

COMMUNICATION FIDELITY: A MEASURE OF AGRICULTURAL EXTENSION EFFECTIVENESS*

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Introduction

AGRICULTURAL extension, as it deals with changing or modifying the behavior of farmers, is essentially a communication task. As such, one of its serious problems is the lack of a valid standard measure or criterion for extension effectiveness. For though the barrio level worker is a vital part of an ongoing communication process as he distributes new varieties of plants, makes field demonstrations of new practices, holds meetings with farmers, or uses channels such as radio and the press, extension agencies usually evaluate his effectiveness only in terms of his accomplishments: number of planting materials distributed, leaflets given, or farmers' classes and field demonstrations conducted. While these data indicate the activities of the extension worker, these same data do not indicate the end result—the behavioral changes on the part of the farmers. Hence such basis for passing judgment on the effectiveness of extension work is not valid.

Another common indicator used in passing judgment on the effectiveness of extension is the number of farmers adopting an innovation or the number of innovations adopted by farmers. Adoption of innovation is a behavioral change, but it is not the only possible change that can

take place as a result of the extension process. It would be an understatement of the accomplishment and effectiveness of extension if adoption rate were to be the basis of extension evaluation that should include other behavioral changes such as awareness (increased level of knowledge), attitudinal changes, and attempts to use new practices. Also, adoption behavior is a result not only of the extension process but also of capital availability, physical and social barriers, etc., and these processes may not be within the immediate control of the extension worker and the farmer.

What then would be a valid measure of agricultural extension effectiveness? It is this question that prompted the development of Communication Fidelity (CF) as a measure of extension effectiveness.

Agricultural Extension as a Communication Process

Schemetically, extension as a communication process may be visualized as follows:

$$S \rightarrow M \rightarrow C \rightarrow R = Ex$$

Where:

S = Source communicator

M = Message

C = Channel

R = Receiver

Ex = Communication effect which is at an "x" level

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In a communication event, the extension agent may be the source communicator and the farmer the communication receiver. The message may be in the form of a new variety of rice and the channel may be by word of mouth, radio, press, group meeting, or result demonstration. It should be noted that the *Ex* can be affected by the communication behavior of the source communicator, the quality and appropriateness of the message and channel, and the ability or condition of the receiver. The communication process takes place in an environment that can favorably or unfavorably affect the *Ex*. The vital part of the source communicator cannot be overstressed because he is the one who "manipulates" the extension situation. The effectiveness of the extension communication process should, however, be based on the action the farmer takes, and not on what the communicator does, because it is the changes in the behavior of farmers that are of transcending importance in rural development.

Communication Fidelity: Operational Definition

In any effort directed towards accomplishing a goal, there is always something that is put in or invested to bring about the desired outcome. Normally, the greater the goal, the greater is the investment or input required. There are two ways of looking at the product of a given input. One is looking at the result *per se*, and the other is looking at the result in relation to the input. The second case requires two kinds of data—input and output. The output-input way of looking at the consequence of communication is preferable because it accounts for what the extension worker or change agent puts into his work. Change agents should be held accountable only for the practices they teach for a given purpose in a given period of time.

According to Shannon and Weaver (1960), "the effectiveness problem in communication is concerned with the success with which the meaning conveyed to the receiver leads to the desired conduct on his part." Similarly, Leagans (1963) considers an effective communicator as one

whose encoded message is decoded by the audience (receiver) as intended, both in meaning and intent. Thus, communication accomplishes its purpose accurately if the message is interpreted in the same way by the communicator and by the recipient of the communication. This fits into what Berlo (1963) defines communication fidelity as "the accuracy with which an encoded message is decoded by the audience receiver."

Operationally, CF is the proportion of accountable communication responses (decoded messages) to the communication input (encoded messages). This can be represented by the equation:

$$\text{Fidelity} = \frac{\text{decoded messages}}{\text{encoded messages}}$$

This means that if the symbols X and Z with given values of one each are communicated and are received and decoded exactly as X and Z, the Fidelity would be $2/2 = 1$ or 100 per cent. On the other hand, if only X is decoded, the Fidelity would be $1/2 = .5$ or 50 per cent.

The preceding illustration is an oversimplification of the operational concept because, in reality, many factors need to be considered in the encoding process. In extension, such factors include (a) the purpose of communicating each practice and (b) the level of difficulty in achieving the purpose of each practice introduced. The purpose or objective may be any of the following:

1. To develop awareness of the new practice among farmers.
2. To develop favorable conviction among the farmers of the usefulness of the new practice.
3. To help the farmers develop courage to try the new practice.
4. To develop confidence among the farmers so that they will adopt the new practice.

