture rule) limitation. This rule is applied by most railroads offering Plan III service and states that not more than 60 percent of the weight on one flatcar can consist of one type of commodity. Railroads apply this rule in order to prevent too much diversion of regular boxcar movements and to protect the boxcar rate structure. Small shippers such as manufacturers of one or two commodities find that this rule hampers their general use of Plan III because they often have problems in scheduling and accumulating a 60/40 commodity mix.

Plan IV

This plan is sometimes known as the freight forwarder's plan, or an extension of Plan III. The major difference between Plan IV and Plan III is that in Plan IV the shipper owns or leases the flatcars as well as the trailers or containers. The railroad thus provides only the motive power, rails, and terminals. Shippers are not paid a per diem fee when the equipment is idle, and the charges apply whether the flatcar and/or trailers and containers are loaded or empty. Plan IV can only be utilized to advantage by shippers having a balanced movement of quantity shipments in both directions of haul.

Plan V

Plan V is sometimes designated as the "intermodal" plan because it describes a joint operation between railroads and motor common carriers. Its basic difference from Plan I is that the freight moves at joint rail-truck rates published in either railroad or motor carrier tariffs. Either may solicit shipper business for this joint movement. In reality it extends either carrier's territory into the territory of the other, a situation which has caused some controversy. In addition, the age-old reluctance of motor carriers and railroads to work together still poses a problem, but the barriers to such cooperation seem to be crumbling as the basic advantages to each party become clear.

Plan II-1/2

This plan is generally considered a hybrid or modified plan. It differs from Plan II in that the railroad furnishes the equipment but
the shipper or receiver performs the merchandise loading and unloading. Also, in most instances the shipper performs terminal services with the exception of placing the container or trailer on the flatcar, or removing it therefrom.

Modified Plan III and other hybrids

No clearcut explanation is available on modified versions of Plan III or other Hybrid Plans. Some railroads modify this plan by dropping the 60/40 rule. Such a modification removes this obstacle for small-volume shippers of one or two commodities. In other instances, there is a modification of other portions of the service. An example here is an agreement by the railroad to perform the pick up and delivery of the loaded trailer at the shipper's origin and destination points. This and other hybrid forms are possible when the tariffs are published separately for specific services rendered. Many of the railroads offer no hybrid plans and, although they may anticipate such changes from the five basic plans in the future, they are awaiting the outcome of the ICC investigation (Ex Parte 230).

Plans offered

Some railroads offer more than one plan and others may engage in only one of the plans. Also when offering more than one plan, 90 percent or more of the movements may be under one plan. Not all plans are feasible for all railroads whether large or small, and thus each usually selects those plans which cater to the specific needs of its
customers and return a profit. Most railroads agree that the potential for all plans is virtually an unknown quantity.

The ICC and Ex Parte 230

The role of the Interstate Commerce Commission in its present investigation of piggyback (Ex Parte 230) shows its importance to and possible influence upon piggyback growth.

Role of ICC

A report on national transportation policy was completed by a Special Study Group of the Commission in 1961 for the Senate Committee on Interstate and Foreign Commerce. Known as the "Doyle Report," it investigated, among other items, "piggyback" and containerization. Some believe that this report was perhaps most directly responsible for the present investigation of piggyback, designated as Ex Parte 230. The report suggested that equipment and rates be standardized as quickly as possible and that all carriers regardless of mode be given the opportunity to "offer the same or similar services at comparable prices."³

The Interstate Commerce Commission stated its reason for the investigation as follows: "As a result of the continued rapid development and marked expansion of trailer-on-flatcar or piggyback service,


and in order to encourage the participation in and the expansion of coordinated service, between the various modes of transportation. . . .  

Ex Parte 230

In referring to Ex Parte 230, Substituted Service-Charges and Practices of For-Hire Carriers and Freight Forwarders, one commissioner stated that, "even beyond the importance of its substantive merits, this proceeding poses certain tests for both regulated and regulators - tests which go to the heart of our respective roles in developing the best transportation policies for America." 5

The ICC issued its original order on June 29, 1962, for the purposes of investigating the

". . . desirability, feasibility, and lawfulness of the operational practices, services, and facilities provided and utilized by or for rail, motor and water carriers, express companies and freight forwarders and to determine the need, if any, for regulations in this operational area governing the use of this type of service. All such carriers and freight forwarders of property operating in interstate or foreign commerce subject to the act are made respondents in the proceeding."

The June 29 order which included a rule-making notice caused immediate reaction as the proponents and opponents juggled their forces


for the assault. Some Eastern Railroads objected to the implication of reviewing old issues that they believed had been settled before in the New Haven case of 1954.

On October 9, 1962, a draft of proposed TOFC rules was made public at a prehearing conference concerning Ex Parte 230. The Commission indicated at that time that it would, through the proposed rules, contemplate abandonment of the plan number terminology in favor of two basic kinds of TOFC service. The commissioners envisioned a "joint intermodal" TOFC service and an "all-rail" service in which equal charges would be made for like services.

The ICC has stated several times that the case as proposed is not being used to stifle coordinated transportation in any way but is an attempt to provide ground rules which will eliminate some controversy, red tape, and protests. The Commission believes that Ex Parte 230 is designed to encourage and possibly expand the growth of this service in the public interest. It should be noted that the proposed rules are concerned only with practices in performance of piggyback service and not with rate structures as such. Railroad executives contacted by

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letter were not willing to make any predictions regarding Ex Parte 230, but the majority believe that the results of Ex Parte 230 will not restrict the future development of piggybacking. They believe that when the issue is settled that even greater strides in this service will be forthcoming.

Growth And Significance

The United States economy has maintained a rather steady growth since 1954, with the exception of the 1958 recession. The growth pattern reflected by the increase in the Gross National Product and Industrial Production Index over this period, coupled with the population growth, gives some indication of the corresponding growth in total ton-miles of intercity freight hauled (1954-1963). The railroads have not maintained a similar pattern of growth and their percentage of intercity ton-miles hauled has declined relative to other modes of transportation during this period. The one bright spot in the railroad scene has been the dynamic change to piggyback and its resulting growth in carloadings and ton-miles carried.

Growth of motor carriage

The importance of the growth in motor carriage is reflected by the increase in intercity freight ton-miles hauled by trucks during the period of 1955-1962. Table 1 shows that ton-miles hauled by motor carriage increased by about one-third, from 226.2 billions of ton-miles hauled in 1955 to 320 billions of ton-miles hauled in 1962. During this period, railroad ton-miles hauled declined from 647.1 billions of ton-miles to 592.8 billions of ton-miles hauled, or to approximately
43 per cent of total ton-miles hauled (Table 2). In an attempt to counter the trend and to regain some of the lost traffic, the railroads turned more and more to piggybacking.

**Growth of piggyback**

The Association of American Railroads began gathering and recording statistics on piggybacking in late 1954, and 1955 was the first full year that total piggyback carloading figures were available. Table 4 depicts the growth in piggyback carload figures by years beginning in 1955 with 168,150 carloadings to a total of 706,441 carloads in 1962. The yearly increase was contrary to a steady over-all decline in total railroad carloadings during the period.

Piggybacking as a per cent to total carloadings increased from .44 per cent in 1955 to 2.46 per cent of total carloadings in 1962. In 1955 some thirty-two railroads reported piggyback carloadings to the Association of American Railroads, and the number of roads initiating this type of traffic increased steadily each year to a total of sixty in 1962 (Table 3)

**Reservations**

The figures in Table 3 should be viewed with caution. Carloading figures do not indicate the size of the shipment. Larger and larger railroad cars and special handling equipment have been introduced during the period, and the average capacity and average tons hauled per car have steadily increased. The average capacity per freight car
(including all types) increased from 53.7 tons in 1955 to 56.3 tons in 1962. The average freight carload transported in 1955 was 42.4 tons compared to 45.9 tons in 1962.

The figures in Table 3 pertaining to piggyback do not indicate changes in the size and capacity of trailers, nor do they reflect the number of trailers per carload. In the early stages of piggyback growth, two small trailers or van containers could be loaded on a thirty-five to forty-foot flatcar, but later the average length of trailers and van containers utilized increased until only one trailer could be loaded on a car. Technological change in railroad equipment took place and the flatcars were increased in length to accommodate the longer trailers and vans. The ratio of trailers to flatcars increased steadily, and it is believed that approximately 90 per cent of trailers and vans transported in 1962 were loaded two to a flatcar. It should be noted that although the percentage increase each year in piggyback loadings is greater than the percentage increases and decreases in total carloadings each year such percentage changes may be misleading. The increase of actual piggyback carloadings from 1961 to 1962 represented 115,195 carloadings or a 19 per cent increase, whereas the 133,973 increase in total carloadings during the same period represents a fraction of 1 per cent. It must not be assumed that the total in-


<table>
<thead>
<tr>
<th>Year</th>
<th>All Carloadings</th>
<th>Piggyback Carloadings</th>
<th>% of Total</th>
<th>Increase in Piggyback</th>
<th>No. of Roads Participating</th>
</tr>
</thead>
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<tr>
<td>1955</td>
<td>37,636,031</td>
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<td>37,844,828</td>
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<td>1962</td>
<td>28,717,753</td>
<td>706,441</td>
<td>2.46</td>
<td>115,195</td>
<td>19.4</td>
</tr>
</tbody>
</table>

CHART 3

PIGGYBACK CARLOADINGS COMPARED TO TOTAL CARLOADINGS 1955-1962

SOURCE: TABLE 3
crease in piggyback loadings was responsible for the increase in overall carloadings since some of the piggyback traffic may have been diverted from regular box car traffic. Therefore, carloadings and particularly piggyback carloadings (although the only guide available) are considered inadequate.

Ton-miles estimate

If figures on ton-miles carried by piggyback were available, a more accurate growth pattern could be established. Ton-mile comparisons would be more realistic and would show a more phenomenal increase in the use of piggyback. Most available projections have concentrated on carloading figures. The few that have estimated ton-miles hauled and made predictions on that basis have not disclosed the source of information or techniques utilized in arriving at the estimates. Appendix A has been provided to show how the estimate of piggyback ton-miles was derived and utilized as an index in Table 4.

Approximately one billion ton-miles of intercity freight was hauled by piggyback methods in 1955. This increased to about seven and one-third billions of ton-miles in 1962, representing 1.2 percent of total railroad intercity ton-miles.

Specific growth

The over-all growth pattern of piggyback movements indicates its importance to the railroad industry as a whole. The importance of this development may be overemphasized, or not emphasized enough, depending upon the railroad involved. Some short-line railroads find that such movements play a minor role in present shipments and in future growth
plans. Many other roads appraise piggyback shipments as a very important part of present operations. A few examples of specific growth and emphasis will indicate this more clearly.

The Delaware and Hudson Railroad Corporation piggyback operations have been limited in scope because of its comparative small size. It has, however, initiated piggyback movements and acted as an intermediate carrier. Piggybacking probably will not become a substantial part of ton-miles hauled on this railroad, because "The Delaware and Hudson is so situated that our haul on piggyback is only 150 miles and this presents a real problem in making this type of traffic profitable."11

The Western Pacific Railroad Company which offers both trailer and container services is expecting to expand its services, particularly the Flexi-Van container service. "Our volume has increased from approximately 200 and some odd trailerloads in 1958 to approximately 12,500 in 1963."12

The Wabash Railroad Company initiated piggyback service in July, 1954, and only offers TOFC services. The Wabash has enjoyed a continuous yearly growth from handling 381 trailerloads in 1954 to a total of 57,233 trailerloads in 1962.13

Other examples indicating expansion include the Santa Fe whose revenues for the first five years of piggyback operations represented less than 1 per cent of all revenues. The percentage of total revenues increased to about 3 per cent for the first six months of 1963. The New York Central's Flexi-van is alleged to bring in revenues of about $20 million a year and may reach $75-$100 million by 1965-1966. The Louisville and Nashville increased revenues from $750,000 in 1960 to "... an expected $10 million in 1962," while the Chicago, Rock Island and Pacific Railroad recorded a 20 per cent revenue gain over a similar period in 1961.\textsuperscript{14}

Growth comparisons

Table 4 has been included to compare piggyback growth with important economic indicators covering the same period.

The indices show the growth of the economy since 1955 indicating a steady growth pattern with the exception of the 1958 recession. The first three indices of Gross National Product, Industrial Production, and Population apparently indicate that an increase in freight movements would be necessary if such growth continues. Thus the index for total intercity ton-miles hauled reflects growth except for 1961. Accordingly, it is obvious from the index of railroad intercity ton-


miles hauled that the railroad industry has not maintained its share of this growth since 1958 and that much of the traffic has been diverted to motor carriers. The generally accepted indicator, freight carloadings index, also reflects the decline in total carloadings since 1958. The great increase in the piggyback ton-miles hauled index is expected because of the relatively late beginning of such service and tends to overestimate the potential growth.

Predictions of growth

It is believed that piggyback methods, equipment, and tonnage have matured to a point of being recognized as a part of railroad movements. Piggybacking should continue to expand and undoubtedly will represent an increasing share of ton-miles hauled. The data in Table 5 and Chart 4 indicate some of its growth possibilities, both by gains in piggyback loadings on a basis of 100,000 and 150,000 per year and by various percentage gains compounded annually.

Although faster growth rates have been estimated, the 15 per cent per year growth rate appears to be the most plausible. It is believed that at this rate of growth total carloadings will reach about two million carloads by 1970. By that time each carload should carry two large trailers, each having a capacity of approximately twenty tons and carrying an average load of fifteen tons an average distance of 460 miles. This would equal about 30 billions of ton-miles, or approximately 4.0 per cent of railroad ton-miles hauled (Appendix A). The prediction is based on an expected decline of the railroad percentage of total intercity ton-miles to 38 per cent and assuming a continued
<table>
<thead>
<tr>
<th>Year</th>
<th>GNP</th>
<th>I.P.</th>
<th>Population</th>
<th>Total Intercity Ton-Miles</th>
<th>Railroad Intercity Ton-Miles</th>
<th>Motor Freight Intercity Ton-Miles</th>
<th>Piggyback Ton-Miles</th>
<th>Freight Car-loads</th>
<th>PB Car-loads</th>
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<tr>
<td>1955</td>
<td>87.1</td>
<td>96.6</td>
<td>96.2</td>
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<td>86.1</td>
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<td>1956</td>
<td>92.0</td>
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<td>106.3</td>
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<td>97.2</td>
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<td>93.8</td>
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<td>104.8</td>
<td>103.1</td>
<td>98.3</td>
<td>119.0</td>
<td>239.9</td>
<td>91.2</td>
<td>187.8</td>
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<td>1962</td>
<td>121.5</td>
<td>118.3</td>
<td>114.9</td>
<td>107.9</td>
<td>101.8</td>
<td>126.2</td>
<td>287.6</td>
<td>92.4</td>
<td>224.5</td>
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</table>

**Sources:** Federal Reserve Bulletin, January, 1961, pp. 94, 88; Federal Reserve Bulletin, August, 1963, pp. 1142, 1136, 1134; Motor Truck Facts, 1963, p. 39; Table 2, p. 28; Table 4, p. 54; and Appendix A, p. 203, shows the estimate of Piggyback Ton-Miles.
<table>
<thead>
<tr>
<th>Year</th>
<th>Estimate Based On Set Increase per year</th>
<th>Estimate Based On Annual Percentage Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100,000</td>
<td>150,000</td>
</tr>
<tr>
<td>1963</td>
<td>806</td>
<td>856</td>
</tr>
<tr>
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<td>906</td>
<td>1,006</td>
</tr>
<tr>
<td>1965</td>
<td>1,006</td>
<td>1,156</td>
</tr>
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<td>1966</td>
<td>1,106</td>
<td>1,306</td>
</tr>
<tr>
<td>1967</td>
<td>1,206</td>
<td>1,456</td>
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<tr>
<td>1970</td>
<td>1,506</td>
<td>1,906</td>
</tr>
</tbody>
</table>
increase in total ton-miles hauled, the railroads share by 1970 should be about 760 billions of ton-miles.

Any estimates made of piggyback growth are extremely conjectural because many problems still remain. It is generally agreed, however, that piggyback is here to stay and will continue to grow.

Forecasts of piggyback movements have been made each year since this method of transportation was devised, and particularly since 1954. Some of these predictions have been quite realistic, while others have shown a decided lack of research and concern for other economic forces within our economy. A brief review of some of the expectations of recent years and months should amply indicate the potentials of piggyback and the beliefs of those engaged in directing its future course.

Selected predictions

Chairman Harry W. Von Willer of the Erie-Lackawanna predicted in 1961 "that piggyback eventually will capture 60 per cent of all rail shipments." At about the same time, George O. Green, sales vice-president of Pullman-Standard Division, Pullman Incorporated, made a more realistic observation when he surmised that "by 1965 piggyback carloadings will probably be up 30 to 40 per cent from what they are today."  

17 Ibid.
CHART 4

PIGGYBACK GROWTH ESTIMATES 1963-1970
(In thousands of Carloads)

SOURCE: TABLE 4
In the opinion of the Assistant Vice President in charge of Southern's Rail-Highway service, the "future (is) limited only by what people don't know about rail-highway service or about the job it can do." 

In June, 1962, the Dun's Review carried a statement from Luther Hodges which read in part,

"Piggybacking is a tremendously growing force in domestic transportation, yet it has not developed as fast and efficiently as it logically could have and should have."

The often outspoken Morris Forgash made several predictions in January, 1963, among which were the following comments:

"In my view the future of transportation in this country--and in the world--is closely allied with the technology of what we term, for lack of a better word, piggybacking. What happens to transportation between now and the year 1975 is entirely in our hands . . .

. . . The Basic rail rolling stock will be flatcars, with roller-bearing wheels, equipped to accommodate standardized trailers or containers and to receive them from the end or either side . . .

. . . The one bright spot that stands out in the whole railroad picture is the phenomenal growth of piggybacking in the few short years since it was first offered to the public on a realistic basis."

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Patrick B. McGinnis believes that the real problem of the future is the continuing trend toward private carrier operations, because shippers will be unwilling to pay the price requested by common carriers. He believes that piggyback is the answer in the form of a traveling warehouse at less expense than the shipper can supply his own equipment and service. Mr. McGinnis looks upon piggyback as a workable coordination on hauls beyond 300 miles. He estimated "that in 1963 the railroads will carry close to a million flatcar loads and progressing on to the point where in 1970 the railroads will be carrying five million flatcar loads - 10 million trailer loads."21

The letters received from various railroad executives did not reveal any specific predictions. The consensus of opinion was that piggyback will grow, particularly involving long hauls and that the problems of equipment standardization, terminal improvement, topography, interchange of equipment, and financing will be overcome. Most stated that they believed piggybacking to be a definite step towards coordination and a smoother functioning transportation system.

IV. Problems And Corrective Actions

In facing the challenges of a new era in transportation history, the railroad industry has placed particular emphasis on the development and application of piggybacking. The dynamic growth of this relatively new method, particularly since 1954, has resulted in organizational changes and technological developments which have at least partially overcome the problems encountered.

Problems

Basic problems of scheduling, routing, needs of terminals, equipment standardization and interchange, as well as financing plagued the railroad personnel as a result of the addition of piggyback services.

Scheduling

One of the first problems that developed for many roads was that of scheduling. A decision had to be reached as to the feasibility of transporting piggyback loads, in special piggyback trains, as a part of regular freight trains on scheduled service or to combine these special loads with regular passenger trains.

Any decision to establish special piggyback trains meant that a large volume of piggyback traffic must be obtained, and that ample loading space and loading equipment such as ramps, cranes and dock facilities were needed. In addition, it was feasible only when
schedules could be set up which would not interfere with the general traffic of the road, and a balanced movement of merchandise in each direction of travel had to be practically assured. These special trains could only serve the two end locations with efficiency. If they served other terminals enroute, the advantages of speed and ease of handling would be lost. The Pennsylvania Railroad announced the inauguration of such a service in February of 1955, and the New York Central System began operations in April 1960.¹

Most of the piggyback traffic in the beginning and particularly since 1954 has been carried on regularly scheduled freight trains. The piggyback freight, therefore, makes up any percentage of the total train, depending on demand for it. At times this means the scheduling of only one or two piggyback flatcars in a full train load and at other times making up a majority of the train with piggy-back flats.

Piggyback services rendered in conjunction with passenger train service have to provide side loading for the containers or trailers so as to prevent the problems of breaking up a train for unloading at terminal points. In some cases the piggyback units were attached at the end of the train in accordance with destination points for more convenient drop-offs.

One apparent reason for such interest would be to attempt to

make the best possible use of train miles and to reduce the dollar losses being suffered by passenger train service. 2

Routing

Closely allied with scheduling were problems of routing. Decisions had to be made as to what areas or key points were to be served by trains utilized for piggyback transfers.

In some cases the routing was restricted by the lack of efficiency and adequacy of terminals, and the problems of interchanging of equipment and sharing facilities. Topography became a key factor as faster, more accurate schedules could be maintained in flat terrain areas. More important, however, particularly to Eastern roads, were factors involving the height of piggyback loads. When TOFC service was offered, the trailer wheels increased the height of the load, which meant that tunnel and bridge clearances were not adequate. The longer flatcars with additional overhang also presented a problem of side clearance on curves through tunnels and interfered with parallel trackage. These factors necessitated the changes of routes in order to avoid low tunnels or sharp curves in the road bed until such time as new tunnels could be built, tracks were straightened or the revamping of old facilities was possible.

Terminal and equipment problems

Terminal facility and equipment problems are not new to the railroad industry. Some rather unique problems, however, have emerged

because of piggyback traffic. The cost of terminal facilities required to handle piggyback traffic as well as the cost of specialized rolling stock was a major problem to many of the railroads. Capital expenditures within terminal areas for loading and unloading ramps and docks, pick up and delivery equipment, cranes, special handling devices, assembling and trailer storage areas, switching tracks, and personnel had to be considered in light of current and expected traffic. Some unused portions of existing terminal facilities were adapted for piggyback but in most cases proved inadequate as traffic increased.

The lack of standardized piggyback containers, trailers, and railroad rolling stock has been one of the major deterrents to the proper development of this service. Experiments were carried on with various sizes, capacities and types of equipment. Tie-downs for trailers were not uniform and freight cars, both new and adapted, were of varying lengths. Many of the railroads were engaged in developing their own specialized equipment, and this prevented efficient interchange between roads.

Organizational Changes

Organizational changes depend upon the nature and extent of any new undertaking as well as the flexibility of the present structure and personnel. The individual railroads originating piggyback traffic have tailored their organizations to meet their own specific goals, and therefore no one basic pattern of organizational change has been followed.
In letters received from various railroad executives, fourteen mentioned special organizational changes, eight said no basic changes had occurred and two made no changes originally but in 1963 had special departments to handle piggyback service.

The larger roads which are more actively engaged in the development of piggyback services have often set up separate departments or divisions to specialize in and to be responsible for piggyback traffic.

Railroads with a smaller volume of piggyback traffic, particularly those who believe that this type of operation will not expand substantially on their lines, have absorbed the tasks within various departments.

An excellent explanation of interdepartmental absorption of piggyback responsibilities was received from Glenn Squibb of the Bessemer and Lake Erie Railroad Company.

No basic organizational changes were necessary in the Traffic Department when Piggyback was inaugurated. The existing organization assumed all Piggyback duties for sales and service. General supervision of sales and service was assumed by the head of the department, and Sales Department absorbed the sales work and the Rate negotiation and tariff publication. The only organizational change on the Bessemer was the appointment of a Piggyback Supervisor with headquarters at our Pittsburg loading ramp, and with direct control over allocation of equipment, loading and tying down trailers, and dispatching tractors for pick-up and delivery.  

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The dynamic growth of piggyback since 1954 has been accompanied by a renaissance in the development of new specialized equipment. The designing, experimentation and manufacturing this equipment has been accomplished by individual railroads, railroad equipment suppliers, trailer and container manufacturers, and other specialized equipment builders. Some of these interested firms have combined forces, usually benefiting all concerned, by moving towards equipment standardization goals. Special terminals and terminal equipment have also been developed, and equipment pools have enhanced more uniform development.

It is generally believed that the new era in equipment development began with the introduction of the General Motors seventy-five foot flatcar in the fall of 1953. This unit was long enough to carry two large trailers and designed to permit side loading. With this spark, interest was generated and greater capital expenditures were forthcoming for terminals as well as equipment.

