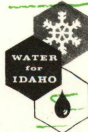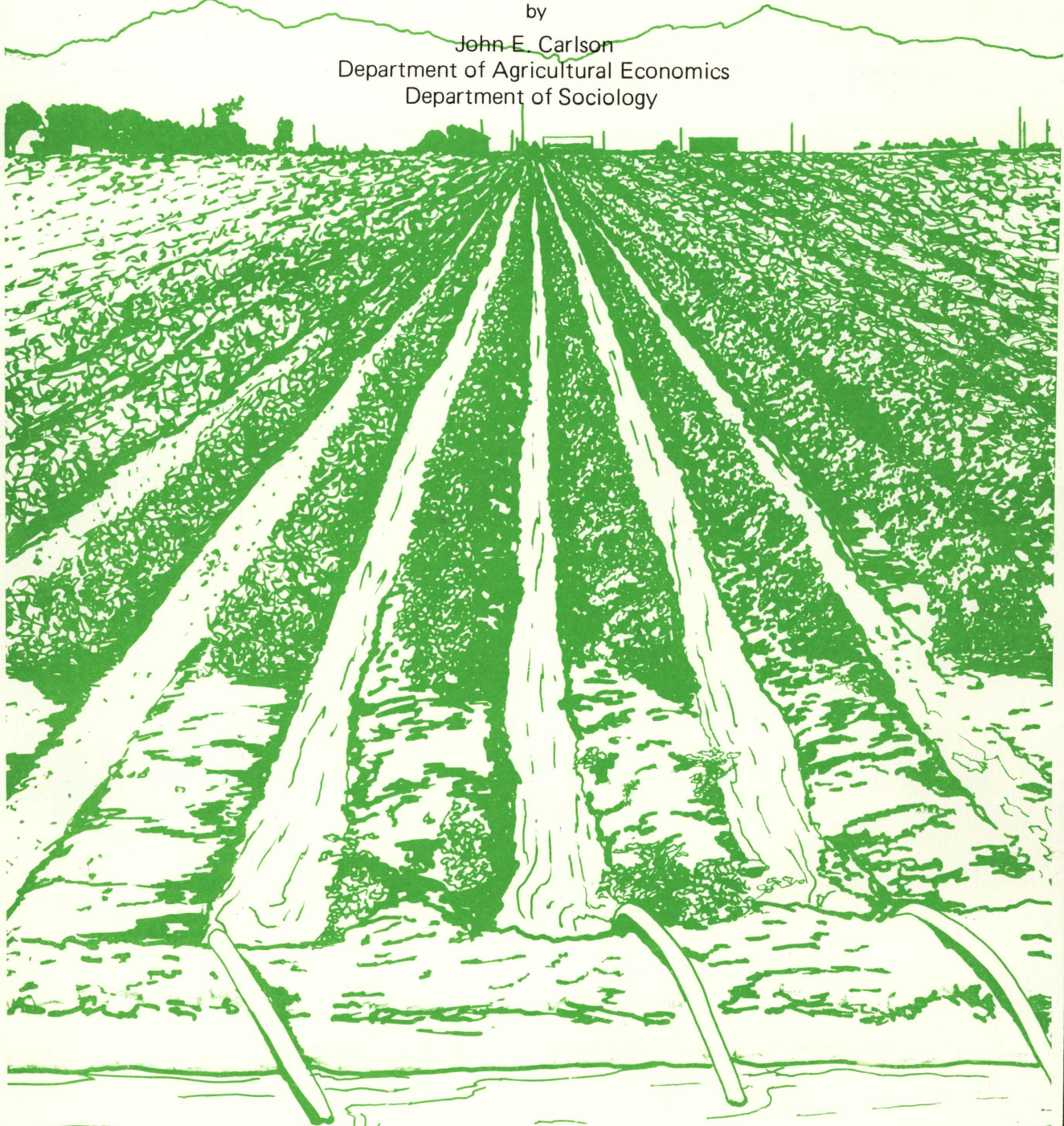# Attitudes
Toward Water Use Practices Among Southeastern Idaho Farmers: A Study On Adoption Of Irrigation Scheduling

by
John E. Carlson
Department of Agricultural Economics
Department of Sociology

IDAHO WATER RESOURCES RESEARCH INSTITUTE
UNIVERSITY OF IDAHO, MOSCOW, IDAHO 83843

JANUARY 1975

Research Technical Completion Report
USBR-Irrigation Scheduling
January 1973 - October 1974

ATTITUDES TOWARD WATER USE PRACTICES
AMONG SOUTHEASTERN IDAHO FARMERS:
A STUDY ON ADOPTION OF IRRIGATION SCHEDULING

by

John E. Carlson
Department of Agricultural Economics
Department of Sociology

Submitted to

United States Department of the Interior
Bureau of Reclamation
Boise, Idaho   83724

October 1974

Idaho Water Resources Research Institute
University of Idaho
Moscow, Idaho

John S. Gladwell, Director

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGEMENTS

CHAPTER I
INTRODUCTION

Irrigated agriculture is an important aspect of the economy of Idaho. The allocation of water for irrigation is of vital importance to farmers in the State. While sufficient water may exist at present, future needs will require additional water sources and more efficient use of existing irrigation projects.

With increasing emphasis on environmental considerations, immediate use of greater quantities of irrigation water by agriculture in the near future seem unlikely. Thus, if larger quantities are needed it may be necessary to develop means of increasing the efficiency of existing projects. Evidence of excessive use of water is the rising water tables in some irrigated areas during the summer months. Flooding of low areas and basements are also among the problems resulting from the inefficient use of water. In addition, a couple effects of excessive water use on crop production have been rapid leaching of fertilizer and lower yields.