Objectives 1 to 4 present an ascending pattern of communication effort and Figure 1 illustrates that as one's objective moves up from

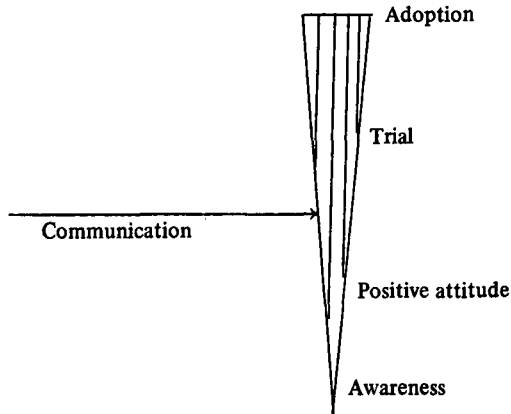


Figure 1. The barrier to achieving different levels of communication objectives in extension. The magnitude of the barrier increases as the objective moves up from awareness to adoption.

awareness to adoption, the magnitude of the barrier to achieving one's goal increases. As Leagans (1963) has said, "Diffusing knowledge is a relatively easy task but getting people to understand, accept, and apply it is a difficult one." For example, informing farmers in a barrio of a new variety of rice can be done in conversation or meeting with them, or through radio and printed matter. But for the farmers to adopt the variety, it may be necessary for the change agent to conduct a field trip to another barrio to see the performance of the new variety, then conduct result demonstrations in the barrio, or spend more of his time in the barrio. For this reason and for scoring purposes, numerical values are arbitrarily assigned to each of the four levels of purpose in an ascending order, i.e., 1 to 4, respectively.

It is recognized that no two communities or extension situations are exactly alike. There are relatively depressed areas and there are relatively wealthy ones. There are communities where the farmers are relatively uncooperative or less interested in learning new practices and there are communities where the farmers are cooperative and eager to learn new practices. These differences pose a real obstacle to the attainment of

specific communication goals. Figure 2 illustrates this point. Where the level of difficulty in attaining a particular objective is not considered, as in Figure 1, it is assumed that the barriers to communication effectiveness are within the immediate control of the communicator. In reality, this is not so. For example, it is relatively easier for a change agent to help rice farmers adopt the rotary weeder in communities where there is adequate irrigation water than in poorly irrigated ones. Another example concerns the adoption of fertilizer. Other things being equal, it is easier to make farmers use inorganic fertilizer when they are close to centers where fertilizer is sold than where the farmers are far away from the source of supply.

According to Solomon (1960), this situational factor is more of a serious problem to the change agent in a depressed area than to the agent in a wealthy one. This problem Solomon attributes to the fact that "the professionals tend to be judged as successful or not on the basis of absolute levels of accomplishment in their programs without reference to the difficulties of the particular location" (Solomon 1960). To control this variable, the perceived level of difficulty in attaining communication goals must be con-

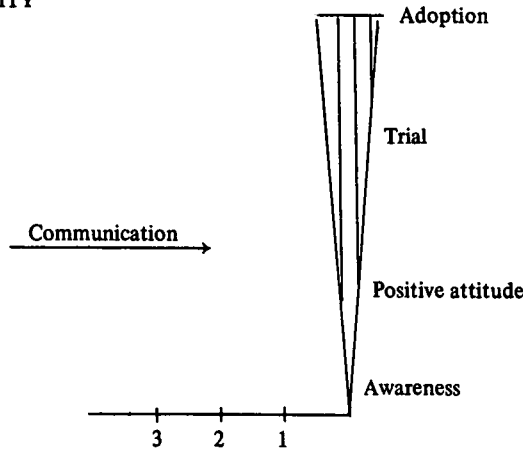


Figure 2. The level of difficulty is additional barrier to achieving different levels of communication objectives in extension.

sidered as part of the conditions that determine the amount of communication input and output. For practical purposes three levels of difficulty may be considered, namely: *easy*, *fair*, and *difficult*.

Given the purpose and level of difficulty considerations in perspective, the CF in extension can be represented by the equation:

$$CF = \frac{\sum [(M_k) (SR) (LD_{mk})]}{\sum [(M_c) (PC) (LD_{mc})]}$$

Where:

M_k = message known by farmer . . . information, practice

SR = state of farmer's response, i.e., awareness, conviction, trial, or adoption

D_{mk} = level of difficulty of information or practice known

PC = purpose of communicating the practice, i.e., to develop awareness, positive conviction, trial, or adoption

LD_{mc} = level of difficulty of information or practice communicated by the change agent

M_c = message(s) communicated by the change agent

Computational procedure

To compute the CF in extension, the four possible purposes of communication and four possible states of the farmer's response are quantified as follows: (a) adoption = 4, (b) trial = 3, (c) favorable attitude = 2, and (d) awareness = 1. The perceived levels of difficulty in attaining communication purposes are also quantified as follows: (a) difficult = 3, (b) fair = 2, and (c) easy = 1.

Given these quantitative values of the communicator's encoded message(s) the denominator in the equation is obtained by multiplying the purposes by the perceived level of difficulty for each practice introduced. Where two or more messages have been communicated for the same purpose at the same level of difficulty the computation becomes $(M_c) (PC) (LD_{mc})$. Since there are always many practices that are communicated to the farmers, the products of the preceding computation are added to obtain the overall communication input.