There are many variations of containers and trailers as well as flatcars to carry them. However, today the most widely accepted and used are the Clejan type end-loading system and the Flexi-van system. Others combine the two for better over-all performance. These two major systems were described by the Interstate Commerce Commission as follows:

The Clejan is the end-loading system where small flanged wheels are added to the trailers or containers, which are moved on or off the cars using the car center sills as a track. Trailers are carried on this track somewhat lower than on ordinary flatcars. The trailer
wheels and tires carry no weight and hang free. These cars cannot carry other freight because they have no floor. The loading and unloading time is about one-third of the usual end-loading process on a one-by-one basis. Terminal equipment required is a special track-end ramp for trailers, and a track end without bumper or ramp for containers. . . . Special flatcars are in use, and are owned or leased by . . . railroads and . . . freight forwarders. . . . Almost any trailer or container can be fitted with the small flanged wheels necessary to use this system. Recently the U.S. rights to this system, a French invention, have been purchased by the largest private car line operator.

The Flexi-Van system is a side-loading container system using . . . special flatcars equipped with turntables and hoists to handle the containers. . . which also serve as truck semi-trailers. The container has detachable wheels (bogies) for operation on the highway. No special equipment is required on the tractor, except an electric power takeoff to operate the hydraulic hoist on the flatcar. The flatcar cannot carry any other freight. The container is not readily useable with any other system. No terminal facilities are required except a level ground area near tie level on one side for turning the trailer on the flatcar hoist. A supply of "bogies" is required at each terminal. . . . Several containers can be simultaneously loaded or unloaded in the same train. The loading or unloading process is very rapid, requiring an average of 4 minutes. This system is now used by four railroads and is available from coast to coast. So far it has been exclusively a plan II, all-railroad, operation with railroad-owned cars and containers on railroad billing. No common carrier truckers have as yet equipped themselves with the special container-trailer required, in order to participate in this system under plan I.4

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The general movement towards standardized trailers, containers, and complete systems has been greatly enhanced by those firms established as equipment pools and leasing corporations.

**Equipment pools**

Equipment pools established by corporations set up solely for this purpose or as subsidiaries of manufacturers and users have been an important factor in the growth of piggyback. Two organizations, Trailer Train (TTX) Company and XTRA Inc. perform the bulk of these services. Two other important suppliers are GATX (General American Trailers Container Division), and R.E.A. Leasing Corporation.5

Trailer Train Company is the nation's largest operator of rail piggyback cars. This supplier of flatcars was incorporated in November of 1955 and operations began in March, 1956, with some 500 seventy-five foot cars. The basic car offered is eighty-five feet in length and some eighty-nine foot cars have been added to the service. TTX serves only its stockholders which in 1962 numbered thirty-four railroads and one freight forwarded, representing 76 per cent of U.S. Class I rail mileage. The members find this arrangement to be profitable and a tremendous aid when interchanging equipment. The Company controls its car flow by a distribution section which receives daily reports from each member road.6

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5 The X stands for privately owned.

The XTRA Corporation founded in Boston in 1960 supplies over 15 per cent of registered piggyback equipment to the railroad industry and serves some fifty-seven Class I Railroads. The railroads sign up as members of a per diem plan, and the company thus provides a national floating pool of trailers and containers rather than leasing equipment.

GATX, a division of General American Transportation Corporation, was alleged to be the first container-leasing pool set up basically for domestic operations involving only van-size containers. The general cargo container leases cover a seven-year period. Payment for this service is figured on container cost and usually runs about seventy cents per day per 1,000 dollars of cost.

The R E A Express Leasing Corporation was established by R E A Express in 1960 and began operations in 1961. It provides containers and trailers in a nationwide piggyback interchange pool called REALCO. Realco had forty-three participating railroads in March of 1963. It has placed major emphasis on trailers, but plans to expand its container service.

10 McCullough, op. cit., p. 36.
Terminal facilities

One major decision that had to be reached when the individual railroads began piggyback services involved all aspects of terminal facilities for handling this new traffic. Market studies were conducted by some of the railroads which indicated the most desirable locations for special piggyback facilities. Following a location decision, the present terminal facilities were examined to determine their adequacy and how they could be renovated or improved for efficient handling of trailers and containers. In some cases where very heavy traffic was expected, new facilities or so called "piggyback terminals" had to be developed. The type of terminal facility depended upon the type of service offered. Some railroads provided TOFC service only. Some offered COFC services and others provided for both types of service. This decision also involved the types of loading and unloading equipment which were available or planned.

In some cases where light traffic was expected and end loading (circus loading) appeared desirable, portable ramps were employed. These ramps were utilized in sections of terminal areas not crowded by other traffic or on previously abandoned spurs outside of the terminal areas. Many of the high-traffic locations were provided with special loading and unloading platforms the same height as the floor of the flatcars being utilized. If only end loading was provided, a piggyback load of perishables several carloads from the dock, was delayed until the trailers on cars ahead were unloaded.

In some high traffic areas, it appeared desirable to provide some type of side loading for the trailers. Side-loading techniques
were necessary when performing COFC services. Special equipment was developed for this purpose. Overhead cranes which could lift either trailers or containers were employed at some locations. Huge fork lift trucks were also developed for handling containers of twenty feet or less. Where space permitted, specially designed flatcars with turntable devices could be employed for loading or unloading containers. At some locations overhead cranes (which were expensive) or other side-loading techniques could be used and no platforms or recessed tracks were necessary.

In most cases terminal areas had to provide for trailer parking and also facilities for weighing the trailers. Special devices for automatically measuring the height of loads were used, particularly on lines where clearance was a major problem. In addition, special lighting facilities were necessary when a yard was to operate at night. 11

Because of the anticipated piggyback volume, most railroads are engaged in building new terminals or revamping the old ones. They are also providing loading and unloading devices or ramps at a number of new locations. These developments in terminal areas should enable piggyback traffic to be handled more efficiently, and an increased traffic flow should result.

11 Kelly, op. cit., p. 8.
V. Field Investigation Methodology

The information gathered by previous research implied that piggyback had matured and was being considered as a possible alternative method of shipping merchandise. Some asserted that anything transported could be shipped by piggyback methods, whereas others limited such statements to specific types of goods. The many products actually shipped by piggyback ranged from candy and beverages to appliances, machinery, automobiles, and missiles. It was generally agreed that materials which were bulky in relation to value, such as coal, agricultural raw materials, and foam rubber, could not be moved economically in this manner.

The proponents of piggyback, particularly the railroads, claimed several and varying advantages for utilizing this method of transportation. These transportation agencies and users usually stated the advantages in three major classifications: speed, dependability, and economy.

Many stressed speed as a major advantage when special piggyback flatcars became a part of a regular passenger train movement.

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Proponents also stressed speed in the over-all transfer of goods because of reduced terminal handling time and door-to-door service. Others asserted that the time saved enroute reduced inventory requirements, investment in inventory, insurance costs, and general warehousing costs.

Some shippers believed that piggyback shipments generally were more dependable regarding schedule of movement and delivery time. They usually stressed the reduction of risks due to weather uncertainties when comparing rail movements to over-the-highway movements. These individuals were usually referring to long distance transfers during the winter months in northern climates.

Shippers' statements regarding economy varied according to their given situations. They generally included, however, savings resulting from less damage, reduced pilferage, and lower handling costs. Some claimed that easier packaging resulted in savings. The major savings appeared to result from the reduced rate per hundredweight for Plan III and Plan IV movements and in some instances on Plan II shipments, according to firms utilizing piggyback extensively.

The implications of these readings and short personal interviews led to the assumptions that piggybacking, if used extensively, would have an impact upon the marketing functions performed by manufacturers and merchant middlemen, i.e., those firms taking title to the goods in which they deal. It was assumed that if piggyback methods were considered when selecting a mode of transportation it would affect the functions of physical supply, i.e., transportation and storage of incoming materials and supplies, and/or physical distribution,
i.e., the transportation and storage of outgoing merchandise.

The transportation function was assumed to involve rates, leasing, buying or renting equipment, regulations, time in transit, risks involved, clerical work, merchandise handling, convenience of use, facilities for receiving or shipping and carrier efficiency. The storage function was assumed to be affected by time in transit, i.e., lower or higher inventory requirements at the origin or destination point of the shipments. The physical facilities for such storage including loading and unloading docks and equipment and the presence of a rail siding at origin or destination may be affected by piggyback operations. These factors were assumed to have some effect upon the functions of exchange and other facilitating functions. For example, if proper coordination and communication existed between marketing personnel and transportation and storage personnel, overall efficiency of a firm could be improved by arriving at economical ordering of quantities in relation to the methods of transportation being utilized. Transportation costs could be reduced if amounts of purchase coincided with transportation media capacities such as boxcars and highway trailers or piggyback loads, preventing the necessity of shipping a partial load or loads. The savings in transportation expense may or may not offset savings incurred by buying in other quantities.

It was further assumed that the selling function could be affected by services rendered, stock on hand or stock outs, efficient delivery schedules, condition of merchandise on arrival, and quantities of sale, i.e., prices in units related to method of shipment. In
addition the sale could be affected, particularly on drop shipping operations, depending on the location of the account and whether or not railsidings were available.

Piggyback operations may affect the risk bearing function by reducing damage claims and pilferage and possible lowering insurance costs. The latter reductions could occur because of less rehandling of merchandise, smaller space requirements, and flexibility of warehouse location.

The finance function may be affected by decisions of cost of leasing or buying rolling stock versus cost of using carrier services, the financing of adequate facilities and financing of inventory.

The primary research, therefore, was undertaken to determine if the assumptions and/or possibilities of the effects of piggyback actually existed and were measureable. It was thought that the proponents' claims might not be substantiated by the facts when actual applications of piggyback methods were examined.

Selection of Firms

It was determined that the necessary data could be gathered only by a comprehensive examination of the piggyback operations of firms. Therefore, it was essential to secure the cooperation of the personnel of a few firms which considered piggyback as an alternative when choosing a method of transportation.

The secondary research had revealed the names of a few firms that were allegedly applying piggyback methods. An attempt to obtain the
names of firms utilizing piggyback from railroads and motor carriers proved futile. The cooperative shippers associations contacted were also unwilling to disclose the names of members and some were obviously fearful of competition and/or I.C.C. investigations.

The procedure decided upon was to formulate a list of firms in the Akron-Canton-Cleveland area from known firms, inquiries, and the telephone books. The area was selected because of a major concentration of industry, including numerous nationally and internationally known firms. Also, the area was served by major rail lines and trucking firms. Two of the rail lines (The Pennsylvania Railroad and the New York Central Railroad) had been active participants in piggyback operations and were major contributors to its growth. It was believed that this was representative of other industrialized areas. Personal visits were then made to some of these firms and others were contacted by telephone to determine whether piggyback methods were being utilized. The persons contacted were also asked if they knew of other firms in the area utilizing piggyback. The original list was revised to include only firms known to be utilizing piggyback methods.

The listings were then classified by personal judgment according to distribution levels and types of products manufactured or distributed. The lists were also organized by location in order to save time and expense when making inquiries.

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2 Other lists were later compiled in a similar manner in Stamford, Norwalk and Bridgeport, Connecticut. Firms known to be utilizing piggyback methods were contacted in New York, Chicago, Youngstown, Chattanooga, Atlanta, St. Petersburg, and Tampa.
Those contacted consisted of firms on all levels of distribution, i.e., manufacturing, wholesaling, and retailing. The manufacturers included some firms making various products for ultimate consumers (personal, family or household consumption). Other manufacturers that were contacted made products primarily for industrial consumption and some firms manufactured products for both ultimate consumers and industrial consumers. The wholesaling firms that were contacted included firms serving industrial consumers and/or retailers.

Contacts were made with firms having rail sidings and others without rail sidings available. The physical facilities of some firms were considered outmoded, where others appeared modern and efficient. Most of the firms were advantageously located near terminals which provided piggyback facilities, but some were located up to fifty miles distance from such facilities.

A preliminary interview was conducted to explain the reasons for the study, indicate the information sought, and to secure the cooperation of the firm's personnel. It was discovered in the early stages of this research that a full explanation of the study, including a review of the information written up to that time, and how the information secured from the firm would be utilized, had to be discussed before any specific company information would be disclosed. The original outline of the complete study was used for this purpose and a duplicated copy of the outline appearing in Appendix B was used to indicate the specific information desired from the firm. The preliminary interview was with the transportation manager or the director of
traffic because it was assumed that these persons would have more knowledge about piggyback operations and have access to the records needed for further examination.

As expected, some were not willing to cooperate and others appeared to be interested and willing to discuss the use of piggyback until they realized that specific company data, particularly quantitative data, were being requested. In some cases, it was necessary for the person interviewed to obtain clearance from superiors before information could be made available. In a few instances persons who appeared willing to cooperate were not able to secure clearance for the project. If the person interviewed was able and/or willing to cooperate and if it was believed that the necessary data could be obtained, an appointment was set up to begin the investigation. In these instances a copy of the outline to be used for data-gathering purposes was left with the person or persons interviewed. In the case of manufacturers, several days of discussion and examination of company records were necessary to obtain the data. The investigation of merchant middlemen, with the exception of Sears, Roebuck and Company and Montgomery Ward, Incorporated, usually required only the preliminary interview and one other appointment because the applications of piggyback were less extensive and few company records were available for analysis purposes.

Finally, the firms selected for purposes of detailed inclusion and major emphasis in the study were selected by judgment. It was believed that these represented a cross section of types of products and piggyback operations which would disclose the pertinent facts
desired for analysis. It was believed that the experience of these firms in applying piggyback methods was similar in nature to other companies interviewed but not included in the study. 3

Interviewing

In the early stages of the interviewing, it was determined that a set list of questions would not be feasible. One reason for this decision was that the persons interviewed did not appear to comprehend the overall aspects of the study readily enough and continuously asked why the answer was requested. The first few believed it would aid their comprehension and the overall data gathering procedure if an outline of desired data was presented to them. A second reason was that as the interview and examination of company records proceeded the outline was more easily modified to fit the needs of the various companies. It also meant that data for different sections of the outline could be gathered out of sequence. This was helpful because as unavoidable interruptions occurred in the interviewing, company records

3 The manufacturers were distributing varying products to industrial consumers and/or ultimate consumers. The firms utilized Plan II, III, and IV in different degrees. One of the three was not equipped with a rail siding. All were utilizing piggyback extensively enough to consider piggyback as an alternative method of shipping and records were available for study.

Few merchant middlemen were utilizing piggyback extensively enough to maintain adequate records. The firms finally selected for inclusion in the study were judged to have the best available information and represented groceries, shoes and department store lines.
applicable to other segments of the study could be checked, interviews with other personnel could be conducted, or physical facilities could be examined. The outline appearing in Appendix B was utilized for this purpose. It was believed that the result of such a procedure was to establish better rapport and eliminate some of the apparent bias which might have been obtained from answers to specific questions.

The respondents were asked to examine the overall outline of the study including information covered by secondary data. They were then asked to review the case study outline on specific company data being requested. This was discussed in detail before the actual data gathering was pursued. In some cases the outlines were left with the persons to be interviewed for one or two weeks before formal data gathering began. In most instances the interviewees were then well prepared to discuss the particularized piggyback applications, had reviewed historical data, and had determined where and in what form the needed information appeared in company files.

**Interview problems**

In most instances respondents were cooperative and believed they benefited from the data gathering thus necessitated. A problem resulted when company policy did not allow disclosure of exact quantitative data. In some cases the total number of piggyback loads by periods of time were only estimated as were the dollar-volume of shipment by periods. In other instances the data, although available from company records, were not revealed. Similar reaction occurred when information regarding shipment analysis of savings and/or additional costs was requested but
usually examples were provided without disclosing total figures.

The transportation executives interviewed generally appeared to have limited knowledge of some of the marketing activities of the firms, i.e., buying, selling, and inventory control, but had contributions to make regarding risk bearing and financing as it related to the transportation and storage activities. The exceptions to this were also evident; for example, Mr. Zollar of the Lincoln Electric Company had worked for several years in the marketing department. It was believed that a few others had previous experience in marketing or were closely coordinating piggybacking efforts with other segments of the firm such as was evident in Sears, Roebuck and Company.

It was also apparent that marketing personnel interviewed had very limited knowledge of the transportation activities, and particularly piggyback operations. When it appeared that the transportation respondents lacked information (or they stated a lack of information) concerning other activities, interviews were conducted with marketing personnel. However, in these cases the marketing personnel was found to be unaware of the activities of transportation personnel and little meaningful data were obtained. In fact, some were not even familiar with the term piggyback. At times the transportation executives interviewed gathered information from other personnel, particularly information pertaining to inventory policy, financing equipment, insurance changes, and sales data.
Interviewer bias

It was believed that some interviewer bias was also present. Although an objective viewpoint was attempted, it was believed that the interviewer was influenced by writings reviewed during the secondary data gathering stage of the study. The extent of this bias was obviously not measurable, and it was considered to have a negligible effect upon the findings.
VI. Piggyback Applications by Manufacturers

Secondary data available on specific company applications of piggyback were considered inadequate and too prejudiced for analysis purposes. Therefore, information in this section relied upon primary data gathered by personal contact.

This chapter includes information obtained by detailed examination of company records and interviews with personnel of the Hoover Company, the Consumer Products Division (formerly National Lead Company) of the Union Carbide Corporation, and the Lincoln Electric Company. It was believed that these firms were representative of the experience of many other manufacturers. In addition consideration is given to other firms utilizing piggyback less extensively or not at all, and to firms providing qualitative information but unwilling to reveal quantitative data.

Other major interviews included: Clairol Corporation, The Sherwin-Williams Company, Pitney-Bowes, Inc., Manufacturing Division of McKesson and Robbins Inc., Bridgeport Brass Corporation, Life Saver Corporation, and others that preferred to remain anonymous. The interviews revealed information similar in nature to that obtained from the comprehensive studies. The degree of utilization of piggyback methods varied from 1 per cent of traffic to about 15 per cent. Generally, the extent of application in each case depended upon the type of product, location of the firm, availability of rail sidings, amount of traffic moving in small loads, and the piggyback Plans available to the firms.
The Hoover Company

In 1963 The Hoover Company, North Canton, Ohio, had about 40,000 dealers around the world selling Hoover products. It was the oldest and largest producer of vacuum cleaners. The cleaners represented about one-half of Hoover's annual sales volume which had reached approximately 200 million dollars.  

Operations

The Hoover Company expanded its overseas operations after World War II as well as production in its North Canton, Ohio, plant. It was continuing to expand operations in 1963 which included building new storage facilities at North Canton. One reason for the expansion was that the company had diversified its product line while still placing major emphasis on cleaners.

Manufacturing facilities

The Hoover Company's largest and principal manufacturing plant in North Canton, Ohio, produces primarily for domestic consumption. This plant produces practically all the parts and accessories needed for Hoover cleaners. For its world-wide sales, Hoover makes its products in manufacturing plants located in London; South Wales (2 plants); Helsinki, Finland; Mexico City, Mexico; San Paulo, Brazil; Hamilton, Ontario, Canada; Bogota, Columbia; and Sydney, Australia.

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2 Major interviews with Frank E. Berrodin, Traffic Manager, The Hoover Company, North Canton, Ohio.
Product line

The Hoover Company manufactures a quality line of cleaners including both upright and canister types. The company also produces floor washers and polishers, clothes washers, can openers, steam irons, and hair dryers. In addition, it markets a shampoo and floor wax, a carpet shampooer and a carpet sweeper.

Marketing

The principal administrative offices are located in North Canton, Ohio. The firm maintains a general distribution policy and does not attempt to limit the number of dealers or sales territories. Its suggested retail prices are the same in any of its five divisions: Eastern; Ohio, Pennsylvania, and Washington, D.C.; Chicago; Los Angeles and West Coast; Kansas City and Midwest. Company salesmen call on dealers throughout the United States from approximately seventy-five sales and service branch offices.

The company operates a large warehouse at the main plant in North Canton and contracts for the services of seventeen public warehouses located throughout the United States. Approximately a three-month inventory of goods is stored in the warehouses located in Kansas City, Cincinnati, Boston, Chicago, Brooklyn, Dallas, Washington, D. C., Detroit, Buffalo, Newark, Atlanta, Minneapolis, Los Angeles, San Francisco, Seattle, Denver, and Philadelphia. These warehouses coincide with branch office locations. The dealers are billed on F.O.B. local warehouse terms, i.e., the dealer pays the freight charge from the nearest warehouse rather than from the factory. The factory
warehouse serves dealers within a 100-mile radius and ships merchandise
direct to the retail outlets of a nationwide chain under a distributor's
private brand. The company therefore ships only in full trailerloads
when shipping beyond the 100-mile radius served by the factory ware-
house.

Piggyback history

Prior to the extensive use of piggyback, the Hoover Company leased
a warehouse on a rail siding in Canton. The company owned a rail right
of way to its North Canton plant but had not installed a rail siding.
The shipments had to be loaded in trailer at the North Canton plant,
transported six miles, unloaded and placed in the warehouse, and later
loaded into boxcars. Approximately two boxcars were utilized per week.

Table 6 provides information on the number of shipments per year
to all destinations and by the various methods utilized. The company
usually shipped by trailer load or carload.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>RAIL</th>
<th>MOTOR</th>
<th>PLAN II</th>
<th>PLAN III</th>
<th>PLAN IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>78</td>
<td>665</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1959</td>
<td>67</td>
<td>807</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1960</td>
<td>72</td>
<td>606</td>
<td>0</td>
<td>17(b)</td>
<td>13(a)</td>
</tr>
<tr>
<td>1961</td>
<td>124</td>
<td>592</td>
<td>0</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>1962</td>
<td>102</td>
<td>604</td>
<td>0</td>
<td>98</td>
<td>2</td>
</tr>
<tr>
<td>1963</td>
<td>25</td>
<td>802</td>
<td>35</td>
<td>146</td>
<td>56</td>
</tr>
</tbody>
</table>

Source: Hoover Company records.
(a) The first Plan IV shipment was made on March 4, 1960.
(b) The first Plan III shipment was made on May 6, 1960, to
Dallas, Texas.
The Canton warehouse had room for only one boxcar at a time. The car would be spotted at the warehouse at night and usually pulled out the next night. At times the railroad was unable to deliver the boxcar when it was needed, and thus delays in loading would occur. Later two piggyback trailer loads were loaded in place of a boxcar because the trailers were easier to obtain. Although the rates were comparable, the Hoover Company was reluctant to use piggyback exclusively. Reports from the West Coast warehouses indicated that better service was obtained and less damage occurred when unloading piggyback shipments. Boxcars required special blocking before closing and loads often shifted slightly during transit. When the boxcar door was opened at destination it often damaged the cartons. Since the piggyback trailer doors opened outwardly, this problem was eliminated. The West Coast warehouses asked for shipments to be made exclusively by piggyback.

Plan III shipments were originally initiated by the Hoover Company on its own behalf. The company had problems because of the 60/40 mixture rule and at first was reluctant to join a shippers' association even to gain the benefits of "marrying" its trailers with the trailers of other firms. Usually a blanket rate per trailer was charged for the movement of two trailers with a maximum of 70,000 pounds. This meant that not more than 42,000 pounds (60 per cent) could be of one commodity. In order to comply with the mixture rule the Hoover Company, which averaged only 26,000 pounds per trailer, could not move more than 42,000 pounds of vacuum cleaners in two trailers. The balance of the load was made up of 10,000 pounds of polishers, sweeper bags, can openers, or other combinations of products.
Competitors were joining associations, and the company decided to investigate several shippers' associations. The legality of some shipper association operations was being questioned. After careful analysis the decision to join International Trailer On Flatcar Associates (ITOFCA) was made in an attempt to cut costs and to improve service by "marrying" loads with other members.

Plan II rates were published in 1963. This enabled the company to replace railroad boxcar movements with piggyback operations to points not being served economically by Plan III, such as Chicago, Denver, Kansas City, Dallas, Minneapolis, Philadelphia, New York, and Boston. Plan II rates could be negotiated, and some over-all costs lower than Plan III were arranged. This was basically because of the unfavorable location of the Hoover Company in relation to the Cleveland consolidation point of the association. The higher drayage costs at origin, in order to "marry" trailers with others in Cleveland, made the over-all cost to some destinations less favorable. The Plan II incentive rates provided for a minimum charge on 24,000 pounds and a 5 per cent reduction on 48,000 pounds, in not more than two trailers. This was lower by 5 per cent than the motor carrier rates.

A new warehouse was completed for use on January 1, 1964, at the plant in North Canton. The company then discontinued the use of boxcars and in March the lease on the Canton warehouse was not renewed. From January 1, 1964 to February 24, 1964, 178 trailerloads of various weights were shipped. Approximately 47 of the loads were shipped by piggyback methods or about 27 per cent. The company expected this percentage to increase substantially.
The traffic manager believed that the potential minimum use of Plan III would be about 14 trailers per month (over 160 per year). The potential minimum use of Plan II had been set at 28 trailers per month (over 300 per year). The decision to put more emphasis on Plan II to the West Coast involved rates and services rendered. A newly negotiated rate of $3.80 compared to a $4.60 rate by motor carrier and $4.08 rate by boxcar. For example, on a 40,000 pound shipment to the West Coast the company saved $112 per load over Plan IV rates or $320 per load over motor carrier rates. Plan III was not available to the West Coast.

