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The Information Dissemination Systems Related to the Six-Row Rice Transplanter Machine

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ABSTRACT. A study was undertaken in the Polonnaruwa district to evaluate the effectiveness of the information dissemination system of the Six Row Rice Transplanting Machine. Pre-tested schedules and questionnaires were used to interview informants from all levels of the research and extension system. Many weaknesses were identified in the system. The types of information, classified into five major groups were studied. The importance and amounts were rated by the farmers. The existing information dissemination system has fulfilled the machine owners' needs for information on nursery management, machine use and its adjustments, and land preparation. Transferring this information was done through training sessions and demonstrations. Information related to machine owners' problems regarding this technique is low. It was found that the linkages between the following components were weak and need strengthening. (a) Engineers and extension workers at all levels below the ADA, (b) Machine manufacturers and the middle and field level extension workers, (c) FMRC and group methods of extension, and (d) Machine owners, field level extension workers and machine manufacturers. There was a total lack of formal linkages between several vital components in the information system. Each component in the system was found to have this limitation. A quick feedback from the farmers about machine defects and improving the technology accordingly is essential for the widespread use of the machine. Practical recommendations are made to solve these limitations.

INTRODUCTION

The Six-Row Rice Transplanter Machine was introduced to Sri Lankan farmers in 1984 *Yala*. It was developed at the International Rice Research Institute (IRRI), Philippines and later modified at the Farm Mechanization Research Center (FMRC), Mahailluppallama. This machine is manually operated and is manufactured by small and large

scale companies. The extension activities related to this technology is being carried out by the Department of Agriculture and the private manufacturers. Transferring this technology to a target group occurs through several means in different ways.

Although this transplanter machine was initially introduced in 1984, its rate of adoption is considerably low. At the end of 1989 not more than 1000 machines were used in Sri Lanka. The low rate of adoption of this machine can be partly due to non-existance or weaknesses of the information exchange system and/or distortion of the messages; both of which tend to occur as the length of the communication chain increases (Roling, 1988; ISNAR, 1988; Pace *et. al.*, 1975). This situation may lead to a gap between research and utilizer sub-systems. Therefore, it is important to examine the existing information dissemination system related to the Six-Row Rice Transplanter Machine.

This study examines the nature of the information flow regarding the Six-Row Rice Transplanter Machine. More specifically it examines the following.

1. The directions of the information flow between technology producer sub-system and the utilizer sub-system.

2. The type, amount and importance of information received by farmers.

When considering the conceptual framework of this study, the technology production and dissemination system consists of various components and the functioning of these components occur in a particular manner which will determine the effectiveness of the information exchange system. The effectiveness is measured in terms of relevance, amount and type of information that flows in the system.

A system is defined as an arrangement of parts, *i.e.*, elements or components, which interact to achieve some common purpose (Fresco, 1986). The major components of a system are called sub-systems. Any system or subsystem has its boundary. The boundary separates the system or subsystem from the environment. Boundaries can be of several types. They are geographical, organizational, disciplinary, a cultivation or combinations of the above. Inputs and outputs are exchanged from

the environment to the system through its boundary. Several components of the subsystems are enclosed by this boundary.

The system theorists usually refer to communicators as components of a system (Emmert and Donaghy, 1981). Components are the basic elements of a subsystem, which can be either persons or institutes. These persons or institutes have knowledge. Knowledge is a set of concepts, meanings, skills and routines acquired actively over time by individuals or groups (Roling, 1988). Knowledge is an attribute of the mind which cannot be transferred or exchanged. Components interact with each other, to achieve a common objective or purpose and exchange information through regular links (Engel, 1987; Blok and Seegers, 1988). The first task in examining the information system is to identify the components of the system.

There are two basic ways in which system components can interact or relate to one another. The first is called an interface. An interface allows information to flow between two or more independent components (or sub-systems) of the system or between two or more independent systems (Emmert and Donaghy, 1981). In another instance, interface is a device of systems or sub-systems to exchange inputs and outputs. Inputs are data in a system. Outputs are the ultimate products of inputs which may lead to an innovation (Blok and Seegers, 1988). Interface is also the common relationship between systems and elements of systems, and thus communication is a type of interface.

In a situation where two or more systems or components of systems are intertwined and dependent upon one another, the term interface does not adequately represent their interdependency. This type of interdependent relationship is known as an intraface. An intraface occurs much more frequently within components of a system than between systems themselves and there could be two or more types of intrafaces. Interpersonal communication is an example of an intraface. This intraface relationships among various human subsystems are important enough to understand many issues relating to human communication (Emmert and Donaghy, 1981).

