Marketing Strategy Study of the Taylor Soil Moisture Tester

Allen Leron Johnsen
Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/gradreports

Part of the Business Administration, Management, and Operations Commons

Recommended Citation
https://digitalcommons.usu.edu/gradreports/635
MARKETING STRATEGY STUDY OF THE
TAYLOR SOIL MOISTURE TESTER

by

Allen Leron Johnsen

Report No. 2 submitted in partial fulfillment
of the requirements for the degree
of
MASTER OF BUSINESS ADMINISTRATION
Plan B

UTAH STATE UNIVERSITY
Logan, Utah
1971
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>iii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Objective</td>
<td>2</td>
</tr>
<tr>
<td>Methodology</td>
<td>2</td>
</tr>
<tr>
<td>Limitations</td>
<td>4</td>
</tr>
<tr>
<td>THE MARKETING MIX</td>
<td>6</td>
</tr>
<tr>
<td>The Customer</td>
<td>6</td>
</tr>
<tr>
<td>The Product</td>
<td>9</td>
</tr>
<tr>
<td>Place of Distribution</td>
<td>16</td>
</tr>
<tr>
<td>Price of the Product</td>
<td>18</td>
</tr>
<tr>
<td>INTERPRETATION OF DATA GATHERED THROUGH THE QUESTIONNAIRE</td>
<td>20</td>
</tr>
<tr>
<td>RECOMMENDED CHANGES IN THE MARKETING STRATEGY OF THE TAYLOR SOIL MOISTURE TESTER</td>
<td>29</td>
</tr>
<tr>
<td>The Product</td>
<td>29</td>
</tr>
<tr>
<td>The Place of Distribution</td>
<td>30</td>
</tr>
<tr>
<td>Price</td>
<td>32</td>
</tr>
<tr>
<td>Promotion</td>
<td>33</td>
</tr>
<tr>
<td>SUMMARY AND CONCLUSIONS</td>
<td>36</td>
</tr>
<tr>
<td>LITERATURE CITED</td>
<td>38</td>
</tr>
<tr>
<td>APPENDIXES</td>
<td>39</td>
</tr>
<tr>
<td>Appendix A. Letter</td>
<td>40</td>
</tr>
<tr>
<td>Appendix B. Questionnaire</td>
<td>42</td>
</tr>
<tr>
<td>Appendix C. Brochure</td>
<td>45</td>
</tr>
<tr>
<td>VITA</td>
<td>46</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Other instruments available on the market</td>
</tr>
<tr>
<td>2</td>
<td>Comparison of Taylor Tester with other testers</td>
</tr>
<tr>
<td>3</td>
<td>Cost to produce and margin for manufacturer, distributor, dealer and salesman</td>
</tr>
<tr>
<td>4</td>
<td>Responses by size of irrigated farmland</td>
</tr>
<tr>
<td>5</td>
<td>Responses to questions 5, 6, and 7 concerning yields, irrigation costs, and water application</td>
</tr>
<tr>
<td>6</td>
<td>Cost to produce and margin for manufacturer, distributor, dealer and salesman</td>
</tr>
</tbody>
</table>
INTRODUCTION

Marketing, some people say, need not be very complicated or costly. Their argument is summarized in Emerson's old adage, "If a man ... makes a better mousetrap ... the world will beat a path to his door." Such persons are sure that all one must do to succeed in business is to develop a good product.

The mousetrap adage may perhaps have been true when it was first expressed, but it certainly is not true today. The creation and production of a good mousetrap—or any other good product—in and of itself, is not enough to assure a man's fortune. In modern, well-developed economies the grass might well grow high on the path to the factory.

Today the design and production of a good product is only one step. The producer must also study consumer demand. He may have to advertise his product, and arrange for transportation and warehousing. Finally, he must sell it. In accomplishing these steps he may need the aid of wholesalers and retailers. The whole process is complex, specialized, and sometimes very expensive (6).

The marketing of the Taylor Soil Moisture Tester fits the introductory statement completely. It is a good product as we shall see when comparing it to other moisture measuring devices. It is less expensive than competitive testers. There also is a need for the information the instrument can provide. Yet the product has not sold in sufficient volume to make a profitable manufacturing operation. If increased sales of the unit can be achieved through use of the information recommended
in this study the experience of conducting the study will be rewarding both academically and financially.

Objective

It is the objective of this study to analyze from a marketing standpoint the potential customer, the need to be satisfied in the market, the product, the distribution channels available, the pricing structure and ways to promote and advertise the Taylor Soil Moisture Tester in a specific geographical area.

In addition, recommendations will be made to alter the marketing mix where necessary to help sell the Taylor Soil Moisture Tester on a profitable volume and margin within the specific area. Hopefully this information, if successful, can be used with adaptation to help sell testers in other regions of the country where irrigation is necessary.

Methodology

A review of the literature published by United States Department of Agriculture Experiment Stations and manufacturers of other moisture measuring equipment has been made and will be introduced into the study to help determine the use feasibility of such instruments and the increased yields they can help achieve.

Personal interviews have been made with potential agriculture customers and other interested parties. Their opinions will influence the recommended changes in the marketing mix. Nine personal interviews were conducted, five with potential agriculture customers, two with soils professors at Utah State University, two with farm implement dealers in areas where irrigation farming is extensive and one with a
teacher who needed summer employment and was interested in selling the product.

A questionnaire was drafted in March, 1968, and planned for mail distribution to a list of 154 agriculturists in southern Idaho who were on record as irrigation farmers with the State of Idaho Employment Security Office. This group of 154 farmers was selected because they all had records of having hired laborers to move their irrigation lines or assist in the manual labor of irrigating during the summer. It was further anticipated that this group would be more cognizant of the labor and cost problems than the non-hiring farmer because they were actually making out-of-pocket costs to pay for the irrigation service.

The questionnaire was sent by first class mail to arrive at the destinations in the early part of May, with the hope that most of the spring farm work would be completed. With the drying conditions of late spring, the thoughts of irrigation for the summer should have been uppermost in the minds of the respondents. However, due to some unforeseen wet weather, it was the peak of the land preparation time when the questionnaire reached the farmers. This may account for the smaller return than had been anticipated.

The questionnaire, brochure and letter which were sent appear in the appendix and were drafted to first, get the confidence of the individuals by asking questions which were not too technical in nature and then later trying to determine their knowledge of the problem of soil moisture in various types of soil; second, to determine farmer interest in having an instrument which could measure the soil moisture in various types of soil and for various crops on their farmland; third, to determine a recommended channel of distribution by getting the
farmer to indicate the place or places he would be most willing to buy such a device if he were so disposed.

A code number was placed under the stamp on the return envelope so that all returned questionnaires could be identified without having the name block filled in on question 14 of the questionnaire.