While inefficient use of water may not seem too important to water users at present, it may become vital to their farm program in the future as demands for water increase. While programs have been developed to increase efficiency of water use they have generally received nominal acceptance by water users. Developing ways of gaining acceptance of new techniques is of importance now in terms of the time lag in gaining acceptance by farmers. This study will help develop some of the guidelines necessary to develop a program to increase water use efficiency of farmers in Southern Idaho.

Specifically, this is a study focusing on factors related to the diffusion of innovations among farmers. The vast amount of research on diffusion and adoption of innovations by farmers will not be reviewed in detail here but books by Rogers (1962) and Rogers and Shoemaker (1972) provide a complete synthesis of related research. In general, these research findings suggest that individuals move through a series of stages during the process of accepting a new technique. Five stages have been identified: (1) Awareness of the new technique, (2) Interest in the new technique to the point of seeking more information, (3) Evaluation of the technique by mentally applying it to one's own farming practice, (4) A period of trial before complete adoption, and (5) Adoption or acceptance of the new technique. In addition, research has found that farmers reach the adoption stage at different times. That is, some move through the five stages more rapidly than others. A number of factors have been shown to correlate with the rate of adoption such as sources of information, benefits of the innovation, educational level, age and size of farm to name a few.

However, few of the studies have dealt with practices related to irrigation management and none have been done in Idaho. While much of the previous work is applicable it may be that some unique factors exist among Idaho farmers that may alter existing knowledge. For example, the area under consideration has a high proportion of farmers that are relatives. What influence might this have on acceptance of new irrigation practices?

The concept of the Irrigation Management Scheduling (IMS) program was developed and tested in 1968 by the Agricultural Research Service to assist farmers in obtaining more efficient use of their

irrigation water. Starting in 1969 an irrigation management program was started by the USBR to provide the farmer with detailed information as to how much water to apply and how often to apply it for specific soils and crops. Data on crops, soil, and weather are obtained from the farmers and form the basic data utilized in making the recommendations. Three methods of service were made available to the farmers of the A and B Irrigation District. The most precise was a field by field method. In this program a trained fieldman collected soil samples in each field and the results were applied to the farming program planed for that field. The farm program provides each participating farmer with irrigation information necessary for general cropping on his farm. Those who did not voluntarily involve themselves in the field by field or farm method received a general irrigation guide by mail.

After several years of trial application of the Irrigation Management Service (IMS) less than 25% of the farmers were utilizing the field by field method of IMS even though there was no direct charge to those involved. At this point it was decided to assess the factors responsible for the slow adoption of IMS. This study focuses on the factors found to be important in the rate of adoption of innovations and their relationship to the adoption of IMS. From this analysis recommendations will be made for developing a program of increasing water use efficiency among farmers in southern Idaho.

CHAPTER II
OBJECTIVES AND METHODOLOGY

Objectives

This study was designed to measure the values of southern Idaho farmers toward the adoption of an irrigation scheduling program. Value orientations have been shown to be of vital importance in a farmer's decision to accept or reject a new technique or program. Specifically involved in this study were:

    a. a study of farmers' general values toward accepting or rejecting new ideas and techniques (with special emphasis on irrigation scheduling).

    b. a determination of the opinion leaders in the community (i.e. those who are important sources of information for the farmer) and their attitudes toward irrigation scheduling.

    c. a study of the socio-economic characteristics of the farmers as they relate to acceptance and rejection of new ideas.

    d. a set of recommendations for initiating a program for gaining acceptance of an irrigation scheduling program.

Methodology

To gather the required data a questionnaire was administered to a sample of 187 farmers in the A and B district. This was approximately 50% of the farmers in the district owning 50 acres or more. A trained graduate student administered the questionnaire in an interview format (See Appendix for questionnaire.)

The development of the interview schedule centered in the area of adoption of innovations. The interview schedule was developed in close cooperation with Bureau of Reclamation personnel. It was decided to obtain general water use information rather than focus

4

on IMS in particular. Based on Bureau of Reclamation experience
it was felt that focusing entirely on IMS might interject bias into
the results due to the connection of IMS with USBR. Throughout
the study a definite attempt was made to minimize knowledge regard-
ing the source of funding of the project.

The interview schedule was pretested in the Falls Irrigation
District and minor changes were made prior to its use in the A and
B District. Interviewing on the A and B District took place in
the late fall from the middle of October to the middle of December,
1973. A letter was sent to the sample group to explain the study
and to notify them that they would soon be contacted by an inter-
viewer for an appointment. The interviewer called each person and
made an appointment for the interview. Only one person in the A
and B District refused to be interviewed.

Data was transferred to IBM cards and analyzed on the Univer-
sity of Idaho computer. The data from the Falls District was from
only 20 respondents which was too few for meaningful results.
Falls District data is therefore only used in a few instances for
comparative purposes.

Sample Characteristics

The average farmer on the A and B District is 45 years old
and has been farming for 23 years. He has been in irrigated farm-
ing an average of 20 years. Sixty-eight percent of the farmers
spent all their farm years in irrigated agriculture. The farmers
in the A and B District are family oriented and 62% have relatives
in the area who farm. Of the relatives 52% are brothers, 24% are
uncles, 20% are fathers and 4% are grandfathers. Forty percent

have some type of cooperative farming agreement with their relatives.

