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AN EVALUATION OF SOURCES OF INFORMATION USED BY TEA PLANTATIONS IN SRI LANKA

W. D. A. P. Wanigasundera

(Tea Research Institute of Sri Lanka, Talawakele, Sri Lanka)

and

Gwyn E. Jones

(The University of Reading, Reading, U.K.)

The prevailing social system of Sri Lankan plantations seem to affect the smooth transfer of knowledge from various external and internal sources. In a study conducted among a sample of tea plantation employees, the knowledge system was analysed to evaluate the effectiveness of present information transfer links and to suggest ways and means of improving the utilization of available scientific knowledge. This study revealed considerable variation in the value attached by the users for the technical information received from major sources. The status and role of employees seem to determine their access to major external information sources. A positive relationship between the performance of plantations and the level of contacts that the plantations maintain with their major external sources i.e. the Tea Research Institute was indicated.

The communication links with regard to the internal information transfer, also showed a positive relationship. The findings of this study suggest that the extension strategies should integrate various external and internal sources of technical information to reach all levels of plantation employees who are involved in the process of implementation of technical innovations.

"If an extension worker gives advice only when asked he merely assists agriculture to remain at its present level, and fails to stimulate farmers to progress."

(Bradfield, 1975)

Throughout the world, but especially within the tropics, the vast majority of farming enterprises are at present making an effort to increase their level of agricultural production and to imporve their efficiency. Advances in the application of agricultural sciences, in communication strategies and methods, and in information technology are among the main factors contributing to improved productivity. Thus, agricultural research and extension have a significant effect on agricultural development. Their relevance in terms of farmers and their farming systems is frequently discussed. However, relatively little study has been made of their operation in terms of plantations, which account for a high proportion of tropical agricultural crop production which enters into international trade.

BACKGROUND

The major factors of production in any agricultural enterprise and their inter-relationship may be summarized by the equation :

Production α (Land + Capital + Labour + Management + Knowledge).

In the case of plantation agriculture, from the 18th century slave plantations in the Americas up to the present day modern plantations in Asia, Africa and the Carribbean, the owners or operators have secured certain pre-conditions (Wolf and Mintz, 1957). Among them are :

(1) Land in sufficient quantity and quality adequate for present and future production.

(2) Labour in sufficient quantity to minimize production costs and to maximize profits.

(3) Capital sufficient to allow plantation organizations to secure required inputs, and other needs.

The focus in this paper, however, is on management (in relation to other workers) and knowledge.

With the socio-economic and political changes of the societies, the plantations have also undergone significant changes. For example, in Sri Lanka, the foreigners who largely owned the tea plantations, later formed companies, and eventually handed over this management to Agency houses but with independence, all large plantations were nationalized. The style of management of the plantations, however, has remained relatively unchanged. The pre-conditions mentioned above also have remained favourable, despite the fact that there have been considerable changes.

Agricultural knowledge is still one of the critical factors which has helped the plantations to undergo transformations in order to remain as a modern and competitive agricultural system. Plantations have always been in the forefront of the utilization of advanced technologies in production and processing. As indicated by Lancaster and Sattar (1984), it is a well established fact that information in the field of agriculture (as in many other fields) is proliferating rapidly. The users of this information are in a competitive environment and are making use of this information to increase their production levels. In such a situation, it is extremely important to introduce relevant agricultural extension programmes (Bradfield, 1975).

COMMUNICATION OF AGRICULTURAL INFORMATION IN TEA PLANTATIONS

Although the amount of information available to the agricultural community has grown tremendously, the time that any individual receiver has to absorb all the increased information, however, remains relatively constant as they have to pay

attention to various other activities. Therefore, the information sources have to be adjusted to make information readily accessible and to aid the identification of the information most relevant to the particular needs of users.

The three main elements of agricultural extension are commonly expressed as :

KNOWLEDGE <—> COMMUNICATION <—> FARM FAMILY

(Oakley and Garforth, 1985)

In the case of a plantation, which is a form of an organized farming system, employees and their families become the "farm family." In the state-owned tea plantations in Sri Lanka, there are three major categories of employees, *viz.* the management (Superintendents and Assistant Superintendents), supervisory staff and manual workers, who are involved in the utilization of knowledge process.

