

Utah State University

DigitalCommons@USU

---

All Graduate Theses and Dissertations

Graduate Studies

---

5-1967

## A Survey of Inventory Systems of Auto Wrecking Yards in Northern Utah

William Lee Taylor  
*Utah State University*

Follow this and additional works at: <https://digitalcommons.usu.edu/etd>



Part of the [Business Commons](#)

---

### Recommended Citation

Taylor, William Lee, "A Survey of Inventory Systems of Auto Wrecking Yards in Northern Utah" (1967). *All Graduate Theses and Dissertations*. 2873.

<https://digitalcommons.usu.edu/etd/2873>

This Thesis is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact [digitalcommons@usu.edu](mailto:digitalcommons@usu.edu).



A SURVEY OF INVENTORY SYSTEMS OF  
AUTO WRECKING YARDS  
IN NORTHERN UTAH

by

William Lee Taylor

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF BUSINESS ADMINISTRATION

UTAH STATE UNIVERSITY  
Logan, Utah

1967

#### ACKNOWLEDGMENTS

I would like to express appreciation to Professor Scott Durdan and Professor Eugene C. Kartchner for their help and encouragement during graduate study and the writing of this thesis.

The helpful suggestions of Professors Howard M. Carlisle, Eugene F. Grape, and JeDon A. Emenhiser, committee members are also appreciated.

Thanks are also extended to those firms who participated in answering the questions posed by this study.

The patience, understanding, help, and encouragement of my family, friends, and especially my wife, are gratefully appreciated.

*William Lee Taylor*  
William Lee Taylor

TABLE OF CONTENTS

	Page
ABSTRACT . . . . .	vii
INTRODUCTION . . . . .	1
Automobile Disposal . . . . .	1
Background of Study . . . . .	2
Auto wrecking industry . . . . .	2
Importance of inventory control . . . . .	5
Purpose and Objectives of the Study . . . . .	8
Paper Sequence . . . . .	9
REVIEW OF THE LITERATURE . . . . .	11
METHODS AND PROCEDURE . . . . .	18
Area Studied . . . . .	18
Sample Selection . . . . .	18
Method of Survey . . . . .	18
Questionnaire Development . . . . .	19
Interview Techniques . . . . .	21
RESULTS AND DISCUSSION . . . . .	23
Inventory Methods . . . . .	23
Feelings About Inventory Control and System Improvement . . . . .	25
Effectiveness of the Present System in Providing Management Information . . . . .	26
Relationship Between the Level of Sophistication of Inventory Control, the Number of Cars in the Yard, and the Number of Employees of the Firm . . . . .	28
Additional Data . . . . .	30
Operations procedure . . . . .	30
Employees . . . . .	30
Number of cars in yards . . . . .	31
SUMMARY AND CONCLUSIONS . . . . .	33



## TABLE OF CONTENTS (Continued)

	Page
RECOMMENDATIONS . . . . .	36
APPENDIXES . . . . .	38
Appendix A. Computation of Inventory as a Percent of Total Assets . . . . .	39
Appendix B. Scrap Iron Prices . . . . .	41
Appendix C. Correspondence with NATWA . . . . .	42
Appendix D. Northern Utah's Populations and Business Activity . . . . .	47
Appendix E. Auto Wrecking Yards in Northern Utah . . . . .	48
Appendix F. Questionnaire Development . . . . .	51
LITERATURE CITED . . . . .	58
VITA . . . . .	59

LIST OF TABLES

Table	Page
1. Corporation inventory as a percent of total assets . . .	5
2. Inventory as a percent of total assets for auto wrecking yards interviewed in northern Utah . . . . .	6
3. Questions one and two from initial questionnaire . . . .	19
4. Question number one from final questionnaire . . . . .	20
5. Methods used to keep track of inventory, the number and percent using each method . . . . .	24
6. Reasons given by yard owners for not making inventory improvements . . . . .	26
7. Check list of management information and responses . . .	27
8. Relationship between the level of sophistication of inventory control, the number of cars in the yard, and the number of employees of the firm . . . . .	29
9. Number of full-time and part-time employees . . . . .	31
10. Number of cars held in yards . . . . .	32
11. Steel making scrap prices . . . . .	41

LIST OF FIGURES

Figure	Page
1. Typical inventory system model . . . . .	12
2. Hypothetical inventory models for engines and differentials . . . . .	15

ABSTRACT

A Survey of Inventory Systems of  
Auto Wrecking Yards  
in Northern Utah

by

William Lee Taylor, Master of Business Administration

Utah State University, 1967

Major Professor: Dr. Eugene Kartchner  
Department: Business Administration

A survey of inventory systems was made of 15 randomly selected auto wrecking yards in northern Utah. The specific objectives were to determine what methods auto wrecking yards were using to keep track of their inventory, to determine the managers' feelings toward inventory control and improvement of their present systems, and to determine the effectiveness of these systems in providing management information. This information was obtained through a questionnaire interview with managers of the yards sampled. The questionnaire was developed by the author using yards outside the sample area to pilot test and help develop the questionnaire.

Results of this survey showed a continuum of systems ranging from the use of memory only up to an elaborate card sort system was being used in inventory control. All managers felt that inventory control was very important and that their present systems could be improved. Time was the limiting factor given for not making needed improvements.

Only 60 percent of the managers were keeping some form of written record. The management information provided by these records consisted mostly of physical information relating to the part available and the condition of these parts. Thirty percent of the managers had a record of capital invested and only 20 percent knew the cost of holding inventory in their yards.

From this survey it was concluded that the majority of the inventory systems were inadequate when compared with the objectives of inventory control. More accurate cost information is needed to calculate and evaluate the profitability of the firm (return on invested capital).

(59 pages)

## INTRODUCTION

### Automobile Disposal

When an automobile has outlived its usefulness as a means of transportation, it still holds potential value. The metal has recoverable scrap value and some of the parts hold value. Auto wrecking yards are able to sell these parts at a profit, while keeping other cars running.

Storage of automobiles that have passed their usefulness as a means of transportation has become a national esthetic problem. There are about seven million cars that fall into this category yearly. They must be placed somewhere until they can be further processed for scrap or used parts. According to a study done by the Bureau of Mines (13) 73 percent of these cars end up in auto wrecking yards, 18 percent are abandoned on public and private property, 6 percent are in scrap processors yards, 3 percent are in auto grave yards (usually abandoned auto wrecking yards).

It is quite evident from these facts that the auto wrecking yards play a dominant role in the storage of old or wrecked automobiles. They also provide a valuable service to the public by taking these cars out of circulation for ultimate disposal and providing used parts for sale in order to maintain other automobiles.

Once the auto wrecking yard obtains an old or wrecked car it becomes part of its inventory. This inventory must be managed properly,

as in any other business, in order to provide the owner with a profit.

The author of this paper, because of personal involvement, became interested in the methods used by auto wrecking yards in accounting for and managing their inventory. In order to examine the present state of art existing in this area, a questionnaire-interview was carried out on a randomly selected sample of auto wrecking yards in northern Utah. The author developed his own questionnaire that was used in the interviews.

Before going into the purposes and objectives of the study, some background information should be considered.

### Background of Study

#### Auto wrecking industry

The Bureau of Mines (13) estimates that there were about 10,000 auto wrecking businesses in the United States in 1965. As mentioned earlier, the industry provides two valuable services: first, they assume the responsibility of disposal for old and wrecked automobiles, and second, they provide an outlet for used parts. These parts are not only less expensive but are often more readily available than new parts. This situation is especially true for older model cars where new parts would have to be ordered. Used parts are sold to individuals, repair shops and garages, and to part rebuilders. Those parts which cannot be sold are turned over to scrap processors.

The source of supply in the auto wrecking industry falls into two categories: (a) individual owners and (b) bids on unclaimed, impounded

autos and insurance claims. Individual owners sell or give their cars to the auto wrecker. It was found in the interviews that many owners would not take older cars because they made no profit on the parts and were paying scrap processors to take them off their hands. Auto wreckers bid on unclaimed, impounded cars and also auto insurance company salvage pool cars. In this method wrecked or impounded cars are stored in a centrally located area. Descriptive lists are periodically sent to buyers who then bid on listed cars.

The majority of vehicles are purchased through the second method. Bidding becomes highly competitive on some insurance salvage cars. This is especially true on the late, popular models. This method of obtaining the businesses' inventory is quite unique to this industry. Most retail or manufacturing firms have a readily available source of supply. When the reorder point is reached they can either make arrangements with a supplier or manufacturer of the article to replenish their depleting stock. In the auto wrecking industry the source of supply is not so dependable. If it is found that the stock of a fast-moving item is being depleted, the firm cannot build up its stock of that particular item as would a normal firm. The dealer must wait until he has a chance to bid on a wrecked auto that has the fast-moving items available on it. Since he is competing with other dealers, he may lose the bid and run out of that particular item.