The typical farmer in the A and B District operates a full time operation and 10% hold outside employment. Most of the outside employment seems to be off season work in local food processing plants. However, 34% have wives employed and 75% of the employed wives are in white collar occupations (41% professional/technical and 34% clerical).

The educational level in the A and B District is relatively high. Ninety percent have a high school diploma and 93% of the wives have comparable education.

The median size of owned land in the A and B District is 263 acres. In addition, these farmers lease additional land with the median leased acres being 125 acres. The median combined size of farms in the District is 291 acres.

With regard to involvement in the IMS program, 60% of the sample utilized the farm method of IMS. This is higher than the proportion on the farm method in the District population because farm IMS users were over-sampled to assure sufficient sample size for analysis. The remaining group of farmers received a mailed bulletin providing water scheduling and cropping information. Thus, for most of the analysis we will be comaring farmers who received only the mailed guide with farmers who received additional services beyond the mailed guide. From this comparison certain characteristics will emerge as being related to level of IMS involvement.

This chapter looks at the acceptance of the IMS program in light of various socioeconomic factors. These interrelationships indicate the kind of farmer that will most likely adopt the IMS program. Those variables measured on a continuous interval have been compared using the T-test for difference between means. Table 3.1 indicates these comparisons.

Table 3.1: Comparison of Selected Background Factors and Level of IMS

Background Factors	Farm	Guide Only	Probability of Difference Between Means Occurring By Chance
Average Age	45.4	45.1	P = .810
Average Total Years In Farming	23.9	20.9	P = .009
Average Years in Irrigated Farming	21.3	17.9	P = .011
Average Acres Owned	308.0	241.8	P = .068
Average Acres Leased	254.0	224.9	P = .825
Average Total Acres Owned & Leased	411.4	315.7	P = .130

Farm users tend to be very slightly older than the guide users but the difference does not approach statistical significance. Farm users have been in farming longer and in irrigated farming longer than guide farmers. Also, farm users own, lease, and have

total farm sizes larger than the guide users.

Of importance is the effect on IMS use by whether families have cooperative farming arrangements or not. As mentioned earlier 40% of those who have relatives in the area have cooperative arrangements with them. Those who do have cooperative arrangements are much less likely to be on the farm IMS program (37% to 62.5%). In that this factor affects one-fourth of the A and B farmers it is of considerable importance. This district is definitely a family centered farming area and the intrafamily norms and values seem to have a restrictive affect on acceptance of the IMS program.

Somewhat contrary to most innovation research is the finding that lower educated farmers in the A and B district are more likely to be involved in IMS than the higher educated farmers. Sixteen percent of the farm users have less than high school education and 22% have some college education. None of the guide only users have less than high school education and almost 40% have at least some college education.

These findings seem to be related to the strong kinship patterns in the district and suggest the importance of unique social forces in either restricting or enhancing the adoption process. This information would have important implications for developing adoption programs. If it is known that a major segment of the population of interest are associated with a particular group it may be that to facilitate adoption the program should be disseminated through the group. This could be done by utilizing group related media channels and by having group affiliated personnel to administer the program.

In sum, the A and B district has unique social forces which are related to the rate of adoption of IMS. These factors are probably the most important with regard to the status of IMS in the A and B district.   In other aspects it is quite similar to past findings in terms of adoption of new innovations.

CHAPTER IV
SOURCES OF INFORMATION ON IRRIGATION

Important aspects of adoption of innovations are the sources of information utilized by the farmers. Farmers usually learn about new ideas through the various mass media channels. Initially, most farmers read about new ideas in various farm magazines, later in more serious consideration of a new technique other forces enter into the final decision. The influence of neighbors and friends is usually a primary consideration prior to final adoption. Various Federal and State agencies and influencial voluntary associations are often important reference groups for farmers. This chapter explores the various potential sources of information available and used by A and B District farmers.

Table 4.1 indicates that the cooperative extension service is the primary source of information about new farming ideas. This is followed closely by farm magazines, then neighbors and friends. Neighbors and friends are the most important secondary source of information. Combining the first and second choices, neighbors and friends are definitely the major source of information about any new farm ideas. This is followed by farm magazines and cooperative extension respectively. When breaking down sources of information by level of IMS (Table 4.2) some differences emerge. Farm users are more likely to obtain information from neighbors and friends and cooperative extension, whereas guide only users make more use of farm journals and neighbors and friends. For both groups, neighbors and friends are equally important. When looking at specific journals some differences emerge by level of IMS (Table 4.3).

10

Table 4.1: General Sources of Information

	Farm Magazines		Neighbors and Friends		Ag Extension		Newspapers		Salesmen		Radio-TV	
	N	%	N	%	N	%	N	%	N	%	N	%
1st Choice	66	36.3	39	21.0	72	38.6	5	2.8	-	-	8	4.5
2nd Choice	37	20.4	83	44.6	29	15.7	18	9.8	10	5.6	-	-
Not Chosen	79	43.3	64	34.4	85	45.7	163	87.4	175	94.4	178	95.5

Table 4.2: Percent of Farm and Guide IMS Users Choosing Each of the Following Sources of Information for New Ideas

Level of IMS	Farm Magazines	Neighbors and Friends	Ag Extension	Newspapers	Salesmen	Radio-TV
	%	%	%	%	%	%
Farm	42.9	65.2	63.4	11.6	9.0	4.1
Guide Only	78.6	66.2	40.5	13.5	-	5.4