The process of communication of agricultural knowledge related to plantations is not confined to a plantation *per se*. Rather it is a knowledge system which involves other major systems.

As shown in Fig. 1, a plantation may be conceived as located at overlapping sectors of an organizational system, a knowledge system, and a social system (from which the organizational and knowledge systems have been heuristically removed), all operating within a particular, environmental system. The central elements and processes of these different systems affect the utilization of resources in a plantation (some of the main elements and processes are given in Fig. 2).

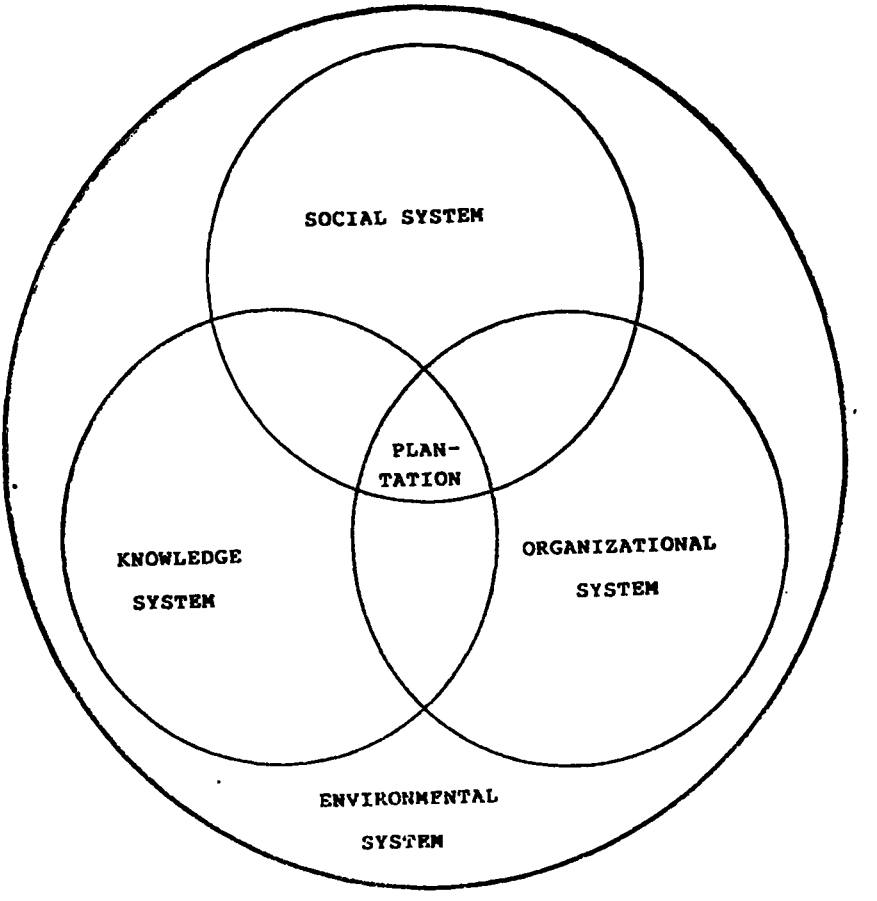

Fig. 1 — Major Systems in the communication process of a plantation.