As defined by the term system, the common purpose of information exchange is to generate, transfer, receive, test, utilize and provide feed back of information. Information is the raw material of communication, more specially it is data, organized and represented in such a way

(patterned, formatted) as to acquire a certain meaning for future action of receivers (Engel, 1987). It makes decision making easier. Information is also defined as patterned data capable of reducing uncertainty beyond the existing knowledge in the receiver (Roling, 1987; Schramm and Porter, 1982). Information, on the other hand, is the tool that reduces entropy. In natural science, entropy means complexity of a particular system (Schramm and Porter, 1982).

Hence, in this study, information exchange is considered essential among the transplanter machine owners, researchers and the extension officers. This will enable machine owners to understand any complex situation and reduce uncertainty of an innovation. This will help them in decision making. It is not correct to assume that only the research sub-system generates knowledge, and that only the extension subsystem transfers the information and only farmers utilize this information. But information will only be received when this information is meaningful to the receiving component. Some information created by a subsystem, may be very important information to the other sub systems. The information generated by a subsystem, may not be utilized unless the information is transformed and transferred to the other sub-systems. The intraface or exchange of information among people in any subsystem - research, extension or machine user is also vital for the development and use of this technology.

Relevant and appropriate information generated is very useful in developing a healthy network among the research, extension and utilizer subsystems regarding the transplanter machine. The information generated by the extension and utilizer subsystems must be carefully examined and transferred to the relevant sub-system to execute necessary ideas to improve and further develop the transplanting machine. This will help increase adoption of the rice transplanting machine.

MATERIALS AND METHODS

The relevant data were collected by interviewing engineers, private machine manufacturers, all the field level extension officers and farmers who owned a rice transplanter machine. Both continuous machine-users and those who had discontinued use were interviewed.

Polonnaruwa district was chosen for the study since it had the largest number of machines. At the time of the field work 366 machines were found in this district (FMRC, 1991). The Polonnaruwa district is divided into two Agricultural Officers' (AO) segments and nine Agricultural Instructors' (AI) ranges. Of these nine AI ranges, four ranges were drawn purposively. Ninety machine owners and twenty nine officers were selected to interview from the four AI – ranges. The distribution of the sample by sub – system is given in Table 1. An interview schedule was developed to obtain data about dissemination of information. All interview schedules were pre – tested before use. While the farmers were interviewed and the schedules filled, the officers were asked to fill the questionnaire.

RESULTS AND DISCUSSION

Identification of the different components of the information system was done first. This was done by consulting key informants at all levels of the system. Once these components are identified, an ideal model of the information flow was developed based on the literature (Figure 1). After ranking the answers given by all the sample respondents, directions of the strong links and the weak links (Figure 2) in the prevailing system were identified. Further, linkages that did not exist in the prevailing information system were highlighted in the Figure 3. Therefore, it is essential to strengthen the weak linkages and develop the linkages which were not existing in the prevailing information system to make the system similar to the ideal model (Figure 1). This ideal information dissemination system may guarantee the efficient exchange of information regarding the machine transplanting technique.

Knowing the pattern of information flow, the next step was to find out the importance and the amount of information that the machine owners have received related to the transplanter machine. Since some types of information are more essential than others, the former was expected to be available to the users than the latter.

In order to simplify the study, five basic types of information were selected. They were on special nursery management, machine use and its adjustments, land preparation, machine purchasing and solutions to the farmers' problems. Of these five types of information, we identified the information which have been received most by the respondents.