Table 4.3:   Specific Magazines Taken by Level of IMS

Magazine	% Who Take		
	Farm	Guide	All Respondents
Irrigation Age	68.1	79.7	72.7
Farm Journal	71.8	93.2	79.1
Western Farm Life	21.4	29.7	24.7
Hoard's Dairyman	14.3	1.4	9.1
Successful Farming	69.0	79.7	73.3
Idaho Stockman-Farmer	59.8	31.1	48.4
Top Operator	73.3	82.2	77.0
Idaho Potato Grower	81.0	87.8	81.6

The largest differences occur with the Idaho Stockman-Farmer and Farm Journal. Farm users are more likely to take the Stockman-Farmer whereas guide only users are more likely to take the Farm Journal. Guide only users are also more likely to take Irrigation Age, Successful Farming, Top Operator, and the Idaho Potato Grower.

Any dissemination program on further involvement in IMS should focus on those journals that will reach the most guide only users.

Another source of information dissemination is affiliation with voluntary associations. Table 4.4 shows the affiliation with various associations by farmers in the A and B District. The Soil Conservation District has the highest membership but there may be some error in this category in that a number of farmers felt they were members by virtue of being in the District. The National

Table 4.4: Membership in Voluntary Associations

Degree of Involvement	NFO		Grange		Farm Bureau		Water Users Association		Soil Conservation District		Potato Growers	
	N	%	N	%	N	%	N	%	N	%	N	%
Not a Member	98	52.7	167	89.8	137	73.7	152	81.3	69	37.3	107	59.1
Irregular Attender	39	21.0	14	7.5	39	21.0	30	16.0	87	47.0	48	26.5
Regular Attender	20	10.8	–	–	10	5.4	5	2.7	15	8.1	22	12.2
Committee Member	6	3.2	–	–	–	–	–	–	9	4.9	–	–
Officer	23	12.4	5	2.7	–	–	–	–	5	2.7	4	2.2

13

Farmers Organization and the Idaho Potato Growers are the strongest groups in the District.

Questions were asked to determine how important various agencies were in terms of the assistance they provided to farmers. Table 4.5 shows the results of this question. This question does not ask where they go for assistance, it only asks how important they feel the agency is. They may feel that a private consultant is important but not utilize one themselves. The irrigation district is viewed as being of primary importance to farmers in the area.

Table 4.5: Importance of Various Agencies in Providing Assistance to Farmers

Agency	Very Important		Important		Unimportant	
	N	%	N	%	N	%
SCS	29	15.6	107	57.5	45	24.2
Irrigation District	111	59.4	64	34.2	12	6.4
Ag. Extension Service	37	19.8	99	52.9	51	27.3
Bureau of Reclamation	9	4.9	87	47.8	86	47.3
Private Consultants	60	32.1	84	44.9	43	23.0

The SCS and cooperative extension are viewed as of secondary importance to farmers in the area. A similar question asked farmers where they would refer a new farmer to for advice about irrigation. Responses were recorded as given and later grouped into categories. Results are shown in Table 4.6.

One's peers seem to be the most recommended source of new irrigation information. The irrigation district is second in

14

Table 4.6: Best Place for a New Farmer to Get Irrigation Advice.

	N	%
Neighbors and Friends	83	44.4
Irrigation District	41	21.9
Extension Agent	28	15.0
Ag Experiment Station	27	14.4
Private Consultants	4	2.1
Don't Listen to Anyone	4	2.1
TOTAL	187	100.0

importance followed by the Ag Extension Agent and the Ag Experiment Station. This question places much less emphasis on private consultants than the previous one. While consultants seem to viewed as important few farmers would send a new farmer to one for advice.

In looking at a breakdown of Table 4.5 by level of IMS few differences emerge (Table 4.7). Table 4.8 shows a breakdown of the free response question as to where farmers would advise a new farmer to seek irrigation information. Farm users would be more likely to send the new farmer to the irrigation district or Ag Experiment Station than would the guide only users. The guide only users would be 1.7 times more likely to tell the new farmer to see his neighbors and friends than the farm users. Both groups place a high premium on peers as a source of information.

Table 4.7: Importance of Agencies in Providing Assistance to Farmers by Level of IMS

	Farm						Guide Only					
	Very Important		Important		Unimportant		Very Important		Important		Unimportant	
Soil Conservation District	19	17.0	67	59.8	26	23.2	10	14.5	40	58.0	19	27.5
Irrigation District*	81	71.7	25	22.1	7	6.2	30	40.5	39	52.7	5	6.8
Cooperative Extension Service	32	28.3	60	53.1	21	18.6	5	6.8	39	52.7	30	40.5
Bureau of Reclamation*	9	8.0	61	54.0	43	38.1	-	-	26	37.7	43	62.3
Private Consultants	41	36.3	45	39.8	27	23.9	19	25.7	39	52.7	16	21.6

*The distinction between Bureau of Reclamation and Irrigation District is somewhat confusing to some water users in the study area. Some District employees were once Bureau employees and some people don't differentiate between them.

16

Table 4.8: Best Place for New Farmer to Get Irrigation
Advice by Level of IMS

Source	Farm		Guide Only	
	N	%	N	%
Neighbors and Friends	40	36.7	43	61.4
Irrigation District	29	26.6	12	17.1
Ag Experiment Station	22	20.2	5	7.1
Cooperative Extension	18	16.5	10	14.3

Finally, we asked the A and B farmers how they would prefer
obtaining new farm information. Table 4.9 shows that most farmers
prefer periodic workshops; almost two thirds of the farmers preferred
this type of information dissemination. Table 4.10 presents the
same information by level of IMS adoption.