There was no preliminary test of the questionnaire within the study population; however, it was read by four agriculturalists in northern Utah and from this determined that the questions were valid and stated the needed information. One of the preliminary questionnaire respondents felt a majority of the farmers, even with fairly large operations, would not have the cost per acre of irrigation available at a moment's notice without some computation. As it turned out this was a valid criticism of the questionnaire. Very few of those responding did actually have knowledge of the cost per acre of electricity or other forms of energy used in the irrigation process. This points to a lack of record keeping in general which is the basis of several other problems in agriculture.

Limitations

The questionnaire mailing caught the group in question at the peak of their spring work, which was definitely a participation limitation. Also the questionnaire was accompanied by a direct mail brochure (Appendix C) which explained, from a sales standpoint, the soil moisture tester. It was felt that this information should be included to enable the farmer to know more about the soil moisture tester. A picture was enclosed on the brochure so each could get an idea of the size and use of the instrument. The direct mail piece changed the tone of the letter from a pure information gathering piece, but this was evaluated in
advance and determined to be acceptable. It was deemed necessary that a visual acquaintance with the instrument be attained to eliminate the unknown of what the device looked like.

From a marketing standpoint, the product would have to be considered an unsought good. Therefore, many of those being questioned were first acquainted with on-farm moisture measuring instrumentation with the arrival of the brochure and questionnaire. This must be considered a limitation to the collection of accurate market research information.

For this reason personal interviews were held with five of those who received the questionnaire but chose not to respond. When they were appraised of the capability of the instrument, more interest was shown in the product.
THE MARKETING MIX

The Customer

There are approximately 44,568,183 irrigated acres in the United States; all could use moisture measuring equipment to an advantage (10). Idaho farmers irrigated 3,550,000 acres in 1966 (5). This is the region where this report is oriented. Each irrigated farm is managed by a hired manager or operated by the owner; someone, in other words, responsible for making each of the farms a productive enterprise. This person is the target market for the Taylor Soil Moisture Tester.

It appears that this customer is not fully aware of the ramifications that soil moisture levels have on efficiencies in an irrigated farming operation. Upon observation, the customer seems slow to change established practices unless some leader of personal acquaintance has success in a new practice within his area.

Higher priority problems seem to overshadow the soil moisture analysis factor. This is especially so in southern Idaho where the interviews were taken. Here, a water shortage is the key problem farmers face. If some rainfall does not supplement the irrigation process, the wells and pumps cannot keep the moisture levels at the optimum and cover the land being farmed. The efficient use of water becomes the key for a soil moisture tester for these consumers. Consumers in other parts of the country face over-irrigation and leaching. A general consumer-oriented approach will have to consider the wide difference of moisture problems consumers face in their various geographical regions.
The customers are decentralized; most live on or near the farm they are operating. The farms are isolated from each other, requiring considerable travel to contact the individual farmer and acquaint him with the product if direct selling is used.

The chief competition in the eyes of the consumer is the stationary soil blocks and tensiometers; however, they require permanent installation and monitoring during the season. All other portable instruments are expensive laboratory products. Consequently, only the largest corporate farms with agronomists on the staff use them. The market has still not been reached where the bulk of a lower priced Taylor Tester can be used.

Additional consumers may be developed for turf moisture measurement, both in the municipal and resident market. Knowing when to irrigate and how much to apply is important in maintaining lush green lawns. This market potential is outside the scope of the study, but it has significance for future market growth.

Satisfying a need in the market

In most parts of the world nature does not provide enough moisture from the atmosphere to raise the crops man must have for food and fiber.

Irrigation is the application of water to the land in lieu of rainfall. In some areas there is not sufficient rainfall to grow any crop, and in other areas, while there is adequate annual rainfall, the distribution is such that there is little or no rainfall during the period of crop maturity. Even in areas where there is enough rainfall, with proper seasonal distribution as a rule, every few years something happens to upset nature, and a crop is lost. It is therefore necessary to apply supplemental water in practically all areas, either during the entire growing season or during periods of limited rainfall. (4)
Extensive research has been done by scientists in experiment stations across the nation to determine the optimum water availability in various soils, but little has been done to aggressively acquaint the individual farmer with the importance of soil moisture content. One of the reasons little has been done is because there is not an adequate, inexpensive and reliable moisture measuring device for soil which can be used by the farmer. In the majority of the agricultural situations, irrigation practices are passed from one generation to another of land tenants. One learns to irrigate and spread the water over the cropland with little scientific evaluation of the soil moisture, the crops being grown, or how much water is being applied. Since crops are produced with some regularity on most irrigated lands, the moisture available for plants has been considered by most husbandmen of the soil as a minor problem, with the amount of water available for application to the land considered as the most important. This is especially true in the arid regions where water supplies are less adequate than they are in parts of the country where rainfall is more abundant (1).

Dr. W. D. Pew, horticulturist at the University of Arizona, concluded in his "Effects of Soil Moisture on Cantaloupe Growth and Production," that it is evident that cantaloupes can be over-irrigated as well as under-irrigated. It is, therefore, important to check cantaloupe fields frequently to determine the soil moisture content. In attempting to maintain optimum soil moisture, it is not enough just to run water down the furrow and assume the crop has been correctly irrigated. An irrigation applied correctly will supply moisture to the root zone. Only with this type of irrigation will the desired results be obtained. He goes on to recommend the use of an accurate instrument such as a tensiometer to evaluate the need and application of irrigation (8).
In the laboratory, moisture can be measured by weight loss in drying a given sample. Such a procedure is impractical as an effective and convenient tool in the field since it requires a disturbance of the soil being tested from its surrounding environment, and also water loss and change in characteristics of the soil as it is transported from the field location to a test site. Other moisture measuring devices have been developed, but most of them are either too expensive, inaccurate, or are strictly laboratory instruments. One of the best field methods of determining soil moisture is the tensiometer which uses the water suction power of the soil to measure the need for water. They are expensive to install and are stationary. At present they are the most used device by the individual farmer. It can be determined from the foregoing that there is a need for a portable, accurate and inexpensive soil moisture measuring device which can be used in the field.

The Product

The Taylor Moisture Tester is a completely portable, battery-powered electronic instrument which will measure the temperature and moisture content in various types of soil.

It is calibrated to five major soil types: clay, clay loam, loam, sandy loam, and sand. Tests have been conducted to ascertain the percentages of moisture held by each major soil type. The tester is calibrated so that it will read full scale when the soil is at full field capacity. Full field capacity for the various types of soil is established by saturating the soil and then waiting for a period of two to three days to permit the excess moisture to be removed by evaporation and gravity.
It has been recognized that there are many variables in the soil, such as texture, fertility, salinity and alkalinity which affect the tester results. To a very great extent, these variables can be compensated for by the tester operator calibrating the tester to his local soil condition. This can be done by saturating a representative location and permitting the excess moisture to be removed, then inserting the probe to the desired depth, selecting the appropriate type soil and adjusting the pointer of the meter to read full scale.

The tester meter face presents both moisture and temperature data. The meter face is divided into three major segments—red, yellow and green. The red area represents 0-50 percent, the yellow 50-75 percent, and the green 75-100 percent. The temperature scale is presented in degrees fahrenheit with a range of 30° to 90°.