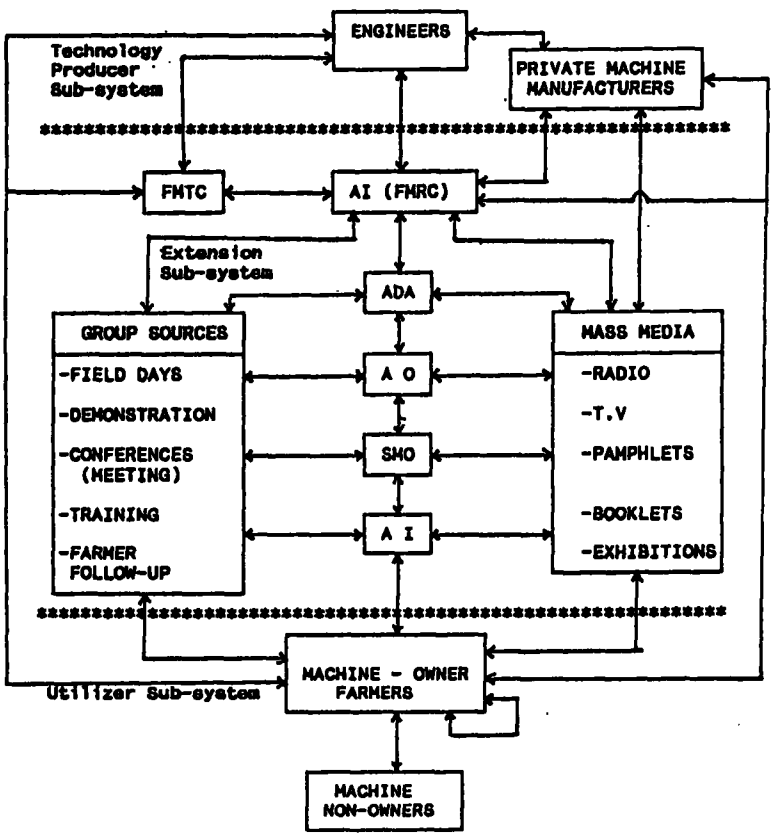

Figure 1. An ideal model of the information system

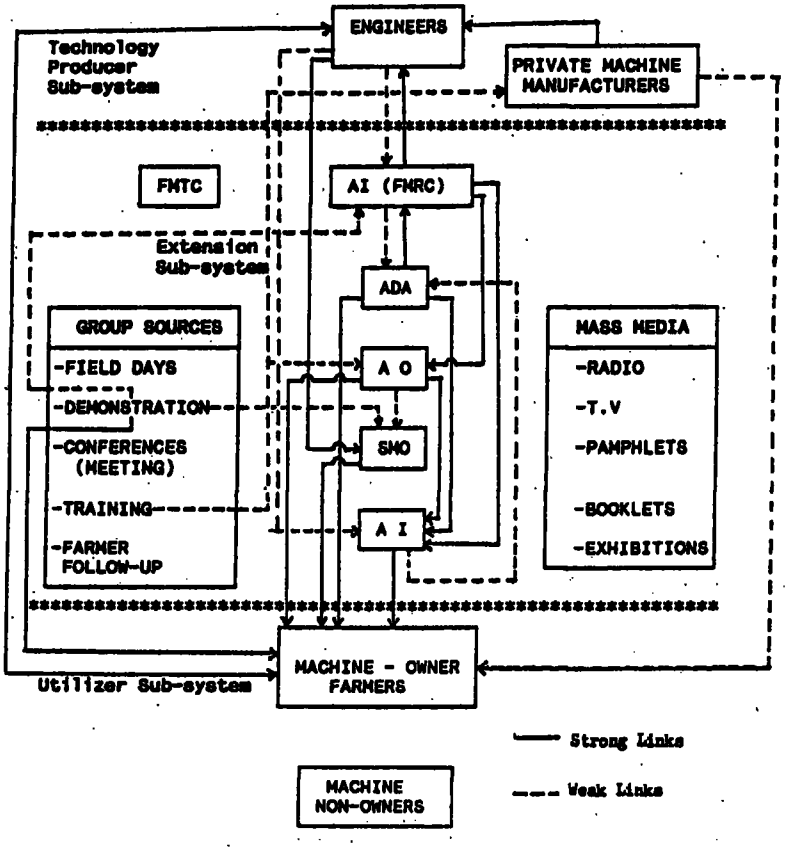

Figure 2. Strong links and weak links of the prevailing information system

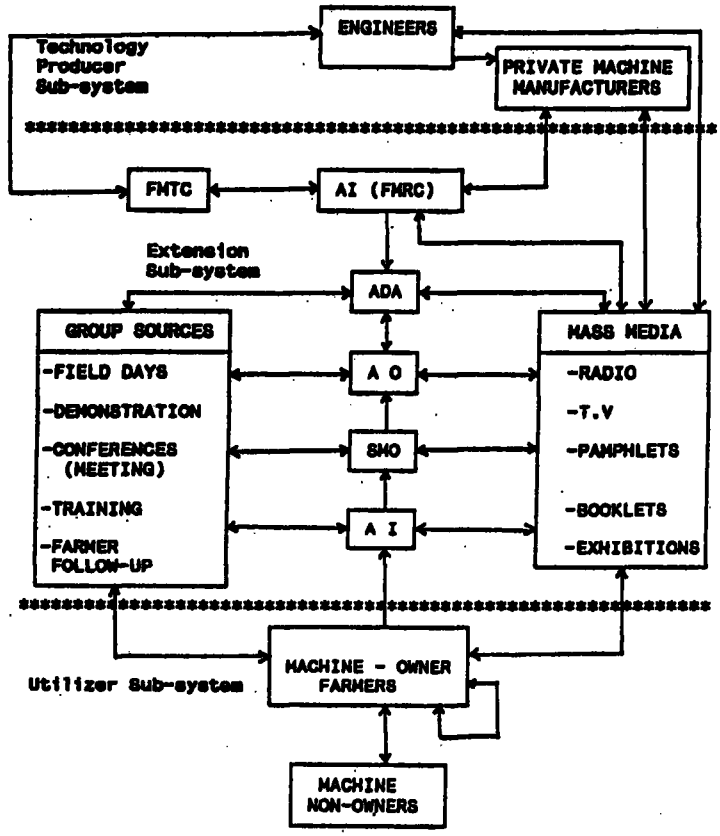

Figure 3. Linkages not existing and which require strengthening

Table 1. Sample distribution by sub systems (N=119).

Sub-system	Officer	Total	Sample
I. Technology-producer sub-system	Engineers (Associated with the transplanter development)	2	2
	Private manufacturers	15	7
II. Extension sub-system	Farm machinery instructors (At the FMRC)	2	2
	Agricultural instructors	11	11
	Subject matter officers	4	4
	Agricultural officers	2	2
	Assistant director of agriculture (Ext.)..	1	1
III. Utilizer sub-system	Machine owners	94	90
Total		119	

According to the amount received the respondents ranked the five types of information. Next step was to find out the importance of these five types of information to machine owners. This perception was also ranked by the respondents.

The five types of information identified and arranged by importance are presented in Table 2. In the adoption of the machine, information on management of the special nursery required was considered most important. About 55 percent of the machine-owners mentioned that this information is very important and they ranked it highest. This information is vital for the farmers when adopting the machine, since appropriate planting material is a prerequisite for its successful use. The same five types of information received by machine-owners were

Table 2. Importance of different types of information related to the machine transplanting technique.

Type of Information	Percentage of respondents ranking different information types according to importance			
	1st	2nd	3rd	4th
Training on special nursery management	54.7	25.6	10.0	5.2
Training on machine-use and it's adjustments	15.0	33.0	30.4	15.6
Training to achieve appropriate water-level and soil texture through land preparation	4.7	28.0	34.2	18.2
Purchasing of transplanter	2.3	3.6	1.4	22.0
Solutions to farmers problems	23.3	9.8	24.0	39.0

ranked by amount received. The results are presented in percentages (Table 3). About 59 percent of the machine-owners mentioned that they received information on special nursery management. According to the data, it is very clear that this task is fulfilled by the field level extension officials and the FMRC extension officers satisfying over half the farmers.

Table 3. Ranking of different information related to the transplanting machine use by the amount received.