Table 4.9: Preferences of Obtaining New Farm Information

Preference	N	%
Periodic Workshops	122	65.2
Farm Demonstrations	34	18.2
Trained Personnel on Farm	20	10.7
Farm Magazines	6	3.2
Mail Information	5	3.2
	187	100.0

Table 4.10: Preferences for Obtaining New Farm Information
            by Level of IMS

Preference	Farm		Guide Only	
	N	%	N	%
Periodic Workshops	87	77.0	35	47.3
Farm Demonstrations	12	10.6	22	29.7
Trained Personnel on Farm	9	8.0	11	14.9
Mail Information	4	3.5	1	1.5
Farm Magazines	1	0.9	5	6.8

In sum, information dissemination is a crucial aspect of innovation adoption especially at the initial stages of the adoption process. The goal is to make as many potential users of the new idea or technique aware of its advantages and potential uses. The means of dissemination changes at various stages of the adoption process. Initially the mass media is more important; later direct contact with the potential users is desireable. For ultimate success the opinion leaders of the local community must become advocates and users of the new program. From this point it is only a matter of time until acceptance takes place. How much time is an important question. Several factors enter into the picture when looking at the time period of adoption. Some of these will be discussed in the next chapter.

CHAPTER V
WATER USE PATTERNS AND IMS

An important aspect of innovation adoption is the advantages of the new technique as perceived by the farmers. Innovation research has shown that rate of adoption is influenced by several factors. Cost, observability of results, the degree to which the new idea can be tried on a small scale are a few of the factors affecting rate of adoption. Also, the degree to which the farmer views the new product as a solution to problems is likely to be important.

In this study farmers were asked to choose the three most significant problems concerning their water use patterns. Table 5.1 shows the degree of concern expressed regarding these irrigation problems. In general, it seems the most important problem centers around the management of irrigation. Keeping up with crop needs, applying too little or too much water or water application at the wrong time are all related to the general management of one's irrigation system. Those farmers who do perceive this as a major problem would be more likely to take action to solve the problems. If this hypothesis is correct IMS users would be more likely to indicate management problems than non-IMS users. Table 5.2 presents the correlation between IMS level and water problems. There is a positive correlation between most management problems and degree of involvement in IMS. The water management items are of higher concern to farm users than to those receiving the guide bulletin only. Steepness of field, uncontrolled flooding, and facility breakdown are

Table 5.1: Irrigation Problems Encountered by Farmers on the A & B District

	Applying Too Much Water		Not Applying Enough Water		Applying Water At The Wrong Time		Finding Enough Time to Change Water		Length Of Rows		Steepness Of Rows		Size and Shape of Fields		Being Able To Keep Up With Crop Needs	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Most Concern	20	10.9	22	12.0	8	4.4	21	11.5	1	0.5	4	2.2	2	1.1	38	20.8
2nd Concern	9	4.9	18	9.8	13	7.1	17	9.3	4	2.1	6	3.3	22	12.0	16	8.7
3rd Concern	-	-	-	-	6	3.3	12	6.6	15	8.0	14	7.6	43	23.5	15	8.2
Not a Major Problem	154	84.2	143	78.1	156	85.2	133	72.7	167	89.3	160	87.0	116	-	114	-

	Uncontrolled Flooding		Facility Breakdown Washouts, Etc.		Field Runoff		Time For Water To Reach Ends		Excessive Wetting of Upper End of Rows		Inadequate Water At Breaks or Ends of Rows		Too Much Water In Low Spots		Personnel		No Problems	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Most Concern	1	0.5	10	5.5	6	3.3	18	9.6	2	1.1	11	5.9	1	0.5	-	-	4	2.2
2nd Concern	-	-	2	1.1	9	4.9	20	10.7	8	4.4	18	9.6	6	3.3	5	2.7	-	-
3rd Concern	14	7.7	-	-	-	-	1	0.5	-	-	11	5.9	6	3.3	14	7.6	5	2.7
Not a Major Problem	168	91.8	171	93.4	167	91.3	148	79.1	173	-	147	78.6	170	92.9	165	89.7	173	95.1

Table 5.2: Correlation Between Level of IMS and Water Problems
on A and B District*

Water Problem	Correlation**	Percent Indicating Concern
Keep Up With Crop Needs	-.32	37.7
Size and Shape of Fields	-.13	36.6
Finding Enough Time To Change Water	.15	27.3
Not Applying Enough Water	.17	21.9
Inadequate Water at Breaks or Ends of Rows	-.16	21.4
Time for Water to Reach Ends	-.15	20.9
Applying Too Much Water	.19	15.8
Applying Water At Wrong Time	.33	14.8
Steepness of Rows	.14	13.0
Length of Rows	-.04	10.7
Personnel	-.24	10.3
Field Runoff	-.01	8.2
Uncontrolled Flooding	.15	8.2
Too Much Water in Low Spots	-.09	7.1
Facility Breakdown, Washouts, Etc.	.16	6.6
Excessive Wetting at Upper Ends	-.11	5.5

*Positive values mean that the more involved the farmer is in IMS the more likely the problem area is of concern to him.

**The correlation coefficient is Phi (ϕ).

also of more concern to farm users. Size and shape of fields, keeping up with crop needs, personnel, and the items dealing with concentration of water in specific locations are more likely to be associated with the guide only users.