The tester should generally be used in conjunction with a soil auger or sampler. The auger will give the user a core sample from which he can gain information concerning texture, compaction and other physical properties as well as moisture content. The moisture tester will then give a relatively accurate measure of the moisture which can be used to determine current status and future moisture requirements. This knowledge of the soil structure is vital to the development of sound irrigation practices.

To get maximum benefit from the use of the soil tester, the farm should be divided into plots with test points selected which are representative of the plots. Tests should be made at regular intervals and the results recorded. The results should then be plotted for the season. Regular analysis of the data will provide the information on moisture available at the various depths sampled and the rate of moisture usage. When this is combined with a knowledge of the holding capacity of the
soil, the schedule for irrigating and the quantity of moisture to be applied can be readily calculated.

Forms for collecting moisture data and for plotting the season's history for the plot are shipped with each instrument. In addition, the Sprinkler Irrigation Handbook is included with each tester. The book provides much of the data required to irrigate properly and economically.

Properly used, the Taylor Soil Moisture Tester will pay for itself many times each season in the form of lower water costs and better crops. To be of value it must be used systematically and regularly.

Mr. Alfred S. Gray, author of the Sprinkler Irrigation Handbook, concluded in an article in another publication:

Every grower should have a soil moisture recording instrument or a good soil auger and use either consistently. Water is agriculture's most important growth factor and must be used accordingly. (3)
<table>
<thead>
<tr>
<th>Type</th>
<th>Tester</th>
<th>Initial Cost</th>
<th>Accuracy</th>
<th>Additional Material</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oven Dry Method</td>
<td>$ 700.00</td>
<td>Industry</td>
<td>Proper equipment for handling samples</td>
<td>Basically lab instrument. Very time consuming. Sampling cost high.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Standard</td>
<td>technical knowledge</td>
<td></td>
</tr>
<tr>
<td>Neutron Probe</td>
<td></td>
<td>2,800.00</td>
<td>Good</td>
<td>Education and training required</td>
<td>Very high initial cost. Not accurate in upper 18&quot;. Samples taken at fixed locations 1-5/8&quot; to 2&quot; pipe must be installed.</td>
</tr>
<tr>
<td>Psythermeters</td>
<td></td>
<td>1,200.00</td>
<td>Good</td>
<td>Laboratory instrument</td>
<td>Strictly a lab instrument. One man can take approx. 40 samples per day. Very high sample cost.</td>
</tr>
<tr>
<td>Tensiometers</td>
<td></td>
<td>Up to $30 per location</td>
<td>Good in higher range</td>
<td>No special knowledge</td>
<td>Very useful - restricted to fixed locations. Over all installation cost high - sample cost low.</td>
</tr>
</tbody>
</table>
Table 1. (Continued)

<table>
<thead>
<tr>
<th>Type Tester</th>
<th>Initial Cost</th>
<th>Accuracy</th>
<th>Additional Material</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic Blocks (Moisture Resistance)</td>
<td>$100 - $200</td>
<td>Limited</td>
<td>Must interpret data</td>
<td>Fixed locations, not accurate in high range 80-100% of field capacity</td>
</tr>
<tr>
<td></td>
<td>meter</td>
<td>good, lower ranges</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$2 - $5 per</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbide Gas Pressure</td>
<td>$250 - $300</td>
<td>Good</td>
<td>Must work out oven curves. Need education.</td>
<td>Portable but heavy, moderately high sample cost due to cost of carbide and time required.</td>
</tr>
<tr>
<td>Taylor Soil Probe</td>
<td>79.00</td>
<td>Good</td>
<td>Easy to operate, little instruction required</td>
<td>Completely portable, sample time short, instantaneous reading. Good accuracy over the full range.</td>
</tr>
</tbody>
</table>

Source: Trade publications
Feasibility and comparison of the Taylor Tester with other testers

The comparison tests in this experiment were run over a period of three months under irrigated field conditions. Each point on the accompanying chart (Table 2) is an average of over fifty readings per instrument.

Both of the testers calculated gave excellent comparison with the oven dry tests. Both are very rapid and relatively easy to use. Either method will give accurate results which can be applied to any farming practice. A brief discussion of the limitations of each device is included in the conclusions because this is actually the purpose of the tests—to determine which is the most practical instrument to use.

The Carbide Tester is expensive and takes 3-5 minutes per sample. The person taking the sample has to take several readings from each hole to be positive of uniformity. A separate and previously calibrated curve is necessary before calculating available soil moisture for each soil type. Many times there are several soil changes in each field and at different profile levels. The necessity of taking each soil sample and transferring it into soil cans or onto the Carbide Tester balance is a point which takes time and can be a source of error. Although there are limitations, this method is as accurate as any method now being used.

The Carbide Soil Moisture Tester is very accurate but it allows a greater possibility of error in field determinations, even though it is more rapid than the oven dry procedure.

The Taylor Moisture Tester is inexpensive, very rapid (less than one minute per reading), and is also very mobile, allowing several readings per sample area to insure a uniform soil test. The meter calibrations allow immediate reading changes to compensate for the soil
<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>% Moisture Content Determined by</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oven Dry percent</td>
<td>Carbide percent</td>
<td>Taylor percent</td>
</tr>
<tr>
<td>Coarse Sand</td>
<td>10.0</td>
<td>12.0</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>30.0</td>
<td>34.0</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>80.0</td>
<td>76.0</td>
<td>78.0</td>
</tr>
<tr>
<td>Sandy</td>
<td>6.5</td>
<td>8.0</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>35.2</td>
<td>33.5</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>82.6</td>
<td>79.5</td>
<td>78.4</td>
</tr>
<tr>
<td>Sandy Loam</td>
<td>13.0</td>
<td>14.0</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>25.0</td>
<td>27.0</td>
<td>26.5</td>
</tr>
<tr>
<td></td>
<td>45.0</td>
<td>44.0</td>
<td>45.0</td>
</tr>
<tr>
<td>Silt Loam</td>
<td>10.0</td>
<td>12.0</td>
<td>11.5</td>
</tr>
<tr>
<td></td>
<td>38.0</td>
<td>41.0</td>
<td>38.5</td>
</tr>
<tr>
<td></td>
<td>78.0</td>
<td>42.0</td>
<td>79.0</td>
</tr>
<tr>
<td>Clay</td>
<td>15.0</td>
<td>15.0</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>35.0</td>
<td>37.0</td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>88.0</td>
<td>90.0</td>
<td>89.0</td>
</tr>
</tbody>
</table>

Note: Each reading is an average of 50 readings on moisture testers and 10 readings on oven dry.

variables. The instrument is rugged and appears to have no electronic weaknesses. One limitation is that loose sandy soil does not make adequate contact and will give erroneous readings. Another factor to consider is that the operator of the instrument needs to have some knowledge of soil types so he can preset the calibration scale. Also, the instrument is not calibrated to read in excess of 100 percent moisture.