**The effect of piggyback application**

The effect of the change to piggyback operations was examined in more detail by analyzing rates and charges, time in transit, load sizes, labor requirements, equipment needs, warehousing and inventory policy relating to outgoing merchandise. The investigation also included study of available information regarding buying, selling, damage and loss claims, and insurance costs.

**Effect on the transportation function**

The change to the utilization of piggyback as a method of transporting finished products by the Hoover Company had little, if any, effect upon the personnel organization of the traffic department. New positions were not created as a direct result of the change. The changes in workload and responsibilities of handling piggyback shipments and paper work were absorbed by the department personnel.
**Shipment analysis.**—The investigation of savings or additional costs in the performance of the transportation function of the firm involved rates and minimum weight per load by modes available. The data in Tables 7 and 8 were tabulated according to destination points. The analysis included only comparisons between over-the-highway movement and piggyback shipments because boxcars were no longer utilized.

The Plan III rates were figured on the basis of an average load and included: drayage at origin and destination, loading and unloading, rail charge, insurance charge, estimated ITOFCA fee, and the trailer lease charge for a one way movement. The rate varied according to the proportional charge made when trailers were "married" with a shipment from another firm for rail movement. Where only Plan III rates were designated in the table, no Plan II rates existed. Plan III charges to Philadelphia, Washington, and Chicago were higher than normal primarily because of the high cost of drayage at destination and therefore Plan III was not utilized to these points.

To most destinations lower rates could be obtained by utilizing either Plan II or Plan III rather than motor carrier. However, motor carrier rates to Boston and Cincinnati were lower than piggyback rates.

Piggyback shipments by the Hoover Company in most cases (to destinations where it is available) resulted in substantial savings to the firm. In some instances, however, it increased the cost of shipment depending on minimum weights and destinations. The company anticipated greater use of Plan II when more of the Plan II rates could be negotiated. The company believed fewer Plan IV shipments would be made. Motor carriers, both common and contract, were to be utilized to some
destinations, such as Boston and Cincinnati, and to other points where piggyback methods were not available.

**Transit time.**--The average transit times were longer than motor carrier average transit times when piggyback shipments were made to Boston, Kansas City, Dallas, and Denver. Piggyback shipments to Atlanta and to the West Coast had a shorter average transit time than motor carriers. Generally the average transit time of piggyback shipments when compared to the average transit times of motor freight shipments of the Hoover Company were either the same or of greater duration.

**Labor requirements.**--In early 1964 the Hoover Company began to utilize its new warehouse facilities in North Canton. The warehouse was not equipped with a rail siding; as a result, shipments were made primarily by motor carrier and piggyback methods. The labor factor was considered the same for loading trailers for either method of shipment. The rolling stock utilized consisted of forty-foot trailers which could be loaded on the average by four men in 2-1/2 hours. The wage scale averaged approximately $2.50 per hour per man. The total average cost of loading a trailer (average 26,000 pounds) was approximately $25 or about $2 per ton.

Loading costs were higher when the Hoover Company leased the warehouse in Canton. The rehandling of all shipments (plant to warehouse, warehouse to trailer or boxcar) tripled shipment loading costs. The average cost of loading for motor carriage was about $50 more and an even higher cost was evident when loading a boxcar. The cars generally needed a thorough cleaning, nails had to be pulled, and the cars had to
### TABLE 7
RATES AND TRANSIT TIME FROM NORTH CANTON, OHIO TO EASTERN POINTS
(AVERAGE TRAILERLOAD 26,000 POUNDS)  (FEBRUARY 24, 1964)

<table>
<thead>
<tr>
<th>Destination</th>
<th>Mode</th>
<th>Minimum Weight in Thousands</th>
<th>Rate per cwt.</th>
<th>Savings/loss per cwt. via Piggyback</th>
<th>Av. Transit Time in Days</th>
<th>Av. Time Saved via Piggyback in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston</td>
<td>MC</td>
<td>30</td>
<td>1.20</td>
<td>- .29</td>
<td>1-2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>34</td>
<td>1.49</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>PBIII</td>
<td>34</td>
<td>1.49</td>
<td>- .29</td>
<td>1-2</td>
<td>-3.5</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>MC</td>
<td>26</td>
<td>1.16</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>23</td>
<td>1.16</td>
<td></td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>MC</td>
<td>26</td>
<td>1.11</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>20</td>
<td>1.11</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Atlanta</td>
<td>MC</td>
<td>22</td>
<td>1.62</td>
<td>.09</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>PBIII</td>
<td>34</td>
<td>1.53</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>MC</td>
<td>23</td>
<td>.77</td>
<td>- .05</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>23</td>
<td>.82</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

**SOURCE:** Company records.

- MC - Motor carrier. Rates based on lowest rate to the area which were commodity rates (class and exception rates slightly higher).
- PB - Piggyback (Plan II, III, and IV designated).
- Minimum weights were designated on Plan III because of the minimum weight requirement for drayage to Cleveland, the nearest terminal point for ITOFCA.
### TABLE 8

**RATES AND TRANSIT TIME FROM NORTH CANTON, OHIO TO WESTERN POINTS**

*(AVERAGE TRAILERLOAD 26,000 POUNDS) (FEBRUARY 24, 1964)*

<table>
<thead>
<tr>
<th>Destination</th>
<th>Mode</th>
<th>Minimum Weight in Thousands</th>
<th>Rate per cwt.</th>
<th>Savings per cwt. via Piggyback</th>
<th>Av. Transit Time in Days</th>
<th>Av. Time Saved/Lost via Piggyback in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>MC&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20</td>
<td>.90</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>20</td>
<td>.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kansas City</td>
<td>MC</td>
<td>26</td>
<td>1.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>24</td>
<td>1.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBIII</td>
<td>48</td>
<td>1.60</td>
<td>.17</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>PBIII&lt;sup&gt;b&lt;/sup&gt;</td>
<td>34&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.64</td>
<td>.04</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Dallas</td>
<td>MC</td>
<td>28</td>
<td>2.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MC</td>
<td>24</td>
<td>2.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>48</td>
<td>2.22</td>
<td>.10</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PBIII</td>
<td>34</td>
<td>1.92</td>
<td>.20</td>
<td>5-6</td>
<td>-2</td>
</tr>
<tr>
<td>Denver</td>
<td>MC</td>
<td>25</td>
<td>2.63</td>
<td></td>
<td>4-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>24</td>
<td>2.63</td>
<td></td>
<td>6-8</td>
<td>-2</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>48</td>
<td>2.50</td>
<td>.13</td>
<td>6-8</td>
<td>-2</td>
</tr>
<tr>
<td>West Coast</td>
<td>MC</td>
<td>26</td>
<td>4.60</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PBIV</td>
<td>26</td>
<td>4.08 (present)</td>
<td>.52</td>
<td>4-5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PBII</td>
<td>26</td>
<td>3.80 (proposed)</td>
<td>.80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Company records.

<sup>a</sup> MC - Motor carrier. Rates based on lowest rate to the area which were commodity rates (class and exception rates slightly higher).

<sup>b</sup> PB - Piggyback (Plan II, III, and IV designated).

<sup>c</sup> Minimum weights were designated on Plan III because of the minimum weight requirement for drayage to Cleveland, the nearest terminal point for ITOFCA.
be lined at a cost of about $5. The boxcars utilized held about 6,000 pounds more than a trailer. The average cost of loading a boxcar at the warehouse was about $36 or approximately $2.25 per ton (including $5 car preparation and $6 for handling additional tonnage). Labor used in handling an average boxcar shipment (load, unload, and load) cost about $98 which was $73 more than loading a trailer at the new warehouse.

When operations began at the new warehouse piggyback movements also reduced handling charges. The additional costs for rehandling at origin, when utilizing boxcars raised the average cost of shipping by rail to a level above other modes, even where a very favorable rail commodity rate existed to a given destination. If rehandling and delivery were necessary at a destination point not equipped with a rail siding, the cost by rail increased even more. The cost of handling by piggyback or motor carrier was the same at origin and destination, because both were door-to-door movements.

**Effect on clerical operations**.--On boxcar shipments only one set of papers was processed. When two forty-foot trailers were utilized in lieu of a boxcar shipment one set of papers covered the shipment but two bills of lading had to be used. The added checking time averaged about five minutes and was considered negligible. When Plan III shipments consisted of only one trailer which was "married" with another by the association, some additional phone calls were handled by the executives of the traffic department. These interruptions on inquiries from the association office or calls to the association took additional executive time. Keeping a special check on the Plan III shipments,
to establish an average cost, also took a few minutes. The additional clerical work was considered more than offset by the savings involved.

Effect on the storage function

The piggyback movements generally had little effect on the storage facilities and operations of the public warehouses utilized. Better service was provided to West Coast warehouses because of piggyback movements. The Hoover Company was able to utilize newer one story warehouses in suburban areas or in industrial parks not served by a rail siding.

The successful transition to piggyback methods was an important factor in the decision to change storage facilities required at the main plant in North Canton. It was a major factor in the determination to abandon leased warehouse space in Canton even though it was equipped with a rail siding.

New warehouse facilities.--The new warehouse was constructed as an addition to the main manufacturing plant. The cost and inconvenience of rehandling shipments was eliminated. The new storage facilities enabled the firm to employ modern handling equipment and eliminated a substantial amount of hand labor.

The new dock area consisted of three forty-foot bays employing self-leveling docks for easy access to the various heights of trailer and truck beds.

Inventory changes.--Piggyback transportation had little effect upon inventory. The Hoover Company under normal manufacturing and marketing conditions maintained about a three-month supply of merchan-
disse in each of its seventeen public warehouses. When orders were received at the main plant, full trailerloads were shipped to these warehouses. These shipments sometimes included more merchandise than the order designated.

Time in transit had not been considered a major factor because motor carrier freight to most locations provided faster service. The piggyback shipments had saved some transit time to the West Coast, and unloading at destination had been improved.

**Effect of piggyback on other marketing functions**

Piggyback transportation methods had no discernible effect on the other marketing functions of the Hoover Company. The company had not requested the use of piggyback on inbound shipments. Most inbound traffic arrived by motor freight from within a 400-mile radius. About 60 per cent of the inbound freight arrived in full truckloads and very few boxcars were received. For example, only two boxcar shipments were received from suppliers in the first six months of 1964.

The selling function had not been affected by piggyback utilization because the company served all areas of the country from inventory stored in warehouses within specified marketing territories. The dealers were supplied from these warehouses by local motor carriers. The quantity of sale, terms of sale, sales techniques, the extent of market area covered, and services rendered to the dealers had not been affected by piggyback shipments. There had been no changes in the financing of finished goods inventory or equipment resulting from the switch to piggyback.
A detailed examination of damage and pilferage claims from company records showed that piggybacking had no significant effect on the risk bearing function. Piggyback indirectly affected insurance costs on the storage of inventory because of the decision to build the new warehouse. Insurance rates covering the inventory stored in the new building were not available for analysis in detail. The rates were considered lower on fire insurance. The insurance coverage for pilferage, water damage insurance, and flood damage insurance were eliminated because of improvements in the location of the warehouse and security provided.

Loss and damage claims generally had been insignificant in relation to total volume and value of the products transported. The company always relied on the carriers' insurance to cover loss and damage enroute. The only questions arose on Plan III shipments where carrier liability had not been established. The carriers claimed no legal liability on damage to the shipment unless negligence could be proven. Water damage sometimes occurred because of the position of the trailer on the flatcar and the lack of adequately sealed doors on the trailer. This was covered by a special insurance carried by the association.

The company recorded loss and damage claims in the same file and no separation was made between piggyback and other rail claims. All lost shipment claims were listed, and pilferage was not considered a separate classification. The majority of damage claims registered were below $25. Table 9 shows the claims record according to damage and loss by years from 1958-1963.
TABLE 9

CLAIMS -- RECORDED 1958-1963

<table>
<thead>
<tr>
<th>Year</th>
<th>Damage</th>
<th>Loss</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>34</td>
<td>105</td>
<td>139</td>
</tr>
<tr>
<td>1962</td>
<td>77</td>
<td>86</td>
<td>163</td>
</tr>
<tr>
<td>1961</td>
<td>79</td>
<td>90</td>
<td>169</td>
</tr>
<tr>
<td>1960</td>
<td>58</td>
<td>68</td>
<td>126</td>
</tr>
<tr>
<td>1959</td>
<td>66</td>
<td>65</td>
<td>131</td>
</tr>
<tr>
<td>1958</td>
<td>46</td>
<td>55</td>
<td>101</td>
</tr>
</tbody>
</table>

Source: Company claim records.

The information available was not sufficient to show any basic trends. The number of claims registered may or may not show any relationship to the number, volume, or value of shipments during the yearly time periods. Claims recorded in monthly periods ranged from zero to a high of eighteen and did not appear to be seasonally high or low in any given month of the year. The reduction of damage claims in 1963 could not be assumed to result from piggyback movements, because the claims appeared to be evenly distributed between the types of carriers utilized. The company believed that the good claim record and low dollar value of claims was due to good packaging, careful packing and marking, good loading practices and careful choices of carriers. It was believed that rail claims had lessened since the demise of boxcar shipments, but no discernable trend could be stated accurately.
Lincoln Electric Company

The Lincoln Electric Company's main manufacturing plant is located in East Cleveland. Approximately one-half of the 30-acre plant is utilized for the production of welding machines, welding accessories, and motors. The other half is used basically for the manufacture of welding electrodes.

Materials are received on docks extending the full length of the north side of the building. Truck trailers and rail cars are brought directly into the building for efficient handling of stock under all weather conditions. The shipping area is located along the south wall of the building where loading onto rail cars or truck trailers is accomplished inside the building. The rail siding and truck docks are served by conveyor belts and transfer cranes. Special loading equipment, designed by the company, and adjustable loading ramps are provided on the shipping platform. The equipment enables one man to load finished products into trailers or boxcars. The company employs about 1300 persons and has an annual sales volume of over 60 million dollars. Shipments from the Cleveland plant are destined for domestic and world markets.

Product line

The Lincoln Company manufactures electrodes for all types of welding. Some 43 variations of electrodes and corresponding fluxes make up

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3 Major interviews with Norman Zollar, Traffic Manager, The Lincoln Electric Company, Cleveland, Ohio.
about 70 per cent of the bulk of the goods shipped. Welding machines, accessories, and motors comprise close to 30 per cent of the shipments.

The company has a complete line of welding equipment and accessories. These welders are utilized for small welding repairs in garages and repair shops and for heavy construction and industrial uses in production plants. The welders are used by contractors, job welders, farmers, maintenance men, and manufacturers.

Marketing

The company maintains stocks in 40 warehouses; 28 of which are leased or owned by the company and 12 of which are public warehouses. About 150 sales engineers call on dealers, service shops, and large customers from 45 sales offices. The dealer organization includes over 1100 independent companies who service the trade with Lincoln products. Over 230 other independent companies located in major communities from coast to coast provide quick and efficient repairs on Lincoln welders. In addition, a factory staff of technical men supports the field representatives, and conducts seminars for customer designers and welding supervisors.

Piggyback history

Piggyback shipments of inbound materials had been received occasionally from New Jersey. Competitive rates of rail boxcars and motor common carriers were lower on products received, therefore, there had been no incentive to utilize piggyback methods on inbound traffic.
Low commodity rates were available to most points for outbound shipments. These low commodity rates for iron and steel products, coupled with the problems of meeting the mixture rule, limited the company's use of piggyback.

Plan II utilization

Few records had been maintained by the company on Plan II shipments. This all-rail plan was utilized basically the same as truck, and products moved on similar rates. Plan II had been used primarily to destination points served by truck, such as Baltimore, Chicago, Philadelphia, and St. Louis, and to scattered points within a reasonable radius from these main terminals. Plan II was first used in 1954 on the average of about one trailer per week or about fifty shipments per year. A steady growth was recorded each year, and Plan II was utilized about five times per week or approximately 250 shipments in 1962 and 1963.

Plan II was more flexible in operation than Plan III because stop-offs in zones were allowed (similar to truck shipments) enroute, and the trailer then continued on to its final destination. This arrangement was not available under Plan III. Occasionally to some points, the Plan II rates were not increased automatically when truck rates increased. This time lag enabled the company to take advantage of the lowest possible rate during the interim period.

Plan II was utilized when less than carload orders were received from customers of the railroads (builders, fabricators, etc.) and on shipments to Lincoln customers who manufacture for the railroads. In
these cases, where it was impossible to move a full boxcar economically, the all-rail piggyback plan sufficed to satisfy all the firms involved. It was also used for shipments that moved by water when railroads owned or controlled the dock areas. When shipping materials to these dock areas, motor carriers were billed for a wharfage charge. With Plan II piggyback, no warfage charge was levied.

Plan III utilization

The Lincoln Electric Company began utilizing Plan III to a few destination points in 1960. At first only a few loads per month were shipped but later trailerloads ranged from a low of 6 per month to as high as 45 per month. Approximately one-half of the Plan III shipments were set up by Lincoln by utilizing its own or leased trailers and providing its own product mixture to meet the 60/40 mixture rule. The other half of the shipments were "married" with trailers from other firms in the area by ITOFCA or the Ohio Forwarding Company. About 25 per cent of the time "marriages" could not be made and the shipment was sent by Plan II or by motor common carrier. Generally the problem of "marriage" existed when the load was destined for shipment under 450 miles.

In 1961 Plan III service was available to about five destination points. In 1962 the number of points served increased to ten, and in 1963 Plan III covered eighteen destination points. There had been an approximate annual increase in the use of Plan III of about 50 per cent since 1960. About 60 shipments were made in 1960, about 90 shipments in 1961, 135 in 1962, and over 200 in 1963. The primary
reason for utilizing Plan III was because of the savings in transportation costs when shipping to the designated points. In addition, the time saved in transit (in relation to boxcar movements) to some points such as Atlanta and Kansas City sometimes amounted to three days. Transit times of Plan III to these points were similar to motor truck in most instances.

Effect of piggybacking applications

Generally the piggybacking operations of the Lincoln Electric Company had a greater impact on the transportation and storage functions than on the other marketing activities of the firm. For example, the lack of inbound piggyback traffic restricted any possible effect that piggyback operations had on quantities of purchase or choice of transportation method on merchandise received. All equipment used in piggyback operations was leased, and therefore, no increased financial burden resulted from the change. The utilization of piggyback had not affected the selling or risk bearing functions significantly.

Effect on transportation function

The switch to the utilization of piggyback shipments did not require any reorganization of the traffic department or additions to

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4 The transit time experience was different than that of the Hoover Company because the "marriages" were affected in Cleveland. The Hoover Company was handicapped under Plan III as it was necessary to haul trailers to Cleveland, and arrival time sometimes delayed shipment an additional day.
personnel. The slight variation in processing time for paper work was absorbed by the present staff.

**Shipment analysis.**--Products shipped by the company were relatively heavy in relation to space requirements. The company did not have a weight problem in loading boxcars or trailers to maintain minimum load requirements and often loaded more weight than the minimum. Boxcar shipments averaged about 40,000 pounds, and trailers were usually loaded with about 35,000 pounds which was one-half the minimum load per flatcar under Plan III arrangements.

When mixes of all commodities, were considered, savings or losses on piggyback Plan III shipments ranged from an extra expenditure of $20 to a high savings of over $100, depending on the size of shipment, local drayage, and particularly drayage charges at destination. The average savings were approximately $50 per trailer on an average load of 35,000 pounds. The high weight factor enabled the company to take advantage of the shorter 36-foot trailers which moved on the rails under Plan III at a lower rate than longer trailers.

Occasionally longer trailers were utilized when it was possible to ship the higher commodity rated welding machines in the mixture. The machines required more space per pound, but were subject to higher commodity rates when shipped by rail boxcar or motor carrier.

Table 10 provides information on rates per hundredweight by mode of shipment, minimum weight, and transit time to specific destinations. The rates given were for the shipment of electrodes, which comprised more than 70 per cent of the shipments made by Lincoln Electric Company.
The Plan III rates were figured for an average load, on average lease time, and included average drayage charges at origin and destination.

In order to obtain low boxcar rates, the commodities were subject to a higher minimum weight per shipment. Plan II rates in the examples given in Table 10 were higher than truck load rates, carload rates, and Plan III rates but require lower minimums. The lowest rates possible were Plan III rates except in cases of boxcar shipments subject to a high minimum weight such as to New Orleans and Kansas City.

Transit time averages were somewhat lower on motor carrier shipments than on piggyback to all points listed in the table and considerably lower than boxcar shipments. Piggyback transit time, although longer in duration than truckload, was shorter in duration than boxcar. Occasionally, a shipment was held up for as much as two days in order to accomplish a "marriage" under Plan III arrangements. The company generally utilized carloads when shipping west of the Mississippi, basically because Plan III was not available and the low commodity rail rates applied.

Labor requirements.--The cost of labor for loading boxcars had been estimated at 3 cents per hundredweight greater than the cost of loading trailers. This amounted to about $13 on a 40,000 pound load. In order to load electrodes properly, special strapping (bands of steel) were utilized. It appeared that no significant difference was encountered while unloading. When welding machines or motors were loaded, it generally took one to two hours longer. When a trailer was being utilized, the over-all cost rose from $7 to $14 when loading machines
because the trailer lease was on an hourly basis. The extra lease charge occasionally offset the 3 cents per hundredweight savings.

Clerical operations.--When utilizing piggyback methods, particularly Plan III, an extra set of lease papers had to be signed. Extra time was spent in gathering and checking invoices. Phone calls placed in order to make "marriages" with other trailers and incoming calls attempting to effect a "marriage" also took the time of traffic department personnel. The extra time spent was estimated at 10 to 15 minutes per shipment.

Other requirements.--Piggyback had required slight changes in the arrangement of loads in the trailers. The distribution of weight in the trailer had to conform to axle load requirements for that portion of haul which was on the highway. Even when properly loaded at origin the load sometimes shifted while enroute. It was also necessary to load loose materials and particularly flux bags forward in the trailer to prevent water damage. Usually the trailer doors were not weather tight and some seepage occurred when these doors were toward the front of the train during transit in bad weather. In addition, when bags of flux were shipped, the bags were normally glued to pallets and each layer of bags glued to each other. When piggyback was utilized, the bags were taped as well as glued to prevent shifting of loads. This additional taping cost approximately $3 per trailer.
## TABLE 10

RATES BY MODE, TIME IN TRANSIT AND MINIMUM LOAD FACTORS
LINCOLN ELECTRIC COMPANY, CLEVELAND, OHIO

<table>
<thead>
<tr>
<th>Destination</th>
<th>Mode</th>
<th>Min. Wt. in Thousands</th>
<th>Rate/cwt.</th>
<th>Transit Time in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boston</td>
<td>CL</td>
<td>40</td>
<td>.88</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>TL</td>
<td>32</td>
<td>.92</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Plan II</td>
<td>30</td>
<td>.94</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Plan III</td>
<td>35</td>
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<tr>
<td></td>
<td>CL</td>
<td>22</td>
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</tr>
<tr>
<td></td>
<td>CL</td>
<td>40</td>
<td>.85</td>
<td>7-8</td>
</tr>
<tr>
<td></td>
<td>TL</td>
<td>35 (only)</td>
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</tr>
<tr>
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<td>5</td>
</tr>
<tr>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>.83</td>
<td>5</td>
</tr>
<tr>
<td>Birmingham</td>
<td>CL</td>
<td>22</td>
<td>1.33</td>
<td>7-8</td>
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<tr>
<td></td>
<td>TL</td>
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<td>1.13</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Plan II</td>
<td>22</td>
<td>1.57</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>.83</td>
<td>5</td>
</tr>
<tr>
<td>Kansas City</td>
<td>CL</td>
<td>40</td>
<td>.87</td>
<td>5-6</td>
</tr>
<tr>
<td></td>
<td>TL</td>
<td>20</td>
<td>1.32</td>
<td>3</td>
</tr>
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<td>TL</td>
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<td>32</td>
<td>1.10</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>1.03</td>
<td>3-4</td>
</tr>
<tr>
<td>New Orleans</td>
<td>CL</td>
<td>40</td>
<td>1.14</td>
<td>6-7</td>
</tr>
<tr>
<td>(factor of water rate competition)</td>
<td>CL</td>
<td>60</td>
<td>.83</td>
<td>6-7</td>
</tr>
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<td></td>
<td>TL</td>
<td>22</td>
<td>1.99</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Plan II</td>
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<tr>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>1.07</td>
<td>5</td>
</tr>
</tbody>
</table>

SOURCE: Company records.
Effect on the storage function

The utilization of piggyback had little discernable effect on the function of storage. However, some future changes may be necessary at certain destination points. The storage of finished products at the main plant was a temporary storage in an area reserved for shipping. It was along one-quarter mile of the south wall of the building next to the rail siding and highway vehicle loading docks. It had not been affected by the change to piggyback methods.