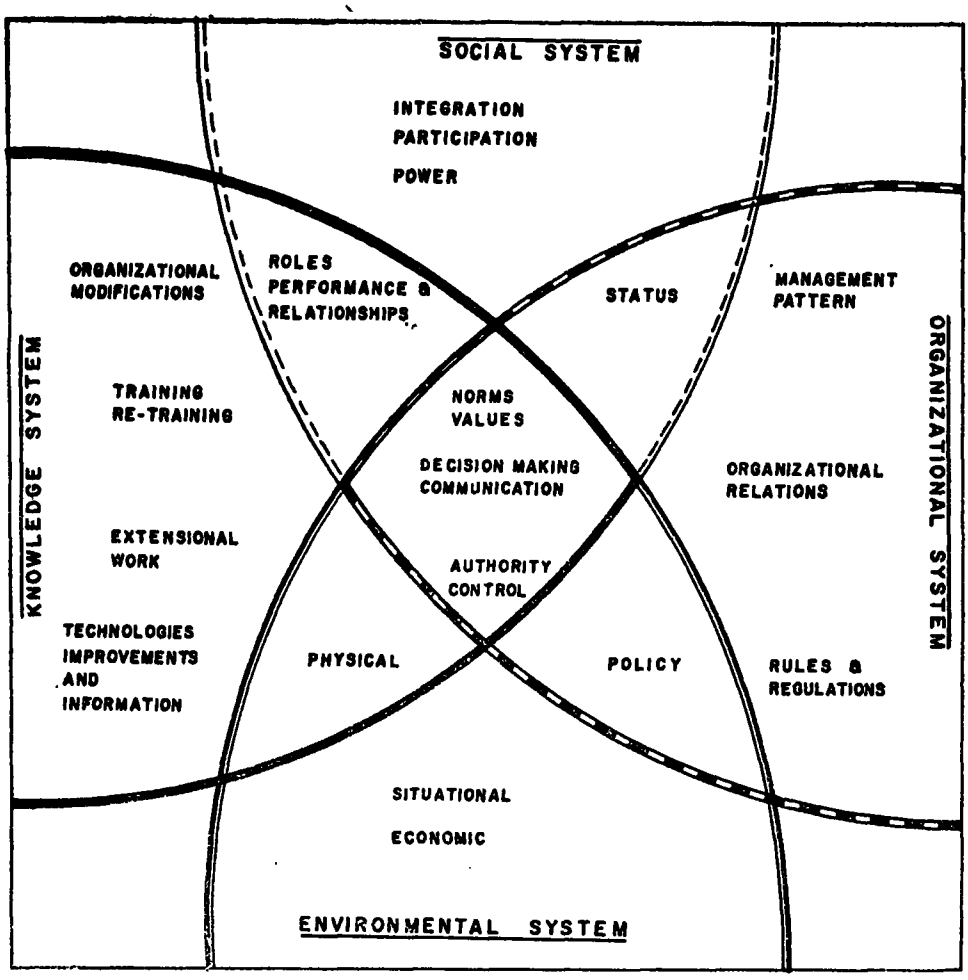

Fig. 2 — Elements and processes of the major systems of tea plantation.

Havelock (1969) has identified the following factors which may inhibit the knowledge flow related to innovations into an organization :

(1) *The need for stability*—If the new knowledge can threaten the dynamic equilibrium which characterizes the relationship between persons or groups of an organization, the new knowledge may be blocked.

(2) *Social relationship* — If the change being suggested by new information threatens the social structure, it may be resisted.

(3) *Status difference* — The fear of being judged inferior on rational or irrational grounds by those who act as the sources or channels of information can also inhibit organizations from approaching others for information.

(4) *Fear of malevolence of outsiders* — This is mainly a psychological condition which leads to a lack of interest in changing traditional ways of action.

These factors emanate from existing values and attitudes of the receivers on the information sources and their relationship with the receiving units.

RESEARCH METHODS

A field study was conducted during 1985-86 (Wanigasundera, 1987), among a sample of plantation employees in 47 state-owned tea plantations in Sri Lanka, by means of a questionnaire survey in order to investigate the information links of the plantation employees. Four types of questionnaires were administered. All the managers of the 47 plantations were included, but 2 managers were not available on the day of the visit made to their plantations. One Assistant Manager was randomly selected from each plantation where they were present; two or three members of the field staff were also selected randomly. A Headman and five to six workers were also randomly selected. The composition of the resulting survey sample was as follows :

Sample		*Sampling fraction (%)*
No. of Plantations	47	11.5
No. of Managers interviewed	45	100
No. of Asst. Managers	28	50
No. of Field Staff	93	15.2
No. of Workers (including Headmen)	232	0.5

The respondents were asked to provide details of their external and internal (within the plantation) technical information sources on tea cultivation. The scales used in this study to evaluate the information sources are the personal view point of these employees according to their perceptions of the different external and internal sources of information. The employees in different employment categories may have utilized subtly differing viewpoints. Therefore, all findings should be interpreted as suggestive, rather than conclusive.

Simple social statistical procedures were employed in the analysis of the results of field investigations. Percentages of respondents who had given similar answers were calculated and the results were used in interpreting the majority of aspects, while weighted scores were calculated to facilitate the comparison of the quality of information received from different external sources. In addition, the Chi-square Test was employed in testing the statistical significance of the relationships of certain non-parametric variables.