Either instrument is capable of rapid, accurate soil moisture testing. The Carbide Tester is more of a research type device because of the expense and experience needed to operate it. The Taylor Meter, if used correctly, has a great potential.
If the moisture readings are kept as a record and the holding capacity is known, the Taylor Tester will improve any irrigation practice and, therefore, increase the yield and profit per farm. It should and will become a valuable tool to all people in the field of agriculture.

In the preceding table the oven dry percent and Carbide results are read and calculated. The Taylor Tester is read directly from the meter in the field—no sample removal is necessary and there is no delay due to calculation time (7). From this study it was concluded that the Taylor Tester was the most practical instrument evaluated.

Place of Distribution

The distribution channels which supply farming operations have very little continuity throughout the country, and it remains a challenge to introduce a new product into the main stream of the agriculture market. Most of the farmers deal with well-known and locally established businesses, such as implement dealers, hardware stores, and cooperatives which farmers themselves have established. The cooperatives, dealers, and hardware stores have their own distribution channels, so many times there is really no chance to insert a new product into these channels without going through the conventional distributors and wholesalers. Realizing this condition exists offers one of the greatest marketing challenges to a new company producing instruments. To establish the best distribution channels and try to determine a marketing procedure in the area selected for the study will be one of the keys to the success or failure of the project.

In further analyzing distribution, the tester would currently be classified as an unsought good, in other words, one few people know they need.
The distribution channels for unsought goods involve an expensive marketing organization. Time and effort must be put into the selling of the product through the entire distribution channel and especially at the consumer level or results will not be obtained. Since marketing is the satisfaction of customer needs at a profit, it follows that the need must be felt by the customer or he will not be responsive to the sales effort.

The letter, brochure, and questionnaire generated some need. When the information was received those aware of the moisture problems indicated a desire to see a demonstration immediately. Most respondents wanted to use trial instruments when made aware of the problem. In the minds of these respondents the product changed classification from an unsought good to possibly a shopping good. A well-known implement dealer, after hearing the sales presentation on the tester, wanted to underwrite a salesman in his area contacting individual customers demonstrating the product to gain the quickest sales of the instrument. However, a price problem entered at this point. It appears that there is not enough commission or margin available to entice progressive implement dealers into a distribution of the product through their marketing channels. This occurs because the distributors and dealers are handling much larger items where commissions and margins amount to several hundred dollars. In the study a solution to this distribution problem must be found.

Currently the distribution channel for the product looks like this:
Since the product is classified as an unsought good, a closer look at this distribution channel may turn up a better solution to getting the product to the consumer at a profit to everyone in the channel.

**Price of the Product**

Table 3 identifies the costs associated with the production and distribution of the product.

Table 3. Cost to produce and margin for manufacturer, distributor, dealer and salesman

<table>
<thead>
<tr>
<th>Item</th>
<th>Soil Moisture Tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total component cost</td>
<td>$17.46</td>
</tr>
<tr>
<td>Man hours per unit, assembly and checkout</td>
<td>1</td>
</tr>
<tr>
<td>Average hourly rate</td>
<td>5.30</td>
</tr>
<tr>
<td>Total assembly checkout cost</td>
<td>5.30</td>
</tr>
<tr>
<td>Revised total unit cost</td>
<td>22.76</td>
</tr>
<tr>
<td>Selling expense--12 percent</td>
<td>2.73</td>
</tr>
<tr>
<td>Corporate general and administrative costs--5.5 percent</td>
<td>1.40</td>
</tr>
<tr>
<td>Total manufacturing cost</td>
<td>26.89</td>
</tr>
<tr>
<td>Distributor price</td>
<td>40.00</td>
</tr>
<tr>
<td>Gross margin</td>
<td>13.11</td>
</tr>
<tr>
<td>Gross margin % mfg. cost</td>
<td>48%</td>
</tr>
<tr>
<td>Dealer price</td>
<td>$55 to $59 based on quantity purchased</td>
</tr>
<tr>
<td></td>
<td>$20 or $24 available profit and sales expense</td>
</tr>
<tr>
<td></td>
<td>79.00</td>
</tr>
</tbody>
</table>

Source: Corporate records

Note: Corporate selling expense and administrative costs may be low compared to other manufactured unsought goods.
Promotion

Efforts of promoting the product up to this point have consisted of product demonstrations at trade fairs throughout the western part of the United States, distribution of the mailing piece (Appendix B) to selected potential customers, sending articles to trade magazines to expose the instrument as a new product, plus issuing trial instruments for experimental purposes to selected testing agencies.

This product promotion must be directed to four different groups—final consumers, users, retailers, and wholesalers. The promotion blend suitable for each group will be different.

Since the customers are so widely scattered personal selling without some form of introductory mass communication cannot be expected to do the job.

The person who buys the instrument may not use it. Therefore, the potential user must also be considered in the promotion of the product.

Retailers as well as wholesalers are interested in volume turn-over and margin and not directly in product performance. If the customer and user can be convinced of the need for the product, brand recognition may develop to a point where mail order sales and seeking of the product at established dealers would occur.

The key to this part of the marketing mix is that unsought goods are in the introductory stage of their life cycle. Aggressive and persuasive personal selling will be needed but it will be more effective if supported by mass advertising in areas where customers are concentrated.
INTERPRETATION OF DATA GATHERED THROUGH QUESTIONNAIRE

In this section of the study the questionnaire responses are presented. Table 4 is a breakdown of the replies received in comparison with the number of questionnaires sent by the size of the farm. It appears that those with the larger acreages are more interested in soil moisture and are probably those more interested in the efficiency which can be obtained in closer management of the producing assets of their operations. The general response to the questionnaire was considered poor from an information-seeking standpoint; less than 20 percent returned the questionnaires by mail. No follow-up through the mail was attempted, but interview follow-ups were made to try and substantiate the findings and to give more validity to the data in analyzing the marketing problem of this product.

Twenty-six of the questionnaires were returned by mail within one week before and one week after the May 10 deadline; four came back as undeliverable; this amounts to 17 percent of those sent. People most responsive were those living in the geographical areas of Idaho Falls, Blackfoot, and American Falls. This is somewhat understandable, because this is the area of Idaho which uses large sprinkler irrigation units due to the unlevel ground. Water is supplied by wells in many instances, thus increasing the irrigation costs compared to canal source flood irrigation.