The warehouses and large customers had to order products far enough in advance of receiving dates so that the merchandise could be shipped by boxcar, truck, or piggyback. Time in transit was not considered a governing factor.

The company could not utilize piggyback to its fullest advantage when shipping to Minneapolis. The Minneapolis warehouse lacked ample loading and unloading facilities for trailers. Space may have to be added or a new warehouse built in order to accommodate more trailers. The trailer leases made it imperative that the trailers be unloaded immediately upon arrival, whereas boxcars could be unloaded at leisure.

The facilities at Fort Worth, Texas lacked parking and turn around space. Most trailers could not be maneuvered into position at the dock for unloading or loading which limited the use of piggyback when shipping to this warehouse.

The savings resulting from the use of piggyback methods had enabled the Boston warehouse to extend its marketing territory and increase the size of its shipments. For example, if the company saved "n" dollars
by shipping to the Boston warehouse, and also received better service by this method, then the Boston warehouse used the "n" dollars to contact and ship to customers in a wider area.

In Philadelphia, where costs of storage and delivery had been high and were increasing, the savings effected through the use of piggyback enabled the warehouse to maintain its territorial coverage without an increase in over-all costs.

**Effect on damage and loss claims**

The risk bearing function had generally not been affected to an extent deemed significant by the firm. The company believed that over-all claims were not a major problem. The product did not lend itself to pilferage, and the claims filed were small in dollar value. A review of damage claims by the company showed that the dollar value of boxcar damage claims averaged about $15 per car. The average dollar value of claims from Plan II and Plan III piggyback ranged from $5 to $10. The average dollar value on damage claims by truck was less than $5.

Over the three-year period covering 1961, 1962, and 1963 the number of damage claims registered on railroad shipments ranged from 56 to 61 as compared to truck damage claims of between 31 to 38. A hypothetical example of comparison follows: with 100 shipments by boxcar there were about 20 claims; with 100 shipments by piggyback there were about 12 claims; and with 100 shipments by motor carrier there were about 8 damage claims.
The company relied on carrier responsibility and otherwise was self insured. The only exception was on Plan III piggyback movements where it was difficult to determine when the damage occurred. The railroad accepted this responsibility only when it could be proven that the damage occurred on the rail haul portion of the trip. Lincoln Electric, therefore, carried an insurance policy with a $100 deductible clause on these shipments.

**Future utilization**

The Lincoln Electric Company believed that over-the-highway shipments would continue to be important, particularly on short hauls and to points where piggyback in lieu of boxcar shipments generally under Plan III whenever it was to its advantage in the form of lower transportation costs or better service rendered.

**The Consumer Products Division of the Union Carbide Corporation**

The Consumer Products Division of the Union Carbide Corporation was formed in 1959 when the old National Carbon Company was divided into two divisions. The National Carbon Company was founded in 1886, ten years after the first commercial carbon arc streetlight was demonstrated in Cleveland, Ohio.

The Union Carbide Corporation (formerly the Union Carbide and Carbon Company) has its headquarters in New York City. Its annual sales are over $1.6 billion which places it 27th nationally among industrial corporations. The company ranks thirteenth in net profit and seven-
teenth in terms of assets. It has over 70,000 employees, about 126,000 stockholders, and some 52,000 industrial customers and distributors.

In September 1963 the operating divisions of the Union Carbide Corporation acquired new names which was the final act of a unification program begun years before. Union Carbide has twelve major domestic divisions, the most important of which are: Chemicals, Olefins, Plastics, Linde, Carbon Products, Metals, and Consumer Products. The products of Union Carbide are manufactured in some 450 plants throughout the world. There are over 50 companies overseas affiliated with Union Carbide which manufactures and markets products in over 100 countries.

Union Carbide's domestic operations alone represent an annual expenditure of about $150 million for physical distribution. The transportation expenditure for domestic for-hire transportation services amounts to over $100 million. About 52 per cent of the transportation dollars are spent for rail transportation, approximately 40 per cent for highway services, and close to 8 per cent for water transportation.

Operations of the Consumer Products Division

The Consumer Products Division of the Union Carbide Company accounts for about 10 per cent of the corporation's gross sales annually. The

total yearly sales of this division are over $150 million. The division is expected to expand present operations and to diversify its product line by adding new products for personal, family, or household consumption.

Manufacturing facilities

The Union Carbide Corporation has eight manufacturing plants assigned to the Consumer Products Division. The major plants are located in Cleveland (Edgewater), Ohio; Fremont, Ohio; and Asheboro, North Carolina. The other plants are located in Red Oak, Iowa; Charlotte, North Carolina; Greenville, North Carolina; Bennington, Vermont; and St. Albans, Vermont.

Raw and semi-finished materials are received at these plants from other divisions of the firm as well as outside suppliers. Battery carbons come from the Carbon Products Division, oxygen from the Linde Division, plastics from the Plastics Division, ethylene glycol, methanol antifreezes, ethylhexanediol, and modacrylic fibers from the Chemicals Division, and ore from the Ore Division.

Product line

The Consumer Products Division manufactures Eveready flashlights and batteries of many models and types, Prestone, Winter-Flo, Trek and private-brand antifreezes, Prestone Car Care products, 6-12 insect repellant, Glad Wrap plastic film, Dynel home air filters, Linde emergency oxygen, a complete line of garden pesticides, and bottled gas for cooking and heating.
Marketing

Consumer products, the majority of which are sold under the Ever-ready and Prestone trade names, are distributed on a nationwide basis. A general distribution policy is adhered to in the United States, and the division sells its products at the same price in all areas of distribution. The country is divided into regions and districts served by company branch offices and warehouses at key points. Major warehouses for the storage of finished products are in operation in Boston, Jersey City, Atlanta, Memphis, Dallas, Chicago, Kansas City, Minneapolis, Cleveland, St. Louis and on the West Coast. The warehouses retain approximately three months supply of inventory which serves the general needs of its assigned territory. This amount of inventory is deemed ample to meet the normal demands of the market. Occasionally additional inventory is sent to these locations when orders received do not amount to full boxcar loads or trailer loads. When a disaster strikes in any area, usually the demand for batteries and flashlights depletes the stocks to such a degree that emergency shipments must be made from the plants or other warehouse locations. The division utilizes rail, highway, and the combination movement by piggyback. Piggyback shipments originate only from plants in Fremont and Cleveland, Ohio, and from Asheboro, North Carolina.

Piggyback history

The first shipment by piggyback methods was made from Cleveland to Dallas in 1958. This was a Plan II (all rail) shipment of dry cell batteries. The truck rates to Dallas appeared high because of the lack
of return shipments from Dallas, and Plan II was initiated to compete with the truck rates. Other shipments were switched to Plan II, because it provided more reliable service to the Dallas area.

Early in 1959 Plan III shipments of Car Care products were made to Chicago. The Car Care line consists of polishes, waxes, anti-freezes, car wash, tire cleaner, lead and rust preventatives, de-icing fluid, and brake fluid. Not many shipments were made on Plan III in 1959.

The use of Plan III grew slowly during 1960 and 1961 and up to July of 1962. The shipments originated at Fremont and Cleveland, "marriages" were made only within the company, and the shipments were destined only for New York and Jersey City. In July of 1962 the company joined ITOFCA, and "marriages" were then made with trailers of other area firms who were members of the shippers association. This arrangement also enabled the division to make Plan III shipments to many other key warehouse destination points and to make Plan III shipments from the Asheboro, North Carolina plant. Table 11 provides the Consumer Product Division's shipment record by mode for 1962 and 1963 for the major shipment points of Fremont, Cleveland and Asheboro. The Plan II shipments were made from the Edgewater Plant in Cleveland only.

The continued successful use of Plan III shipments indicated that Plan II had been abandoned. The last shipments on Plan II were made in February, 1963. In 1963 Plan III accounted for about 45 per cent of shipments originating from the three plants, up from approximately 20 per cent in 1962. It should be noted, however,
### TABLE 11

**NUMBER OF SHIPMENTS BY MODE AND YEAR**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Year 1962</th>
<th>Year 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truckloads</td>
<td>519</td>
<td>449</td>
</tr>
<tr>
<td>Rail (carloads)</td>
<td>660</td>
<td>435</td>
</tr>
<tr>
<td>Plan III (trailerloads)</td>
<td>300</td>
<td>733</td>
</tr>
<tr>
<td>Plan II (trailerloads)</td>
<td>19</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Company records.

that 121 more shipments were made in 1963 than in 1962. Also the average weight shipped in boxcars may be much higher than by trailer. Although the number of shipments increased, the actual tonnage shipped may be approximately the same for the two years. Table 11 clearly indicates a trend toward greater utilization of Plan III in total shipments from the three major shipment points. Plan III piggyback is only used from Asheboro and Cleveland to key warehouse points.

**The effect of piggyback operations**

In 1964, the utilization of piggyback methods (basically Plan III) by the Consumer Products Division of the Union Carbide Company had a greater effect on the transportation and storage functions of the firm than on its other marketing activities. More specific analyses of company records and operations tended to substantiate the general statement, and indicated considerable savings per hundredweight in relation to regular rail or regular over-the-highway shipments.
Effect on the transportation function

Greater use of Plan III had no effect upon the organization of the traffic department or the numbers of persons employed by the Division's traffic department. The responsibilities of handling the changes in paperwork and arranging for use of Plan III had been absorbed by the personnel already present.

**Shipment analysis.**--Table 12 provides shipment data by mode, average weight, rate per hundredweight, and average transit time to selected destinations from both Cleveland and Asheboro. The data showed that to all destination points the rate for Plan III was somewhat lower than regular rail carloads or trailerloads moving over the highways. The average weight transported by truckload (trailerload) ranged from 30 to 35 thousand pounds. In the past, carload shipments averaged about 40 thousand pounds when shipped from Cleveland. Shipments by rail boxcar from the Asheboro plant averaged about 60 thousand pounds which was the minimum weight requirement of the rail tariff.

The Plan III rates per hundredweight in Table 12 included drayage charges at origin and destination points, association estimated fee per trailer, a small insurance charge, and the rail charge per trailer for terminal to terminal movement. These Plan III rates were figured on an average weight per trailer of 40,000 pounds. Products shipped by the Consumer Products Division were relatively heavy, and there was no problem of meeting the minimum weight requirements. The rate for Plan III was an average cost of shipping by this method from the origin points. From Cleveland the rate represented an average cost of moving
<table>
<thead>
<tr>
<th>Origin</th>
<th>Destination</th>
<th>Mode</th>
<th>Min. Wt. in Thousands</th>
<th>Average Weight in Thousands</th>
<th>Rate/cwt.</th>
<th>Average Transit Time in Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleveland</td>
<td>Jersey City, N.J.</td>
<td>TL</td>
<td>23</td>
<td>35</td>
<td>1.28</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>40</td>
<td>50</td>
<td>.96</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>40</td>
<td>.72</td>
<td>2</td>
</tr>
<tr>
<td>Dallas, Texas</td>
<td></td>
<td>TL</td>
<td>23</td>
<td>30</td>
<td>1.89</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan II</td>
<td>23</td>
<td>30</td>
<td>1.78</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>40</td>
<td>1.17</td>
<td>5</td>
</tr>
<tr>
<td>Atlanta, Ga.</td>
<td></td>
<td>TL</td>
<td>22</td>
<td>30</td>
<td>1.59</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>40</td>
<td>40</td>
<td>1.18</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>40</td>
<td>.80</td>
<td>3</td>
</tr>
<tr>
<td>Asheboro, N.C.</td>
<td>Chicago, Ill.</td>
<td>TL</td>
<td>30</td>
<td>30</td>
<td>1.30</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>60</td>
<td>50</td>
<td>1.07</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan II</td>
<td>35</td>
<td>40</td>
<td>.86</td>
<td>2</td>
</tr>
<tr>
<td>Dallas, Texas</td>
<td></td>
<td>TL</td>
<td>30</td>
<td>30</td>
<td>2.07</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>60</td>
<td>60</td>
<td>1.71</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>40</td>
<td>1.15</td>
<td>3</td>
</tr>
<tr>
<td>Kansas City</td>
<td></td>
<td>TL</td>
<td>30</td>
<td>30</td>
<td>2.10</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CL</td>
<td>60</td>
<td>60</td>
<td>1.74</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plan III</td>
<td>35</td>
<td>40</td>
<td>1.17</td>
<td>3</td>
</tr>
</tbody>
</table>

SOURCE: Company records.
a 36-foot or a 40-foot trailer. From Asheboro only 40-foot trailers were available for use, and the rate represented an average movement. It was assumed that the transit time was considered average, because the lease charges were higher whenever unexpected delays occurred or lower when exceptional service was rendered.

The boxcar rate from Asheboro did not include a charge for rehandling, which was necessary because of the lack of a rail siding at the plant. Although the rates for Plan III were figured on an average of 40,000 pounds, a shipment of less than 30,000 pounds would still result in a savings when compared with the other methods.

On the average, a 40,000 pound shipment from Cleveland to Atlanta by Plan III rather than truck saved the company about $316. This reduction would be $152 if Plan III were utilized in lieu of a boxcar shipment of the same weight. Savings of $.93 per hundredweight on shipments from Asheboro to Kansas City amounted to $372 if Plan III were used rather than truck.

The average transit time by truck and Plan III to the selected destinations was the same except for movements to Dallas where truck service was more expedient. The transit time averages listed in Table 12 did not include the time element of obtaining the trailers or boxcars at the point of origin. In cases of emergency or when a need for rapid service arose, the company usually called a motor carrier because the rolling stock was available sooner. The carload transit time was much longer in duration to all destinations listed.
Labor requirements.--The labor requirements for loading and unloading trailers and boxcars at Fremont and Cleveland were about the same. Rail sidings were available at these points. The trailers, however, had to be loaded and unloaded immediately because of the daily lease rate.

The Asheboro plant did not have a rail siding, and company owned vehicles transported the merchandise some two miles to the rail siding when boxcars were to be utilized. The products were usually palletized and were transferred across a loading dock and unloaded into the boxcar. When piggyback was utilized the pallets were moved into the trailer at the plant and unloaded. Tractors then moved the trailers to a railhead for shipment. Company studies had determined that the excess cost of loading boxcars varied, depending on shipment size, weight, and product, but averaged a few cents per hundredweight with a range of $.04 to $.08 per hundredweight.

Equipment utilization.--The company owned equipment at Asheboro was used primarily to transfer goods destined for boxcar shipment to the rail siding. If all loads in and out of Asheboro were piggyback loads, then the private carriage would not be necessary. However, the trucks were also used to transfer products from Greenville, North Carolina, to Asheboro and to deliver inbound shipments from the railhead to Asheboro and Greenville. Previously many shipments from the Greenville plant had been moved in less-than-truckload lots at a higher rate. When the switch to piggyback was made, the reduction in time and
cost was sufficient to induce the company to utilize Asheboro as a reshipment point.

Clerical operations and control.--The Consumer Products Division of Union Carbide Corporation encountered problems of record keeping and additional paperwork when Plan III was first initiated. Later when the firm became a member of ITOFCA the association handled all the clerical work. The association sent the company an accounting of each shipment. Although no actual measurement was possible, it was believed that executives of the traffic department spent more time per hundredweight shipped when piggyback was utilized. This additional time was spent "marrying" trailers through the association and keeping a careful check on all shipments. It was usually easier to determine time in transit and delivery dates when using piggyback. From the viewpoint of shipment control, piggyback was considered a more dependable method of shipment.

Effect on the storage function

Although the Consumer Products Division is primarily a packaging and marketing operation, the company attempts to produce at a constant level to eliminate peaks and valleys. Warehouse facilities must be adequate to handle this steady inbound flow of merchandise. Piggyback methods have had little or no effect upon warehouse requirements. Some warehouse facilities had been modified to a degree by providing more ample loading dock space for trailers but overall remained basically the same. About a three month stock of inventory was usually
maintained at the warehouses scattered at key points throughout the United States. One warehouse which was originally set up for receiving rail traffic was somewhat handicapped because it lacked adequate trailer bays and trailer parking space. Work schedules for unloading were also revamped to handle the more frequent shipments.

Some of the public warehouses had requested greater use of piggyback because the driver would often assist in the unloading. When a boxcar shipment arrived at a public warehouse the unloading crew was made up exclusively of warehouse personnel. Occasionally, however, a public warehouseman would complain that piggyback created unloading problems because the trailer had to be emptied immediately, but a boxcar could be unloaded as time permitted.

Effect of piggyback on other marketing functions

Generally the switch to piggyback operations had not had an effect on the selling function. The extent of a sales territory covered by any warehouse, however, could be affected by transportation costs. A reduction in transportation costs by the utilization of Plan III piggyback could be one criterion established for changes in the distribution patterns. For example, the Consumer Products Division determined that the territorial coverage of its Chicago district could be expanded due to the reductions in cost on shipments from Asheboro to Chicago and that the Kansas City territorial coverage could be reduced. However, before action was taken, piggyback routing was established to Kansas City from Asheboro and later made available from
Cleveland to Kansas City. These developments and the resulting reduction in transportation costs to the Kansas City area placed Kansas City in a very favorable situation, and changes in territorial coverages were unnecessary to any specific point. The transportation charge did not affect the price of the products, because the same delivered price was charged anywhere in the United States.

Risks of loss and damage to shipments had changed very little since piggyback methods had been employed. The division did not have an extensive claim problem. The risk of loss and damage was not considered a major factor when determining the method of shipment. Some railroads raised the question of liability regarding Plan III shipments. The company thus analyzed its loss and damage claims to determine if insurance should be obtained on Plan III movements. It was decided that the cost of the insurance was prohibitive in relation to occurring losses. Under ITOFCA movements, insurance coverage was obtained by the association at a very low premium.

It was believed that other marketing activities of the firm had not been significantly affected by the change to piggyback methods.

**Future utilization of Plan III**

The Consumer Products Division expected the utilization of Plan III piggyback to remain fairly stable. The traffic department believed it had reached the peak in efficient utilization of this form of merchandise movement. The major shipping areas had already been covered but a small increase could occur as new products are developed. Some increase appeared possible if Plan III became available and feasi-
ble to West Coast points. The firm did not anticipate any further utilization of Plan II. In 1964 the use of Plan III to Chicago and Plan IV from Chicago to the West Coast was not economical.

Comparisons

Many variables were considered when making comparisons between manufacturers utilizing piggyback operations. The extent of use or successful application depended upon such factors as the type of product manufactured, product size, weight per cubic inch, packaging requirements, location of plant, provisions for warehousing, warehouse locations, customer locations, railsidings at origin and destination, piggyback plans available, location of piggyback terminals and consolidation points for associations, competitive rates of rail-boxcar and motor freight to given destinations, the firm's awareness of developments, and coordination of personnel.

Comparisons of the effects of piggyback on marketing functions performed by the manufacturers included the above factors plus the extent of coordination of the firm's activities, i.e., cooperation and communication between transportation executives and personnel responsible for inventory control, buying, selling, storage, financing, and insurance. Any changes in marketing activities due to the use of piggyback were noted for comparison purposes. It was believed that a general comparison of company activities followed by specific comparisons of piggyback applications, and comparisons of the effect of piggybacking on marketing functions could lead to improved
evaluation of decisions to utilize this method of transportation and how it had affected the operations of firms from a marketing viewpoint.

General comparison

Table 13 was provided to compare those general operations of the Hoover Company, the Lincoln Electric Company, and the Consumer Products Division of the Union Carbide Corporation; which had an influence on piggyback applications. The three firms distributed products on a national basis and utilized regional warehouses and sales officers. The Hoover Company which distributed goods destined for personal, family or household consumption did not have a rail siding at its plant and the plant was located 50 miles from the Cleveland Consolidation point for Plan III piggyback. The extra handling and drayage necessary to use rail boxcar raised total cost by rail above the other modes. The Lincoln Electric Company and the Consumer Products Division of Union Carbide Corporation had rail sidings available and generally were within reasonable distance from consolidation points. All three firms maintained approximately three months' supply of inventory in the regional warehouses which was determined sufficient to meet normal demands.

All three companies shipped generally in full carloads and full trailerloads. In most instances extra merchandise was shipped to the warehouses if the order received did not equal a full load. The products of the Hoover Company were considered light in weight relative to cubic size when packaged for shipment and often the firm was unable to meet minimum load requirements required by the transportation
<table>
<thead>
<tr>
<th>Factors</th>
<th>Hoover</th>
<th>Union Carbide</th>
<th>Lincoln Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product destination</td>
<td>Ultimate consumers</td>
<td>Ultimate consumers</td>
<td>Industrial users</td>
</tr>
<tr>
<td>Market</td>
<td>National</td>
<td>National</td>
<td>National</td>
</tr>
<tr>
<td>Distribution Policy</td>
<td>Selective - Retail dealers</td>
<td>General - retail outlets</td>
<td>Selective; distributors, direct to some users.</td>
</tr>
<tr>
<td>Channels</td>
<td>Direct to retailers</td>
<td>Direct to retailers some wholesale distributors</td>
<td>Direct and some industrial distributors</td>
</tr>
<tr>
<td>Warehousing</td>
<td>Plant and 17 regional - leased</td>
<td>Plant and 18 Regional owned and leased</td>
<td>40 Regional - 28 owned and 12 leased</td>
</tr>
<tr>
<td>Inventory</td>
<td>Approx. 3 months' supply</td>
<td>Approx. 3 months' supply</td>
<td>Approx. 3 months' supply</td>
</tr>
<tr>
<td>Rail sidings</td>
<td>None</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Distance to Rail terminal</td>
<td>15 miles</td>
<td>avg. 5 miles</td>
<td>10 miles</td>
</tr>
<tr>
<td>Distance to Piggyback Consolidation point Plan III</td>
<td>50 miles</td>
<td>avg. 5 miles, one plant to another</td>
<td>10 miles</td>
</tr>
<tr>
<td>Product weight per cube</td>
<td>light</td>
<td>heavy</td>
<td>heavy</td>
</tr>
</tbody>
</table>
| Media Available         | Rail - 15 miles; Motor Carrier and Piggyback at Plant | Rail, motor carrier and Piggyback at Plants | Rail, motor carrier and Piggyback at Plant.
rates. The other firms had no problems in reaching minimum weight requirements. All three firms considered piggyback as an alternative method when selecting a media.

**Piggyback comparisons**

Information related more specifically to piggyback comparisons is provided in Table 14. All three firms had attempted to use Plans II, III, and IV in varying degrees. Hoover had decided its most potential use to be Plan II, Union Carbide basically applied Plan III and Lincoln Electric used a balance of Plan II and Plan III.

The Hoover Company had been able to negotiate favorable Plan II rates and it was at a disadvantage in utilizing Plan III because of drayage necessary at origin to reach the consolidation point. The Consumer Products Division of Union Carbide generally benefited by lower overall costs by the use of Plan III and the Lincoln Electric Company selected Plan II or III according to overall cost to destination. Lincoln also used Plan II when shipping to railroads or railroad suppliers or when a Plan III "marriage" was not convenient.

Transit time saved or lost varied depending on plant location and destination point and was not considered a major factor by any of the firms. Lincoln Electric Company policy was that any warehouse or customer ordering had to plan on enough lead time for any media of transportation to be utilized. It appeared as if the firms were not aware of the cost of time in transit.