Many auto wreckers have partially alleviated this problem by adding telecommunication connections with other yards. This has helped them serve their customers, even though they may be out of a particular item. If the yard is out of a desired part they relay a message of the



needed parts to other yards. Those yards that have the part reply via the telecommunication system. An order is placed with the yard desired telling the method of shipment, place of shipment, and billing. The part is sent to the dealer where the customer picks it up. This method causes a slight delay but still provides the needed part.

After a car is received in the yard, auto wreckers usually conduct their operations in one or more of three general ways: (a) store cars and strip parts as customers come in, (b) strip the vehicles of all major parts and place these parts in storage racks or bins ready for sale, (c) park vehicles in the yard and let customers remove the parts they desire.

Once the salvagable parts are sold, the owner must get rid of the remaining scrap. Recently this has become a problem. In the days of open-hearth furnaces, steel was made by using about half ore and half scrap. Steel mills were paying about \$40 a ton for scrap metal. Now they are paying as low as \$12 per ton for number two scrap metal. (The major portion of auto salvage goes into number two scrap metal.) The low prices resulted because of technological changes in the manufacturing of steel--first, the development of electric furnaces and then the development of the oxygen furnace. Both furnaces use higher grades of scrap than that coming from automobiles (2,8). The equipment that is used to convert automobile bodies and parts into high grade scrap is so costly that there are few converters in operation. They usually run in cost from \$100,000 up to \$2,000,000.

No longer can the wrecking yards salvage what good parts are available on a car and then expect a good price for the remainder that

cannot be sold. They must now pay a scrap processor in order to get rid of scrap.

#### Importance of inventory control

Firms in most lines of business have a large portion of their capital assets invested in inventories. This inventory investment is a store of goods held by the firm for final sale to the customer or to be further processed into final goods for consumers. This investment must be made in order to facilitate trade and production. Consumers of final goods do not ordinarily want to wait while a good is ordered or produced, but want to have it available for examination and immediate purchase. Most manufacturing firms must have a store of raw materials or component parts available in order to facilitate continuous production. Goods-in-process inventory is also an important component of the inventory of an industrial manufacturing firm.

The size of the investment in inventory varies from one type of industry or business to another. Table 1 indicates an array of investments in inventory as a percent of total assets for various industries or lines of business.

Table 1. Corporation inventory as a percent of total assets<sup>a</sup>

Industry or Business	1963-64	1961-62	1954-55
Total Mining	7.18	5.57	5.38
Total Manufacturing	20.85	20.84	21.92
Total Wholesale	28.80	28.52	30.97
Total Retail	32.97	32.29	30.54
Total Service	4.79	4.79	5.73
Total Finance, Insurance, Real Estate	.026	.025	.011

<sup>a</sup>For computational details see Appendix A

Table 1 shows the relative importance of inventories to the retail and wholesale firms. Retail firms have the largest investment in inventory (about 32 percent of total assets), while finance, insurance, and real estate firms have much smaller investments (about .026 percent of total assets).

The author of this paper wanted to compare the inventory investment of the firms that he would be studying with retail firms reporting on federal corporate income tax returns. In order to make this comparison, a question was included in the questionnaire asking the managers of the auto wrecking yards what portion of their total assets consisted of inventory. Table 2 lists the results of this question. Ten out of

Table 2. Inventory as a percent of total assets for auto wrecking yards interviewed in northern Utah

Owned Yard Property	Leased Yard Property
60%	50%
60%	
50%	
50%	
35%	
35%	
30%	
25%	
4%	

the fifteen firms sampled answered the question. The other five had no idea of the proportion they had invested in inventory. By eliminating

the extremely low value of 4 percent<sup>1</sup> a mean value of 43.89 percent of the total assets invested in inventory was determined.

The foregoing figures indicate the great importance of inventories to the operation and capital expenditures of the auto wrecking yard. Since inventories are such a large portion of total assets and are also one of the less liquid current assets, inventories should receive careful management consideration. However, according to Trundle (12, p. 312) ". . . many executives can tell the exact cost of selling a unit of product, of hiring and firing a man, of advertising in relation to each sale, and yet find it difficult to put down in black and white how much they are spending to keep a stock of goods on hand." One of the reasons for this difficulty may certainly lie in the complexity of costs involved in carrying an inventory. Johnson (5, p. 593) has a fairly complete listing of inventory costs as indicated in the tabulation below:

- Cost of capital
  - Inventory
  - Equipment to handle and store inventory
- Cost of space occupied
  - Depreciation, maintenance, rental
  - Taxes
  - Heat, utility costs
  - Janitorial labor
- Inventory service costs
  - Taxes on inventory
  - Insurance
  - Labor cost of receiving and stocking
  - Inventory records and bookkeeping costs

---

<sup>1</sup>This value was eliminated from calculation of the mean because the owner of the yard had many old cars that he was getting rid of. In order to get rid of them he had to pay scrappers to take them off his yard. He figured his inventory value was lower because of this situation.

- Pilferage
- Deterioration
- Inventory risks
  - Risk of decline in price
  - Risk of change in style or other causes of obsolescence

It is easy to put a dollar and cent value on some of these costs, but others such as deterioration and inventory risk are difficult to assign a value. The objectives of management are to minimize these costs and reduce the risks of obsolescence and price decline, while still providing adequate service to customers by having items available for sale.

#### Purpose and Objectives of the Study

Inventory control should be very important to managers of auto wrecking yards, first, since a major portion of their assets are tied up in inventory, and second, because of increasing costs due to highway beautification laws, increased labor costs, and decreasing scrap metal prices.

In the past, auto wrecking yards have been able to store autos in open fields. This created an unsightly view to motorists, and as a result Public Law 285 (14) has been passed requiring all auto wrecking yards along public highways to be screened. In order to facilitate this screening, auto yards will have to eliminate some of their inventory or sustain extra screening costs. Yards will have to be more selective in the inventory they carry in order to be more profitable in the future. Even those yards which are not affected by the Highway Beautification bill still feel the pressure of increasing labor costs and decreasing

scrap iron prices (see Appendix B).

The purpose of this study was to determine the present methods of inventory control and the effectiveness of these methods in auto wrecking yards in northern Utah.

The study had three major objectives;

1. To determine what methods are used to keep track of inventory,
2. To determine managers' feelings about inventory control and the improvement of their present systems.
3. To determine the effectiveness of the present inventory systems and the management information which they provide.

The study was not concerned with the following:

1. National automobile disposal problem.
2. Profitability status of individual yard owners or the industry as a whole.
3. The possible economies of adding an improved system.
4. Collection of quantitative material on demand and supply.

#### Paper Sequence

Following is a brief sequence introducing the remaining parts of this paper. The literature pertaining to general inventory management will be reviewed, followed by a discussion of literature relating to auto wrecking yard inventory management. This section will also compare the simple model used in inventory management of the typical retail or manufacturing firm with the model represented by the inventory situation in the auto wrecking industry. The next section deals with the method and procedure used in this study and contains a detailed description

of the questionnaire development. The results of the study will then be presented along with summary and conclusions drawn from the findings. Recommendations will be made suggesting further areas of study and a closer tie between the academic world and the practical management problems experienced by the auto wrecking yard managers.

## REVIEW OF THE LITERATURE

The importance of inventory as an investment has previously been mentioned. There are numerous other writers who feel that control of and accounting for inventory are very important for profitable management of a business. Since inventories usually are the largest current assets appearing on the balance sheet of most firms, Meigs and Johnson (6) feel that an error of 20 percent in the valuation of inventories may be as great as omitting the cash asset from the financial statement.

Stockton (11, p. 2) states that

Inventories are an asset of the firm and as such appear in a dollar form on the balance sheet. From a financial standpoint inventories represent a capital investment and must therefore compete with other asset forms for the firm's limited capital funds. As a consequence, total investment in inventories must be related to the efficiency with which these funds are used.

He further states that businessmen have shown great interest in improving methods for inventory management in recent years.

Historically, according to Trundle (12) "the origin of inventory preceded that of industry itself and dates back to antiquity." He goes on to explain that anciently, even in the primitive barter stages of trade, craftsmen and traders had to harvest or fashion a store of goods before proceeding to the market place to trade.

Development of the earliest type of equation dealing with inventories was done by F. W. Harris in 1915. He worked with economic lot sizes. According to Alexander (1), other articles dealing with



the economics of large requisitions followed in 1925, which were written by Davis, Miller, and Owen. From 1935-1950 there was a gradual increase in interest in inventory problems by economists, statisticians, and mathematicians. Alexander (1, p. 5) states that

In the last decade, there has been a vigorous resurgence of interest in the studies of optimal policies for holding inventory. the application of methodological tools previously untried in this area has given much impetus to the study.

Some of the tools mentioned by Alexander are calculus of variation, serv- and game-decision theory. These tools have been used to construct advanced models of inventory systems.