The first question asked those being queried was to identify the source of water for application to the crops. Of those responding, the
Table 4. Responses by size of irrigated farmland

<table>
<thead>
<tr>
<th>Acres Irrigated</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 199</td>
<td>1</td>
</tr>
<tr>
<td>200 - 399</td>
<td>2</td>
</tr>
<tr>
<td>400 - 599</td>
<td>1</td>
</tr>
<tr>
<td>600 - 799</td>
<td>3</td>
</tr>
<tr>
<td>800 - 999</td>
<td>5</td>
</tr>
<tr>
<td>1000 - 1199</td>
<td>4</td>
</tr>
<tr>
<td>1200 - 1399</td>
<td>3</td>
</tr>
<tr>
<td>1400 - 1599</td>
<td>3</td>
</tr>
<tr>
<td>1600 - 1999</td>
<td>2</td>
</tr>
<tr>
<td>Above 2000</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

Average size of irrigated farm acres:

<table>
<thead>
<tr>
<th>Respondents</th>
<th>1071</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>988</td>
</tr>
</tbody>
</table>

The majority (twenty of twenty-six) pump from an underground source and sprinkle. This also compares favorably to the known number of farms in the southern Idaho area and the number of wells which have been dug to supply water to the crops. This, as mentioned, is the most costly method one can use because it involves the lifting of water from an underground source, pressurizing it through sprinkler lines and discharging it through nozzles, simulating rain. The water is generally on call (in other words, it can be turned on when needed), which would
make it more feasible for the use of a soil moisture tester because climatic conditions change during the year and the need for moisture will change according to the conditions during the growing season.

The other most common method was to pump from a canal system and sprinkle. Of course, several indicated two or three different sources of water, indicating possible enlargement of their operations as a combination of several small units for efficiency and proper utilization of expensive machinery. The significance here is the fact that savings of water volume and expense could be achieved with increased yields if soil moisture was monitored and controlled.

Question 2 asked the individuals how they determine the amount of water to apply with each irrigation. Only six of the twenty-six reported the use of a method; they used the hand-squeeze or mudball method. This is a traditional practice with no refinement, but it does show an interest in trying to determine the water carrying capacity of soils. A larger percentage (ten of those answering) said that time and past experience were the determining factors as to how much water was applied. A few indicated that there was a water shortage problem and that time determined the amount of land to be covered and the amount of water applied. It was also indicated in some questionnaires that low yields occurred because of the lack of water, especially in the grain crops.

It is interesting to compare the highest yield producers (determined in a later question) to those who used some form of moisture detection. There was some comparison between those using the mudball or hand-squeeze method and those producing larger crops. Of course, this may or may not be a significant factor, but it does show an awareness and interest. Most of the same individuals having higher yields than average requested a demonstration or expressed an interest in purchasing
one of the instruments. It would have to be assumed from this that they have had some experience or exposure to soil moisture management and are, therefore, receptive to the product. To get larger numbers of farmers equally aware is part of the marketing problem.

Question 3 asked if they could classify the soils found on the farmland. Most (14 of the 26 responding) indicated sandy loam, which is a classification of the volcanic ash of the Snake River Basin. The following question asked if there was a varying amount of water applied to the different kinds of soil found on the land. Only eight out of twenty-six indicated they used the mudball or width of subbing across the furrow to determine how much water to apply. In this method water goes through the soil, laterally, from one row to another. When the moisture reaches a certain point between the furrows, it can be determined that the water has gone down to the bottom of the root zone. Only by using furrows or corrugations and flooding would it be possible to use this method. The problem with flood irrigation is over-irrigating next to the head ditch and under-irrigating in the far part of the field. This is another area in which an instrument could determine the rate at which the water was distributed down the row. Of course, the faster the water runs down the row the less penetration there will be. By determining the speed, the correct application and depth of the water could be figured. Of those responding, an overwhelming 14 said that no differing water amounts of any kind were applied to different types of soil. This is significant and points to the need for acquainting farmers with additional correct irrigation practices.

The responses to question 5 on yields were very scattered (Table 5). The barley yield of 110 bushels per acre was one of those farmers who used the mudball method and had very accurate records as to water
Table 5. Responses to questions 5, 6, and 7 concerning yields, irrigation costs, and water application

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yields per Acre</th>
<th>Average Irrigation Cost Per Acre</th>
<th>Average Water Application Per Irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley</td>
<td>70-110 bushels</td>
<td>$10.00</td>
<td>2 inches</td>
</tr>
<tr>
<td>Wheat</td>
<td>57-103 bushels</td>
<td>11.00</td>
<td>2 inches</td>
</tr>
<tr>
<td>Sugarbeets</td>
<td>10-26.6 tons</td>
<td>18.00</td>
<td>2+ inches</td>
</tr>
<tr>
<td>Potatoes</td>
<td>125-301 sacks</td>
<td>15.00</td>
<td>2 inches</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>3½-4½ tons</td>
<td>12.00</td>
<td>3 inches</td>
</tr>
</tbody>
</table>

cost. There were several of the respondents who gave incomplete information on this question. Their records were either not very accurate or they felt some threat in giving lower figures. Also, yields on the same farm vary as to productivity, water requirements, fertilizer, etc. This again points to the need of soil classification and scientific management of fertilizer and moisture application.

Question 6 asks the irrigation costs per acre on the specified crops (Table 5). The response was generally even more scant than on question 5. However, ten of the respondents had very good records. From computations derived from experiment station information, the respondents' figures are close to those obtained in research which is being done. The yields also follow quite closely to the average production in the area. Due to the limited response on this question, it is felt that record keeping is not one of the virtues of the farmers who were asked. Those who are keeping records are aware of the variables, and are interested in finding ways to curtail the costs. In general,
the average farmer is not interested in these minimal costs and is, more or less, doing what comes naturally as far as his farming operation is concerned. When monetary results are documented, however, interest may increase in moisture measuring with this group.

Question 7 asked how they determine how much water was applied with each irrigation. The average results are shown in Table 5. However, frequency is the key factor in proper irrigation as much as is the amount applied. By properly irrigating with enough moisture to fully saturate the plant growth zone, it is possible to conserve water. Without proper instrumentation it would be impossible to determine the exact amount to apply. Generally, farmers are either under- or over-irrigating most of the time.

Experimentation information indicates that alfalfa, especially, may be watered too often.

Proper irrigation results in prolonging and maintaining the life of alfalfa. Shallow rooting, root rot, scald, weeds and draining problems appear to be associated with too frequent irrigation. Growers have begun to place more importance on proper irrigation. Proper irrigation in desert agriculture deserves as much if not more consideration than any other farm operation. (2)

Questions 8 and 9 have been combined because they ask the moisture impact on the quality and quantity of crops. Most everyone was aware that moisture control does have an effect on crop quality and quantity. This was universally responded to with a "great" effect in each of the areas questioned. The step from awareness to analysis and implementation of corrective actions remains to be solved.

Question 10 asked about the over-irrigation practices and if they had any actual experience with leaching of fertilizer and plant nutrients from over-irrigation. Eleven responded that they had had some leaching
(one had leaching only with potatoes on sand) and ten responded they had none. Here again, those who were aware of the leaching process were also those who were trying to determine soil moisture amounts and were interested in some type of soil moisture measuring device. Leaching is occurring on the over-irrigated portions of the farms, but many are unaware of it.