The firms usually found it cost more to use Plan II in lieu
<table>
<thead>
<tr>
<th>Factor</th>
<th>Hoover</th>
<th>Consumer Products Div. Union Carbide</th>
<th>Lincoln Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational changes</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Media used</td>
<td>Motor carrier, Piggyback II, III, IV</td>
<td>Rail boxcar, Motor carrier, Piggyback II, III, IV, Piggyback</td>
<td>Rail boxcar, Motor carrier, Piggyback, II, III, IV</td>
</tr>
<tr>
<td>Most Potential Piggyback Plans</td>
<td>II</td>
<td>III</td>
<td>II and III</td>
</tr>
<tr>
<td>Plan III utilization</td>
<td>only with association</td>
<td>own and with association</td>
<td>own and with association</td>
</tr>
<tr>
<td>Equipment for Plan III</td>
<td>leased</td>
<td>leased</td>
<td>leased</td>
</tr>
<tr>
<td>60/40 mixture</td>
<td>OK when &quot;marrying&quot; with shipments of other firms</td>
<td>no significant problem</td>
<td>no significant problem</td>
</tr>
<tr>
<td>Transit Time</td>
<td>No boxcar shipments</td>
<td>saved av. 3 days</td>
<td>saved av. 2 days</td>
</tr>
<tr>
<td>Boxcar vs. P.B.</td>
<td>Loss av. 2 days</td>
<td>same to most points</td>
<td>loss av. one day</td>
</tr>
<tr>
<td>Motor carrier vs. P.B.</td>
<td>saved 1.5 days to some points.</td>
<td>loss av. 2 days to one point.</td>
<td></td>
</tr>
<tr>
<td>Savings/Loss PB vs. Boxcar</td>
<td>No C/L</td>
<td>savings to all destinations on Plan III</td>
<td>Loss on Plan II, savings on Plan III except to Kansas City</td>
</tr>
<tr>
<td>PB vs. Motor carrier</td>
<td>Loss to Boston, Cincinnati, Atlanta equal to some destinations</td>
<td>Savings to all destinations analyzed</td>
<td>Savings to most destinations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>loss on Plan II to Boston.</td>
</tr>
</tbody>
</table>

TABLE 14

PIGGYBACK COMPARISONS
of boxcars but generally saved on Plan III to most destinations. The extra handling and drayage for the Hoover Company to utilize boxcars raised boxcar overall cost above Plan II rates. Motor carrier rates to Boston, Cincinnati and Atlanta were less than piggyback overall cost for the Hoover Company. Costs were about the same to other destinations except for some favorable Plan II rates. Union Carbide saved on Plan III costs in lieu of motor carrier to all destinations analyzed and Lincoln Electric recorded a loss when Plan II was used to Boston rather than motor carrier. All three firms leased piggyback trailers when utilizing Plan III. The Hoover Company had difficulty in meeting the Plan III 60/40 mixture requirements except when "marrying" trailers with association members. The other firms analyzed could meet the requirement within the firm or when "marrying" trailers within the association. Plan IV was only used by these firms when no other Plans were available to certain destinations, particularly the West Coast points.

The Companies also had to consider destination facilities when utilizing the two Plans considered operational (II and III). Some of the warehouses used and some customers did not have enough space to efficiently unload trailers or to park empty trailers. The location of the warehouse or customer was significant when high local drayage charges were assessed on Plan III moves to some areas.
Effect on marketing functions

Piggyback had not affected marketing functions significantly as indicated in Table 15, except for activities of transportation and storage. The utilization of piggyback had provided each firm with another alternative method of transportation. This was particularly beneficial to the Hoover Company, when it discontinued its Canton warehouse and the use of rail boxcars, for it provided a continuance of competitive rate negotiations. Piggyback was considered as a major factor when the decision was made to build the new warehouse facilities at the main plant of the Hoover Company which had no rail siding.

All of the firms indicated an increase in clerical work when piggyback was used in place of boxcars, particularly on Plan III arrangements. No organizational changes were made as the personnel absorbed the additional work. Lower overall transportation costs were claimed by the firms. Costs were lowered substantially to some destinations, which more than offset slightly higher costs to a few points. The inventory policies of the firms remained the same and no changes were contemplated. Claimed reductions in loss and damage were not measurable. The only change noted in riskbearing therefore, was a reduction in insurance coverage and premiums paid by the Hoover Company resulting indirectly from the building of new warehouse facilities.

The lack of an overall approach to physical distribution appeared to be evident. It was believed that a comprehensive study by each firm of its distribution system would reveal possible additional economies of
**TABLE 15**

**EFFECT ON MARKETING FUNCTIONS**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hoover</th>
<th>Consumer Products Div.</th>
<th>Lincoln Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Union Carbide</td>
<td></td>
</tr>
<tr>
<td>Buying</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Selling</td>
<td>None</td>
<td>Not measurable; Extension of one market area considered</td>
<td>Not measurable; Extended sales territory because of Savings by use of P.B.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Lower costs; more cler-</td>
<td>Lower costs; more cler-</td>
<td>Lower costs</td>
</tr>
<tr>
<td></td>
<td>ical work gives firm</td>
<td>ical work efficient</td>
<td>Minor increase in recording</td>
</tr>
<tr>
<td></td>
<td>alternative.</td>
<td>scheduling</td>
<td></td>
</tr>
<tr>
<td>Storage:</td>
<td>Major consideration when</td>
<td>Changes in equipment</td>
<td>No changes contem-</td>
</tr>
<tr>
<td>Warehousing</td>
<td>deciding to build new</td>
<td>and docks only; Minor</td>
<td>plated</td>
</tr>
<tr>
<td></td>
<td>warehouse at plant. No</td>
<td>changes at regional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>changes in leased</td>
<td>warehouses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>warehouses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventory</td>
<td>No discernable change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Risk Bearing:</td>
<td>records indicate little</td>
<td>claimed reduction but</td>
<td>claimed reduction but not</td>
</tr>
<tr>
<td>Loss and damage</td>
<td>change</td>
<td>no data available</td>
<td>measurable</td>
</tr>
<tr>
<td>Insurance</td>
<td>reduced coverage and</td>
<td>none - self insured</td>
<td>self insured</td>
</tr>
<tr>
<td></td>
<td>premiums on goods in</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>new warehouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
operation. In turn, more efficient utilization of manpower, equipment and physical facilities might be forthcoming. The reductions in transportation costs by utilizing Plan III piggyback methods coupled with the usual savings in transit time should enable firms to maintain lower inventories resulting in more favorable turnover at warehousing locations and reduced financial burdens. In addition such coordination of activities would result in less risk. Adjusting quantities of sale when selling direct, according to transportation media utilized and placing orders by warehouses in similar amounts would ease burdens of transportation personnel and provide for greater efficiency in overall operations.

Transportation decisions

The manufacturers analyzed considered transportation rates, expense of handling merchandise at origin and destination, load factors, minimum loads by media available, volume of shipment requested, and ease or difficulty of acquiring media selected. The companies interviewed did not place any emphasis on transit time except for emergency shipments and transportation personnel were not requesting changes in inventory policy due to the availability of more efficient transportation methods.

Generalizations

The many variables involved in determinations of which transportation methods to use by given firms to specific destinations precluded arriving at numerous generalizations. The following, however, are believed pertinent.
Manufacturers can lower transportation costs and reduce time in transit by application of Plan III piggyback methods providing drayage distances and charges at point of origin and destination are not prohibitive.

When "marrying" trailers with trailers of other firms for Plan III movement the manufacturer must be located within a few miles of the consolidation point (and destination must be only a few miles from end-terminal) to benefit from the use of this method.

Although the effect of piggyback on the marketing functions other than transportation are not generally measurable, there are indications that it does have an affect which will be more apparent when proper records are maintained and analyses are completed by manufacturers utilizing it substantially.
VII. Analysis of The Piggyback Operations of Selected Merchant Middlemen

Available literature only briefly theorized regarding the possible savings and greater efficiency of operations which might result from the proper utilization of piggyback methods by middlemen. Information concerned with the results obtained by the use of piggyback by merchant middlemen, i.e., middlemen who take title to the goods in which they deal, was practically non-existent in the literature.

It was generally believed that small independent retailers and wholesalers operating in a limited geographical area and receiving merchandise in less-than-carload and less-than-truckload lots could not benefit from limited use of piggyback methods. The Research revealed that very few merchant middlemen of any size were utilizing piggyback extensively enough to maintain records of such movements. A few of the firms contacted were unwilling to reveal information regarding any application they were making of piggyback methods. The majority of firms interviewed, either were not utilizing this method of transportation at any time or were using it to such a limited extent that useful information was not available.

The bulk of the information for this chapter was gathered by examination of company records and interviews with personnel of the Kroger Company, The Higbee Company, Montgomery Ward and Company, Sears, Roebuck and Company, and the Nobil Shoe Company. In addition, comments
and limited information received from other merchant middlemen utilizing piggyback less extensively or not at all were given consideration.

The firms listed are retailers and wholesalers interviewed in New York, Cleveland, Akron, Youngstown, Chattanooga, Atlanta, Tampa, St. Petersburg, and Canton, and included the following:

**Retailers**

The M. O'Neil Company  
Polsky's Incorporated  
The Miracle Mart, Inc.  
J. C. Penney Company  
The May Company  
Halle Brothers, Inc.  
F. W. Woolworth Company  
Acme Stores, Inc.  
Atlantic and Pacific Tea Co.  
Walgreens, Inc.  
Spartan Discount Dept. Stores, Inc.  
Butler Brothers, Inc.

Rich's Department Stores, Inc.  
Davison's Dept. Store, Inc.  
Publix Supermarkets, Inc.  
Maas Brothers  
Webb City  
S. S. Kresges Company  
Giant Tiger Stores  
Sparkle Markets, Inc.  
Shoppers Fair, Inc.  
Peoples Service Drug Stores, Inc.  
W. T. Grant, Inc.

**Wholesalers**

McKesson and Robbins, Inc.  
Monarch Finer Foods, Inc.  
Bingham Incorporated  
Hardware and Supply Company  
Sacks Electric Company  
Summervilles, Inc.  
Greybar Electric  
Canton Hardware  
Stanbaugh Thompson, Inc.

Danimiller Wholesalers, Inc.  
Independent Drug Company  
Fudim Brothers, Inc.  
W. M. Tynan Company  
Southern Wholesalers, Inc.  
Wilson and Company  
Akron Standard Meat Company  
Sugardale Meats, Inc.  
Superior Provision, Inc.

Other Merchant Middlemen were contacted but not interviewed.
The Kroger Company

The Kroger Company was organized by B. H. Kroger on July 1, 1883 in Cincinnati, Ohio. In 1964 the Company operated about 1350 large-scale supermarkets and was the nation's third largest retail food company. The Kroger Company stores were scattered in a 22 state area from the Great Lakes to the Gulf of Mexico. It employed about 38,000 full-time workers in stores, warehouses, manufacturing plants and offices and nearly 13,000 part time employees. Subsidiaries of the Company included the Market Basket in Los Angeles, Childs' Big Chain in Freeport, Louisiana, the Wyatt Food Chain in Dallas, and Krambo Markets in Milwaukee.

The warehousing divisions of the firm were located in Pittsburg, Washington, Roanoke, Charleston, Atlanta, Memphis, Nashville, Louisville, Cincinnati, Columbus, Cleveland, Madison, Detroit, Grand Rapids, Fort Wayne, Indianapolis, St. Louis, Peoria, Kansas City, Little Rock, and sub-warehouses were in Dayton and Toledo. A factory in Cincinnati produced candy, peanut butter, pork and beans, and spices which were stored in a Kroger warehouse in Springdale, Ohio. Bakeries at St. Louis, Columbus, Ohio and Solon, Ohio, were operated by the Kroger Company. Each division was operated as a decentralized unit with a vice president in charge. Merchandise was received at the division warehouses directly from producers except for private label goods which were ordered from the general office of the firm. The company contracted with canners and processors near each division headquarters whenever possible. Fresh beef, for example, was purchased locally, and frozen beef and other frozen
foods were ordered through the main office. Fresh vegetables were purchased by each division. Another subsidiary, Kroger Wesco Foods, a buying subsidiary, purchased from the growing areas according to seasonal need.

The Cleveland Division warehouse and offices were located in Solon, Ohio, just a few miles south of Cleveland. This eight-million dollar food distribution center covers 47 acres and served over 80 retail stores within a 135-mile radius of Cleveland. Other division operations varied in size depending on the number of stores served and the geographical area covered. The Solon warehouse had an inside dock area which could serve 116 trucks simultaneously; also, 38 railcars could be unloaded all under roof at one time.

History of piggyback

The Kroger Company first utilized piggyback around 1954 on a shipment of potatoes from Texas to St. Louis via Mopak. In 1964, the company divisions received shipments on Plan II, although the application of piggyback is limited.

Piggyback shipments have been received from the following firms:

<table>
<thead>
<tr>
<th>Church and Dwight</th>
<th>Syracuse and Solvay, N. Y.</th>
<th>Soda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rea-Lemon Puritan Co.</td>
<td>Chicago</td>
<td>Lemon extract</td>
</tr>
<tr>
<td>Derby Foods</td>
<td>Chicago</td>
<td>Peanut butter</td>
</tr>
<tr>
<td>Swift and Company</td>
<td>Chicago</td>
<td>Dog Food</td>
</tr>
<tr>
<td>Kitchen Art Foods</td>
<td>Chicago</td>
<td>Flour, cake mixes,etc.</td>
</tr>
<tr>
<td>Curtis Candy Co.</td>
<td>Chicago</td>
<td>Candy</td>
</tr>
<tr>
<td>Witco Chemical Co.</td>
<td>Chicago</td>
<td>Soap Powder</td>
</tr>
<tr>
<td>Blue Star Foods</td>
<td>Council Bluffs, Iowa</td>
<td>Frozen foods</td>
</tr>
<tr>
<td>Lever Brothers</td>
<td>Chicago and St. Louis</td>
<td>Soap and soap powder</td>
</tr>
<tr>
<td>Beechnut Foods</td>
<td>Rochester, New York</td>
<td>Baby food</td>
</tr>
</tbody>
</table>
These shipments arrived on a Plan II or Plan III piggyback according to the shipper's choice because freight is prepaid or allowed. This implied a savings to the shipper. Less than 2 per cent of the Cleveland division's goods were received on piggyback, a percentage which was negligible in relation to the total volume received. The Solon division was receiving the bulk of its merchandise by rail boxcar. It estimated this volume by weight at 60-70 per cent. The greatest number of shipments (60-70 per cent) arrived by motor carrier (less weight per shipment). It was believed that approximately the same percentage of loads received by other divisions were by piggyback. Because the shipments arrived prepaid, no records of piggyback movements were kept or specifically analyzed. Approximately 2 to 4 piggyback loads per week received by the Pittsburgh division and the Solon, Ohio Division were considered as truck shipments.

Effect on Kroger operations

Generally piggyback had little effect on the operations of the Solon, Ohio (Cleveland) division operations. Usually, when merchandise was ordered and not on a prepaid shipment, the division could obtain lower rates by ordering volume rail shipments than by utilizing over-the-highway or piggyback methods.

Plan II rates and truck rates were landed dock rates where boxcar shipments had to be unloaded. Company studies showed that the range in

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the cost of unloading a boxcar was from $.51 per thousand to $1.10 per thousand, or from $.05 to $.11 per hundredweight, depending on the type of product and the handling necessary (palletized loads or unitized unloading).

Table 16 indicates the savings which were possible when utilizing large volume rail shipments relative to piggyback Plan II and motor contract carrier on a specific commodity.

TABLE 16

<table>
<thead>
<tr>
<th>Mode</th>
<th>Minimum weight</th>
<th>Rate per hundredweight</th>
<th>Avg. Unloading charge per hundredweight</th>
<th>Total per cwt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan II</td>
<td>22,000</td>
<td>59.5</td>
<td>0</td>
<td>59.5</td>
</tr>
<tr>
<td></td>
<td>30,000</td>
<td>49.5</td>
<td>0</td>
<td>49.5</td>
</tr>
<tr>
<td>Motor contract carrier</td>
<td>22,000</td>
<td>59</td>
<td>0</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>30,000</td>
<td>49</td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>Railroad boxcar</td>
<td>36,000</td>
<td>48.5</td>
<td>.057</td>
<td>55.2</td>
</tr>
<tr>
<td></td>
<td>60,000</td>
<td>39.5</td>
<td>.057</td>
<td>45.2</td>
</tr>
<tr>
<td></td>
<td>75,000</td>
<td>36</td>
<td>.057</td>
<td>41.7</td>
</tr>
</tbody>
</table>

SOURCE: Company records and published tariffs.

Table 16 indicates the importance of the cost of unloading. In this situation, the savings on a 60,000 pound shipment by utilizing rail boxcar rather than motor carrier was $.038 per hundredweight or $22.80. The savings on rail boxcar vs. piggyback Plan II on shipments of 60,000 pounds was .043 per hundredweight or $25.80. On a shipment of 75,000 pounds the differential from rail boxcar would have been $57.75 by motor carrier and $58.50 by Plan II.
If the goods shipped weighed less than 60,000 pounds it would have been more reasonable to ship by Plan II piggyback or by motor contract carrier. The landed cost of a 40,000 pound shipment by rail boxcar would have been $240.80 compared to $196.00 by motor contract carrier or $198.00 by piggyback Plan II, providing 40,000 pounds was handled in one trailer.

Volume was therefore a determining factor in choosing the method of shipment, and the cost of unloading raised the total charge by rail above motor carrier and Plan II landed costs, on shipments of less than 60,000 pounds. The decision to ship by rail boxcar on loads weighing 60,000 pounds or over was questionable only when the unloading costs on the particular commodity reached $.095 per hundredweight. At this point the total landed cost by motor carrier or rail boxcar would be equal. Also, if at anytime personnel for unloading boxcars were not available, the alternative choice of motor carrier or piggyback was possible.

An analysis of rates and landed costs regarding other shipping points was made but the results in all instances were the same. One example was provided by the data presented in Table 17.

Piggyback had not affected operations of the Cleveland division of the Kroger Company to any significant degree. It was considered as an alternative method of shipment but not given any major emphasis because the piggyback rates were usually higher on most goods handled. The unloading of boxcars was not alleged to be a significant problem area for the cars were unloaded under roof and the personnel were
utilized in other capacities when not engaged in unloading. The stores served by the warehouse rarely received a full truckload of one commodity, therefore the advantage of not breaking bulk at the division terminal by use of piggyback was lost. Also, if such drop shipments to stores were desired motor contract carriers could have been utilized.

**TABLE 17**

**COMPARISON OF MOTOR CONTRACT CARRIER RATES AND RAIL RATES DAYTON TO SOLON, OHIO**

<table>
<thead>
<tr>
<th>Weight</th>
<th>Mode</th>
<th>Minimum weight</th>
<th>Rate</th>
<th>Avg. Unloading Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>36,000</td>
<td>truck</td>
<td>30,000</td>
<td>.37</td>
<td>$0</td>
<td>$133.20</td>
</tr>
<tr>
<td>36,000</td>
<td>rail</td>
<td>36,000</td>
<td>.355</td>
<td>23.52</td>
<td>151.32</td>
</tr>
<tr>
<td>60,000</td>
<td>truck(2)</td>
<td>30,000</td>
<td>.37</td>
<td>0</td>
<td>220.00</td>
</tr>
<tr>
<td>60,000</td>
<td>rail</td>
<td>60,000</td>
<td>.275</td>
<td>34.20</td>
<td>199.20</td>
</tr>
<tr>
<td>75,000</td>
<td>truck(3)</td>
<td>30,000</td>
<td>.37</td>
<td>0</td>
<td>277.50</td>
</tr>
<tr>
<td>75,000</td>
<td>rail</td>
<td>75,000</td>
<td>.255</td>
<td>42.75</td>
<td>234.00</td>
</tr>
</tbody>
</table>

**SOURCE:** Company records and published tariffs.

Kroger buyers checked closely with the transportation personnel on the most reasonable transportation rates for specific purchases from given shipping points when Kroger was to pay the freight. They were not concerned, however, with buying in quantities related to any specific method except where the "lot" purchased was by truckload or carload rather than pounds, bushels crates or by the piece. Warehouse and inventory control personnel believed that piggybacking had not
affected operations and the loads arriving by piggyback were handled in the same manner as truck shipments.

The Higbee Company

The Higbee Company, a large-scale department store in Cleveland, Ohio, had utilized piggyback methods for shipments of bedding and mattresses since January of 1963. The Company had also experimented with shipments of gliders and light cushions, but no regular movements by piggyback had been made for other types of merchandise.

The shipments of mattresses had been arriving by Plan II from Lockland, Ohio. These shipments had previously been made by boxcar, but under warehouse conditions in 1963 and 1964, it had been inconvenient to unload because the boxcars could not be spotted advantageously. The mattresses had to be moved a considerable distance across a dock area for loading into racks when boxcars were received which often damaged the mattresses. When utilizing piggyback methods the trailer could be placed near the storage area and the racks loaded directly from the trailer and then moved into stock with a forklift truck. It was alleged that piggyback was more expensive to use than the previous rail movement, but it was believed that the convenience of unloading offset the additional charge for the service. The company received

Interviews with personnel of other grocery firms, A & P Stores, Inc., Acme Stores, Inc., and Durkee Foods, Inc. revealed that these Companies were using piggyback methods even less extensively than Kroger and did not consider it advantageous.
approximately 100 shipments of mattresses by Plan II during 1963. The minimum weight under this Plan II movement had been set at 10,000 pounds. Under the minimum weight the charge had been about $148 per trailer or $1.48 per hundredweight. The same merchandise previously moved by rail boxcar at a cost of $375.00 per carload on a 30,000 pound minimum or approximately $1.25 per hundredweight. The company estimated the cost of Plan II to be approximately $.30 per mattress more than when boxcars were utilized.

Most of the goods sold by the Higbee Company arrived by motor freight and consolidated rail boxcar. Shipments from the New York area were consolidated with shipments destined for other local area department stores and discount chains.

4 The minimum weight requirements could not be met with mattress shipments. Trailerloads averaged between 7,000 and 9,000 pounds and boxcars averaged between 16,000 and 18,000 pounds depending on the sizes of mattresses shipped. Smaller mattresses weighed more in relation to size than larger mattresses. Analysis of the same mattress mix shipped by trailerload and boxcar refutes company estimates. A 9,000 pound load by trailer actually costs $1.63 per hundredweight and an 18,000 pound load by boxcar costs $2.08 per hundredweight. A 7,000 pound load by trailer costs $2.11 per hundredweight and a 16,000 pound load by boxcar costs $2.34. In addition better turnover could be achieved by use of the smaller shipments under Plan II arrangements. No coordination exists between personnel in charge of inventory, buyers, and transportation. When an order is placed buyers notified the trans- portation department of the type of merchandise, amount, and shipping point. Often the amount was not related to modes. For example the shipment may have been for one and one third boxcars or one and one fifth truckloads, or any such combination leaving partial loads to be shipped at higher cost.
The Higbee application of piggyback Plan II had affected storage and handling as mentioned above but was considered to be a temporary arrangement. The company was remodeling its warehouse facilities to provide better unloading facilities for boxcars. This movement of mattresses was believed to have reached its peak as to the number of trailers utilized in a yearly period and damage claims were non-existent.

Little change was expected in the types of modes utilized and piggyback applications were to be considered whenever convenient or whenever a savings could be achieved.  

Montgomery Ward Incorporated

In 1964, Montgomery Ward Incorporated transported merchandise to its many retail department stores and mail orders outlets by rail, motor, air, forwarder operations, and private carrier fleet. The company attempted to coordinate all modes of transportation in order to expedite shipments and provide its stores with the best possible service relative to the type of merchandise being shipped.

It maintained several major distribution centers at strategic locations throughout the United States. Manufacturers shipped by car-load to the major centers which distributed the merchandise to metropoli-
tan warehouses serving the local retail outlets. The major distribution centers were located in Baltimore; New York; Chicago; Kansas City; Fort

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Worth; Allen Park, Michigan; San Leandro, California; and Portland, Oregon. Additional centers were being planned for other key cities. When possible full truckloads and boxcar loads were sent direct from manufacturers to Ward's metropolitan warehouses. Orders consisting of mixed merchandise were forwarded from the major distribution centers.

**Akron Metropolitan Warehouse**

The Akron Metropolitan Warehouse was established in the spring of 1961 and served two stores in the Akron area. A third store was being constructed in 1964 which would be served by this metro warehouse. The warehouse handled major appliances, furniture, camping and boating equipment, scooters, motors, lawn mowers, fence supplies, peat moss, other bulky products, and products requiring some assembling operations. The metro warehouses did not distribute soft goods nor fashion merchandise. The Akron warehouse had 12 truck-trailer docks and three bays for rail boxcars.

**Piggyback operations**

The Akron metro-warehouse began receiving piggyback Plan II shipments in November of 1963. The trailers were delivered to the warehouse docks by the railroad and the driver aided the warehouse employees in unloading. About 1 or 2 Plan II shipments per week were received in November and December of 1963. The number of piggyback loads received increased to between 4 and 8 per week by June, 1964.

The shipments received varied from full truckloads of one particular type of merchandise shipped direct from producers to mixed
trailer loads which arrived from the company's major distribution centers. Plan II shipments had consisted of full loads of furniture from Georgia, peat moss from Canada, fence from Iowa, and camping equipment from Iowa. Plan II shipments received from Chicago or other major distribution centers consisted of from 10 to 60 separate customer orders of varying merchandise, pooled for the two local stores and for warehouse stock. For example, special customer orders for livingroom suites, bedroom suites, kingsize mattresses and box springs, motor boats and trailers not in warehouse stock arrived in a pool shipment. The shipment was then distributed to the specific local store or delivered directly to the local customer. Piggyback Plan II service to the Akron warehouse was expected to increase. Service had been good, and savings in rates were possible.