Figure 1 is a simplified model of an inventory system. Theoretically there is a different model for each line of inventory items. Different models are necessary because each line may have a different demand, order time, and source of supply.

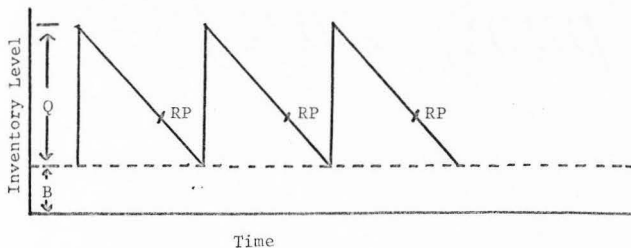


Figure 1. Typical inventory system model

The distance  $Q$  indicates the quantity that is ordered to replenish

the store of goods. The distance B indicates a buffer or safety stock which is held in case of increased demand or unexpected delay in delivery. If the exact demand and order filling time were known, it would not be necessary to keep a buffer stock. The point RP indicates a reorder point on the usage or demand line. This point is set so that by the time lapse after an order is made and received, the inventory will have decreased to the buffer stock level with normal usage. The buffer stock is held at a level so that with anticipated maximum usage it would not be depleted by the time a new order arrives.

Buffa (4), Biegel (3), Starr and Miller (10), and Stockton (11) all state that there are only two basic inventory systems. These two systems, according to Starr and Miller (10), can be differentiated in terms of the variables that can be controlled by the manager. These two variables are the amount ordered and the frequency of the order. If a fixed quantity is ordered each time, the system is known as the fixed-order-size, fixed-order-quantity, or Q systems respectively, depending on what text is used. In this system the quantity ordered is fixed. The time of the order may vary or remain the same, depending on the constancy of demand. If demand remains constant the time interval will be the same for each order. If demand fluctuates, the time will also fluctuate.

When the orders are placed regularly, the system is known as the fixed-order-interval, fixed-reorder-cycle, or P system respectively, again depending on what text is used.

This system is based on a fixed reorder time, Therefore, the quantity must vary or remain constant, depending upon demand again.

These two systems, with variation, work well for most production and merchandising firms. Buffa (4) feels that the fixed-order-quantity system has more valuable application with low value items and that the fixed reorder cycle has valuable application to high value items.

The development of these basic inventory systems through the application of methodological tools has given quantitative strength and direction to inventory management for most retail and manufacturing firms. However there are factors which complicate inventory control for auto wrecking yard managers that are not encountered in the management of most retail and manufacturing firms. First, most retail and manufacturing firms have an adequate source of supply where they can obtain inventory items as needed. The manager of the auto wrecking yard can only acquire inventory as cars are wrecked or abandoned as a means of transportation. Even though he may have demand for certain items, he may not be able to supply this demand because the items are not available for his acquisition. Secondly, retail and manufacturing firms can usually obtain their inventory in the quantities needed to supply their demand. The auto wrecking yard manager, in most cases, must purchase a complete car usually having many parts that are damaged or not in demand and therefore have little or negative value to him. He would rather just purchase the parts desired but finds that in order to acquire desired parts he must accept the undesirable parts also. The following hypothetical example illustrates these two problems.

Chevrolet "327" engines have a very high demand and can be sold readily but Chevrolet differentials are infrequently demanded. In order to acquire the engine, the manager must usually buy the complete car

containing the differential along with other desirable and undesirable parts. By setting up a year's transactions for these items, models can be made to illustrate what problems the unique situations pose for inventory control. Starting in January the hypothetical yard has four "327" engines and ten Chevrolet differentials in inventory. In March two more cars are acquired with engines and differentials. Three engines are sold in April and three more in May. It is August before another car with a "327" engine can be purchased. This engine, along with a differential, is sold in September. In October the yard acquires three more cars with the desired engine. Two engines are sold in December. Figure 2 illustrates models of the inventory of engines and differentials over the year.

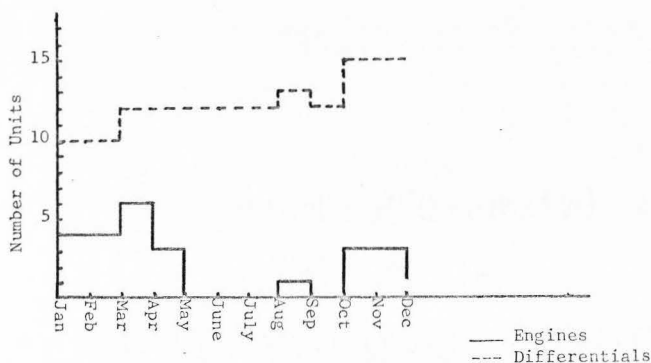


Figure 2. Hypothetical inventory models for engines and differentials

The ending inventory for the year shows one "327" engine and fifteen differentials. There are less engines in inventory than would be desired and far too many differentials, but the desire to increase the number of engines automatically creates the problem of carrying more differentials than desired. Some of these undesirable items not only required additional holding space and dismantling costs but also cost the yard to dispose of them. Such items include seats, damaged tires, floor mats, head liners, and broken glass.

This has been a hypothetical example but it points out the problems of inventory control experienced by the managers of auto wrecking yards. The question is can inventory control models and systems that are used successfully in inventory management for most retail and manufacturing firms be modified to fit the needs of auto wrecking yards. There have been numerous articles written on the esthetic problems of automobile disposal, but the author has been unable to find any concerned directly with problems of inventory management in the auto wrecking industry. Searching in the Business Periodical Index, Reader's Guide to Periodical Literature, and the Journal of the American Production and Inventory Control Society has yielded no information in this area. The author corresponded directly with the president of the National Auto and Truck Wreckers Association for any information in this area which he might know of or have. He returned copies of some systems of inventory control used by some of the members, but no reference was made to any studies. For reference to the correspondence with the NATWA see Appendix C.

The area of study in auto wrecking yard management and especially consideration of their problems in inventory control is desolate.

Further studies in these areas may prove to be a valuable aid to the managers of auto wrecking yards.

## METHODS AND PROCEDURE

### Area Studied

The study was limited to the auto wrecking yards in the vicinity of Logan, Ogden, Provo, and Salt Lake City. This area was selected because the majority of Utah's population is located here. Concentration of population also results in a concentration of business activity. (See Appendix D for details.)

### Sample Selection

A list was compiled of all auto wrecking yards listed in the yellow pages of the telephone directories in the areas mentioned. The local telephone office has directories for all areas of Utah available for public use. There was a total of 49 yards listed. Each yard was given a number (1 through 49). Then, by using a random number table, a sample of 15 yards was selected from the total population. This allowed a 30.6 percent sample of the total population. (Appendix E lists all the auto wrecking yards.)

### Method of Survey

Mailed questionnaires were first considered as a method of conducting the survey. After some thought by the author and some suggestions by committee members, personal interviews were considered more applicable to the study. It was felt that mailed questionnaires would go unanswered.

Also, because of the varied backgrounds of the owners, many questions would be answered differently. Personal interviews would provide more responses and by direction of the interview background differences, which might influence the answers, would be eliminated.

Development of the questionnaire to be used in the interview was a major step in this study. Details on the development of this instrument are explained in the following section.

#### Questionnaire Development

The first step in the development of the questionnaire was to closely examine the objectives of the study and then to develop questions that would provide answers to the objectives. Once the initial questions were developed, the third step was to pilot test them on yards outside the study sample in order to determine their effectiveness. It was found from the pilot study that the initial questionnaire did not provide the information needed to meet the objectives and thus considerable changes would have to be made. For example, the first objective was to determine what methods were being used by auto wrecking yards to keep track of their inventory. The questions that were initially developed to meet this objective are presented in Table 3.

Table 3. Questions one and two from initial questionnaire

- 
1. Do you have a formal inventory system?      Yes \_\_\_\_\_      No \_\_\_\_\_
  2. If your answer is yes, what method do you use for accounting for your inventory?
    - A. Periodic method \_\_\_\_\_
    - B. Perpetual method \_\_\_\_\_
-



After the pilot study of these questions, analysis of the answers given revealed the fact that the actual methods used by auto wrecking yards in keeping track of their inventory could not be determined. From the knowledge gained in the pilot study and from additional interviews with yard owners and the president of the Utah Auto Wreckers Association in Salt Lake City, some of the actual methods used by auto wrecking yards were put into general category groups. These groups were then listed in ascending order of sophistication. Table 4 presents the final question used to meet objective number one.

Table 4. Question number one on final questionnaire

A. Which of the following do you use to keep track of your inventory?

- 1. Memory only, no yard location or no written record.
- 2. Yard location with grouping of cars by make, model, and year with no written record kept on cars.
- 3. Yard location with grouping of cars by make, model, and year with written records such as purchase receipts, invoices, and sales receipts kept on each car.
- 4. Card file listing each car, but not listing parts available or condition.
- 5. Card file listing each car, parts available, and condition.
- 6. Card sort system listing each car, parts available, and condition.
- 7. Other (please specify)

This type of question provided answers to objective one by allowing a quick summary of what method was being used by the yards

and how many yards were using each method.