Continual over-irrigation will force water below the feeder root zone, where not only the water, but the plant nutrients and fertilizers as well, are wasted and the plants are robbed of maximum growth. Conversely, if continual under-irrigation is practiced, the soil moisture in the feeder root zone will drop below the soil moisture wilting point, which will retard plant growth and may stop growth entirely. (2)

Question 11 gets to the heart of demand for the product. It asks, "Excluding cost as a factor, would you be interested in buying a portable soil moisture tester?" There were twelve responses of "yes" and eight of "no." The twelve who said yes are those who were interested in applying varying amounts of water to their crop land, trying to determine the amount of water being applied and knowledgeable of the problems associated with soil moisture impact on growing crops; in other words, those educated to the efficiencies of rigid moisture control. From a marketing standpoint, this awareness must be isolated. If many other farmers had this knowledge, advertising and marketing could be accomplished for this product; without the awareness it will be very costly to distribute this unsought good.

All the respondents to question 12 would like to purchase an instrument in the price range of $50-$100. There were, however, ten who did not respond as to the price they would like to pay. The significance here is that they had a look at the instrument in the brochure
and were cautious in establishing what they would pay for it. This would have to be considered normal for an untried and unsought good.

Question 13 asks where they would prefer purchasing such an instrument. Six responded they would like to purchase it through the mail; two said from irrigation parts supply; eight from a farm implement dealer; two from a salesman after a demonstration on their own land, but no one responded that they would purchase it from a salesman after a demonstration at a fair or convention. Therefore, no single channel of distribution was identified. However, cost was a factor in that some indicated they would prefer buying through the mail, direct from the manufacturer, if there would be a savings on cost. This should be taken into consideration in the marketing strategy.

Question 14 was asked to see if some interest could be established by having trial instruments available, asking the respondents if they would be interested in using one. Of those responding, 18 were interested; two were not; some left the question blank. This is so significant that the questionnaire may have had an educative impact. It was partially designed to do so by arousing some interest in a problem of which some of the respondents had not been aware.

There were only three questions in the questionnaire which would need to be asked in determining the marketing concept—the place where they would prefer to purchase an instrument if interested; what they would be willing to pay, and what advertising would be most effective from a general awareness of the problem. Most of the questions were designed to indicate an awareness. This was accomplished if we analyze question 14 as having resulted from the proper impact of knowledge of soil moisture and its effect on crops.
The name and address was responded to by fourteen of the twenty-six respondents, ten asking for the results of the survey and eight asking for a demonstration.

The interviews conducted as a follow-up to verify some of the mail results overwhelmingly indicated the interest people have in increasing their crop yields on the varying soil conditions they have on each farm. There is an awareness that one field is not being properly irrigated and that there is a water shortage in general. The follow-up interviews were made by selecting those who did not respond. This was done to find out why they had not responded to the questionnaire. Most of them, of course, had the answers for the completion of the questionnaire, but their reply was that "I get so many advertisements in the mail that I just throw most of them in the wastebasket." This is the fate of many direct mail pieces, accounting for the low percentage participation in this type of advertisement and marketing.
RECOMMENDED CHANGES IN THE MARKETING STRATEGY
OF THE TAYLOR SOIL MOISTURE TESTER

The Product

The ideal moisture measuring product would be a master control box which could be fitted with various probes to measure soil moisture, dampness of winrowed alfalfa, or different grains grown in the rotation. In addition, a circuit should be available to measure moisture content of wool and processed feed grains. Such an instrument could be marketed for as much as ten times the present retail price of the single soil moisture tester and could be built at less than ten times the cost. All models would look identical yet could be calibrated to measure a varied combination of grains or feeds.

A rechargeable battery which could be plugged into an electrical outlet while in the storage case would eliminate battery replacement problems and increase reliability.

As mentioned, this is the ideal and when sufficient research and development funds are available would be the proper way to attack the market. With a selling price of $400 to $500, sufficient margins could be made available to pull the product through the distribution channel.

Meanwhile, the soil moisture tester which is available and ready to be marketed should be improved in outward appearances by chroming the probe, attaching a larger, better grade hand grip, and anodizing or enameling the control box black with white lettering and instructions. In addition, the dial face should indicate a visible scale of percentage of moisture instead of color ranges only. These steps would make the
tester appear much more like a scientific instrument--internally it is. At present it looks somewhat flimsy and homemade. Packaging of the product is now non-existent other than cardboard shipping boxes. A fiberglass or aluminum case would add immensely to the over-all eye appeal and permanence of the product.

These changes would not require considerable increase in manufacturing costs and would add the feel of quality which is necessary to move this unsought good up the ladder of acceptance in the market place.

One of the respondents noted on his questionnaire that he had tried a cheap resistance probe in California and was disappointed with the performance. This reaction expresses the concern felt by others interviewed. Improving the appearance of the product will partially eliminate this sense of buying a new untried product.

This instrument has some of the marketing problems of a record player or console stereo. Performance will eventually determine customer satisfaction, but the initial outward appearance and feel of quality will determine how easy or difficult the item is to sell. The electronic components are now arranged in a good working sequence and the output from the tests run is reliable and accurate enough to do the field work. With additional eye appeal the product would increase in salability.

The Place of Distribution

From the questionnaire responses, six preferred direct mail purchase, eight wanted to do business with a known implement dealer, and two wanted a demonstration. In a later question, however, eight wanted a demonstration and an overwhelming eighteen wanted to use a trial instrument. This indicates how important some physical contact with the
customer and the instrument under field conditions is. With this in mind the following distribution channel is recommended:

```
Manufacturer/Representative

Distributor/Dealer

Direct Salesman
```

It will be noted that there is a person at each level who will be paid on a commission basis per instrument sold to push the product through the distribution channel.

The manufacturer will have a fulltime representative establishing distributor/dealers in the off season and working with the training of seasonal direct salesmen. The direct salesmen will be working directly for the distributor/dealers on a seasonal basis.

It is recommended that the distributor/dealers be well-established farm implement or irrigation equipment dealers. For the spring-summer rush in sales it is recommended that school teachers looking for summer employment on a year-to-year basis be employed. The salesmen could be hired and trained as soil moisture instrument agents for the well-known implement and/or irrigation equipment dealers. A sign affixed to a car or pickup could identify the individual salesmen with the local dealer and give him hometown representation. He could also serve with only a limited amount of training as the instrument troubleshooter in the area.

By using a sales organization it would be possible to give as much as $35 per unit commission to the salesman. If he would make at least six calls per day, he should average two sales per day. This would be good summer employment for an aggressive school teacher or college student. Even paying $35 per unit it would still leave $11.50
per instrument for the distributor/dealer and he would not have to deplete his own sales force to push the product. A parts man or other fulltime employee could install batteries and perform simple adjustments in the off-season when the salesman was not available. With the $3.40 selling expense plus a $16.24 gross margin per unit, the manufacturer's representative could be compensated adequately to keep him interested.

In addition, he may make several direct sales as he travels about with the possibility of direct mail sales, which would increase as the product gains acceptance. This in turn would increase the manufacturer's gross return.