Effect on marketing functions

The Akron Metropolitan Warehouse had been able to reduce transportation charges by the use of piggyback methods. A study of shipments from Chicago to Akron by piggyback showed an average saving of $26 per trailer when Plan II was utilized rather than contract motor carriers. The minimum weight requirement on piggyback Plan II and by contract motor carrier was 20,000 pounds. Normally the company could load between 9,500 and 16,000 pounds. Plan II rates were $.69 per hundredweight for a total cost of $138.00 per trailer. The contract motor carrier rate had been $.82 per hundredweight for a total cost per trailer of $164.00. Much of the freight received in Akron arrived prepaid and no indication of rates appeared on the shipping documents.
Comparison of rates on heavier shipments was not available.

Differences in transit times were considered as insignificant by Akron personnel because it had varied from 1 to 5 days when contract motor carriers were utilized and from 2 to 5 days when transporting by Plan II from Chicago to Akron.

Usually more time was involved in unloading a piggyback shipment than a boxcar on a per hundred pound basis. The major reason for this additional time and cost was because many miscellaneous types of merchandise were received on piggyback loads which required additional checking and transferring to various warehouse locations. Boxcars usually contained only one type of merchandise to be stored in one location in the warehouse. Contract motor carrier shipments and Plan II required approximately the same amount of clerical time as the goods were usually destined for either one of the two stores or the warehouse and both were pooled types of shipments. Boxcars, motor freight and piggyback methods, were utilized for different purposes. It was estimated that as much as two hours additional clerical work was necessary to check in a trailer load with from 50 to 75 paper shipments compared to the checking of an average of five statements per boxcar load.

The piggyback shipments had not required any changes in the personnel organization and had not affected storage operations of the Akron Metropolitan Warehouse because the procedure for receiving and storing was the same as for truck. The buying (ordering) function had not been affected and the risk bearing function regarding damage claims had shown no significant changes. The company was self-insured
and relied upon the carrier's responsibility and insurance coverage on shipments. The company expected to increase its utilization of piggyback whenever it was possible to improve service, to make it more reliable, to improve efficiency, or to reduce transportation and handling costs.

Other areas served

The company had utilized piggyback in other areas of the country, particularly from New York to Detroit, Chicago, and St. Paul. This service replaced motor carrier and freight forwarder service which previously handled shipments from the major distribution center in New York to some 200 stores in the North Central region. Purchases from many sources on the Atlantic Coast were consolidated at Ward's New York terminal on piggyback trailers. The trailers were delivered to New York Central's rail yard where the vans were placed on flatcars. Special piggyback trains moved out of New York at midnight, at passenger train speeds, bound for Detroit and Chicago. When the shipments arrived, they were transhipped by private carrier fleet to Ward's stores. Ward's piggyback plan was assumed to cost less than motor freight and forwarders' small shipment charges. Also the transit time from New York to Detroit, Chicago, and St. Paul had been reduced from a range of 5 to 9 days by boxcar to about 2 to 4 days on relatively

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6 Interviews with Robert Wagner, Warehouse Manager, Montgomery Ward, Inc., Akron, Ohio, May 6 and 12, 1964; Paul Dizer, Regional Manager, May 12, 1964; (No additional quantitative data available).
fixed schedules. Ward's also consolidated shipments with other firms which were members of shippers associations in the areas covered.

Ward's was therefore gaining the advantage of lower transit time from the Atlantic Coast to Chicago, Detroit, and St. Paul, which could conceivably have an effect upon inventory operations at those locations. Special piggyback trains were not available from Chicago to Akron and transit time was considered insignificant. The company was, however, saving because of the lower rates on movements from Chicago to Akron. It appeared that the Akron metro-warehouse operations were not affected in any way by the use of piggyback.  

Sears, Roebuck and Company

Sears, Roebuck and Company, which began operations in 1887 by selling watches, now sells about 60,000 items in 761 stores. In addition, it operates some 1,055 "catalog stores" with the general catalog offering some 170,000 items. Sears owns and operates an insurance company, auto-financing company, retail credit subsidiary, savings and loan associations, and has an equity ranging from 9 to 100

7 The other department stores interviewed (except Sears, Roebuck and Company) were making very limited use of piggyback. The only applications noted were when consolidated shipments were too small to utilize full boxcars and the local association (Akron, Cleveland, Atlanta, Tampa) would authorize a Plan II movement. None of the firms were utilizing Plan III movements. The personnel of the firms did not appear to be very well informed about piggyback operations. A vice-president of a six unit chain believed the firm was too small to utilize piggyback methods.
per cent in various manufacturing companies which supply about 30 per cent of Sears' products. Sales volume for the firm for the 1963 fiscal year was $5.1 billion.

Sears, Roebuck and Company utilizes all forms of transportation and operates a subsidiary, Terminal Freight Handling Company, to provide for its transportation needs. The Terminal Freight Handling Company is a part of the Traffic Division of Sears. The general traffic manager works closely with the vice president of operations. The company is now decentralized into "traffic groups" by territories with seven division traffic managers. Each territory has a territorial traffic manager who reports directly to a vice president of the territory. A regional traffic manager reports to the territorial traffic manager.

The Terminal Freight Handling Company is the major member of a shippers association. This association operates in from 15 to 18 major terminal areas where it assembles less-than-carload and less-than-truckload shipments in carload or piggyback trailerload lots. The Terminal Freight Cooperative Shippers Association originated about 25 years ago when Butler Brothers Inc. and Sears pooled shipments from the Chicago area to Dallas. This partnership proved to be workable and expanded to include other firms. The associations' 42 members can utilize any of the Terminal facilities. The firms attempt to make direct movements with no

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8 John McDonald, "Sears Makes It Look Easy," *Fortune*, May, 1964, p. 120.
in-between terminal operations. For many years the members primarily assembled less-than-carload lots into carload lots for shipment to destination points.

**History of piggyback operations**

Sears began limited piggyback operations utilizing 5 to 10 trailers per month under Plan II in 1955. Plan IV was utilized in 1956 and continued along with Plan II until 1960. In 1960 Sears began utilizing Plan III and converted shipping percentages from 5 per cent piggyback to 40 to 45 per cent piggyback in 1964. Piggyback provided a more efficient method of moving smaller volume lot shipments by mixing with other "source loads" (loads from manufacturers in the territory). In the past some manufacturers received orders for partial carloads and the shipment had to be retained until a full carload could be assembled for a specific destination point. With piggyback, partial loads could be picked up from various locations resulting in better service to the stores. Because of these arrangements, stores were able to order more frequently in smaller volume and thus reduce inventories.

**Cleveland Terminal operations**

The Cleveland Terminal operation assembled merchandise from Ohio, West Virginia, Western Pennsylvania, and Northwestern New York. About 35 to 40 motor common carriers were utilized in the past to transfer the goods to the Cleveland terminal. This number was later reduced to

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around 20 such carriers because of better services rendered and lower rates. The company expected the carriers in the Cleveland based territory to provide overnight delivery service to the terminal on about 96 per cent of the shipments, but in some instances would accept second-day delivery.

Only a few piggyback shipments were made by the Cleveland Terminal operation prior to February, 1964. Little was being done before this time in utilizing "source load" pickups for piggyback. Records indicated that only about 20 trailer loads per month were used. New emphasis was placed on piggyback as the "source load" concept was developed into an important operation. In February (Sears' fiscal year ends January 31), some 64 piggyback loads were shipped from Cleveland. This total increased to 97 in March and to 166 in April. These trailer loads represented about 1.3 million pounds in February, approximately 2 million pounds in March, and about 3.5 million pounds in April. The company believed that the peak volume had been reached at the Cleveland Terminal and that future utilization would approximate 170 trailer loads per month.

The majority of the piggyback trailers moved on Plan III arrangements. A very limited number (about 6 per year) of Plan II shipments were made from Cleveland. Plan II was used only when one trailer was ready for shipment and could not be held to be "married" with another trailer under Plan III to the same destination point. The Cleveland terminal primarily shipped trailers to Atlanta, Chicago, Boston, and New York under the Plan III arrangements. In addition, trailers were
received primarily from Chicago for the 12 Cleveland area stores, consisting of 3 department stores, 2 limited soft line stores, and 7 so-called hardline stores.

The Cleveland Terminal of Terminal Freight Cooperative Association primarily shipped piggyback loads of washers and dryers, lawn mowers, vises, and some miscellaneous products. Other terminals shipped leather goods, leather slabs, lighting fixtures, vacuum cleaners, stainless steel ware, wading pools, carpeting, plastics, linoleum, paint, sewing machines, motors and generators, garden tools, tail pipes and mufflers, toys, tents and canvas goods, machine tools, electric stoves, wallpaper, radios, and televisions. The list was growing and practically all of Sears' sources of merchandise were involved in piggyback movements.

**Effect on transportation function**

In general, the various duties necessary to provide piggyback movements had been added to the work load of terminal employees. These duties included shipment control, arranging for pickup, marrying trailers, and extra clerical work. On a national basis, however, a manager of piggyback operations was designated whose duties involved planning, organizing, and controlling piggyback movements and coordinating efforts with the buying departments. This new manager was concerned only with piggyback shipments.

**Shipment analysis**

An example of the possible savings in transportation incurred by the use of piggyback movements was provided. (Table 18). The
washers and dryers varied from a low of 16,000 to a high of 20,000 pounds per boxcar with an average load of about 17,000 pounds depending on the size of the order. Approximately the same weight could be loaded on a piggyback 40-foot trailer as on a boxcar. The trailers were loaded two to a flatcar. The Plan III charges consisted of:

$376 for railhead to railhead charge
20 drayage from Marion to railhead at $10 per trailer
40 lease charge on trailer, $20 per trailer
30 drayage at destination, $15 per trailer
10 association overhead

$476 Total (or $238 per load)

TABLE 18
PIGGYBACK VS. BOXCAR SHIPMENTS OF DRYERS
MARION, OHIO, TO NEW YORK AREA

<table>
<thead>
<tr>
<th>Mode</th>
<th>Minimum Weight</th>
<th>Average Weight</th>
<th>Total Cost</th>
<th>Average Transit Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carload</td>
<td>16,000</td>
<td>17,000</td>
<td>$304</td>
<td>4-5 days</td>
</tr>
<tr>
<td></td>
<td>22,000</td>
<td>17,000</td>
<td>$360</td>
<td>4-5 days</td>
</tr>
<tr>
<td>Plan III piggyback</td>
<td>up to 72,000</td>
<td>30-35,000</td>
<td>$476 ($238 per trailer)</td>
<td>2 days</td>
</tr>
</tbody>
</table>

SOURCE: Company records.

On a 16,000 pound shipment, therefore, the savings by shipping Plan III equaled approximately $66. The drayage, overhead, and lease charges used were average figures. The members of the association received a refund on any overages charged according to the percentage of total traffic handled by the association for the member during the year. A considerable reduction in transit time had been obtained on
Plan III movements from Marion to the New York area. Usually the savings in transit time averaged about two days. This method provided second morning (7 a.m.) delivery. Trailers were often placed on faster, special piggyback trains which traveled at passenger train speed.

Washers shipped were heavier in weight. Company records indicated a savings of approximately $30 per trailer on Washers from Marion, Ohio, to the New York area. Lawn mower shipments from Newark, Ohio, averaged about 17,000 to 23,000 pounds depending on the type of mower being shipped. One trailer of mowers was destined on occasions for Hackensack and one for Farmingdale and were moved on the same flatcar to the New York terminal. The flexibility of shipping by Plan III was further illustrated by the movements of Columbian vises which were very heavy in relation to space requirements. Anytime a shipment of over 5,000 pounds of vises was to be shipped to Philadelphia, for example, the terminal checked with the plant in Marion, Ohio, to determine if a load of washers was to be routed via Philadelphia. The trailer was loaded short on washers leaving space for the partial load of vises and both moved on the same Plan III trailer, providing additional savings to the association.

Labor

The initiation of "source load" pickup for piggyback shipments had eliminated substantial amounts of rehandling at the terminal. The company estimated that it saved $.32 per hundredweight on labor which would equal $64 per 20,000 pound shipment. The overall cost of terminal operation had also been greatly reduced due to these special piggyback
movements. For the first two months of the 1964 fiscal year (beginning February 1) the overall cost of operations at the Cleveland Terminal was approximately $.17 per hundredweight handled. Records of a comparative two-month period in 1963 showed the cost to be $.455 per hundredweight. This reduction was partially due to an increase in tonnage handled; however, the increased tonnage was directly attributed to the piggyback operation. The tonnage was recorded as being shipped by the terminal but terminal operations other than record keeping, "marrying" loads, and extra phone calls, were not utilized. In addition to labor savings at the terminal, the manufacturing plant saved as much as $30 per load on piggyback shipments. Loads did not have to be braced and blocked extensively, as Sears' used the full trailer cube. The use of boxcars required lumber and labor to secure the load. The company estimated that it took about 6 to 8 hours to load a boxcar compared to from 1 to 1-1/2 hours per trailer. One manufacturer reported unloading a trailer in three minutes on an interplant transfer.

**Effect on storage function**

The Terminal Freight Cooperative Association had changed virtually all terminal facilities to accommodate trailers. Utilization of piggyback movements had a noteworthy effect upon the Chicago freight terminal facilities. The company moved to a new freight house location in 1956. The new facility provided for the loading and unloading of 240 boxcars and 375 trailers all under roof. The increase in piggyback movements had required an addition of approximately 160 new trailer bays. In addition, the use of boxcar facilities had been reduced by some 50 per
The company was studying the possible future use of part of the present boxcar facilities for trailer loading and unloading.

The faster, more dependable piggyback shipments had affected storage requirements of Sears' warehouses and stores. In past years large orders were placed immediately after the midyear inventories were taken, thus concentrating purchases in a short period of time. In turn this caused a transportation bottleneck. In addition, carload orders were placed far in advance to insure delivery when needed. Better control of inventory and the coordination of transportation and buying, coupled with more dependable piggyback movements, had enabled stores to reduce inventory. In some cases, outside warehouse space (rented by the stores) had been eliminated.

For example, a shipment of sleds on August 2, 1963, consisting of two carloads created a storage problem at the Cleveland stores. The shipment arrived too early in the year and had to be stored for four months until the Christmas season. Utilizing piggyback the stores could place orders for sleds to be shipped December 1st and still be well prepared for the buying season. It was also possible to order in smaller quantities and thus prevent overstocking for the shipment dates, and arrival dates were more strictly adhered to. The stores reorder point had been lowered because of the reduced transit time. The lower inventories had enabled the stores to have more stock turns per year.
Effect on other marketing functions

Piggyback had a favorable effect on purchasing and ordering by Sears, Roebuck and Company. Its greatest effect had been registered on seasonal products such as lawn mowers. Initial orders and reorders of mowers had been reduced in volume. Piggyback had particularly affected buying during the selling quarter. Shipments were made in smaller amounts, at a savings, and in less time than was possible previously. This enabled buyers to place orders in closer accordance with demand for merchandise in a given store during the season. The company claimed that careful coordination between buying and transportation existed. The buyers were actually increasing or decreasing quantities of purchase in order to meet the requirements of piggyback movements.

In order to compete in more distant markets, a terminal in Lenore, North Carolina, had been specifically designed for consolidation of furniture shipments to move in volume lots. Specially designed piggyback trailers were being applied to operations of the new consolidation terminal. The trailers were high in cube, low-belly types which provided for maximum loads. The company believed this new application and its resulting savings placed it in a more favorable competitive situation in some market areas.

Total numbers of damage claims appeared to be reduced by the use of piggyback transportation. The cost of damage to Sears as a shipper had increased, however, because of greater liability when utilizing Plan III and IV.

Pilferage had been greatly reduced because of the pick up arrange-ments at the source. The loading of trailers at the source resulted in
one less handling of the freight, thus removing one temptation. The thefts by stevedores was usually the highest rate. One unexpected problem arose as full trailerloads of television sets disappeared 10 rather than individual packages.

Sears' employees believed they had "just scratched the surface of piggyback utilization." Careful organization and control enabled efficient use of piggyback service and the company insisted on being able to offer second-morning delivery within a 1,000-mile radius of terminals. The company gave assurance of delivery almost to the hour: This careful scheduling reduced the cost of handling at destination points. The company's distribution cost analysis was based on this efficient delivery schedule which relied on special fast train service. The leasing of trailers from the railroads was also based on two-day charges and efficient utilization.

Atlanta Terminal

The experience of the Atlanta Terminal of the Terminal Freight Cooperative Association regarding piggyback movements was similar and yet unique. It was similar in operation techniques of movement because it received piggyback loads as well as shipped them but unique because it had no "source load" pick up. The terminal received only

a very minor percentage of shipments by motor freight and was almost entirely a rail terminal engaged in shipping and receiving boxcar loads and piggyback trailerloads. About 80 boxcars were handled by the terminal compared to each 20 piggyback loads. Piggyback loads had been handled for about 3 years.

Piggyback loads moved both from Chicago to Atlanta and from Atlanta to Chicago. Loads were received from Philadelphia and shipments were made to Memphis, Dallas, Miami, and Tampa. Plan III was utilized about 85 per cent of the time. The terminal management attempted to keep buyers informed of the trends in the service, and, as a result of regularly established piggyback movements on more dependable schedules, buyers were able to have lower inventory requirements. Transit time was lowered by one day in relation to boxcar movements to and from the Chicago area. The Atlanta terminal management believed that savings occurred because of better railroad service, because smaller units of shipment were possible, and because it usually cost less when utilizing Plan III. 11

The Nobil Shoe Company

The Nobil Shoe Company was established about 75 years ago. Akron, Ohio was the central headquarters for this chain of retail stores. The company operated in 9 states: Wisconsin, Michigan, Illinois,

11 Interview with James North, Manager, Terminal Handling Corporation, Atlanta, Georgia, July 17, 1964.
Indiana, Iowa, Kentucky, Pennsylvania, Maryland, and Ohio. There were 123 store units in the chain averaging from $25,000 to $70,000 gross per year per store.

The company places its orders for shoes 4 to 8 weeks in advance of production, i.e., shoes ordered in June would be received at the end of August. Each order arrived usually in several small shipments related to the production schedule of the company's major supplier, the International Shoe Company.

**Piggyback operations**

The Nobil Shoe Company began utilizing piggyback in 1961. Only about 4 per cent of shipments were received by piggyback and the rest was made up of motor freight shipments. No boxcar loads were received because shipments were small, less-than-carload rates were high, and service was poor. The company seldom received a full truckload shipment. The average weight of a shipment was between 1,000 and 2,000 pounds. The shipments ranged in size from 10 cases to 300 cases. Only Plan III shipments were utilized and arrived primarily from St. Louis. The Nobil Shoe Company was a member of Associated Shippers' Association in St. Louis which handled freight only by piggyback methods.

The company received piggyback shipments totaling 169,500 pounds from August, 1962 to August, 1963. Average size of the piggyback loads approximated that of motor truck shipments and no separate record of load size had been recorded by the company. The less-than-truckload lots were consolidated with shipments for other companies in the Cleveland-Akron area at the association's St. Louis terminal. This
consolidation of loads resulted in an average of one-day loss in transit time.

Savings

Savings were noted by assuming the current rates applicable to piggyback shipments and applying them to the number of pounds received from August, 1962 to August, 1963 for comparison to motor freight shipments of the same amount. The piggyback rate from St. Louis was $3.60 per hundredweight compared to $4.11 per hundredweight by motor freight on less-than-truckload shipments averaging 1,000 to 2,000 pounds. The company thus saved about $867 on its shipments (170,000 x .51 difference).

The management stated that approximately 100,000 pounds that arrived from St. Louis by motor freight during the same period should have been shipped by piggyback. This would have resulted in additional savings of about $510 (100,000 x .51 difference). Shippers were not following the company's instructions or management had not designated the correct routing.

Viewpoint

The company had very few piggyback claims and no basic change in loss or damage claims had resulted from its utilization of piggyback methods. Only on two occasions piggyback had been utilized on shipments directly to the stores in the chain. Shipment size and the requirements of the individual stores usually precluded this arrangement. The Nobil shoe executives viewed piggyback as a means of saving transportation
dollars only. It had not affected other functions of the firm and the loss of a day in transit was not considered significant because of the somewhat unique methods of ordering and delivery required in the shoe industry.

Other Retailers

The other retailers interviewed included grocery chains, independent and multiunit department stores, drug chains, variety store chains, hardware chains, and discount house chains. These firms listed in footnote Number 1 of this chapter were located in New York, Cleveland, Akron, Canton, Atlanta, and Tampa.

Most of the grocery chains that were contacted had not received any piggyback shipments. One had received two shipments in 1963 and another had intermitently shipped a few trailerloads from the East Coast to the Cleveland area but was not willing to disclose any information.

The department stores, variety stores, hardware stores, drug stores and discount houses interviewed were members of shipping associations. These stores consolidated boxcar shipments with other members of the various associations according to metropolitan areas served by the stores. The associations involved had only utilized piggyback services on occasions when shipping less-than-full boxcar loads so that the shipments were not delayed. For fast shipments of merchandise these

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12 Interview with Thomas Nobil, Vice President, Nobil Shoe Company, Inc., Akron, Ohio, June 2, 1964.
firms relied on motor freight and considered boxcar shipments to be the most economical and efficient in relation to needs. None of these firms had made any formal study of the use of piggyback shipments in place of boxcar traffic. Most of the firms interviewed believed that piggyback could only be applied efficiently by firms having a common warehouse serving several stores in a metropolitan area.

Wholesalers

The wholesalers interviewed handled many lines of merchandise including groceries, hardware, plumbing, electrical, drugs, office equipment, industrial supplies, and meats.

The firms were interviewed in New York, Cleveland, Canton, Youngstown, Atlanta, Chattanooga, and Tampa. Some of the wholesalers interviewed were receiving a few intermittent trailerloads by piggyback methods, but not enough to provide accurate records of such shipments.

Of the meat wholesalers, the New York based firms (W. N. Tynan Company and Fudim Brothers, Inc.) stressed the preference for piggyback shipments of meat from the Middle West because of less damage compared to shipments arriving by motor freight or by boxcar. In addition rehandling was not necessary at the rail terminal when piggyback loads were received in lieu of boxcar shipments. Information regarding savings on rates was not available and accurate studies of handling costs had not been made. Fudim Brothers, Inc., usually sent a crew of 4 or 5 men to the rail terminal to unload a refrigerated boxcar. The meat was loaded into a truck, transported to the warehouse, and unloaded.
The necessary rehandling resulted in higher labor costs and more damage to the meat. The marketing functions of the firm other than transportation had not been affected by the use of piggyback. Speed in transit was not considered a factor because motor freight lines utilizing a tandem crew provided faster service. The shipper usually paid the freight, but Fudim Brothers, Inc. benefited because of reduced handling and dockside service.

The W. N. Tynan Company utilized piggyback about one-half of the time. The meats arrived either piggyback or motor freight so the load factor was similar in either case and other functions were not affected. Piggyback loads missing a rail connection in Chicago were forwarded over the highway, thus piggyback provided the firm with more flexible transportation combinations. Information was not available concerning savings in rates, labor expense, or damage experience.

The hardware wholesalers interviewed mentioned little use of piggyback if any. No information had been formally recorded on piggyback shipments. Shipments received from suppliers by piggyback are treated the same as truck shipments. Most hardware dealers cited the need for lower inventories and rapid service to the trade. Much of the freight for these firms had been switched to motor freight in recent years. Smaller shipments were received in less time, much of it arriving in less-than-truckload lots. Large-volume shipments were received by boxcar whenever possible. One large hardware wholesaler did not have a rail siding and yet did not receive piggyback loads. The majority of shipments arrived by motor freight in less-than-truckload lots.
The other wholesalers interviewed had not examined the possible use of piggyback on inbound freight and were receiving the majority of shipments in less-than-truckload lots. A drug wholesaler estimated that 90 per cent of the merchandise received arrived in less-than-truckload lots.

Comparisons

The information gathered on the applications of piggyback methods by merchant middlemen indicated contrasts, unique usages, and few similarities of utilization. Merchant middlemen generally had not utilized piggyback methods extensively and few maintained adequate records of such movements. However, the applications of piggyback methods by Sears, Roebuck and Company were considered successful and beneficial to the firm. In the following comparisons, therefore, Sears, Roebuck and Company operations were compared to the operations of other merchant middlemen.