	Percentage of respondents ranking different information types according to amount received			
	1st	2nd	3rd	4th
Training on special nursery management	58.6	26.0	11.0	2.5
Training on machine – use and it's adjustments	13.8	36.4	32.0	12.0
Training to achieve appropriate water – level and soil texture through land preparation	6.9	20.5	42.0	15.7
Purchasing of transplanter	5.8	5.7	5.0	30.0
Solutions to farmers problems	14.9	11.4	10.0	39.8

Training on machine – use and its adjustments was the second type of information considered. The machine is a new technique to the Sri Lankan farming community. Hence, machine – owners should have received basic information on its use. Only 15 percent of the machine – owners mentioned that this type of information (machine – use and it's adjustments) as the most important one. However, above 30 percent of the machine – owners ranked this information as their second and third choice. About 14 percent ranked machine use and adjustments as the first rank in terms of amount of information received. However, above 30 percent of the machine – owners mentioned this information as their second and third ranks. Although it is an important information, the amount of information received in this regard is ranked to be low.

The third type of information is on achieving appropriate water level and soil texture through land preparation. Land preparation is a life – long activity of these farmers and thus may require relatively less information. Results of the study, match this expectation. Only about 5 percent of the machine owners mentioned that the information on land preparation is an important one for them. Hence, it is clear that farmers are not expecting further information on land preparation. Only about 7 percent of the machine owners mentioned that they received information on land preparation.

Information on purchasing of rice transplanters is the fourth type. Information on purchasing of the machine was thought to be not required by the respondents. Based on discussions held with farmers it was clear that they knew where to purchase the machines from, the limitation being lack of finances for purchase. If the farmers are in a good financial position, they have enough knowledge to choose an appropriate machine to suit their condition. Hence, information on purchasing of machine is not required. Only about 2 percent ranked this as the most important while 6 percent ranked this as the most amount of information received from among the five types.