FINDINGS

External Sources of Information

The distribution of different categories of employees according to their external information sources is given in Table 1.

TABLE 1 — *Percentage of plantation employees receiving information from major external sources.*

Source	Manager (N=45)	Asst. Manager (N=28)	Senior Field Officer (N=48)	Junior Field Officer (N=45)	Headman (N=54)	Workers (N=178)
TRI*	100.0	92.8	27.1	8.9	0.0	0.0
Agricultural Advisor ...	93.3	89.3	6.3	0.0	0.0	0.0
Regional Office ...	80.0	46.4	4.2	0.0	0.0	0.0
Commercial Organizations	66.7	60.7	2.1	0.0	0.0	0.0
Informal Sources** ...	66.7	82.1	18.9	20.0	1.8	3.4

* Tea Research Institute of Sri Lanka ** Friends, relatives, etc.

It can be seen from Table 1 that the status and role of the employees are major-criteria which pre-determine their access to external information sources. The management *viz.* Managers and Assistant Managers, had direct access to the formal external sources. The workers (including Headman) virtually had no contacts with these external sources ; rather, the lower level employees obtained the greater part of their information from their superiors in the plantations (internal sources).

The management personnel were then asked to comment on the amount and the quality of information received from each external source and place each source on four- and five-point scales. Since the majority of lower level employees did not receive information directly from these sources, they were not included in this part of the study (Tables 2 and 3).

TABLE 2 — *Percentage distribution of management according to the level of information received from external sources.*

Information source	*Percentage receiving information from each source*	*Of those who received information proportion who considered it was* ** *Sufficient (%)*	*Insufficient (%)*
T.R.I.	97	58.8	41.2
Agricultural Advisor	90	78.5	21.5
Regional Office	67	74.4	25.6
Commercial Organizations	64	36.8	63.2
Informal Sources	73	69.8	30.2

** The four-point scale was reduced to two for ease of interpretation.

TABLE 3 — *The percentage distribution of management according to level of information and evaluation of quality of information.*

Level of information	*Source*	*Receivers evaluate the quality as* Below Average	Average	Good	V. Good	*Weighted Score*
	T.R.I.	0.0	9.8	48.8	41.5	3.31
	Agricultural Advisor	2.0	11.7	66.7	19.6	3.04
Sufficient	Regional Office	3.1	18.8	56.2	21.9	2.97
	Commercial Organizations	0.0	50.0	28.6	21.4	2.71
	Informal Sources	0.0	13.2	55.2	31.6	3.2
	T.R.I.	3.6	10.7	67.9	17.9	3.0
	Agricultural Advisor	0.0	28.6	42.8	28.6	3.0
Insufficient	Regional Office	0.0	63.6	27.3	9.1	2.45
	Commercial Organizations	16.7	45.8	33.3	4.2	2.25
	Informal Sources	0.0	42.1	42.1	15.8	2.7
	T.R.I.	1.4	10.1	56.5	31.9	3.19
	Agricultural Advisor	1.5	15.4	61.5	21.5	3.03
All Receivers	Regional Office	2.3	30.2	48.8	18.6	2.83
	Commercial Organizations	10.5	47.4	31.6	10.5	2.42
	Informal Sources	0.0	24.0	52.0	24.0	3.0

* Weighted score was calculated on the basis of, below average = 1, Average = 2, Good = 3, Very Good = 4.

Of all the external sources (Tables 2 and 3), the TRI is the most valued source, followed by Agricultural Advisors, Informal Sources, Regional Office and Commercial Organizations. Relatively, a higher proportion of those in the 'sufficient' category, feel that the quality of TRI information is higher than those in the 'insufficient' category. It appears that there is a general reduction in the value given to all sources by those who received insufficient quantities compared to those who received adequate quantities. This suggests that there is a relationship between the perceived quality of information and the quantity they receive from each source. This may be mainly due to the fact that the management personnel tend to have less contact with those sources which (they feel) provide low quality information, and *vice versa*. This reinforces the point of view that the credibility of the information source is very important in order to have a successful flow of information.

As mentioned earlier, the respondents in this survey were employees of a sample of state-owned tea plantations. These plantations differred in their 'performance', measured in terms of average annual yield, and the level of implementation of recommended agronomic practices†.