Questions were developed to obtain answers to the remaining objectives through the same method described for objective number one. The use of a pilot study was very beneficial in the development of the questionnaire. First, it was an effective way of testing the questions to find out if they would provide the information desired. Second, it gave some idea of what types of answers to expect. This additional knowledge added greatly in further refinement and development of the final questions. Third, it aided in wording the questions so that they would be understood by those being interviewed. Fourth, although this is not related to the questionnaire development, the pilot study was a good preparation for the interviewer in conducting the final study interviews. (Refer to Appendix F for a full comparison of various stages in the development of the final questionnaire.)

#### Interview Techniques

The interviewing was conducted during the month of July, 1967. All interviews were conducted on the week days, except on Wednesday. The members of the Utah Auto Wreckers Association are closed on this day. The managers of the yards sampled were contacted without prior appointment. A brief introduction was given by the interviewer pointing out the nature of the study and the length of time taken to complete the questionnaire (each interview took from 10-15 minutes). The manager was also told that his answers would be confidential, his answers would be grouped with totals, and his yard would remain anonymous.

The interviewer presented the questions to the manager and checked off or marked down the answer or information that applied. If there were any questions asked by the manager in answering the questions, they were explained by the interviewer.

Most managers were contacted on the initial meeting. Only two managers out of the 15 sampled were not available and had to be contacted later. All of the managers were very helpful and were willing to answer the questions. The information that was so generously given is tabulated and presented in the next section.

## RESULTS AND DISCUSSION

The basic objectives of this study were to determine what methods were being used by auto wrecking yards to manage and control their inventory, to determine managers' feelings about inventory control and the improvement of their present systems, and to determine the effectiveness of the present inventory systems and the management information which they provide. Answers to these questions were obtained through questionnaire interviews with the managers of 15 auto wrecking yards in northern Utah, which were selected from a total listing of 49 auto wrecking yards in this geographical area by use of a random number table.

### Inventory Methods

Table 5 lists the methods used by auto wrecking yards to keep track of their inventory, the number of yards in the sample using each method, and the percent of the sample using each method. This tabulation indicates that 20 percent of the managers sampled are keeping track of their inventory by memory only. In fact, 40 percent have very little or no written record of their inventory. There are only 34 percent of the yard managers who keep a record of the parts they have available and the condition of these parts. The records that are kept vary in sophistication from one yard to another. Differences exist in parts breakdown, detail recorded, and the methods used to record con-

Table 5. Methods used to keep track of inventory, the number and percent using each method

Method	Number	Percent
Memory only, no yard location or written record.	3	20.00
Checkbook stub record only.	1	6.67
Yard location with grouping of cars by make, model, and year with no written record kept on cars.	2	13.33
Yard location with grouping of cars by make, model, and year with written records such as purchase receipts, invoices, and sales receipts kept on each car.	0	0
Ring book folder record kept on each car, but no record of parts available or condition.	1	6.67
Card file listing each car but <u>not</u> listing parts available or condition.	3	20.00
Ring book folder record kept on each car listing parts available or condition.	3	20.00
Card file listing each car, parts available, and condition.	1	6.67
Card sort system listing each car, parts available, and condition.	1	6.67
Total	15	100.00

dition, location, etc. Therefore, it would be impossible to present a general example covering all of the various types of record systems. (Appendix C contains three examples of record systems used by different auto wrecking yards.)

This data also indicates that once a manager decides to keep records on his inventory, he records his inventory in a systematic order, such

as a ring book folder or card index, instead of just filing his title or purchase receipts.

#### Feelings About Inventory Control and System Improvement

One hundred percent of the managers interviewed felt that inventory control was necessary in the auto wrecking industry. All managers indicated that their present system could be improved. Fourteen managers felt that the development of an improved, formal inventory system would be beneficial in the management of their business. One owner felt that his present system was adequate for the present time and only slight changes were needed. He did not feel that the development of a formal inventory system would be beneficial to his business. This particular manager had a very elaborate card index system which contained a breakdown on all inventory in his yard. This breakdown listed all parts available, the condition of the parts, and the location of the part. His index contained no cost information, however. He said he had heard of some dealers in Idaho who had similar systems by who had added cost information on their card index and were finding it very useful. This yard was also one of the few that dismantled all cars into major components and had a storage area for separate parts, such as generators, radios, motors, differentials, transmissions, etc. All parts were tested before storage to determine their condition.

The reasons given by the other 14 owners for not adding improvements to their present inventory systems are listed in Table 6. These three reasons are all closely tied together and could technically be

Table 6. Reasons given by yard owners for not making inventory improvements

Reason	Number
Cost	8
Time	11
Personnel	7

considered under one heading--cost. For example, a manager could hire extra personnel which would increase the cost but would give him more time to devote to management problems. If one considers the typical yard operation he can see why managers cited time over other reasons. The majority of the yards sampled have only one or two employees. Most of the time the owners try to do all of the work themselves. Due to prohibitive costs they have not considered adding another employee. Therefore, the limiting factor to them is their time.

Effectiveness of the Present System in Providing  
Management Information

In determining the effectiveness of the present system of inventory control in providing management information, the questionnaire included a check list of items which should be important in the proper management of a business. These check list items and the responses are presented in Table 7.

The information contained in Table 7 is very interesting. Eleven of the fifteen yards sampled indicated that they did use their inventory evaluation in the compilation of a balance sheet and income statement.

Table 7. Check list of management information and responses

Management Information	Yes	No
Is your inventory evaluation used in compilation of your yearly income statement and balance sheet preparation?	11	4
Do you use your inventory and accounting records in bidding on wrecked cars	4	11
setting markups (prices)	3	12
Do you know about how much it costs you to hold a car in your yard for a year?	3	12
Do you have a record of how much capital you have invested in each car and how long it has been held?	5	10

However, only 5 out of the 15 yards kept any record on the amount of capital invested in their inventory. Such inconsistency raises a question as to the accuracy of their balance sheet preparation.

It was also enlightening to find out that 4 out of the 15 owners were using their inventory and accounting records in bidding on wrecked cars. Since bidding is their major source of popular, late model parts and becomes highly competitive, it was the author's feeling that more managers should be using their records to establish bid prices. Those managers who were using their records for bidding were the ones with the more systematic record keeping systems.

Those managers who knew how much capital they had invested in each car also knew what portion of their total assets were invested in inventory. The five who had no idea what portion of their total assets were invested in inventory were among the ones who had no record of capital invested in inventory.



Relationship Between the Level of Sophistication of Inventory Control, the Number of Cars in the Yard, and the Number of Employees of the Firm

The author desired to find some indicator that could be used to predict what level of inventory control was being used by a yard. Two factors were considered as possible indicators: first, the number of cars held in the yard, and second, the number of employees working in the yard. Table 8 indicates the results of the survey. As it can be seen from this table, the number of cars held in the yard seems to have no relationship with the sophistication of the inventory system. One yard using memory only has 800 cars. This is 100 more than an operator with a complex card file system. There seems to be a relationship between the number of employees and the sophistication of the inventory system. Study of Table 8 shows that 53.3 percent of the yards with more sophisticated systems employ 81.5 percent of all employees. (The top 8 out of the 15 yards have 53 out of the total 65 employees.) The yard with the card sort system, which represents 6.7 percent of the sample, has 26.2 percent of the employees.

These results give some indication that there is a relationship between the sophistication of inventory control and the number of employees. Theoretically, this could also indicate that firms with more sophisticated systems of inventory control have greater business activity because first, it takes a more sophisticated system to facilitate inventory control and second, more workers are necessary to carry on their business activity. The larger payroll commitment is also an indicator that more business is being done by these yards.

Table 8: Relationship between the level of sophistication of inventory control, the number of cars in the yard, and the number of employees of the firm

Method of Inventory Control	Yard Sample Number	No. of Cars in Yard	Number of Employees	
			Part-time	Full-time
Memory only, no yard location or written record.	2, 7, 10	800, 200, 215	1, 0, 0	0, 1, 3
Checkbook stub record only.	8	200	1	1
Yard location with grouping of cars by make, model, and year with no written record kept on cars.	5, 13	?, 900	0, 0	1, 2
Ring book folder record kept on each car, but no record of parts available or condition.	12	500	0	2
Card file listing each car but <u>not</u> listing parts available or condition.	3, 4, 14	400, 600, 2300	1, 2, 2	2, ?, 6
Ring book folder record kept on each car listing parts available or condition.	6, 9, 15	300, 300, 100	1, 1, 0	1, 1, 7
Card file listing each car, parts available, and condition.	1	700	3	7
Card sort system listing each car, parts available, and condition.	11	1500	0	17

Additional Data

This additional data was obtained to increase the author's knowledge concerning the operation of auto wrecking yards and to aid in the writing of this paper. It has been included here because it may be useful to others doing further research in this area or for comparative purposes.