The general comparisons of use were analyzed as a foundation for the more specific comparison of effects upon marketing activities of the firms interviewed. These comparisons were continued by an analysis of the basic reasons why some merchant middlemen had applied piggyback methods and reasons for not using it or limiting its use. The primary reasons for Sears successful application were given separate treatment.
General comparisons

Some of the information gathered was consolidated in Table 19 for purposes of general comparison. The Kroger Company, the Higbee Company, Montgomery Ward and Company, and Tynan Inc. (meat wholesaler) were primarily utilizing Plan II movements. The Nobil Shoe Company was using Plan III for less-than-truckload shipments and combining these loads with association members. Sears, Roebuck and Company was primarily applying Plan III methods in 1964.

Less than 2 per cent of the Kroger Company shipments were arriving by piggyback at Division warehouses and the Higbee Company was utilizing piggyback only for shipments of mattresses from one location. The extent of application by Montgomery Ward and Company was not measurable because of limited data available. The Akron metro-warehouse of this firm was receiving about 4 to 8 trailers a week from Chicago. It was believed that more extensive use was being made from New York to Chicago and some other distribution points. The Nobil Shoe Company was utilizing Plan III about 60-75 per cent of the time from its major product source in St. Louis. The actual volume of these shipments was limited and were less-than-carload shipments. The Tynan Company (a New York meat wholesaler) requested piggyback shipments about 50 per cent of the time. The Sears, Roebuck and Company was applying piggyback methods on about 40-45 per cent of shipments from all terminals. The firm was using piggyback more extensively at some terminals than others.

The Kroger Company was able to achieve lower costs only on movements below 60,000 pounds. The Higbee Company was alleged to have an
### Table 19

**Comparison of Piggyback Applications**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Kroger</th>
<th>Higbee</th>
<th>Montgomery Ward</th>
<th>Nobil Shoe</th>
<th>Tynan, Inc. Meat Wholesaler</th>
<th>Sears Roebuck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plans utilized</td>
<td>II-III</td>
<td>II</td>
<td>II</td>
<td>III (with assoc.)</td>
<td>II</td>
<td>III</td>
</tr>
<tr>
<td>Extent of use (number of shipments)</td>
<td>2%</td>
<td>Mattress movement only</td>
<td>% not available, metro warehouse</td>
<td>60-75%</td>
<td>50%</td>
<td>40-45%</td>
</tr>
<tr>
<td>Transportation $ saved</td>
<td>only on less than 60,000 lbs.</td>
<td>claimed higher cost</td>
<td>savings on P.B. II vs. motor carrier</td>
<td>Savings vs. motor carrier LTL or LCL Rail.</td>
<td>Less handling lower rates</td>
<td>Substantial Trans-lower Inventory</td>
</tr>
<tr>
<td>Transit times</td>
<td>not considered</td>
<td>same as motor carrier</td>
<td>About same considered insignificant (N.Y. to Chicago saved 3-5 days)</td>
<td>Loss of one day</td>
<td>Motor carrier faster</td>
<td>Saved av. 2 days</td>
</tr>
<tr>
<td>Personnel changes</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
increase in cost on its piggyback operations. Montgomery Ward and Company claimed savings in transportation costs compared to motor carrier shipments. The Nobil Shoe Company indicated savings when comparisons were made between Plan III, motor (l.t.i.), and railroads (l.c.l.). Lower rates were negotiated by the Tynan Company and it believed less handling resulted in considerable savings. Sears, Roebuck and Company claimed substantial savings in over-all transportation costs and additional savings resulting from lower inventory requirements.

In most cases transit time was not considered important as it appeared to be about the same or of longer duration than motor carrier. The Nobil Shoe Company lost an average of one day because of delays in consolidation of loads at point of origin. Sears efficient applications, however, lowered transit times by an average of 2 days. On specific applications from New York to Chicago, Montgomery Ward and Company claimed a saving of 3 to 5 days in transit time.

All of the firms except Sears, Roebuck and Company claimed that no personnel changes had been made as a result of piggyback applications. Sears had made few if any personnel changes at terminal locations but had appointed a manager of piggyback operations at its Chicago headquarters. This manager was in charge of all piggyback operations and the coordination of piggyback applications to meet the needs of buyers, regional managers, source loads, terminal operators, inventory control personnel, and other transportation executives.
Functional comparisons

The comparisons of the effects of piggyback operations on the marketing functions of the merchant middlemen interviewed and those of Sears, Roebuck and Company were even more revealing. Two basic limitations in the comparisons analyzed were the lack of quantitative data, i.e., inventory volumes, reorder points, costs of financing stored merchandise, extent of pilferage and damage and so forth, and that not all products handled by Sears were involved. Table 20 summarizes these comparisons.

The buying function had not been affected in any discernible degree by piggyback operations of the retailers interviewed other than Sears. Only one wholesaler (meat) mentioned that buying was affected indirectly in that the buyer often requested piggyback movements because it resulted in less damage to the product. The buying functions of Sears had been affected as a result of piggyback operations' more dependable scheduling, smaller volume loads, and lower reorder points because of reduced transit time. This result could have been accomplished by the use of motor carriage but at a higher cost. Buyers were ordering merchandise more frequently in smaller volume and spreading orders over the seasons rather than larger volume shipments in preparation for peak periods of sale. The company claimed close coordination and cooperation between buyers and those in charge of piggyback operations.

Other merchant middlemen alleged that piggyback had not affected the selling function whereas Sears' personnel believed that the improved service on special orders, more accurate delivery promises, and the
<table>
<thead>
<tr>
<th>Function</th>
<th>Retailers</th>
<th>Wholesalers</th>
<th>Sears, Roebuck and Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buying</td>
<td>None</td>
<td>Meat: requested P.B., - less damage.</td>
<td>Coordination on volume. Ordering more frequently in smaller volume. - spread over season rather than at peak periods</td>
</tr>
<tr>
<td>Selling</td>
<td>Not discernible</td>
<td>None</td>
<td>Faster service on special orders. - Promise of delivery dates more accurate. Fresher merchandise.</td>
</tr>
<tr>
<td>Transportation</td>
<td>Alternative selection. Rates usually higher than Boxcar. vs. motor carrier</td>
<td>Alternative selection lower cost vs. motor carrier</td>
<td>Faster loading - coordination of motor carrier to terminals for P.B. - savings in rates - Appointed P.B. executive - Planned delivery dates, often by the hour. - saved in transit time.</td>
</tr>
<tr>
<td>Storage</td>
<td>More convenient loading and unloading vs. boxcar</td>
<td>None</td>
<td>Most merchandise now stored in retail outlets - abandoned outside warehousing - terminal equipment and facilities changed.</td>
</tr>
<tr>
<td>Inventory</td>
<td>None</td>
<td>None</td>
<td>Reduction (order in smaller quantities)</td>
</tr>
<tr>
<td>Financing</td>
<td>None considered</td>
<td>None</td>
<td>Lower inventory - often eliminated outside storage rented by retail stores.</td>
</tr>
<tr>
<td>Risk bearing</td>
<td>Damage claims - no discernible effect other risks seldom considered.</td>
<td>(Meat) - claimed less damage smoother trip - less handling - less pilferage.</td>
<td>Less market risk - order during season Reduced damage claims - but higher cost because of greater liability on Plan III. Reduced pilferage.</td>
</tr>
</tbody>
</table>
availability of "fresher" merchandise aided the selling activities. Merchant middlemen generally assumed that piggyback movements had not affected financing of inventory or storage facilities. Sears' personnel claimed that lower inventory requirements freed capital, and specially rented external storage facilities at some store locations were eliminated and thereby reduced overhead. The extra storage facilities were usually leased to handle specific seasonal merchandise.

The retailers interviewed other than Sears claimed that piggyback had not affected the risk bearing function. Increases or decreases in damage and pilferage claims were not significant or not discernible. These firms were utilizing piggyback to such a limited extent that changes in market risk were not considered. The meat wholesalers interviewed claimed less damage to merchandise resulting from a smoother trip and reduction of handling. These wholesalers also noted a decrease in pilferage. Sears' executives stated that the number of damage claims had been reduced but higher actual costs to Sears resulted because of the greater liability involved when utilizing Plan III, i.e., the company was liable for any damage occurring while the leased equipment was not in the hands of railroad personnel and responsibility for damage was difficult to establish. Sears' personnel also alleged that less pilferage resulted from piggyback applications as the number of rehandlings of merchandise was reduced. In addition it was claimed that less market risk resulted from ordering smaller quantities during the buying season for specific commodities when demand for these products was more easily determined.
Most of the retailers stated that storage had not been affected. The Higbee Company claimed more convenient unloading when compared to boxcar shipments basically because of the inadequacy of warehouse facilities. The wholesalers interviewed claimed storage had not been affected. Sears, however, had made changes in warehouse and terminal facilities and equipment to accommodate piggyback movements. The company had also reduced space requirements by lowering inventories on some merchandise and abandoned some of the "outside" leased warehouses.

The merchant middlemen interviewed considered piggyback as a possible transportation method and generally lower costs prevailed with Plan III than when motor carriers were used. Plan II rates were approximately the same as motor carrier rates. All of the firms considered labor costs in loading and unloading to be the same as motor carrier but lower than boxcar utilization which usually required more blocking and bracing to protect the load. In addition boxcars usually had to be cleaned, nails and some old bracings removed before loading. The Nobil Shoe Company had reduced transportation costs by shipping less-than-truckload orders by consolidated piggyback than by motor carrier as members of a shippers association. It appeared that other shippers associations might benefit from such application. The transportation function performed by Sears was affected by piggyback applications. Faster loading (than boxcar), the coordination of motor carrier deliveries to terminal points, savings in rates, delivery dates planned almost to the hour, reduced transit time, and the appointment of a manager of piggyback operations provided Sears with a more efficient transportation system.
User and non-user rationale

The major reasons for merchant middlemen utilizing piggyback were savings in transportation dollars, convenience of unloading, flexibility on special shipments, and better service. Most merchant middlemen were not using piggyback extensively but only considered it as a possible alternative method of shipping. Each application was tailored to a specific transportation need rather than an analysis of a total physical distribution system.

Non-users and firms utilizing piggyback only for a minor percentage of shipments cited reasons such as lower rates on boxcar loads, traditional use of boxcars by associations, problems in meeting minimum weight requirements, volume of business too small, receiving majority of shipments in less-than-truckload lots, shift from rail freight to motor freight for better service, and short distances to suppliers. It was believed that many of the reasons for non-use or limited application stemmed from misconceptions about piggyback utilization and a lack of research from a total physical distribution standpoint. Some appeared to be accepting association methods without question and had done little to examine the possibilities of utilizing piggyback particularly Plan III. It was believed that others were reluctant to change traditional patterns and investigate possible changes that would disrupt well established systems.
Generalizations

Generalizations on piggyback applications by merchant middlemen derived from analysis of the data gathered were few in number but believed to be significant.

Merchant middlemen utilizing Plan III piggyback methods benefit by lowering transportation costs.

Lower labor costs for loading and unloading are possible when utilizing piggyback or motor freight than when utilizing rail boxcars.

A firm can successfully apply piggyback transportation methods, particularly Plan III, on less-than-truckload shipments providing it consolidates loads with other firms utilizing the same terminals at origin and destination.

Most merchant middlemen have not been utilizing piggyback methods extensively enough to measure its effect on marketing functions other than transportation, and therefore, may not have been aware of its potential and/or its possible impact on these activities.
VIII. Summary, Evaluations and Conclusions

Intensive exploratory research regarding the transportation function and its relationship to other marketing activities revealed that very little information was available on how major marketing functions had been affected by the utilization of combined over-the-highway and rail transportation methods, and more specifically, by piggyback operations. This was true despite the growth in the volume of piggyback methods of transportation since 1954 and the predictions of its frequent and sizeable future utilization. It was believed that this would be a timely subject for investigation and that the need for information about the effects of piggyback operations on marketing activities was apparent.

This study was undertaken in an attempt partially to fill the void in past and current writings on the subject of piggybacking and to suggest areas for further treatment and evaluation. The preliminary research revealed that the study should focus upon the following hypotheses:

1. Firms utilizing piggyback services in the future will need to evaluate its merits by actual application or simulation in each instance, relating such factors as plant and warehousing locations, markets, inventory requirements, total physical distribution costs, buying activities, and the risks involved.

2. The volume of merchandise shipped by piggyback has increased substantially and this method of transportation should affect the marketing activities of firms utilizing it, particularly the physical distribution functions.
3. Rates, storage, speed, and merchandise handling receive the greatest amount of attention and analysis when piggybacking is considered as an alternative method of transportation.

4. Proponents of piggyback have tended to overemphasize its growth, resulting in unrealistic predictions of usage.

5. The use of carloading data is both inadequate and inaccurate for comparisons and predictive purposes.

Research Methods

Primary sources of secondary data were utilized whenever possible to secure empirical information and to make predictions. Library research was recognized as having some limitations and therefore information was also gathered by correspondence and personal contact with railroads, government agencies, private firms, associations, university business research bureaus and trade magazines. The data so gathered were analyzed and interpreted to form the basis for Chapters II, III and IV of the study dealing with the history and present status of piggybacking.

Case studies were undertaken to provide primary data relating the utilization of piggyback to the physical distribution functions and to other marketing activities of manufacturers and merchant middlemen. Qualitative and quantitative data were gathered by personal interview and through the investigation of the records of selected firms utilizing piggyback services. The information so gathered (as explained in Chapter V) formed the basis of chapters VI and VII.
The study was primarily concerned with trailer-on-flatcar (TOFC) and container-on-flatcar (COFC) movements. This represented the middle viewpoint and included that portion of piggyback utilizing the movements of loaded trailers or van-size containers by motorized over-the-highway and rail methods.

Piggyback had been more narrowly conceived by some to include only trailer-on-flatcar (TOFC) and very broadly construed by others to denote a loaded transportation unit of any form being transported by the unit of movement of another form, which would include non-motorized units of land movement and air and water units. The latter two are more generally designated as birdyback and fishyback.

Historical Development

When all concepts of piggyback were considered, the first such applications were lost in antiquity. The earliest recorded variations of piggybacking were established in the literature in 1801 and 1846 in England. The earliest domestic account was believed to be the movement of a circus in 1856. Most historical references to early use in the United States described the movements of farmers' wagons from Long Island to New York in 1884.

When adhering to the middle viewpoint, records revealed that the first combined motor vehicle-rail containerized system was utilized by the American Railway Express Company in 1921. The containers used were limited to a 6000-pound capacity because of the size and power of the motor trucks available at that time. Most writings alleged that the origin of trailer-on-flatcar service was established by The Chicago,
North Shore and Milwaukee Railroad on May 1, 1926. During the next decade, only a few successful operations were recorded in the literature or in railroad records. The only two early services to survive until the present time were begun in 1936 and 1937, the first by the Chicago Great Western Railway Company and the other by the New York, New Haven, and Hartford. The problems encountered by the railroads in the early applications included the standardization of sizes and types of handling equipment. Regulations and restrictions led to the canceling of most piggyback services prior to World War II. Further development of piggyback methods remained at a virtual standstill until 1954. In that year renewed interest was highlighted by the Interstate Commerce Commission's answer to the New Haven Railroad's inquiry regarding legality and acceptable methods of application. The Association of American Railroads began gathering piggyback carloading data late in 1954 and the five basic "plans" now in use were formulated at that time.

The statistics on piggyback carloadings were recorded as 168,150 carloadings in 1955, which grew to 706,441 carloads in 1962--an increase of 320 per cent. Although the total piggyback carloadings recorded did not reflect changes in the capacity of flatcars or in the capacity of trailers and van-size containers, the growth pattern was obvious but still much understated. Research revealed that such figures, while a guide to growth, were not adequate for predictive purposes. Furthermore, it appeared that many predictions had been made without adequate facts or proper relationships and these were believed to be inaccurate and misleading.
Generally, the railroad industry had placed particular emphasis on the development and application of piggyback methods. Organizational changes and technological developments aided the railroads in partially overcoming the problems encountered. The basic problems of scheduling, routing of piggyback shipments, terminal needs, equipment standardization and interchange, as well as financing this relatively new endeavor, varied in scope depending on the extent of application by specific railroads.

Predictions

An estimate of piggyback ton-miles hauled was devised and utilized as an index for comparative purposes and as a basis for prediction. Approximately one billion ton-miles of intercity freight was hauled by piggyback methods in 1955. This increased to about seven and one-third billions of ton-miles in 1962, or over 600 per cent, and this represented approximately 1.2 per cent of total railroad intercity ton-miles. A conservative estimate of the piggyback carloading growth rate was established at an annual increase of 15 per cent. Predictions based on this estimate showed that a total of about two million car-loads and approximately 30 billions of ton-miles would be hauled in 1970.

Summaries of Case Analyses

The firms interviewed included many that were not utilizing piggyback methods, and some firms using piggyback in limited amounts did not maintain adequate records. In addition, several firms were
unwilling to provide the necessary information. Only those firms utilizing piggyback extensively enough to provide data for analysis were summarized. The firms included manufacturers and merchant middlemen.

Utilization by manufacturers

The manufacturers studied in detail utilized piggyback basically on outbound shipments of consumer and industrial products. The application and extent of use varied with each firm. Some of the manufacturers interviewed were equipped with rail sidings although a few were not so equipped. Summarized Comparisons were presented in Chapter VI.

The Hoover Company

The Hoover Company began using Plans III and IV in 1960. In 1963, 146 Plan III shipments were utilized compared to 56 Plan IV shipments. Plan II rates were established to more of the Hoover Company's destination points in 1963 and were favorable to the Hoover Company. The company shipped 36 Plan II loads during the year. The switch to piggyback had virtually eliminated boxcar shipments by the firm. The Hoover Company completed a new warehouse in January of 1964 which was not equipped with a rail siding. The use of piggyback had eliminated local cartage and the rehandling of shipments which were necessary when boxcars were utilized. The company believed the minimum potential of Plan III was about 14 trailers per month or over 160 per year. The company had to transfer trailers to the Cleveland Terminal for Plan III "marriages" and shipment. The extra drayage costs and inconvenience of reaching the Cleveland terminal was expected to
limit Plan III movements in favor of Plan II to all destinations where satisfactory Plan II rates could be negotiated. The minimum potential use of Plan II was estimated at 28 trailers per month or over 300 per year. Plan II shipments to the West Coast practically eliminated any use the company had made of Plan IV. Piggyback shipments to most destinations resulted in substantial savings to the company. The company had realized savings in labor because of reduced handling resulting from loading directly into piggyback trailers or motor carrier trailers at the new warehouse. All shipments to the regional warehouses were in full trailer loads.

The company retained about a three-month inventory in all of its warehouses from coast to coast. The only warehousing of finished goods affected by the switch to piggyback was at the main plant.

The Lincoln Electric Company

The Lincoln Electric Company had utilized Plan II movements beginning in 1954, when the average was about one trailer per week. Plan II was used about five times per week or on about 250 shipments annually in 1963. Plan II was utilized for less-than-trailerload as well as for full trailerloads. Plan III was first employed by the Lincoln Electric Company in 1960 to a few destinations. Shipments varied from 6 loads to 46 loads per month. If "marriages" could not be made immediately under Plan III, the shipment was sent by Plan II methods. Savings or losses on Plan III ranged from an extra expenditure of 20 dollars to a high average savings of one hundred dollars. The company had rail sidings in the building. The cost of labor for loading a
boxcar was somewhat higher ($13 per 40,000 pound load) than for loading trailers. The switch to piggyback had alerted the company to necessary changes in destination warehousing but had not had an effect upon storage at the main plant.

The Consumer Products Division of the Union Carbide Corporation

The Consumer Products Division of the Union Carbide Corporation has advantageously utilized piggyback Plan II since 1958. Plan III shipments were begun in 1959 and grew slowly until July of 1962. Up to July of 1962, the Plan III shipments were made only from Cleveland and Fremont and "marriages" of the trailers were not made with other firms. The company joined ITOFCA in July of 1962 enabling it to "marry" trailers with other companies and to ship by Plan III to additional destination points. In 1963 shipments by Plan III increased to 733 from 300 shipments in 1962. The last shipment by Plan II was made in February, 1962. The division's use of Plan III had resulted in substantial savings to the firm. These savings in transportation costs are coupled with labor savings resulting from reduced handling and lower loading costs at the Asheboro, North Carolina plant.

Utilization by middlemen

Piggyback methods of shipment had generally received less attention from middlemen than from manufacturers. Most of the merchant middlemen were only utilizing piggyback methods on inbound shipments. The firms included in this portion of the study varied in size and product lines handled on the retail and wholesale level. Summarized comparisons were presented in Chapter VII.
The Kroger Company

The Cleveland Division of the Kroger Company indicated that only about 2 per cent of shipments were received by piggyback. The company received most of its shipments by motor freight and boxcar. The company had received piggyback loads of non-perishable food items and a few piggyback loads of frozen foods. Piggyback generally had not affected the operations of the Cleveland Division. In practically all cases the company received substantially lower rates on volume rail shipments than would have been possible by piggyback. The shipments Kroger received by piggyback were usually Plan II shipments.

The Higbee Company

The Higbee Company consolidated its shipments into carloads with those of other local retailers in most instances. The special use of piggyback for the shipment of mattresses was alleged to cost the firm more per mattress. The company believed this was offset by greater efficiency and ease of unloading because facilities for receiving boxcars were inadequate.

Montgomery Ward and Company

The Montgomery Ward and Company had utilized piggyback Plan II in most instances for interwarehouse movements of merchandise where the services of the receiving warehouses were used by two or more local stores. The company also applied piggyback methods from sources of merchandise on the East Coast to Detroit, Chicago and Minneapolis. The limited data available indicated lower transportation costs but other effects of piggyback utilization were not discernible.
The Nobil Shoe Company

The Nobil Shoe Company was applying piggyback Plan III methods by consolidations of trailers with other members of a shippers association. It was the only firm contacted which was making extensive use of piggyback for less-than-truckload shipments. Plan III was utilized about 65 per cent of the time. The Company indicated it lost a day in transit because of consolidation requirements but was utilizing this plan to save transportation dollars in lieu of high rates for LTL and LCL shipments. Most shipments ranged from 1,000 to 2,000 pounds.

Sears, Roebuck and Company

Sears, Roebuck and Company used Plan III through the Terminal Freight Cooperative Association of which Sears' subsidiary, Terminal Handling Corporation, was the chief member. The corporation shipped as well as received piggyback loads at most terminals and, had utilized piggyback more than other retailers. The "source loads", those from manufacturers were often consolidated with other partial loads under Plan III for shipment to destination points. Sears, Roebuck and Company was the only merchant middleman contacted utilizing Plan III extensively for full trailer loads. All others interviewed received goods basically by Plan II piggyback, if at all. Sears utilized Plan II on very few shipments when Plan III "marriages" were not convenient. This was the only merchant middleman contacted which believed piggyback was particularly useful in lowering inventory requirements and transit times and thus affecting quantities of purchase (ordering by the stores or warehouses). The company had claimed substantial savings through
the use of piggyback and expected to increase applications in locations not already using it to capacity.

Wholesalers

The wholesalers contacted were still adhering to standard transportation techniques with the exception of some New York meat wholesalers. The meat wholesalers believed savings resulted from reduced handling, largely because of less damage, decreased pilferage, and lower labor costs. Actual company records were either not available or not recorded in such a manner as to differentiate the loads by method of shipment but the Tynan Company claimed it requested piggyback about 50 per cent of the time on shipments from the Middle West. The drug, hardware, electrical equipment, plumbing, appliance, food, wine, and office equipment wholesalers which were interviewed mentioned little, if any, use being made of piggyback shipments. In most cases the companies had not requested its use for specific shipments. Some firms that were receiving a few loads, by piggyback Plan II, treated the shipment as a regular trailer delivery. None of the firms indicated making comprehensive studies of piggyback applications.

General Evaluations Of Case Studies

The firms interviewed which were utilizing piggyback methods usually applied Plans II and III. Plan I generally resulted in savings to the motor carriers which were seldom, if at all, passed on to the shippers. Plan IV was essentially a freight forwarder plan and Plan V was offered because it jointly benefited the railroads and the motor carriers. Plan II generally gained more traffic for the railroads but
the rate structure was similar to motor carrier rates. This plan had provided some firms with reduced rates because of careful negotiations with railroads on point to point transfers of specific commodities. Plan III generally enabled shippers to reduce transportation costs when compared to motor freight and rail boxcar methods.

A variety of factors were considered by the firms when making decisions to utilize piggyback Plan II and Plan III in lieu of other methods as summarized in Table 21. Merchant middlemen generally applied piggyback methods on inbound traffic and manufacturers usually utilized piggyback on outbound shipments. Sears, Roebuck and Company, because of its unique terminal organization, had applied piggyback on both inbound and outbound traffic.