Information dissemination is not a one-way flow. It is a two-way flow between technology producers and the technology users. Feed back from the technology users is very important in further development and improvement of any technology. When field problems of any technology are identified that must be transferred to the technology producers. At the same time, these problems must be solved and re-transferred to the users without delay. Hence, the solutions to the farmers' problems is an important information in this regard. In this study, about 23 percent of the farmers ranked this as the most important (Table 2). Only 15 percent of the farmers ranked this as the type for which most information was obtained. This is an unsatisfactory situation indicating a poor linkage between technology users and producers which could seriously impair the wide adoption of the technology.

The ranking of information related to the transplanter machine were correlated with farmer characteristics to identify possible determinants. This was done through contingency table analysis. The findings are presented in Table 4.

The five information types considered in this study were re-coded. The information on transplanter machine purchasing, machine use and its adjustments were re-coded as "machine related information". The information on nursery management, water management and land preparation were re-coded as "planting information". The last category, which was solutions to the machine owners' problems, was kept unchanged.

These types of information were cross tabulated with selected socio-economic variables related to the adoption behaviour of farmers. These variables were: age, education, farming experience, social

Table 4. Results of contingency table analysis for ranking of information types by amount and importance and selected farmer characteristics.

Variable	Chi – square value	d.f.	Significance	Contingency coefficient
Ranking of information according to most importance with:				
1. Educational level	6.25981	2	0.0437	0.26048
2. Farming experience	18.08471	6	0.0060	0.41683
Ranking of information according to least amounts received:				
1. Cultivated low – land extent	8.95747	4	0.0622	0.31555
2. Contact with extension officers	5.71223	2	0.0575	0.25666

participation, cultivated extent of land, machine transplanted extent, wealth, income, total cost with and without family labour, time loss and number of contacts with the extension officers. Only four of these variables showed significant relationships with either the amount or importance of these types of information.

The education level of the machine owners and the importance of the above types of information have an association, but the nature of this relationship was not clear when the frequency distributions were examined in the two way tables. The farming experience of the machine owners and the importance of the above type of information have a similar association (Table 4). The cultivated extent of the machine owners and the machine owner's contacts with extension officers also have significant associations with amount of information received. These two associations have shown significant relationships with machine owner's ranking of these types of information as least amount. It appears that even though farmers have contacts with extension officers, machine owners receive least amounts of information regarding the transplanting technique. However, these findings are not conclusive. When considering the range of socio – economic factors correlated with

the farmers perceptions of the importance and amounts of information received, the non – parametric techniques of analysis could not reveal any conclusive relationships.

CONCLUSIONS

In this study, identification of the different components, linkages and their directions in the information system of the rice transplanter machine were undertaken. There are aspects of both interface and intraface which are important but weak in the prevailing system. In order to guarantee an effective information dissemination system for the Rice Transplanter Machine, the following linkages were identified for strengthening (a) engineers and extension workers at all levels below the ADA, (b) machine manufacturers and both middle level and field level extension workers, (c) the FMRC and group methods of extension, (d) machine owners and the field extension workers and also the machine manufacturer. Some linkages which did not exist according to the study were identified for developing : (a) engineers, the FMTC and the FMRC, (b) the machine manufacturers and the FMRC and the Mass media, (c) all levels of extension officers and the group and mass methods of extension activities, (d) the machine owners and the group and mass methods of providing information on machine use, (e) linkages among the users themselves and also those between the machine owners and those who do not own the machine.

Regarding the types of information indicated in the study, the existing information dissemination system has fulfilled the machine owners need by providing information on nursery management, machine use and its adjustments and land preparation. According to the prevailing information system, transferring of this information was mainly done by means of training sessions and field demonstrations. According to the results, providing solutions to the machine owners' problems regarding this technique is low. A quick feedback from the farmers of any defects is essential for the refinement of the machine and this information must be communicated with the new product to the users to maintain and build up confidence on the FMRC and the machine manufacturers. An effective way of ensuring this is the use of a "user complaints and suggestions form" to be given with the machine at time of sales to be perfected and mailed to the manufacturers. A new form for further communication should also be supplied.

It was felt that the information system has provided information on purchasing of transplanter machines in excess compared to the other information needs indicating an inefficient resource utilization. Instead of information on purchasing, owners must be provided solutions to related technical problems.

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