Operations procedure

It was found that 12 of the 15 yards sampled left automobiles intact, while the other 3 dismantled their cars into major components. Many of those managers who were not dismantling their automobiles expressed a desire to do so, but were unable to because they lacked adequate storage (bins, racks, and building facilities) where the parts could be stored away from the weather and protected from theft.

Employees

Table 9 lists the employee situation existing in the auto wrecking yards sampled.

Table 9. Number of full-time and part-time employees

	Full-time			Part-time		
	No. of Employees	Frequency	Total	No. of Employees	Frequency	Total
0 <sup>a</sup>		1	0	0	7	0
1		5	5	1	5	5
2		4	8	2	2	4
3		1	3	3	1	3
6		1	6			
7		2	14			
17		1	17			
Totals		15	53		15	12
Mean number of employees			3.53			.80
Standard deviation			4.35			.91

<sup>a</sup>One owner worked part time at the yard himself

#### Number of cars in yards

Any automobile that was not completely dismantled into parts or processed for scrap was counted as a car held in the yard because it was using space.

There was a wide range of cars held in the yard. There were 14 managers who knew about how many cars they were holding in their yards and one manager who had no idea how many he had in his yard.

Table 10 lists the number of cars held by the various yards.

Table 10. Number of cars held in yards

---

	2,300	
	1,500	
	900	
	800	
	700	
	600	
	500	
	400	
	300	
	300	
	215	
	200	
	200	
	100	
	<hr/>	
Total	9,015	
Mean number of cars held in yards		643 cars
Standard deviation		605 cars

---

## SUMMARY AND CONCLUSIONS

There are about seven million cars in the United States that are wrecked or worn out each year and become useless as a means of transportation. Seventy-three percent of these cars end up in auto wrecking yards as their inventory. This inventory must be managed properly, as in any other business, in order to provide the owner with a profit. Managers of auto wrecking yards, as well as the managers in other firms or industries, face external pressures that have decreased their profit margins. Some of the forces faced by the manager of the auto wrecking yard are decreasing scrap iron prices, increasing labor rates, zoning restrictions, and screening laws associated with the National Highway Beautification Act. In order to remain profitable in the face of increasing costs, many managers have had to exert greater control over their business operations. Since inventory constitutes the major asset of most firms, inventory control has received much attention in the past few years.

The objectives of this study were to determine what methods were being used by auto wrecking yards to keep track of their inventory, to determine managers' feelings about inventory control and improvement of their present systems, and to determine the effectiveness of the present systems in providing management information. Answers to these questions were obtained through the use of a questionnaire interview with managers of a randomly selected sample of 15 yards in northern Utah.

The questionnaire was developed by the author using yards outside the study sample to pilot test and help develop the questionnaire.

The systems being used for inventory control fell into a continuum ranging from the use of memory only up to an elaborate card sort system for easy referral, listing the parts available, condition of the parts, and yard location. Other systems consisted of card files, ring book folders, and yard locations. All of these systems were with or without written records kept on parts available and the condition of these parts. Forty percent of the systems fell into the lower part of the continuum with no written record of inventory.

All managers interviewed felt that inventory control was necessary. They also felt that their present system could be improved and that the development of an improved, formal inventory control system would be beneficial in the management of their firm. The reasons given for not making improvements were time, cost, and personnel. Time was considered the most important limiting factor.

The management information provided by inventory and accounting records consisted mostly of physical information relating to the parts available, the condition of the parts, and the yard location. Sixty percent of the yards were keeping some type of written record, but only 33 percent of the yards had a record of the capital that was invested in inventory items and 20 percent of the managers knew the costs of holding inventory in their yards.

The objectives of inventory control are to minimize the costs of invested capital, space occupied, inventory service, and inventory risks while still having inventory available to provide adequate service to

customers. Using these objectives as a standard of comparison, it is readily seen that the majority of the inventory systems provide inadequate and/or insufficient management information for the proper control of the operation. More attention needs to be devoted to cost information, which is necessary to accurately determine how well the business is doing (rate of return on invested capital). More accurate cost records would also aid in bidding on needed inventory items, setting prices, and in eliminating those items which may not be making a return to the yard.



## RECOMMENDATIONS

The auto wrecking industry provides a valuable service by assuming the ultimate responsibility for disposal of the automobiles they acquire. Increasing labor costs, screening costs, decreasing scrap prices, and zoning laws have made it more difficult for these firms to operate profitably. In fact, many once profitable yards are now abandoned as auto graveyards and have become a public eyesore. There has been much written on the problems faced by the auto wrecking yards, but little has been done in the way of research to help them overcome these problems.

This paper has taken the first step by examining the state of art existing in the management of inventory which constitutes the largest single asset of most auto wrecking firms. This step was necessary before other steps could be taken to improve the present systems. Other areas that should be studied are the economic advantages and disadvantages of adding improvements to the present systems, the possibility of modifying present inventory control systems and models to fit the unique situations prevalent in the auto wrecking industry, pricing policies, and marketing approaches.

The author hopes that this study will stimulate others to do research in the indicated areas and that eventually enough information will be available to set up an effective system of inventory control that will aid managers in the profitable management of their firms.

Evidently, in the past there has been a lack of academic interest in the management problems faced by the auto wrecking industry. The author hopes that this can be improved in the future through closer association between the trade associations of the auto wrecking industry and those of the academic professions. Management seminars and extension classes may be offered to managers in this area in order to give them the knowledge to upgrade their business techniques.

APPENDIXES

Appendix AComputation of Inventory as a Percent of Total Assets

$$100 \times \frac{\text{Inventories}}{\text{Total Assets}} = \%$$

1963

Total Mining		
Inventories	\$ 106,332,545 <sup>a</sup>	
Total Assets	\$1,479,935,534	7.184
Total Manufacturing		
Inventories	64,663,275	
Total Assets	310,189,863	20.846
Total Wholesale Trade		
Inventories	13,632,674	
Total Assets	47,336,791	28.799
Total Retail Trade		
Inventories	18,295,788	
Total Assets	55,489,993	32.971
Total Finance, Insurance, Real Estate		
Inventories	216,311	
Total Assets	825,124,635	.026
Total Services		
Inventories	1,318,901	
Total Assets	27,526,328	4.791

1961-1962

Total Mining		
Inventories	999,595	
Total Assets	17,943,960	5.573
Total Manufacturing		
Inventories	57,522,979	
Total Assets	275,963,520	20.844
Total Wholesale Trade		
Inventories	12,643,772	
Total Assets	44,339,153	28.576

Total Retail Trade		
Inventories	15,359,863	
Total Assets	47,566,230	32.291
Total Finance, Insurance, Real Estate		
Inventories	176,352	
Total Assets	699,887,834	.025
Total Services		
Inventories	1,094,621	
Total Assets	22,829,046	4.794

1954-1955

Total Mining		
Inventories	640,408	
Total Assets	11,891,355	5.385
Total Manufacturing		
Inventories	39,872,109	
Total Assets	181,890,701	21.920
Total Wholesale		
Inventories	8,342,120	
Total Assets	26,933,902	30.972
Total Retail Trade		
Inventories	8,793,866	
Total Assets	28,789,635	30.545
Total Finance, Insurance, Real Estate		
Inventories	47,865	
Total Assets	432,476,851	.011
Total Services		
Inventories	574,311	
Total Assets	10,017,262	5.733

<sup>a</sup>All values are in thousands

Source: U.S. Treasury Department, Internal Revenue Service. Statistics of Income, corporate income tax returns. 1963-64, pp. 19-34; 1961-62, pp. 40-142; 1954-1955, pp. 44-54.

## Appendix B

## Scrap Iron Prices

Table 11. Steel making scrap prices

Price <sup>a</sup>	Year
\$27.17	1967 (1st two quarters)
30.67	1966
34.28	1965
33.71	1964
27.21	1963
28.54	1962
36.48	1961
33.05	1960
39.71	1959
37.85	1958
47.10	1957
54.16	1956
40.50	1955

<sup>a</sup>Average of number 1 heavy melting scrap price/gross ton at Pittsburgh, Chicago and Eastern Pennsylvania. Number 2 bundles were approximately \$5.00 less than number 1 heavy melting scrap prices.

Source: Steel Magazine. Steel markets. 1955-1967.

Appendix CCorrespondence with NATWA

837 North 8th East  
Logan, Utah 84321  
July 26, 1967

Raymond E. Morris, Public Relations  
2nd Avenue  
San Mateo, California

Dear Mr. Morris:

In my graduate program at Utah State University I am doing a study on inventory systems of auto wrecking yards. I have been told that you are the executive officer of the National Auto and Truck Wreckers Association. I am wondering if you have any information on previous studies that have been conducted in this area or any other information which might be useful in my study. If you have I would appreciate your help in providing me with references or copies of the information.