TABLE 4 — *Percentage of management receiving information in different performance categories.*

Performance Category *	*Information Sources*				
	TRI	*Agricultural Advisor*	*Regional Office*	*Commercial Organizations*	*Informal Sources*
Poor	94.4	100.0	64.7	94.1	80.0
Medium	96.2	88.5	69.2	50.0	80.8
High	100.0	89.3	58.3	44.0	62.9

* Poor = Low yielding and low implementation
Medium = Low yield and high implementation or high yield and low implementation.
High = High yield and high implementation.

† In this case the following agronomic practices were considered :
(1) Pruning - method, height, time and post pruning treatments,
(2) Mulching young tea, (3) Weed management.

Therefore, an attempt was made to study whether a relationship exists between the linkage of the management with major information sources and the level of performance of the plantations (Tables 4 and 5).

According to Table 4 there is a certain amount of variation between the three performance categories. The proportion who receive information from the TRI has a positive relationship with the performance, while in all other cases a negative relationship can be observed. This suggests that the management in high performance plantations tend to rely more on the TRI and less on other sources.

TABLE 5 — *Evaluation of the quality of information (in weighted score) received by management in different performance categories*

Performance category	*Information Sources*				
	TRI	*Agricultural Advisor*	*Regional Office*	*Commercial Organizations*	*Informal Sources*
Poor	3.0	2.8	2.7	2.6	3.4
Medium	3.3	3.0	2.9	2.1	2.9
High	3.2	3.2	2.9	2.6	2.8

The weighted scores in Table 5 indicate that the management in high performance plantations value the information from the TRI and their Agricultural Advisors more highly than those in the poor category. On the other hand, the valuation given to the information from other sources (especially informal sources) by the management in poor performance plantations was higher than those given by the management in high performance plantations.

INTERNAL SOURCES OF INFORMATION

As shown in Table 1, only a small proportion of lower level employees mentioned using external sources of information. Their sources were primarily the superior employees within the plantation (Tables 6 and 7).

TABLE 6 — *Percentage of plantation employees who receive information from internal sources*

Sources	*Receivers*				
	Asst. Managers	*Senior Field Officers*	*Junior Field Officers*	*Headmen*	*Workers*
Manager	87.5	97.9	86.7	38.9	21.9
Asst. Manager ...		80.6	70.4	52.8	22.4
Snr. Field Officer ...			44.4	71.4	51.1
Headman				50.0	52.2
Informal Sources ...				57.4	39.9

TABLE 7 — *Percentage of employees who receive information from the members of each major social strata*

Sources	*Receivers*		
	Field Staff	*Headmen*	*Workers*
Management	100	50.0	27.5
Field Staff		81.5	70.2
Headman			75.8
Workers		57.4	39.9

The most widely mentioned information source for both senior and junior field staff members was the manager. For the junior field staff, the next two most common sources were the Assistant Manager and senior field officers. The majority of Headmen (Kanganies) mentioned the senior field officers as their major sources of information.

The informal sources (i.e. experienced workers who are friends or relatives) were the second most widely used by the Headmen. In the case of ordinary workers, their Headmen were the most common information source while the field staff and the informal sources were the next two common sources. The managers were the least mentioned internal sources by ordinary workers.

The pattern of internal communication, however, varied between different plantations. An attempt was thus made to study how these variations might relate to the performance of plantations. In order to develop a suitable parameter to compare the extent of internal information links in different plantations, information link diagrams were drawn for each plantation, as shown by the example in Fig. 3. Using the information link diagrams, a communication link ratio was calculated for the purpose of statistical analysis. Since the emphasis was placed on the top down flow of information the informal sources were omitted for this analysis.