It seems evident that those farmers who perceive their problems centering around the amount and timing of water application are more likely to be most involved in the IMS program. Thus, perception of the problem precedes adoption of techniques to alleviate the problem.

In addition to specific problems about irrigation, questions were asked about other aspects of irrigation. Questions dealing with changing intervals, variations in changing of water and the bases for changing water were asked to assess the patterns of water use and to note any water use patterns associated with degree of involvement in IMS.

Table 5.3 shows the pattern of water changes by level of IMS.

Table 5.3: Time of Changing Settings by Level of IMS

IMS Level	Early Morning		Late Morning		Morning & Evening	
	N	%	N	%	N	%
Farm	15	13.3	-	-	98	86.7
Guide Only	41	56.2	5	6.8	27	37.0
Total	56		5		125	186
%	30.1		2.7		67.2	

This reflects the greater concern for water application problems by the farm users. However, it is evident that changing

22

water is fit into a convenient time in one's day. Mornings and evenings are good times to change water and regardless of the amount of water applied during the setting, it is unlikely that the farmer will alter his schedule. Water setting should be given high priority in developing a management system in that any program should favor 12 or 24 hour settings. The farmer is not going to stop what he is doing at 2:00 p.m. to change his water. This is reflected in part by his response to a question as to how much the farmers vary their schedule of irrigation due to changes in weather conditions. Eighty five percent vary their schedule only in extreme cases. Eight percent never vary their schedules and about seven percent vary their schedule seasonally; that is, they have one schedule early in the season and change it later in the season. This pattern is not affected by level of IMS involvement.

A question was asked concerning the basis for determining the irrigation interval for various crops. Table 5.4 presents this information.

Table 5.4: Basis for Changing Water by Level of IMS

| IMS Level | Crop Needs | | IMS | | Experience | | Check Around | |
	N	%	N	%	N	%	N	%
Farm	32	28.3	21	18.6	21	18.6	34	30.1
Guide	24	34.3	1	1.4	39	55.7	6	8.6
Total	56		22		60		40	
%	32		12		34		22	

Experience is the most frequent basis for changing water (34%) followed closely by crop needs (32%). In this question experience refers to past behaviors whereas crop needs is a present basis for establishing an application interval such as feeling the soil around the plants to check moisture level. Checking around has reference to noting what the neighbors do. Farm users are almost four times more likely to use "checking around" as a basis than are guide users. On the other hand, the guide users are three times more likely to depend on past experience and crop needs than the farm users. More farm users make use of IMS than guide users but only 19% of the farm users depend primarily on IMS. Perhaps they use IMS as a basis for comparing their own experience. A and B farmers seem hesitant to accept new techniques as a basis for decision-making, in preference to years of experience in irrigated farming. Probably most farmers view themselves as the primary decision-maker in their operation and feel confident in making these decisions. New programs that remove decision-making functions from the farmer could be met with distrust no matter how good they might be. The challenge lies in convincing the farmer that the new idea will result in higher production and thus more money, reduced drainage problems and fertilizer savings.

Farmers were asked who they contacted when they encountered irrigation problems. Seventy four percent contact the irrigation district and the remaining contact no one. Farm users are more likely to contact the district than guide users (85% to 56%). Farm users are also more likely to utilize a trained field man in their irrigation program than are guide only users (75% to 22%).

Finally, farm users are more satisfied with their source of irrigation help than guide users (81% to 66%). Therefore, farm users of IMS are more satisfied with their total irrigation program than are the guide users. Innovations may be restricted or facilitated by the type of operation on a given farm (Crouch, 1972). This seems to be a factor in the adoption of IMS. Farmers often commented to the interviewer that they would use IMS if they had a sprinkler system or that IMS is not suitable to open ditch irrigation. There is little doubt that IMS is more easily adopted to sprinkler irrigation in that more precise control of water exists with sprinkler systems. This is borne out by the fact that substantially more farm users have sprinkler systems than do guide users (35% to 6%). Thus, one could not expect as rapid adoption of IMS in an area of open ditch irrigation as in an area of primarily sprinkler irrigation.

Another important factor is the perception that the farmer actually has a problem that can be solved by IMS. IMS focuses primarily on managing the amount of water and the interval of application. Those most involved in IMS perceive these as water problems and evidently believe the solution is IMS. Those who do not make full use of the program are less likely to perceive these areas as problems for them. Of course, the A and B district is a relatively efficient user of water, thus making this perception somewhat more difficult. Nevertheless, it is a factor that must be considered.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study was undertaken to provide information useful to establish programs for facilitating the adoption of an irrigation scheduling service to farmers. While the results may not be specific enough to assess in detail the benefits and costs of the IMS program it does provide a basis for assessing the factors affecting the acceptance of the program. Some may believe that it fails to ask relevant questions specific to IMS. Others may believe that it does not reveal why farmers don't utilize IMS or provide information necessary to assure successful adoption in another location. The reasons for this have been discussed earlier and will not be reiterated. This study suggests that both the pattern of farm practices and the social structure are important as far as acceptance of IMS on the A and B District is concerned.