Yours truly,

*William L. Taylor*  
William L. Taylor



# NATWA

NATIONAL AUTO AND TRUCK WRECKERS ASSOCIATION, INC.

EIGHTEEN SECOND AVENUE  
SAN MATEO, CALIFORNIA 94401  
TELEPHONE: 415/342-3892

July 31, 1967

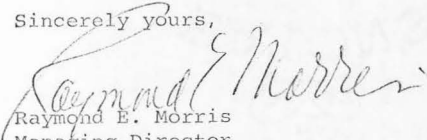
Mr. William Taylor  
837 North 8th East  
Logan, Utah 84321

Dear Mr. Taylor:

In response to your request of July 26, I am enclosing a few sample inventory forms which are now in use by some of our members. I hope this information will be of some help to you.

I would be very interested in receiving a copy of your study when it is completed.

Sincerely yours,

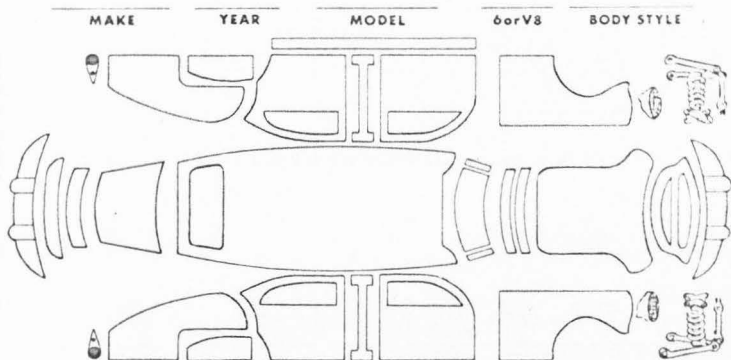
  
Raymond E. Morris  
Managing Director



CAR NO. \_\_\_\_\_

## INVENTORY CONTROL RECORD

DATE: \_\_\_\_\_



**MOTOR** Good  Bad  Manual  Elect. 
**DOORS** Auto.  O.D.  Std. 
**TRANSMISSION** Good  Bad 
**RADIATOR** Tinted  Clear 
**GLASS**

## CODE

A. No Damage

B. Damaged

X. Spare

Shading: Damaged Area

Power Steering Power Brakes 

## RECEIVING RECORD

Store \_\_\_\_\_

Date \_\_\_\_\_

Make	Year	Model	Body Style	Car No.

Towed From \_\_\_\_\_ Towed By \_\_\_\_\_ Charges \_\_\_\_\_

Wheel Covers 

Tires

A	B	C

Spare 

Radio

Yes  No 

## STRIPPING RECORD

Make	Year	Car No.	Date

 Battery Radio Tires & Wheels Wheel Cover

Form Y4B (2-20-58)

RE Form Y4A (1-7-58)



CAR NO.			ROW			TRIM NO.					
MOTOR, GEAR TRAIN, ETC.			INSIDE OF CAR								
Poor	Fair	Good	ITEMS			Poor	Fair	Good	ITEMS		
Notes on Engine			Engine Assembly			L. Sun Vis. Col.—			R. Sun Vis. Col.—		
			L. Cyl. Head			Steering Wh. Col.—			Horn Ring		
			R. Cyl. Head			Dashboard Col.—			Pd. R.		
			Carb. Mkt.—			Temp. Gauge					
			Int. Manif. - No. Bar.—			Amp. Gauge					
			Air Cleaner			Oil Gauge					
			Water Pump			Fuel Gauge					
			Fuel Pump Sg. D E			Speedometer					
			Distributor			Radio Type—			PB M		
			L. Ex. Manifold			Clock E M					
			R. Ex. Manifold			Head Light Switch					
			Gen. or Alt. Volt—			Wiper Switch					
			Regulator			Ignition Switch W/Key—			Y N		
			Starter			Emer. Brake Assembly					
			Solenoid			Heater Controls					
			Oil Pump			Heater Motor					
			Oil Pan			Heater Radiator					
			Frt. Bal Pulley			Heater Control Valve					
			Bell Housg.			Upholstery Col.—					
			Flywheel			Front Seat					
			Clutch Assembly			Tracks M E					
			Steering Box S P			Rear Seat					
			Power Pump			Front Floor Mat Type—					
			Power Cylinder			Rear Floor Mat Type—					
			Power Cont. Valve			L. Front Door Pad					
			Power Hose			R. Front Door Pad					
			Brake Master Cyl. S P			L. Rear Door Pad or Qtr. Pad					
			Trans. - Type—			R. Rear Door Pad or Qtr. Pad					
			Converter			Headliner Color—					
			Drive Shaft No.—			Air Cond. Unit					
			Axle Housing			Notes on Special Equip.—					
			Carrier Assembly								
			L. Axle								
			R. Axle								
			L. Spring - Type—								
			R. Spring - Type—								
REAR OF CAR											
			Rear Glass C Y								
			Trunk Lid or Gate								
			Misc								
			Rear Body Section			C—Clear			N—No		
			Bumper No. Sect.			Col—Color			S—Standard		
			Left			D—Double			P—Power		
			Center			E—Electrical			PB—Push button		
			Right			M—Manual			Pd—Padded		
			L. Back Bars			/—Part attached in Condition Checked			Sh—Shaded		
			R. Back Bars			O—Part missing or sold			T—Tinted		
			Gas Tank			— - Signifies car never equipped with part			V—Vacuum		
			Rear Frame Section			(/)—Part loose in condition checked			Y—Yes		

Copyright applied for

Make		Year	Model	Body Style	Type Body	Stock No.	
Color	Burnt <input type="checkbox"/>	Collision <input type="checkbox"/>	Mileage				
Lot	Building		Location				
NO. DAMAGE BUT REPAIRABLE	ITEMS					NO. DAMAGE BUT REPAIRABLE	ITEMS
	<b>BODY</b>						<b>REAR SUSPENSION</b>
	Cowl - R. Side <input type="checkbox"/> L. Side <input type="checkbox"/>						Rear Axle - Integral Drive
	Quarter Panel - R						3rd Member
	Quarter Panel - L						Rear Axle - R. <input type="checkbox"/> L. <input type="checkbox"/>
	Pool Deck Lid						Rear Axle Housing
	Lower Deck Panel						Propeller Shaft
	Windshield - Tinted <input type="checkbox"/>						Rear Spring - R. <input type="checkbox"/> L. <input type="checkbox"/>
	Back Glass - Tinted <input type="checkbox"/>						<b>STEERING</b>
	Front Seat Back						Steering Assembly - Power
	Front Seat Cushion						Steering Assembly - Automatic
	Back Seat Back						Steering Assembly - Standard
	Back Seat Cushion						Steering Wheel - Deluxe <input type="checkbox"/> Standard <input type="checkbox"/>
	Doors - Power <input type="checkbox"/> Tinted <input type="checkbox"/>						<b>ELECTRICAL</b>
	R.F. Door - Glass <input type="checkbox"/> Vent <input type="checkbox"/>						Generator
	L.F. Door - Glass <input type="checkbox"/> Vent <input type="checkbox"/>						Starter
	R.R. Door - Glass <input type="checkbox"/> Vent <input type="checkbox"/>						Distributor
	L.R. Door - Glass <input type="checkbox"/> Vent <input type="checkbox"/>						Battery
	Rocker Sill - R. <input type="checkbox"/> L. <input type="checkbox"/>						Top Motor
	Door Post - R. <input type="checkbox"/> L. <input type="checkbox"/>						Windshield Motor Elec. <input type="checkbox"/> or Vac. <input type="checkbox"/>
	<b>SHEET METAL</b>						Seat Motor
	Hood						Head Lamp - R.
	Front Fender - R.						Head Lamp - L.
	Front Fender - L.						Tail Light - R.
	Rear Fender - R.						Tail Light - L.
	Rear Fender - L.						<b>INSTRUMENTS</b>
	Radiator Grille						Radio
	Radiator Core						Clock
	<b>FRAME - FRONT SUSPENSION</b>						Heater
	<b>BUMPERS</b>						Spotlight
	Front Bumper						Air Conditioner
	Front Bumper Guard - R.						<b>ENGINE</b>
	Front Bumper Guard - L.						Engine - 6 Cylinder
	Rear Bumper						Engine - 8 Cylinder
	Rear Bumper Guard - R.						Intake Manifold
	Rear Bumper Guard - L.						2 Barrel <input type="checkbox"/> 4 Barrel <input type="checkbox"/>
	Frame						Cylinder Head - R. <input type="checkbox"/> L. <input type="checkbox"/>
	Frame Rail - R.						Carburetor
	Frame Rail - L.						Barrel - 1. <input type="checkbox"/> 2. <input type="checkbox"/> 4. <input type="checkbox"/>
	Frame Section Back						Air Cleaner
	Frame Cross Member						Exhaust - Single <input type="checkbox"/> Dual <input type="checkbox"/>
	Truck Axle						<b>TRANSMISSION</b>
	Front Springs - R. <input type="checkbox"/> L. <input type="checkbox"/>						Transmission - Standard
	Knee Action - R.						Transmission - Automatic
	Knee Action - L.						
	Front Hub & Drum - R. <input type="checkbox"/> L. <input type="checkbox"/>						Clutch Housing
	Rear Hub & Drum - R. <input type="checkbox"/> L. <input type="checkbox"/>						<b>TIRES</b>
	Sway Bar						Front
	Conventional Brakes <input type="checkbox"/>						Rear
	Power Brakes <input type="checkbox"/>						Towing Condition
	<b>WHEELS</b>						
	Wheels - Truck						
	Type Front Disc <input type="checkbox"/> Disc W/ Lock Rim <input type="checkbox"/>						
	Budd <input type="checkbox"/> Dayton <input type="checkbox"/>						
	Type Rear Disc <input type="checkbox"/> Disc W/ Lock Rim <input type="checkbox"/>						
	Budd <input type="checkbox"/> Dayton <input type="checkbox"/>						
	Hub Caps - Small <input type="checkbox"/> Discs <input type="checkbox"/>						