To illustrate how the denominator is obtained, an example is given here in which the change agent is asked what practices he communicated to the rice farmers in barrio X during the past year. He is also asked what his purpose was in communicating each practice and what

level of difficulty he perceived the farmers would encounter in responding to the message as intended. The following information may be obtained:

Finally, with the total input and total response indices known, the CF for this example would be:

$$CF = \frac{17}{24} \text{ or } .76$$

Table 1.—Derivation of communication input

Practices	Purposes				Level of difficulty			Input index
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	
1. Straight planting				/	/			4
2. Use of rotary weeder			/			/		6
3. Use of 2-4-D	/					/		2
4. IR-8				/			/	12
Total communication input								24

The numerator of the equation is obtained by multiplying the state of response of the farmer of the message known by the level of difficulty in responding to the message as indicated by the communicator. The products of the several practices known are added to obtain the total response index of the farmer. The following would illustrate the point:

The fidelity of communication may be expressed in percentage. Therefore, for this example, the CF is 76 per cent.

Gross and Net Fidelity

In an open society such as the Philippines, the flow of new information into the community usually goes through a number of communica-

Table 2.—Derivation of communication response (output)

Practices	Awareness response (1)	From when	Other response level			Level of difficulty	Response index
			(2)	(3)	(4)		
1. Straight planting	/	FMT		/	1	4	
2. Use of rotary weeder	/	FMT	VG*		2	4	
3. Use of 2-4-D	X				2	0	
4. IR-8	/	FMT		/	3	9	
Total response index						17	

*Very good

tion channels coming from several sources. Because of this, the validity of assessing communication effectiveness may be questioned: how much of a given response to technological innovation can be credited to a single source or to each of several sources? The problem is complicated by the fact that the extension agent usually serves as a technical consultant for other change agents in the rural area. School teachers and workers of the PACD receive from him information which they in turn pass on to the farmers. Furthermore, as the change agent cannot reach all the farmers in the community, he works with a relatively few farmer cooperators in the hope that they pass on information to all.

This problem is difficult and the approach suggested here, however, cannot claim absolute control over this variable. For practical purposes, the best that can be done is to ask the farmer respondent from whom he learned the practice in question (see Table 2) and to record the information in the proper column of the instrument. The information approximates what portion of the total farmer's response is attributed directly or jointly to the change agent and what portion to other sources even if the change agent can be assumed to have influenced these other sources. Thus, in computing gross fidelity, the total farmer's response index, regardless of the sources, is divided by the total communication input of the change agent in question. Net fidelity differs from gross fidelity in that the responses of farmers in net fidelity exclude those attributed to sources not of the making or influence of change agents.

Communication Fidelity between Farm Management Technicians and Rice Farmers in Leyte

In showing that the CF index is a valid measure of extension effectiveness, we shall turn to a study conducted in 1967-68 of some 40 farm management technicians (FMTs) and six randomly selected farmers under each in 40 selected barrios in Leyte. During a period of not more than two years, the FMTs reported having communicated between 38 to 66 or an average

of 52 practices in rice production to the farmers in the sample barrios. Some of these practices were communicated for the purpose of creating awareness, others to create favorable attitudes, but most were for trial and adoption. The FMTs' perceived level of difficulty for farmers to respond to each of the practices ranged from 1.04 to 2.65 or a mean perception of 1.54. In general the FMTs perceived that the overall level of difficulty in achieving most of their communication goals was between easy and fair.

The computed FMTs' communication input was between 185 to 492 with a mean of 296.05. Of 13 operational units in rice production the highest communication input was in fertilizing rice and the lowest in soil treatment.

Of the 38 to 66 practices communicated by the FMTs to the sample barrios 9 to 62 practices were known by the farmer respondents. The mean number of practices known by the farmer respondents was 39.20 or 75 per cent of the mean number of practices introduced by the FMTs. The computed communication response of the farmers ranged from 29 to 391 with a mean of 177.32.

The sources of information on rice production mentioned by farmers are the following: (a) the FMT; (b) other farmers or neighbors; (c) landlords; (d) radio; (e) PACD; (f) Esso chemical agents, mayors, priests, and teachers; and (g) FMT and any of the other sources jointly.

Given the mean communication input of 296.05 and the mean communication response of 177.30, the gross CF between the FMTs and rice farmers in Leyte is approximately 60 per cent. Net CF, as explained above, is obtained by dividing the farmers' response index on practices known directly and jointly from the FMT by the communication input. By this method, it is found that the mean net CF of the 40 FMTs and 260 farmers is 43.3 per cent.

Validity of the CF measure

Does CF measure what it purports to measure? This part of the study is crucial as there are no external criteria with which to compare the

CF index. It is reasoned out, however, that since the introduction of new practices in rice production is believed to increase yield if these practices are applied by farmers, the CF can be a prediction criterion of estimating the average yield of rice produced by farmers. If so, then CF which is based on the farmer's response to recommended practices should correlate positively with the average yield of rice produced by farmers.

On the basis of this hypothesis, an *r* correlation coefficient of CF and estimated average production in cavans per hectare was computed. As three farmers in the sample gave no average production estimate, the estimate included 237 cases only. The result of the analysis indicated a .53 coefficient of correlation which is statistically significant beyond the 0.005 level of probability. The result is taken as an indication that the CF index is a valid measure of extension effectiveness.

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