Farm Processes

Farm development is a continuous process whereby the farmer manages his program on the basis of the knowledge he has of his farming enterprise at a given time. If he perceives a new idea or technique as improving his practice he will likely adopt it or he may view the new innovation as being desirable for him at some time in the future after he has made other changes in his system. As Crouch (1972:436) suggests, ". . . if development is to occur the adoption of succeeding practices is dependent on the prior adoption of others." While some practices may be adopted

26

independently of others such as disease control, others must fol-
low a particular sequence in order to fit the farmer's overall
development plan. This seems to be a factor in the adoption of
IMS. Farmers often commented that irrigation scheduling was good
if one had a sprinkler system but they couldn't use it with their
open ditch systems. While this is not strictly true, there is
little doubt that irrigation scheduling is easier to use with
sprinkler systems. At least in the eyes of some farmers, the adop-
tion process is from open ditch to sprinkler to IMS, in that order.

Of equal importance to rate of adoption is the view by farmers
that the technique will be of benefit to them. "Adoption follows
full understanding of the problem and its solution", (Crouch, 1972:
443). IMS is a system designed to solve problems related to the
timing of application and the amount of water necessary for optim-
izing production. For most farmers to be interested in using the
program, they must perceive that they have problems that can be
solved by IMS. The results indicate that farmers who do perceive
that their problems are management oriented are the ones who are
utilizing the farm IMS program. Thus, a program to enhance IMS
should first alert farmers to the problems common to their operation
and then indicate the ability and advantages of utilizing IMS as
a solution.

In conclusion, with regard to the development of the farmer's
operation two aspects should be focused on closely when looking at
an area for potential IMS development.

The ability of IMS to fit within the farmer's operation at a
given point in time will indicate whether emphasis should be placed

27

on adoption of IMS per se or whether emphasis should center on adoption of several other practices that would ultimately result in adopting IMS into a total management system. Crouch (1972:445-446) aptly comments on this point when he states; "It is less likely that the farmer is at fault in not adopting than is currently thought. It is also caused by failure of Extension and Research to recognize the specific needs of farmers . . .". (Emphasis mine).

Second, and closely related is the assessment of farmers' perceptions as to irrigation problems. Initial efforts in an area should focus on educating farmers as to important problems in their area and alternative solutions.

An additional factor not dealt with in this study is the benefit-cost ratio. The benefits of the new practice in light of its costs should be documented thoroughly and demonstrated to the farmers. If benefits can be shown the farmer will be much more likely to adopt the program. The benefits need not necessarily be financial or short term, they may be long term and save time or conserve the resource.

Social Structure

The results of the A and B study illustrate the importance of the local social structure in affecting adoption of a new practice or idea. Social forces are at work in the A and B District which have a definite influence on the adoption of IMS. These social factors are of crucial importance to acceptance of innovative programs and should not be overlooked. Prior to beginning a new program an assessment of the local social structure should be made.

This can often be done relatively quickly be spending several days in the potential area assessing the social background (i.e., family structure, ethnic and religious backgrounds; etc.) of the farmers in the area. This type of information and its ultimate usefulness may mean the difference between success and failure of the program. It may also provide information useful in altering the program in order to enhance the liklihood of success. For example, if a very cohesive social group predominates the area it would be of value to utilize members of that group as examples or the media of the group for promotion.

Directions for Future Study

As indicated earlier, this study was not specifically directed to the pros and cons of IMS. Further study should focus specifically on the IMS program by looking at those most involved in the program. Where do they see the benefits? How much would they pay for the service? How does it fit into their overall operation? These are a few of the questions one might wish to have answered.

In addition, a similar study of a less efficient irrigation district might shed additional light on the patterns of water management in irrigated farming areas.

REFERENCES

Crouch, Bruce. 1972. "Innovation and Farm Development: A Multi-dimensional Model" _Sociological Ruvalis_ 12:431-449.

Rogers, Everett. 1962. "The Diffusion of Innovations." New York: The Free Press.

Rogers, Everett, and F.F. Shoemaker. 1972. "The Communication of Innovations: A Cross-Cultural Approach." New Jersey: The Free Press.

APPENDIX

INTERVIEW SCHEDULE

WATER USE SURVEY

How many acres of each of the following crops do you usually plant each year?

_____ Beets
_____ Potatoes
_____ Alfalfa
_____ Grain
_____ Peas
_____ Beans
_____ Corn
_____ Pasture
_____ Other (Specify) _____

Please indicate your first and second sources of new ideas about farming.

_____ Farm Journals
_____ Neighbors or friends
_____ Agricultural Extension Service
_____ Newspapers
_____ Salesmen
_____ Radio and Television
_____ Other (Specify) _____

Please indicate which of the following farm journals you regularly read or receive.

_____ Irrigation Age
_____ Farm Journal
_____ Western Farm Life
_____ Hoard's Dairyman
_____ Successful Farming
_____ Farm Quarterly
_____ Idaho Stockman-Farmer
_____ Top Operator
_____ Idaho Potato Grower

If you need advice on a problem concerning the following aspects of farming, who do you contact? Do you use the services of a trained fieldman? Are you satisfied with your sources of help, or would you prefer another source?

Fertilizer: Who do you contact?

Do you use a trained fieldman?

Would you prefer another source of help?

<u>Seeding</u>:   Who do you contact?
            Do you use a fieldman?
            Would you prefer another source of help?

<u>Harvesting</u>:

<u>Irrigation</u>:

<u>Farm Management</u>:

<u>Marketing</u>:

<u>Pest Control</u>:

How often do other people in the community come to you for advice?

_____ Frequently
_____ Sometimes
_____ Seldom
_____ Never
_____ No response

What type of irrigation practice do you use?