**Price**

The retail price of $79, in the opinion of those interviewed, was at first glance excessive. Yet when the instrument was demonstrated and the capability was established cost did not seem to be the most limiting factor. This again brings home the point that an altered outward appearance and quality carrying case would do much to initially get customers interested in the product. By direct selling using demonstrations this initial quality impression would be reinforced and a sale would ensue.

By approaching the market in this way it is possible that an increase of the retail price to as much as $96 or $97 could be achieved. This would then allow more commission to be paid to the retail salesman to compensate for the demonstration of the instrument, and thus pull it through the distribution channel.

If the recommended changes were made, the new cost estimates and margins would be as shown on Table 6.
Table 6. Cost to produce and margin for manufacturer, distributor, dealer and salesman

<table>
<thead>
<tr>
<th>Item</th>
<th>Soil Moisture Tester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total component cost including carrying case</td>
<td>$23.00</td>
</tr>
<tr>
<td>Material per unit assembly</td>
<td>1.0</td>
</tr>
<tr>
<td>Average hourly rate</td>
<td>5.30</td>
</tr>
<tr>
<td>Total assembly checkout and packaging cost</td>
<td>5.30</td>
</tr>
<tr>
<td>Revised total unit cost</td>
<td>28.30</td>
</tr>
<tr>
<td>Selling expense 12 percent</td>
<td>3.40</td>
</tr>
<tr>
<td>Corporate general and administrative 5.5 percent</td>
<td>1.56</td>
</tr>
<tr>
<td>Total manufacturing cost</td>
<td>33.26</td>
</tr>
<tr>
<td>Distributor/dealer price</td>
<td>49.50</td>
</tr>
<tr>
<td>Gross margin (49 percent manufacture cost)</td>
<td>16.24</td>
</tr>
<tr>
<td>Retail price</td>
<td>96.00</td>
</tr>
<tr>
<td>Sales commission and dealer margin</td>
<td></td>
</tr>
<tr>
<td>(94 percent dealer/distributor cost)</td>
<td>46.50</td>
</tr>
</tbody>
</table>

Price consideration as revealed by the questionnaire study indicates acceptance of the price range recommended. Farmers from observations seem quality-price conscious, as can be seen in the farm equipment they buy. They like to get quality merchandise at a competitive price. If the product can be made to look better from a quality standpoint, it will sell better at the higher price recommended.

Promotion

The most effective way to promote this product would be to have an outstanding agriculturist in each locality endorse and use the instrument. With as much enthusiasm as was indicated in the questionnaire for trial instruments this should not be a difficult task. In establishing the dealer/distributors the manufacturer's representative could help isolate the trial instrument users within each area and get them committed to helping in specified ways which would create an awareness.
of the product. As a reward the trial instrument users would get to keep their instruments at no cost.

If a modest television advertising budget was available a short interview with each of the trial users could be shown on a commercial station in his locality to add awareness and interest of the potential customers.

But increasing the awareness of optimum water levels in irrigated cropland is the general problem of promotion which must be overcome. Without this background knowledge demand for the product will remain mediocre.

Documented evidence of increased yields would do much to open the eyes and minds of agriculturists to the need and benefits of soil moisture management. Precise records become an important part of any such documentation and/or proof. Here again trial instrument users offer a built-in opportunity for localized documentation. Using the forms furnished with each tester moisture levels of different fields can be recorded and tabulated, taking into consideration differing fertilizer and crop applications. From this evidence increased yields and quality of the products grown could be filmed and made into a short filmstrip for display stand projection in dealers' showrooms and on television spots.

Many agriculture oriented magazines will also print such information on their new products pages at no cost to the sponsoring company. This too would be a way to expose the product to wider user centers.

Exposure of potential customers to users of the instruments who have achieved success is the backbone of the promotion phase in the marketing mix. On a restricted promotion budget, word of mouth and
newspaper ads may be the limit. With good financing and an aggressive sales force incorporating television and direct mail pieces with the ideas mentioned, greater marketing results can be achieved.
SUMMARY AND CONCLUSIONS

Through a research of the literature, personal observation and interviews, and the limited use of a market research questionnaire the basis for recommended changes in the marketing strategy for the Taylor Soil Moisture Tester has been established.

Because of the limited response the questionnaire data would not be considered statistically valid. However, certain indications were confirmed in the personal interviews conducted and mentioned many times in the literature reviewed.

The over-riding problem seems to be that moisture measurement and control is too sophisticated for a large segment of the farm operators. They must be educated to this refinement of tilling and soil and raising crops. In addition, and partly caused by the lack of understanding, the product is still in the introductory stage of market evolution. It also appears at first glance to be an unsophisticated instrument of only fair quality.

To rectify this image, realizing the other factors presented at some length in the body of the study, the following condensed recommendations are made:

1. Chrome the probe and anodize black the control box with reversed instruction lettering on the lid and sides.

2. Print a new dial face with percentage calibrations superimposed upon the color coded markings.

3. Fabricate and supply with each instrument an aluminum or fiberglass case lined with compartments for the instrument, soil auger and records.
4. Isolate a prominent farmer as a trial instrument user in each major geographical area. Follow up several times during the growing season to document his usage and success with the instrument.

5. Advertise on television, in newspapers, and national farmer magazines the results of Mr. Potter's tests and individual user results.

6. Contact a progressive, respected implement dealer in each area and present the marketing plan to him. Indicate the availability of summertime salesmen to represent his firm to the local potential customers and arrange meetings of these individuals at sales promotion meetings.

7. Concentrate on a geographical area which can be adequately serviced and which provides maximum use of expensive advertising.

8. Encourage the sales force to isolate and contact the larger, more progressive farmers. Others will follow their lead.

9. Disseminate articles to local papers and county agents, field men, etc., concerning moisture management, and do all within resources to increase the general awareness of this unknown refinement of farming.
LITERATURE CITED


APPENDIXES
Let me introduce myself:

I am Leron Johnsen, a marketing graduate student at Utah State University in Logan, Utah. I was born and reared on a farm near Tremonton, Utah (which accounts for my interest in contacting an agriculturist like yourself). My family owns farmland in Southern Idaho (which is another interest we share).

Why I am writing:

First: to fulfill a requirement for my academic graduate work in marketing.
Second: to acquaint you with a product that may assist you in management of your farmland.

What I know about you:

I know your name, your location and approximate size of your operation. That you probably use sprinkler systems and that you are interested in maximizing returns from your operation.

How I can help:

As a part of my graduate work I am trying to determine the market potential of a scientific instrument that could have agricultural application worldwide. This instrument resulted from electronic research in the aerospace industry. It is accurate, portable and sturdy. A brief description of it is found on the enclosed fact sheet. If you are not using an instrument of similar capability this tester will prove valuable to you. If similar tests of moisture measurement are included in your program you will be interested in the speed, reliability and mobility of this instrument.

How you can help me:

Fill in the enclosed questionnaire and return it to me before May 10th. Use the handy self-addressed and stamped envelope enclosed. Your completed questionnaire along with others received from your farming colleagues will provide the information to complete the market survey.