## SALVAGE BID

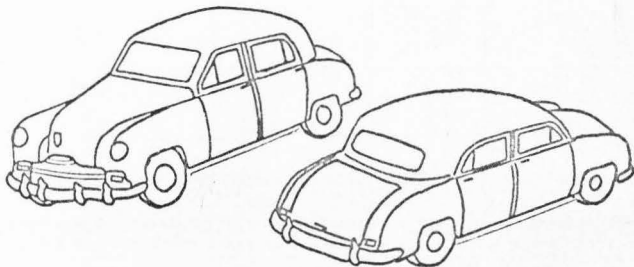
Company Name \_\_\_\_\_ Address \_\_\_\_\_ City and State \_\_\_\_\_

Name of Person Handling Deal \_\_\_\_\_ Title of Person \_\_\_\_\_ Office # \_\_\_\_\_  
Home # \_\_\_\_\_

Make of Car \_\_\_\_\_ Year \_\_\_\_\_ Model \_\_\_\_\_ Body Style \_\_\_\_\_

License No. \_\_\_\_\_ Color \_\_\_\_\_

Insured Name \_\_\_\_\_ File # \_\_\_\_\_

Kind of Loss: Collision  Fire  Theft Comments \_\_\_\_\_  
\_\_\_\_\_Tow Condition \_\_\_\_\_ 2 Wheel  4 Wheel 

Comments \_\_\_\_\_

MILEAGE \_\_\_\_\_ CLEAN  FAIR  ROUGH Equipment: Radio  Heater  Spotlight Air Conditioner  Size \_\_\_\_\_ Type \_\_\_\_\_Power: Steering  Brakes  Windows Transmission: Automatic  Standard  Standard w/O.D. Tires: White Walls  RF \_\_\_\_\_% LF \_\_\_\_\_%  
RR \_\_\_\_\_% LR \_\_\_\_\_% Spare \_\_\_\_\_%BATTERY Comments \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Appendix DNorthern Utah's Population and Business Activity

Estimated population by counties in the area studied as of 1/1/65

Cache	40,000
Davis	84,000
Morgan	3,100
Salt Lake	450,000
Utah	117,000
Weber	122,000
	<hr/>
Total	816,100

Total estimated population for Utah--1,008,000 as of 1/1/65

<u>816,100</u>	80.9% of Utah's estimated population live in
1,008,000	the above seven counties

51% of Utah's retail sales are made in Salt Lake County

52% of Utah's manufacturers are also located in Salt Lake County

Source: Rand McNally. Commercial atlas and market guide. New York. 98th edition. 1967. 524 p.

Appendix EAuto Wrecking Yards in Northern UtahLogan

1. Economy Auto Wrecking Co., 1483 N. 4th W.
2. South West Auto Parts, South State Highway

Ogden

3. A. & B. Sales and Auto Wrecking, 3486 N. 2000 W.
4. Auto Salvage Inc., 17 N. Main, Clearfield
5. Baur Auto Wreckage Co., 1830 Wall Ave.
6. Ben's Body Shop and Auto Salvage, 3157 W. 4800 S., Roy
7. Central Auto Salvage, 2151 Wall Ave.
8. Coy Dee Auto Wrecking, 3786 N. Highway 84
9. Farrer's Auto Salvage, 1681 S. 1900 W.
10. Crabtree Auto Co., 705 W. Riverdale Rd.
11. Roy Auto Parts and Glass Co., 5316 S. 1930 W., Roy
12. Siefert Auto Service, 1670 S. 1900 W.
13. West 20th Auto Salvage, 262 W. 20
14. Barne's Auto Salvage, 2462 E. 6575 S., Uintah
15. Uintah Auto Salvage, Uintah

Salt Lake City

16. American Auto Wrecking Inc., 176 W. Central Ave.
17. Apex Auto Wrecking, 4841 W. 2100 S.

18. Bonacci Bros., 402 S. Redwood Rd.
19. Boone's Auto Wrecking, 3367 S. 5th W.
20. Buck's Auto Wrecking, 4085 S. 3600 W., Granger
21. C. & E. Auto Wreckage Co., 3037 S. 3600 W., Granger
22. Charles Rowland and Sons Auto Wrecking, 2201 S. 2700 W.
23. Curly's Auto Wrecking, 3216 S. State
24. F. & W. Auto Wrecking and Salvage, 70 E. 8000 S. Midvale
25. Hansen Auto Wrecking, 3564 S. Main
26. Labrun Auto Wrecking, 3508 S. 500 W.
27. Midvale Radiator and Salvage Co., 153 N. Holden, Midvale
28. Motor Parts Co., 4125 S. State, Murray
29. Reasonable Auto Wrecking, 2321 S. 7800 W., Magna
30. Rudy's Auto Wrecking and Coal Co., 100 W. 4800 S., Murray
31. Sandy Metal Works, 764 W. 21<sup>st</sup> S.
32. Sommers Auto Wrecking, 647 W. 3300 S.
33. South Bountiful Auto Wrecking, 839 W. 1500 S., Woods Cross
34. South State Street Auto Wreckage Co., 3840 S. West Temple
35. South State Street Auto Wreckage Co., Inc., 1623 S. State St.
36. Taylor Service and Auto Wrecking, 3627 S. 6 W.
37. Tourist Auto Wrecking, 1016 S. State
38. Utah Auto Wrecking, 3375 S. 500 W.
39. Waltons Auto Wrecking Co., 585 W. 3300 S.
40. West Centerville Auto Salvage, 500 N. 1675 W., Centerville
41. Western Auto Wrecking Co., 585 W. 3300 S.



Provo

42. C. & J. Auto Wreckage, 363 E. 44 N., American Fork
43. R. & V. Auto Wrecking, Payson
44. American Auto Wreckage and Salvage, 2403 S. State
45. Beck's Auto Salvage, 301 E. 900 S.
46. Hilltop Auto Works, 1785 S. State, Orem
47. Pitlo Auto Repair, 1135 N. State, Orem
48. Rawlings Auto, 255 S. 1600 W., Orem
49. Valley Auto Salvage Inc., 650 S. 1200 W., Orem

Appendix FQuestionnaire DevelopmentInitial Questionnaire

1. Do you have a formal inventory system? Yes \_\_\_\_\_ No \_\_\_\_\_
2. If your answer is yes, what method do you use for accounting for your inventory?
  - A. Periodic method \_\_\_\_\_
  - B. Perpetual method \_\_\_\_\_
3. Do you leave cars intact as they come into the yard? Yes \_\_\_\_\_ No \_\_\_\_\_
4. Do you break cars down into major components such as engine, transmission, differential, radios, radiators, etc.? Yes \_\_\_\_\_ No \_\_\_\_\_
5. Do you leave the older models intact and dismantle the newer models? Yes \_\_\_\_\_ No \_\_\_\_\_
6. Approximately how many cars do you have in your yard?
7. Approximately how much does it cost you to hold a car in your yard for a year? \_\_\_\_\_
8. How many employees do you have working for you? \_\_\_\_\_
9. Does your bookkeeper work full time or part time? \_\_\_\_\_
10. What will be your approximate gross sales for this year? \_\_\_\_\_
11. Do you feel that the Highway Beautification law, which goes into effect in 1968, will have any effect on your business?  
Yes \_\_\_\_\_ No \_\_\_\_\_
12. If so, have you taken advantage of any federal funds to offset the costs of screening your yard? Yes \_\_\_\_\_ No \_\_\_\_\_