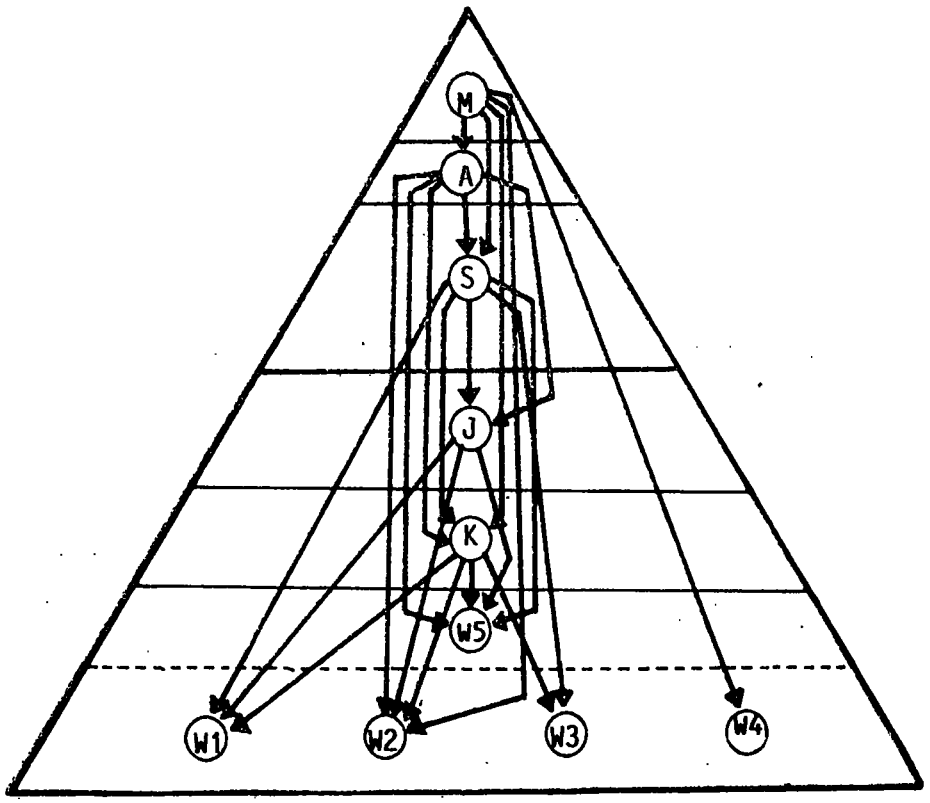

Fig. 3 — Example of an Information Link diagram of a plantation.

M = Manager A = Assistant Manager S = Senior Field Officer
J = Junior Field Officer K = Headman (KG) W = Worker

Internal Information Links

	Actual	*Maximum possible*
1 Step downwards	7	9
2 Step downwards	6	8
3 Step downwards	4	7
4 Step downwards	3	6
5 Step downwards	2	5
Total	22	35

Link ratio = 22/35 = 0.629

$$\text{Communication link ratio} = \frac{\text{Actual number of links in the plantation}}{\text{Maximum number of links possible according to the number of respondents}}$$

The relationship between the performance and the above variable was tested using the chi-square test (Table 8).

TABLE 8 — *distribution of plantations according to the link ratio and overall performance*

Performance	*Link ratio*		*Total*
	Low (0 - 0.50)	*High* (0.51 - 0.10)	
Low	12	3	15
Medium	7	8	15
High	6	11	17
Total	25	22	47

$x^2 = 6.77$, df = 2, $p < 0.05$

From the data in Table 8, it can be seen that there is a positive and significant relationship between performance and the link ratio of plantations. This means that the plantations which showed low performance tend to have a relatively low amount of internal communication of technical information, while those which had higher levels of performance had a relatively high level of internal communication.

A further attempt was made to see which of the two variables used in assessing the overall performance have the stronger relationship with the link ratio. Tables 9 and 10 shows the results of the chi-square tests.

TABLE 9 — *The distribution of plantations according to the average yield and communication link ratio.*

Yield (*kg ha*$^{-1}$)	*Link ratio*			*Total*
	Low (<0.425)	*Medium* (0.425-0.620)	*High* (>0.620)	
Low (<1200)	10	8	6	24
High (≥1200)	6	8	9	23
	16	16	15	47

$x^2 = 1.5$, df = 2, $p < 0.05 > 0.3$

TABLE 10 — *The distribution of plantations according to the level of Implementation of recommended field practices and link ratio.*

Implementation	*Link ratio*			*Total*
	Low (<0.425)	*Medium* (0.425-0.620)	*High* (>0.620)	
Low (<60%)	12	9	3	24
High (≥60%)	4	7	12	23
Total	16	16	15	47