_____ Sprinkler
_____ Open ditch
_____ Both sprinkler and open ditch
_____ Total flooding
_____ Other   (Specify) _____
_____ No response

On the list I have given you are some problems one might encounter
with irrigated farming during the growing season. Please indicate
the three that are of most concern to you. Please rank them from
the one that is of most concern to the second most concerning,
through the third most concerning

                              1. first most concern
                              2. second most concern
                              3. third most concern
                              4. not chosen (does not concern)

_____ Applying too much water

_____ Not applying enough water

_____ Applying water at the wrong time

33

_____ Finding enough time to change sprinklers, siphon tubes or ditches

_____ Length of the rows

_____ Steepness of the rows

_____ The size and shape of the fields

_____ Being able to keep up with the crop needs on all fields

_____ Damage to crops by uncontrolled flooding

_____ Breakdown of irrigation facilities, washouts of ditches, etc.

_____ Field runoff

_____ The time required to push the water to the end of the rows

_____ Excessive wetting at the upper end of the row

_____ Inadequate water at breaks in slope or at the ends of fields

_____ Too much water in low spots

_____ Personnel

_____ Have no problems at all

_____ Other   (Specify) _____

When do you usually change your water settings?

_____ Early morning
_____ a.m.
_____ noon
_____ p.m.
_____ Late evening
_____ Varies
_____ Morning and Evening
_____ No response

At what intervals do you change the water for each of the following crops?

1. 8 hours
2. 12 hours
3. 16 hours
4. 20 hours
5. 24 hours
6. varies
7. 10 hours
8. no response

34

_____ Beets

_____ Potatoes

_____ Alfalfa

_____ Grain

_____ Peas

_____ Beans

_____ Corn

_____ Pasture

_____ Other (specify)_____

_____ Other (specify)_____

_____ Other (specify)_____

_____ Other (specify)_____

How do you decide about the interval of time between water applications for each crop?

How much do you vary your schedule of irrigation because of weather conditions?

What is your source of weather information?

What do you feel is most important for maximum crop yield with regards to irrigation?

_____ Amount of water applied
_____ The timing of the water application
_____ Uniformity of the water application
_____ The quality of the irrigation water
_____ Combination of 1 and 2 above
_____ No response

If a farmer new to the area asked you where he could get the best information about irrigation management, what advice would you give him?

35

A number of private and public agencies are associated with farm operations in this area. Please indicate how important you feel each of the following are to farmers in this area, in terms of the assistance they provide to the farmers.

1. very important
2. important
3. unimportant

_____ Soil Conservation Service

_____ Irrigation Districts

_____ Agricultural Extension Service

_____ Bureau of Reclamation

_____ Private Agricultural Consultants

If you desire more information about new farming practices and equipment, how would you prefer to obtain this information?

_____ Period Workshops

_____ Trained field personnel visiting your farm

_____ Mailed information at regular intervals

_____ By reading about it in farm magazines

_____ Demonstration on your farm or a neighbor's farm

I have listed several different farm practices. I would like to know if you have heard of them, if you are interested in using them, have decided to use them but have not tried yet, if you have tried them, are now using them or if they are not applicable to your type of operation. I would also like to know why you are at the stage you are now.

NOTE: The reason will be recorded verbatum on the blank answer sheet provided in the space applicable to the col. for that particular question. This is to be coded after the interview.

1. heard about
2. interested in using
3. have decided to use but have not tried
4. have tried
5. now using
6. not applicable

_____ Automatic siphons

_____ Fertilizer application in the water

_____ Irrigation scheduling

_____ Automated headgates

_____ Bale stacker (harrowbed)

_____ Minimum tillage farming

_____ Automatic beet thinner

_____ Trickle irrigation

_____ Gated pipe

_____ Cutback stream practice

_____ Labor-free (chemical) weed control for sugar beets

_____ Sprinkler irrigation

Finally, I would like some information about yourself.

What is your age?_____

How many years have you been farming?_____

Has this been irrigated farming?_____

Has it all been on this farm?_____

How many years have you been in irrigated farming?

Do you have any relatives in this area who are farmers?_____

What is their relationship to you?_____

Do you have cooperative arrangements with them?_____

How many acres do you or your wife own?_____

How many acres do you or your wife lease or rent?_____

What is you marital status?_____

How many children do you have?_____

What are the ages of your sons from the oldest to the youngest?

_____ _____ _____ _____ _____ _____ _____ _____

What are the ages of your daughters from the oldest to the youngest? _____ _____ _____ _____ _____ _____ _____

Do you have any employment other than farming? _____

What are the average hours you work per week? _____

Please describe what type of job you hold

        1. professional/technical
        2. managerial or
        3. clerical
        4. foreman or craftsman
        5. equipment operator
        6. laborer
        7. service, i.e., waitress
        8. other (specify) _____
        9. no response

Does your wife have employment away from the farm? _____

What are the average hours per week that she works? _____

Please describe the type of job she holds. _____

What is the highest level of education you have completed?

        1. elementary school (0-8)
        2. high school (9-11)
        3. high school graduate (12)
        4. some college of vocational school
        5. college graduate, Major (note on free answer sheet)
        6. advanced college degree (Major - same as above)

What is the highest level of education that your wife has attained? _____

Please indicate the level of your involvement in each of the following farm organizations.

        1. not a member
        2. irregular attender
        3. regular attender
        4. committee member
        5. officer
        6. not applicable

_____ National Farmers Organization

_____ Grange

_____ Farm Bureau

_____ Idaho Water Users Association

_____ Soil Conservation District

_____ Idaho Potato Growers

What is your religious affiliation? Please specify denomination. _____

What is your wife's religious affiliation? Please specify the de-
nomination. _____