Second Questionnaire

1. Do you have a formal inventory system? Yes \_\_\_\_\_ No \_\_\_\_\_
2. If your answer is yes, what method do you use for accounting for your inventory?
  - A. Periodic method \_\_\_\_\_
  - B. Perpetual method \_\_\_\_\_
3. Check one of the following which applies to your firm:
  - A. Do you leave cars intact as they come into the yard? \_\_\_\_\_
  - B. Do you break cars down into major components such as engine, transmission, differential, radios, radiators, etc.? \_\_\_\_\_
  - C. Do you leave the older models intact and dismantle the newer models? \_\_\_\_\_
4. Approximately how many cars do you have in your yard? \_\_\_\_\_
5. Do you know approximately how much it costs you to hold a car in your yard for a year? Yes \_\_\_\_\_ No \_\_\_\_\_
6. If your answer to the above question is yes, approximately how much does it cost to hold a car for a year? \_\_\_\_\_
7. How many employees do you have working for you? \_\_\_\_\_
8. Does your bookkeeper work full time \_\_\_\_\_ or part time \_\_\_\_\_?
9. Do you feel that the Highway Beautification law, which goes into effect in 1968, will have an effect on the number of cars you will be able to keep in your yard? Yes \_\_\_\_\_ No \_\_\_\_\_
10. Have you taken advantage of any federal funds that are available to offset the costs of screening your yard? Yes \_\_\_\_\_ No \_\_\_\_\_
11. Do you feel that the development of an inventory system for an auto wrecking yard would be beneficial in the management of your firm? Yes \_\_\_\_\_ No \_\_\_\_\_

Third Questionnaire

## I. Inventory Systems

A. Which of the following do you use to keep track of your inventory?

1. Memory only, no yard location or no written record.
2. Yard location with groupings of cars by make, model, and year with no written record kept on cars.
3. Yard location with grouping of cars by make, model, and year with written records such as purchase receipts, invoices, and sales receipts kept on each car.
4. Card file listing each car, parts available and condition.
5. Card file listing each car, but not listing parts available or condition.
6. Others (please specify) \_\_\_\_\_.

B. Upon Receiving an automobile do you

1. Leave car intact?
2. Break all cars down into major components?
3. Leave older cars intact and break all late models down into major components?

## II. Evaluation of Present Systems

A. Do you feel that a system for inventory control is necessary in the auto wrecking industry? Yes \_\_\_\_\_ No \_\_\_\_\_

B. Are you satisfied with your present inventory system? Yes \_\_\_\_\_ No \_\_\_\_\_

C. If you are dissatisfied, please check from the following list those reasons for dissatisfaction:

1. Cost to maintain.
2. Lack of adequate personnel to operate system properly.
3. Fails to provide management information.
4. Lack of time to supervise and maintain.
5. Too complicated.
6. Other (please specify) \_\_\_\_\_.

- D. Do you feel that the development of an improved, formal inventory system for an auto wrecking yard would be beneficial in the management of your firm? Yes \_\_\_\_\_ No \_\_\_\_\_

III. Coordinating Inventory System and Accounting Records

- A. Do you taken your physical inventory

\_\_\_ periodically

\_\_\_ perpetually

\_\_\_ other (please specify) \_\_\_\_\_.

- B. Is your inventory evaluation used in compilation of your yearly income statement and balance sheet preparation? Yes \_\_\_ No \_\_\_

- C. What portion of your total assets are invested in inventory? \_\_\_\_\_%

- D. Do you know about how much it costs you to hold a car in your yard for a year? Yes \_\_\_\_\_ No \_\_\_\_\_

- E. If so, approximately how much \$ \_\_\_\_\_?

- F. Do you have a record of how much capital you have invested in each car and how long it has been held? Yes \_\_\_\_\_ No \_\_\_\_\_

- G. Approximately how many cars do you have in your yard? \_\_\_\_\_

- H. How many workers do you have working? full time \_\_\_\_\_  
part time \_\_\_\_\_

- I. Does your bookkeeper work full time \_\_\_\_\_?  
part time \_\_\_\_\_?

FINAL QUESTIONNAIRE

## I. Inventory Systems

A. Which of the following do you use to keep track of your inventory?

- 1. Memory only, no yard location or no written record.
- 2. Yard location with grouping of cars by make, model, and year with no written record kept on cars.
- 3. Yard location with grouping of cars by make, model, and year with written records such as purchase receipts, invoices, and sales receipts kept on each car.
- 4. Card file listing each car, but not listing parts available or condition.
- 5. Card file listing each car, parts available, and condition.
- 6. Card sort system listing each car, parts available, and condition.
- 7. Other (please specify).

B. Upon receiving an automobile do you

- 1. Leave car intact?
- 2. Break all cars down into major components?
- 3. Leave older cars intact and break all late models down into major components?

## II. Evaluation of Present Systems

A. Do you feel that a system for inventory control is necessary in the auto wrecking industry?

\_\_\_\_ Yes      \_\_\_\_ No

B. Do you feel that your present system could be improved?

\_\_\_\_ Yes      \_\_\_\_ No

C. Which of the following are reasons for not making improvements:

\_\_\_ 1. cost

\_\_\_ 2. time

\_\_\_ 3. personnel

\_\_\_ 4. complexity

\_\_\_ 5. other (please specify)

D. Do you feel that the development of an improved, formal inventory system would be beneficial in the management of your auto wrecking business?

\_\_\_\_ Yes      \_\_\_\_ No

## III. Coordinating Inventory System and Accounting Records

- A. Do you take your physical inventory  
    periodically  
    perpetually  
    other (please specify)
- B. Is your inventory evaluation used in compilation of your yearly income statement and balance sheet preparation?  
    Yes          No
- C. Do you use your inventory and accounting records in  
    bidding on wrecked cars  
    setting markups (prices)
- D. What portion of your total assets are invested in inventory?     %
- E. Do you own     or lease     your land?
- F. Do you know about how much it costs you to hold a car in your yard for a year?  
    Yes          No
- G. If so, approximately how much? \$
- H. Do you have a record of how much capital you have invested in each car and how long it has been held?  
    Yes          No
- I. Approximately how many cars do you have in your yard?
- J. How many workers do you have working  
    full time  
    part time
- K. Does your bookkeeper work  
    full time  
    part time



LITERATURE CITED

1. Alfandary-Alexander, Mark. An inquiry into some models of inventory systems. University of Pittsburgh Press, Pittsburgh, Pennsylvania. 1962. 108 p.
2. Anonymous. The junk-car plague. The Nation 200:630. 1965.
3. Biegel, John E. Production control. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1963. 230 p.
4. Buffa, Elwood S. Modern production management. John Wiley and Sons, Inc., New York. Second edition. 1965. 758 p.
5. Johnson, Robert W. Financial management. Allyn and Bacon, Inc., Boston, Massachusetts. Second edition. 1963. 714 p.
6. Meigs, Walter B., and Charles E. Johnson. Accounting. McGraw-Hill Book Co., New York. 1962. 879 p.
7. Rand McNally. Commercial atlas and market guide. New York. 98th edition. 1967. 524 p.
8. Sill, J. M. Jr. Junk cars are causing scraps. Iron Age 195:26-27. 1965.
9. Steel Magazine. Steel markets. 1955-1967.
10. Starr, Martin K., and David W. Miller. Inventory control: theory and practice. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1962. 354 p.
11. Stockton, R. Stansbury. Basic inventory systems: concepts and analysis. Allyn and Bacon, Inc., Boston, Massachusetts. 1965. 109 p.
12. Trundle, George T. Jr. Managerial control of business. John Wiley and Sons, Inc., New York. 1948. 408 p.
13. U.S. Bureau of Mines. Automobile disposal, a national problem. U.S. Department of Interior, Bureau of Mines. 1967. 569 p.
14. U.S. Congress, Public Law 89-285, 89th Congress, First Session, Washington, D. C., pages 1030-1031. October 22, 1965.
15. U.S. Treasury Department, Internal Revenue Service. Statistics of income, corporate income tax returns. 1963-64, 1961-62, 1954-55.

VITA

William Lee Taylor

Candidate for the Degree of

Master of Business Administration

Thesis: A Survey of Inventory Systems of Auto Wrecking Yards in Northern Utah

Biographical Information:

Personal Data: Born at Preston, Idaho, October 26, 1937, son of Joshua H. and Leah Carter Taylor; married Lucy Christiansen November 24, 1965; one child--Christine.

Education: Attended elementary schools in Thatcher and Clifton, Idaho; graduated from West Side High School, Dayton, Idaho, in 1956; received the Bachelor of Science degree from Utah State University at Logan, with a major in forest management, in 1965; did graduate work in business administration at Utah State University beginning in 1965 and completing requirements for the Master of Business Administration degree in 1967.

Professional Experience: 1966-1967 graduate teaching assistant.