$X^2 = 9.41$, df = 2, $p < 0.01 > 0.001$

The results indicate a strong relationship between the levels of internal information transfer and of implementation of recommended practices. However, there is no significant relationship between the link ratio and the average yield of plantations. These results suggest that where the upper level employees pass more knowledge to the lower level employees, (those really responsible for the implementation), the majority are likely to receive a greater level of skills with consequent, better performance of these plantations in the long run. The failure to show a relationship between the average yield and the extent of internal information transfer can be explained when the time lag between the proper implementation of field operations and its effect on yield is considered. The average yield data used in this study were the annual averages of the three years before the study commenced. The implementation levels and the link ratio were actually a reflection of the existing situation at the time of the study. In a perennial crop such as tea, the field operations used in order to find the level of implementation (*viz.* pruning and related operations, methods of weed management and mulching of young tea) as well as the present level of internal information transfer are likely to reflect on the yield in the next 1-3 years.

Therefore, unlike the results given in Table 10, one could expect a significant relationship between the present link ratio and yield in the next 1-3 years.

DISCUSSION AND IMPLICATIONS

The results of the field investigations have indicated the following :

1. The different levels of tea plantation employees have different technical information sources.

2. The external sources provide information primarily to the upper level employees (the management), while internal sources are mainly responsible for the provision of information to lower level employees.

3. The management in the high performance plantations rely more on the TRI for their technical information. They also value the TRI much higher than those in lower performance plantations.

4. There is a positive relationship between the level of internal information transfer (frcm higher employees to lower employees) and the long-term performance of the plantation.

Thus, according to the results of the field investigations, the TRI appears to be the principal and most credible source of technical information.

The factors responsible for the success of information transfer in an agricultural knowledge system may be broadly categorized into three main areas :

1. The perceived characteristics of innovations.
2. The communication channels used.
3. The extension practitioners' efforts.

Tea growers may not accept innovations created by the Research and Development (R & D) system if they are not convinced of the comparative advantages of the innovations. This becomes a serious problem when the R & D organization carries out its activities in isolation from the ultimate utilizers—the growers. In the case of the TRI and the state-owned plantations in Sri Lanka, close contacts are usually maintained with the management of tea plantations by the TRI's scientists during the process of developing innovations. Moreover, any knowledge created and consequent innovative practices are usually tested in commercial tea plantations in various locations before they are formally recommended.

The Advisory and Extension Service of the Tea Research Institute employs several channels to communicate with its clients. These include advisory visits, seminars, symposia, field-days, advisory correspondence, advisory circulars, monographs and bulletins. All these channels may not be equally acceptable and effective with regard to all receivers. A proper evaluation of the effectiveness of the various channels would be useful in attempting to improve them.

Rogers and Shoemaker (1971) have given the following reasons to explain the variation in the success of the efforts of extension practitioners.

1. Perceived credibility by clients

2. Client orientation rather than change agency orientation

3. Client needs orientation rather than innovation orientation

4. Empathy with clients
5. Extent of client contact
6. Socio-psychological similarity with clients.

In the context of plantation sector, the relative importance of each of the above aspects may differ when compared with a community of small farmers. Until recently the "clients" of the TRI extension workers were usually considered as the plantation managers. However, in the complete process of adopting and properly using innovations, the whole hierarchy —from the employees above the plantation level management (e.g. Regional executives, visiting agents), to the lower level employees (i.e. the field staff and workers)— become involved in different stages of the process.

Therefore, the present extension system should be modified in such a way that appropriate technical knowledge is disseminated efficiently to all these employees. Special attention should be paid to the level of education and experience, and to the performance of individual employees. The results of the field investigations clearly showed that all levels of plantation employees do not receive information from the formal external sources. These external and internal sources should thus be integrated into a more interactive and participative extension service. The importance of higher level employees providing information and guidance to their subordinates should be emphasized; the existing system of voluntary contacts should be formalized. There should also be a more frequent and programmed system of knowledge exchange among external sources, plantation management and lower level employees. The experienced extension agents attached to the TRI can act as catalysts by providing the basic understanding of communication processes, adult learning processes, etc. required by effective extension agents.

In addition, specialists should supply the necessary tools of communication, such as carefully designed extension programmes and various media and audio visual aids. The information needs of different categories of employees should also be evaluated from time to time, and extension programmes should be designed to cater to those needs.

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