How the results will be used:

I will use the information to complete my academic requirements and recommend a marketing approach to the manufacturer. You will remain anonymous unless you choose to be appraised of the results.
of the study or wish further information about the product. Space is provided at the end of the questionnaire to request this information.

The success of this project will be enhanced by your participation. Thank you for your consideration.

Respectfully yours

Leron Johnsen
Appendix B

Questionnaire

To be used in the study of soil moisture measuring techniques, equipment and market feasibility.

In your farming operation:

1. How do you get irrigation water to the crop? (Check all applicable)
   a. Pump from underground source and sprinkle.
   b. Pump from underground water and flood.
   c. Pump from canal system and sprinkle.
   d. Flood from canal system.
   e. Gravity fed, inclosed sprinkler system.
   f. Other

2. What determines the amount of water applied with each irrigation? (Check one most used)
   a. A soil moisture test is taken. If so, what type test is used?
   b. Time of application determined from past experience. If so, what is time schedule:
   c. Amount of water applied determined by core sample.
   d. Time determined from amount of land to be covered and amount of water and equipment to do the irrigating.
   e. Other (specify)

3. What soil classifications are found on your farmland? (Check all applicable)
   a. Sand
   b. Sandy Loam
   c. Loam
   d. Clay Loam
   e. Clay

4. Are differing water amounts applied to the varying types of soil on your farmland?
   a. Yes. If so, indicate how this is determined.
   b. No

5. What was your 1967 yield per acre for the following crops? Give information for those crops raised.
   a. Barley: acreage __________ bushels per acre __________
   b. Wheat: acreage __________ bushels per acre __________
   c. Sugar Beets: acreage __________ tons per acre __________
   d. Potatoes: acreage __________ sacks per acre __________
   e. Alfalfa: acreage __________ tons per acre __________
6. In 1967 what was your irrigation cost per acre on the above named crops? (Power costs and hired labor)
   a. Barley: $____ per acre
   b. Wheat: $____ per acre
   c. Sugar Beets: $____ per acre
   d. Potatoes: $____ per acre
   e. Alfalfa: $____ per acre

7. How much water do you attempt to apply with each irrigation?
   a. On barley: _____ inches per acre
   b. On wheat: _____ inches per acre
   c. On sugar beets: _____ inches per acre
   d. On potatoes: _____ inches per acre
   e. On alfalfa: _____ inches per acre

8. From your experience do you think rigid soil moisture control has a positive effect on the quality of the following crops? (By rigid I mean within a few soil moisture percentage points of the optimum for the crop grown.)
   (Check the degree of effect, if any, on each crop.)

   a. Barley: No effect Some effect Great effect
   b. Wheat: 
   c. Sugar Beets: 
   d. Potatoes: 
   e. Alfalfa:

9. From your experience do you think rigid soil moisture control has a positive effect on the yield or quantity of the following crops? (Check the degree of effect, if any, on each crop.)

   a. Barley: No effect Some effect Great effect
   b. Wheat: 
   c. Sugar Beets: 
   d. Potatoes: 
   e. Alfalfa:
   f. Not prepared to answer the question.

10. To your knowledge, have you experienced leaching of fertilizer and plant nutrients from over-irrigation?
    a. Yes.
    b. No.

11. Excluding cost as a factor, would you be interested in buying a portable soil moisture tester?
    a. Yes.
    b. No.

12. What would you consider an equitable price for such an instrument if you were considering buying one?
    a. $50-$100
    b. $101-$150
    c. $151-$200
    d. Over $200

13. Where would you prefer purchasing such an instrument?
   (Check one you like best.)
   a. Through mail, direct from manufacturer.
   b. From irrigation parts supply house.
   c. From salesman after demonstration at a fair or convention.
   d. From salesman after a demonstration on your own land.
   e. From farm implement dealer.

14. If trial instruments were available, would you be interested in using one?
   a. Yes.
   b. No.

Optional:

Name:__________________________________________________________

Address:_______________________________________________________

___ Please send the results of the survey.

___ I am interested in a demonstration.

Please return this questionnaire in the post-paid return envelope before May 10, 1968. Thank you.
A Low-Cost Portable Moisture Tester

The Taylor Soil Moisture Tester

A new lightweight electronic instrument which senses moisture content of soil and reads soil temperature.

Measures Soil Moisture

Direct readings in percent of moisture are provided by the Taylor Soil Moisture Tester. No special education or aptitude is necessary to operate this instrument. Included in the purchase of a Taylor Tester are instructions and information as to moisture requirements of soils and crops under seasonal conditions.

Who Needs To Measure Soil Moisture?

The Taylor Tester can be used by Potato Producers to maintain the critical balance between moisture and temperature.

Sprinkler Crop producers can know when to sprinkle and how much water to apply. The price of the Taylor Tester can be quickly recouped through savings of water and time as well as through crop improvement.

“On Demand” water users will especially benefit from this device which takes the guesswork out of knowing when to irrigate.

Determines Soil Temperature

Soil temperature is shown directly on the tester dial in Fahrenheit degrees. His reading is made easily and very quickly by inserting the tip of the tester into the soil. At the same time the soil moisture content can be read.

Because of its complete portability the Taylor Tester can be used anywhere for all types of soils and crops. Fruit Growers, Sugar Beet Growers, Row Crop Producers, Golf Course and Park Operators as well as Home Owners interested in lawn care can also all benefit greatly by using the Taylor Soil Moisture Tester.
VITA

Allen Leron Johnsen

Candidate for the Degree of

Master of Business Administration

Reports:  A Review of Private Fund Raising at Utah State University with Recommendations for Increased Private Financial Support, and Marketing Strategy Study of the Taylor Soil Moisture Tester

Major Field:  Business Administration

Biographical Information:

Personal Data:  Born at Bear River City, Utah, July 10, 1933, son of Austin L. and Victoria Campbell Johnsen; married Deanne Gardner August 22, 1957; six children--Lezlee, Torianne, Alec, Jeffrey, Miles, and Jennifer.

Education:  Attended elementary school in Bear River City, Utah; graduated from Box Elder High School in 1951, serving as studentbody president and engaging in athletics; entered Utah State University in 1951 on athletic and Standard Oil Company scholarships; fulfilled a mission to Denmark for the LDS church, 1954-56; received the Bachelor of Science degree from Utah State University, with a major in business administration, in 1958; completed requirements for a Master of Business Administration degree at Utah State University in 1971. During entire life have helped to manage and operate farming operations.

Professional Experience:  1959-1963, served in the U.S. Army as an officer and helicopter pilot; 1963-64, established a securities and insurance business in Brigham City, Utah, also owned a lawn sprinkling installation company; 1964-68, served as director of the development fund at Utah State University; 1968 to present, director of corporate and deferred giving at Utah State University; vice president of Taylor Enterprises, Inc.; president of Deep Canyon, Inc.; president of Utah Nuclear Mining and Construction, Inc.; management consultant to Dynatek Industries, Inc.