All of the firms analyzed were considering transportation rates, changes in handling techniques and number of handlings, damage claims, pilferage claims, and liabilities. Most of the firms, however, could not adequately measure risk bearing factors because of the methods of record keeping. Some claimed reductions in damage and pilferage when utilizing piggyback but it was believed the literature on the subject had biased this opinion. Plan III users generally believed that greater liability had increased the actual costs of damage and pilferage even though the numbers of claims had been reduced.

It appeared that most of the firms were adhering to the traditional methods of analyzing costs, i.e., rates and handling expenses, rather than considering total physical distribution costs. If the firms were utilizing composite cost analysis methods it was not evident during the interviews or the personnel did not want to reveal such
TABLE 21
FACTORs CONSIDERED TO
DETERMINE USE OF PIGGYBACK (PLAN II & III)
IN LIEU OF OTHER METHODS

<table>
<thead>
<tr>
<th>Factors</th>
<th>Merchant Middlemen</th>
<th>Sears</th>
<th>Manufacturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inbound freight</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Outbound freight</td>
<td></td>
<td>XX</td>
<td>XX</td>
</tr>
<tr>
<td>Rates</td>
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<td>*</td>
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</tr>
<tr>
<td>Handling</td>
<td></td>
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<td>*</td>
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<tr>
<td>Transit Time</td>
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<td></td>
<td>+</td>
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<tr>
<td>Cost of Time</td>
<td></td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Storage facilities</td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Storage costs</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Inventory levels</td>
<td></td>
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<td>+</td>
</tr>
<tr>
<td>Total Physical Distribution</td>
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<td></td>
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<tr>
<td>costs</td>
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<td>+</td>
<td></td>
</tr>
<tr>
<td>Optimum buying quantities</td>
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<tr>
<td>Optimum selling quantities</td>
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<td>+</td>
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<tr>
<td>Risk Bearing:</td>
<td></td>
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</tr>
<tr>
<td>Damage</td>
<td></td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Pilferage</td>
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</tr>
<tr>
<td>Market risks</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Financing</td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

Key: X Factors generally considered by Merchant Middlemen only.
XX Factors generally considered by Manufacturers only.
* Factors generally considered by all firms.
+ Factors Not generally considered by other firms.
a Measurable from data available.
b Not measurable from data available but should be measurable.
c Exist but generally not measurable.
1 Considered by the Hoover Company and Sears only.
information. Possibly no precise analysis was made or the personnel were not really interested in the cost of time and did not consider such an analysis urgent. Therefore, it was believed that most of the firms were not considering costs of time in transit, storage costs, financing of inventory, and equipment financing. Sears, Roebuck and Company was the only firm interviewed that alleged it was considering these factors but quantitative information was not available. It could not be determined if the company was attempting to include cost of transit time in its overall analysis. With the exception of Sears the firms considered the changes of time in transit to be insignificant as a factor in arriving at a decision to use piggyback.

Changes in storage facilities as a result of piggyback movements were considered as significant only by the Hoover Company and Sears. Some were concerned with minor equipment and dock area changes and the Higbee Company was using piggyback because of the lack of adequate warehouse facilities rather than changes because of piggyback utilization.

Personnel of Sears, Roebuck and Company were the only ones that stated consideration for inventory levels, i.e., reduced inventory requirements at major warehouses and retail stores or storage costs. Although no adequate examples were provided for analysis, the company believed that lower overall costs of physical distribution were attained by lowering inventory levels, as a result of reductions in lead time necessary for reordering. Lower inventory levels were believed to reduce storage costs and enabled Sears to abandon some rented warehouse space near store locations. The company believed that
ordering smaller quantities also reduced market risks particularly on seasonal merchandise but this was obviously not measurable. It was not considered by other firms to be a factor in the decision to utilize piggyback methods. For example the Hoover Company believed three months supply should be retained at regional warehouse locations to meet demand when special sales or promotion were carried on and to enable the firm to level off peaks and valleys in production schedules. Hoover did not want to maintain the bulk of its inventory at the main plant warehouse. In addition the Consumer Products Division of the Union Carbide Company believed three months supply was necessary to meet the normal demands and that if an area emergency such as storm, flood, fire and so forth occurred, supplies of flashlights, batteries, and bulbs would be exhausted from the regional warehouses.

Sears claimed close coordination between transportation personnel, and more particularly the piggyback manager, and its buying and selling organizations. The buyers were kept well informed on piggyback developments and some purchases were made in quantities applicable to piggyback movements.

Major limitations to such an analysis were considered as follows: Not all goods were transferred by piggyback methods, precise measures were not available or not possible, piggyback methods were not available to all destinations, and distances, time in transit, weights of products, terminal facilities, local drayage costs, labor costs at destination, finance rates, transportation rates, storage facilities, equipment utilized and volume of trade, varied according to origin and destination of the products.
The case studies of manufacturers and merchant middlemen revealed advantages and disadvantages in the utilization of piggyback methods. Generally the firms considered piggyback as a substitute for boxcar movements rather than for replacing motor freight traffic.

**Advantages of application**

1. In most instances, a reduction in freight costs was possible through the utilization of Plan III piggyback, and at times through the use of Plan II, to selected locations.

2. Firms shipping or receiving freight in trailerload or carload quantities could benefit more from piggyback than could smaller firms normally shipping or receiving in small lots. Limited volume firms benefited from the use of piggyback when members of shippers associations.

3. Piggyback provided for more flexibility and efficiency in transportation planning. Firms without rail sidings were not solely dependent on motor freight, and firms with rail sidings had an additional alternative.

4. The lower minimum weight requirements on piggyback shipments compared to carload shipments made smaller shipments possible at lower rates than less-than-carload shipments. The selection of motor carriers in lieu of rail boxcars generally meant higher rates.

5. Labor costs for loading piggyback trailers, although generally the same as for motor freight, were usually lower than when loading boxcars.

6. The use of piggyback methods or motor freight resulted in less handling of the merchandise than when utilizing rail boxcars.
unless the shipment was railsiding to railsiding. In addition it was
alleged that the combined shock resistance of trailer and flatcar
resulted in less damage to the shipments.

7. In 1964 piggyback equipment was more readily available than
boxcar equipment, resulting in less waiting time for loading a ship-
ment.

8. Most firms utilizing piggyback claimed that piggyback
service had been more dependable regarding schedules than boxcar
service. Also, piggyback methods were more dependable than motor
carrier methods during inclement weather.

9. The use of piggyback in lieu of boxcar shipments enabled
firms to be more flexible in choosing warehouse facilities and the
geographical location of such warehouses.

10. The flat rates per trailer under Plan III, enabled firms to
reduce shipment charges on high-rated items. Combinations of loads
were possible providing the firms adhered to the 60/40 mixture rule.

11. Piggyback allowed companies generally shipping to areas where
no railsidings were present to be more flexible regarding the extent
of market area covered.

12. Piggyback methods generally resulted in lower transit times
than when utilizing boxcar shipments. In most cases motor freight
provided faster service than piggyback or boxcar, except where ship-
ments were made by piggyback in special fast trains or when the dis-
tance covered was more than 400 miles.
Disadvantages of application

1. Plan III services did not allow stop-off in transit privileges to the shipper.

2. Piggyback equipment for Plan III was usually leased on a per diem basis with little variance in loading and unloading time. Delays in either case increased charges and offset savings.

3. Some warehouses (receiving points) were not adequately equipped to handle trailers in volume numbers and delays in unloading sometimes resulted. In such cases, extensive renovation of the facilities was required.

4. Greater responsibility occurred when leasing trailers. Trailers were not usually covered by insurance when not under the jurisdiction of the carriers.

5. The lack of clarity and uniformity of rules regarding liability for damage to merchandise under Plan III resulted in confusion when shipments were packed and sealed at the shipping point by the shipper.

6. Piggyback utilization required additional supervision and paperwork, particularly Plan III "marriages".

7. It was difficult for some shippers to meet the 60/40 mixture rule requirements under Plan III.

8. Companies shipping or receiving in small lots could not economically apply piggyback methods unless the firm was a member of a shippers association.

It was believed that the advantages of using piggyback in lieu of boxcar shipments outweighed the disadvantages of such movements.
Many of the benefits of piggybacking could also result from use of motor freight but generally at higher costs.

Conclusions

The term piggyback should be used when referring to both TOFC and COFC, i.e., the movement of highway trailers including chassis and wheels, and the movement of van-size containers, both of which are transported over-the-highway by motorized units and on the rails by placement on flatcars. The Association of American Railroads adhered to this concept of piggybacking when collecting carloading data beginning in 1954. Therefore, the actual beginning of piggyback movements was in 1921 (COFC) and not in 1926 (TOFC) as generally recorded in the literature.

The use of carloading data indicated about a 320 per cent increase in piggyback movements from 1955 to 1962. Carloading figures are inadequate and inaccurate for comparisons because they do not reflect increases in the capacities of trailers, van-size containers, and flatcars. A formula derived on ton-miles carried by piggyback was utilized to provide an estimate of the increase during the same period, and indicated a growth of over 600 per cent.

Percentages reflecting increases in carloading or ton-miles hauled when used independently for predictive purposes can lead to unwarranted conclusions. For example, an estimate of ton-miles hauled by piggyback from 1955 to 1962 reflects an increase of about 5 billion ton-miles and in the same period the ton-miles hauled by motor carrier increased 94 billion and railroad ton-miles hauled decreased 31
billion. The percentage increase in motor carrier freight was about 41 per cent and the percentage decrease in railroad freight was approximately 5 per cent. It was believed that the use of percentages relating to carloading data had led proponents of piggyback to over-emphasize the growth rate and arrive at unrealistic predictions regarding actual growth. One proponent estimated usage of 5 million carloads by 1970. A conservative estimate based on a 15 per cent increase in the number of carloadings per year, would indicate slightly over 2 million carloadings in 1970. Utilizing this carloading estimate as well as estimates based on increases in trailer, container and flatcar capacities, and slight increases in the average miles hauled, a prediction of about 30 billion ton-miles hauled in 1970 was believed to be more realistic.

It was concluded therefore that government agencies and the American Association of Railroads should publish estimates based on ton-miles hauled rather than just estimates of carloadings. Railroads and other proponents of piggyback should provide shippers and the public with proper comparisons rather than misleading statistics and unrealistic predictions of use. Many previous views on the efficiency and saving characteristics of piggyback utilization have been ill founded and distorted in some instances to the extent of actual misrepresentation of facts and opinions.

The following conclusions were primarily based on the contrasts and similarities of the firms interviewed. It was believed these firms represented a cross section of companies utilizing piggyback methods.
Most of the firms interviewed were giving the greatest amount of attention to rates and merchandise handling when selecting methods of transportation particularly when investigating piggyback as an alternative. Only two firms had altered storage facilities substantially and others were contemplating some minor equipment and dock facility changes. Speed, i.e., comparisons of time in transit was not being analyzed by most firms. Some stated that differences in speed between piggyback and other modes was insignificant and had little bearing upon their choice of mode. Although it appeared that a few were considering transit time the research did not verify it as being an important criteria for purposes of the selection of piggyback methods. However, it was noted that some of the firms contacted which were primarily receiving or shipping merchandise by motor freight rejected piggyback because of a loss in transit time basically on short hauls. The hypothesis, that rates, storage, speed, and merchandise handling received the greatest amount of attention and analysis when piggybacking was considered as an alternative method of transportation, was only partially valid.

Therefore, it was concluded that most of the firms arrived at decisions to utilize piggyback by traditional methods of analyzing transportation rates and merchandise handling rather than considering time in transit, the cost of time, storage facilities, and other factors such as financing of inventory, turnover rates, and so forth, which would ordinarily be included in a total physical distribution cost analysis. Many of these firms may increase their efficiency of operation and reduce overall physical distribution costs by
applying more research to this important area and evaluating suggestions made by persons now engaged in the specialized field of distribution logistics.

It was not possible to verify in any significant degree the effect of piggybacking upon marketing functions other than transportation. Most of the firms interviewed were giving little if any consideration to other marketing functions when selecting modes of transportation. The predominating criteria appeared to be the savings in transportation dollars. The evaluations indicated that Sears, Roebuck and Company had considered these aspects but all the results were not measurable. For example, better service, smaller shipments, reduced inventory were claimed, which in turn enabled buyers to reduce quantities of orders. Information was not available that would substantiate the actual changes in the size of orders before the advent of piggyback and following its more extensive use.

Piggyback had affected the storage function of the Hoover Company and Sears which can be verified by the physical existence of new warehousing and changes in older facilities. Actual dollar costs or amounts of change in space and equipment were not made available. The other firms indicated that storage facilities had not been altered in any significant way.

Sears' personnel believed that market risks had been reduced by ordering in smaller quantities during the selling season but such changes were not measurable. The changes in market risk might be partially verified by comparing changes in inventory levels, turnover rates, and, ending inventories, if actual quantitative data were
available. The other firms interviewed had alleged that changes in inventory policy had not been forthcoming because of the use of piggybacking and therefore the only risks that could be affected were those of damage and pilferage. No significant effect could be determined even by the study of claims records made available by some firms, although most firms claimed reductions in damage and pilferage when utilizing piggyback in lieu of boxcar traffic.

The effect upon the financing of storage space, inventory, and equipment could not be measured by the data available. Obviously, in firms where inventory policy and storage facilities had not been altered since switching to piggyback methods, changes in financing were nonexistent. Sears did not have information available for public use but it was assumed that the claimed reductions in inventory and storage had been reflected in changed financing, i.e., reduced costs of maintaining inventory (interest charges on money) and lower taxes.

Although the research revealed that in most cases piggyback had not affected the marketing functions other than transportation, the information from Sears indicated that under certain conditions the functions may be affected even when the results are not measurable. Apparently, better organization and particularly closer coordination and cooperation between transportation and marketing personnel had enabled Sears to benefit to a greater extent than other firms. The existing communication network enabled Sears to keep all personnel informed about developments. Rather than transportation personnel only assessing the transportation capabilities and not having too much consideration for the economic advantages, and rather than having
marketing personnel only concerned with inventory levels when it hurt sales, and not the economics of inventory, Sears had established a team approach and an environment of overall cooperation.

The hypothesis, that firms utilizing piggyback services in the future will need to evaluate its merits by actual application or simulation in each instance, relating such factors as plant and warehousing locations, markets, inventory requirements, total physical distribution costs, buying and selling activities and the risks involved, could not be verified on the basis of the findings. The research revealed that most firms were not fully evaluating the merits of piggyback application. Some of them considered warehousing locations, markets, and transportation costs but few took into account inventory requirements, total physical distribution costs, buying and selling activities and the risks involved.

The information gathered did, however, support the hypothesis that a thorough analysis should be undertaken by firms planning to utilize this method of transportation extensively. All of the factors mentioned above should be a part of any evaluation if the firm is to gain maximum benefit from the utilization of piggyback. If the firms choose to evaluate by actual application, the time span of such study should be not less than six months. In many instances simulation will suffice because adequate data on cost of shipment, loading charges (about the same as over-the-highway trailers), local drayage charges, and association fees can be determined in advance by referring to tariffs and by personal inquiries. The effect of piggyback operations on present warehousing, inventory turnover, buying and selling
activities, risk and financing will be more difficult to quantify but this should not alter the premise that such a study should be undertaken. It was believed that Sears, Roebuck and Company had made such an analysis and continually evaluates its actual application of piggyback methods. Other firms and/or associations should be able to conduct such studies and apply their findings, possibly benefiting from piggyback applications in a similar manner.

In addition to the conclusions related directly to the hypotheses, other important results of the study appeared to focus upon the circumstances which made piggyback worthwhile, the apparent disregard for other marketing advantages and the generalizations derived. First, the research revealed that the greatest benefits from the application of piggyback methods were gained by firms with large scale operations which generally shipped in full boxcars or full trailerloads. The manufacturers utilizing piggyback extensively usually had a wide geographical market and were providing for the warehousing of products close to the industrial users or dealers. In some cases full trailerloads were shipped directly to the user or dealer. Apparently the most successful applications by merchant middlemen had been by large multi-unit firms which provide regional or local warehousing and also shipped to large single establishments in full carloads or full trailerloads. Merchant middlemen with single establishments or with a limited number of establishments in a relatively small geographical area received shipments from many varied sources, and only requested piggyback shipments on high volume lines of merchandise. Occasional piggyback shipments were consolidated with those of other local firms which
received merchandise from the same source. It was found that most consolidated operations primarily utilized boxcar shipments rather than trailerloads.

Second, most of the firms interviewed, including those analyzed in detail, generally had disregarded some possible marketing advantages of utilizing piggyback methods. In most cases manufacturers had been concerned primarily with lower transportation charges. In addition, the firms had considered more dependable service and the availability of a more flexible transportation program. Little effort had been put forth by manufacturers to study the advantage of lowering inventory requirements at warehouse locations. Reductions in inventory may be possible due to the smaller shipments by piggyback vs. boxcar shipments and in some instances by lower transit time. Some savings may also develop by providing less costly packaging because of fewer handlings of the merchandise. Sometimes the market area for a product could be extended by piggyback application because of its flexibility or the savings resulting from shipments to given areas. Some manufacturers could benefit on direct shipments to customers if the size of the sales order was related directly to the method of shipment.

Apparently Sears, Roebuck and Company had more favorable results from piggyback application than other merchant middlemen. The size of the firm and the volume of merchandise transported were obvious reasons for the successful switch to piggyback operations. In addition, several other important reasons exist which should be considered by other merchant middlemen. Sears, Roebuck and Company had developed a specialized organization for piggyback application by appointing a
director of piggyback operations. Furthermore, the firm had studied the proper applications of piggyback methods both quantitatively and qualitatively. The company had noted reductions in transportation expenses and a reduction in storage expenses, the latter due mainly to the lowering of inventory requirements particularly on seasonal merchandise. The possible reduction in transit time coupled with more dependable scheduling of shipment arrival had resulted generally in greater inventory turnover. Sears, Roebuck and Company had also had the cooperation of store buyers who, whenever possible, related the size of the order to the method of shipment. Piggyback, therefore, as applied by Sears apparently provided better service to its many branch operations. Less costly packaging methods on some merchandise lines had been implemented, and damage and pilferage had been reduced. It is quite possible, therefore, that comprehensive study and evaluation of piggyback operations by middlemen and manufacturers would reveal it to be a worthwhile method of shipment, and that piggyback should affect the marketing functions of those firms utilizing it extensively.

The following generalizations that evolved from this study may aid firms presently evaluating piggyback methods and suggest areas for future research.

Manufacturers and merchant middlemen can lower transportation costs by utilizing Plan III piggyback methods in lieu of boxcar or motor freight, providing drayage charges at the point of origin and destination are not prohibitive.
Manufacturers and merchant middlemen having problems in "marring" trailers or meeting the 60/40 mixture rule requirements under Plan III, may benefit from piggyback by negotiating lower rates on specific commodities under Plan II arrangements to some destinations.

Lower labor costs for loading and unloading are possible when utilizing piggyback or motor freight than when utilizing boxcars, thus partially reducing physical distribution costs.

Firms must coordinate transportation and marketing activities and evaluate total physical distribution costs if they are to derive maximum benefits from any method of transportation.

Manufacturers and merchant middlemen generally have not considered how piggybacking affects marketing functions other than transportation and will not be able to analyze these effects accurately until more adequate records are maintained and consolidated.

The greater the communication and cooperation between transportation executives and marketing personnel the more successful the firm will be in utilizing piggyback operations effectively.

Plan III piggyback has greater potential than the other piggyback Plans from the viewpoint of most manufacturers and merchant middlemen for lower transportation costs result from its application. Modification or revoking of the 60/40 rule on Plan III would enable firms to avoid problems of "marriage" and allow firms utilizing this Plan to further reduce transportation costs.

Piggyback applications will continue to increase in number substantially each year as more firms become aware of its potential and railroads offer this service to more destination points.
Future researchers attempting to evaluate the effect of piggyback upon the marketing activities of firms utilizing it should benefit from more accurate record keeping by government agencies, associations and firms. These researchers, however, should narrow the study to more meaningful and less ambitious hypotheses, preferably dwelling in depth on one or two measurable aspects such as changes in inventory policy and the implementation of it before attempting to study piggybacks effect upon specific marketing activities. Future studies in this area should focus first upon the marketing activities other than transportation in an attempt to uncover information which may then be related to the transportation function, i.e., focus on ends then the means rather than the reverse.

If possible, future researchers should conduct group interviews including personnel in charge of all marketing activities before conducting individual interviews and examining specific company records. It would be advisable to include other group meetings during the course of the investigation or at least one other group meeting at the end of the investigation for final coordination of the facts derived. In this way the researcher could avoid any implications given, that a lack of knowledge by the interviewee must be covered by supplemental interviews with other personnel, and more specific information, and satisfactory answers, rather than inadequate opinions, may be derived.

It is believed that firms analyzing piggyback operations in the future should evaluate inventory requirements, costs of time in transit, and financing of inventory, as well as transportation and handling costs, thereby implementing more of an overall physical distribution approach.
APPENDIX A

The Ton-Miles Carried by Piggyback From 1955-1962 Were Estimated by Using the Following Formula:

\[
P_{\text{piggyback}} = \frac{\text{Avg. # of Trailers per flatcar load} \times \text{Avg. Trailerload in Tons} \times \text{Avg. Miles per haul} \times \# \text{ of P.B. carloads}}{\text{Year} \times \text{Avg. Load per trailer} \times \text{Avg. Load per car in Tons} \times \text{Avg. Miles per haul} \times \text{Avg. Ton-Miles per loadings in Thousands}}
\]

<table>
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<tr>
<th>Year</th>
<th>A/L</th>
<th>Avg. Load per Trailer</th>
<th>Avg. Load per car in Tons</th>
<th>Avg. Miles per haul</th>
<th>Avg. Ton-Miles per loadings in Thousands</th>
<th>Ton-Miles in Billions</th>
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<td>1.3</td>
<td>11.07</td>
<td>14.4</td>
<td>430</td>
<td>6192</td>
<td>168</td>
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<td>1956</td>
<td>1.4</td>
<td>11.51</td>
<td>16.1</td>
<td>428</td>
<td>6890</td>
<td>208</td>
<td>1.433</td>
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<td>1957</td>
<td>1.5</td>
<td>11.91</td>
<td>17.9</td>
<td>429</td>
<td>7679</td>
<td>249</td>
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<tr>
<td>1958</td>
<td>1.5</td>
<td>12.21</td>
<td>18.3</td>
<td>445</td>
<td>8144</td>
<td>278</td>
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<td>19.5</td>
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<td>X</td>
<td>15</td>
<td>= 30</td>
<td>X</td>
<td>460</td>
<td>= 13800</td>
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**Sources:**
- 1970 Estimate based on trends and 15 per cent per year increase in carloadings.
APPENDIX B

The following outline was utilized when interviewing manufacturers and merchant middlemen. It was modified depending upon whether the data included inbound and/or outbound freight.

I. INTRODUCTION TO CASE

History of firm (Brief historical sketch including growth and present status, organization and operations).

II. HISTORY OF PIGGYBACK UTILIZATION

A. Plans used.
B. Number of loads by periods.
C. Dollar-volume of shipments by periods.
D. Present evaluation.

III. EFFECT OF PIGGYBACKING ON FUNCTIONS OF PHYSICAL SUPPLY AND/OR PHYSICAL DISTRIBUTION

A. Effect on the transportation function of the firm.
   1. Organizational changes, if any.
   2. Analysis of savings and/or additional costs.
      a. Shipment analysis (by various methods).
         (1) size of shipment (weight and density).
         (2) origin and destination.
         (3) time in transit.
      b. Damage claims (analysis by years and method of shipment and of claim's value).
      c. Pilferage (analysis by years and method of shipment).
      d. Insurance costs (analysis by years and method of shipment).
e. Labor requirements (handling and rehandling and time involved) (motor and piggyback versus rail).

f. Equipment requirements and utilization.

g. Clerical operations and shipment control.

h. Packaging changes.

B. Effect on the storage function.

1. Changes in facilities.

a. Extent and type.
   (1) size.
   (2) heat and refrigeration requirements.
   (3) loading and unloading equipment and docks.

b. Inventory control.
   (1) rate of turnover.
   (2) space requirements (changes, etc.).
   (3) reorder point.

IV. EFFECT OF PIGGYBACK ON OTHER MARKETING FUNCTIONS

A. Buying (quantities, time, etc.).

B. Selling (extension of marketing area, distribution pattern) (service).

C. Risk bearing (insurance, damage, other loss).

D. Financing (equipment, inventory).

V. EFFECT ON FIRM'S MARKETING POLICIES

A. Changes in distribution policies (extent of market).

B. Pricing policies.

C. Terms of sale.

VI. APPARENT ADVANTAGES AND DISADVANTAGES OF PIGGYBACK UTILIZATION

VII. EXPECTED FUTURE USE
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