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Knowledge System Analysis :Knowledge Utilization in an Agricultural System

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Abstract

The former development models granted very little attention to the process of knowledge utilization. In fact, role of the utilizers in an agricultural system was not given serious consideration. However, recently, this fact was realized and scientists were inclined to incorporate utilizers function into agricultural programmes. The concept of Agricultural knowledge and Information System (AKIS) high lights and values clients role in an agricultural system. Further, it can be utilized to analyse different processes in a system. This study attempts to investigate the knowledge utilization process of a minor agricultural system of Sri Lanka. The study demonstrates that fifty percent of the farmers confined to low adopter category and among the six technology packages tested only one has reached to the level of high adoption. Such facts indicate that knowledge utilization process had encountered certain limitations. In fact, there is a considerable technological gap. It is also evident that knowledge utilization is limited for technology packages with costly hardwear components and complex softwear components.

Introduction

Prior to the independence in 1948 only the plantation crops, namely tea, rubber and coconut played a significant role in the economy of Sri Lanka especially as a source of

foreign exchange earnings. The food crops sector received a marginal attention. Further, agricultural economy was limit ed to these two components, plantation and peasant subsectors. However, two decades after the independence, government realized the economic potential of a group of longstanding traditional Minor Export Crops (MEC). This group includes a wide range of spice and beverage crops such as cinnamon, coffee, pepper, cardamoms, nutmeg, cloves, sesame, betel, cacao, cashew, papaya, arecanut and citronella. The historical evidence reveal that country was popular for spices such as cinnamon, cloves and pepper and further, international trading has been facilitated especially between Middle and far Eastern countries. Even today, production of MEC is for foreign markets. The quantum of local consumption is relatively small. As the state realized the importance of MEC especially as an additional source of foreign revenue in addition to major plantation crops, policy measures were taken to develop the MEC sector. As a separate institute, the Department of Minor Export Crops (DMEC) was established in 1972 to deal with these unexploited group of crops. Later, in 1989 this agency was agency wad renamed renamed as the Department of Export Agriculture (DEA). This institute wested powers to make decisions pertaining to promotion of MEC. Subsequently, institutional framework has been organized to facilitate the processes of knowledge generation, dissemination and utilization. In fact, in order to facilitate above processes two technical divisions, Research and Development were established within this agency (Weerasinghe, 1992) Moreover, the government policy orientation has given a specific identity to the MEC and it can be viewed as an evolvement of the third agricultural sector which is interrelated to the other subsectors of the agricultural economy.

As the minor agricultural sector of three main components of an agricultural system, research sub-system, dissemination sub-system and utilizer sub-system with linkages and elements, the entire sector can be viewed in the context of system perspective. The institutionalization of research and dissemination frameworks reflect on the knowledge generation and transfer processes. Further, identification of MEC farmers as a target group formed a clientele for knowledge utilization process. The Agricultural Knowledge system (AKS) paradigm is based on the system approach and basically explains above mentioned sub-systems and processes. This concept was first introduced by Nagel (1980). At present, this concept is popularly known as Agricultural knowledge and Information System (AKIS). Roling (1988) has defined it as a set of institutions, organizations and / or persons, and their linkages and, interactions engaged in the generation, transformation, diffusion and utilization of knowledge and information, with the deliberate purpose of working synergically to support decision making, solve problems and / or introduce innovation in a given sector, branch, discipline or other domain. This paradigm represents the connections between its components; Research, Extension and User. Havelock (1986a, 1986b), Roling (1986a, 1986b, 1988,1989) and Engel (1987), Wijeratne (1988, 1991) have elaborated the Knowledge System concept by highlighting the role of utilizers in the paradigm. In fact, up to the recent past role of utilizers and their linkages to the other elements in the system were not well accounted in the AKIS model and also in the other approaches based on the system perspective such as Farming system Research and Extension (FSR/E). This was mail because the influence of popular Transfer of Technology (ToT) model which grants very high consideration to the process of knowledge generation but not to the other proc-

esses. Further, it considered research develops knowledge and passes it to change agencies for dissemination Finally, the utilizers adopt the knowledge. In fact, it is a one-way, top-down approach and utilizers were not seriously regarded as an important element. However, the recent approaches such as AKIS, FSR/E, Participatory Technology Development (PTA), etc. Have granted some attention to utilizers and their main process, knowledge utilizers and their main process, knowledge distillation. Based on the knowledge system analysis, this study attempts to investigate the knowledge utilization process in the Sri Lanlan minor agricultural sector. It has three main objectives. First, to estimate the knowledge levels of certain practices pertaining to selected MEC. Second, to make an approximate adopt categorization in the context of knowledge system paradigm. Such knowledge can be utilized by policy makers, researchers and extensionists in order to launch effective programmes for the utilizers.

Methodology

This study was carried our in one of the southern MEC growing districts of Sri Lanka, Matara during Feb. - July 1992. First, discussions were held with Assistant Director (AD) of the Department of Export Agriculture and also with the Extension officer (Eo). In fact, several visits were paid to the district extension office to collect relevant secondary information.. Next, a visit was paid to the MEC research station located at palolpitiya in the same district. This made a provision to get acquainted with past and ongoing technology generation programmes. Furthermore , case studies were conducted in prominent MEC growing locations to ascertain qualitative information. Next, the major MEC

growing areas were stratified in order to represent different agro-ecological zones of the district (WL4, WL2, WL1, and WM1,). Farmer's lists were obtained from Weligama (WL4), Kamburupitiya (WL2), Akuessa (WL2), Hakmana (WL2), Morawaka (WL1) and Deniyaya (WM1) provincial Council (PC) Secretariat divisions. These lists served as the sampling frame. Next,40 MEC farmers were drawn randomly from each division to include 240 respondents in the final sample. Data were gathered using a pre-tested structured check-list and farmers were interviewed referring to their prominent minor export crop as all the selected crops are not grown by all the sample units.

The sample survey facilitated to gather informational to reveal the present status of knowledge utilization. Six technology packages were developed on existing dissemination materials. In fact, extension recommendations deployed for five selected crops namely, cardamoms (Elettaria cardamoms), cinnamon (Cinnamon species), cloves (Eugenia caryophyllus), ciffee (Coffea species), and pepper (Piper nigrum L.) /were used for this purpose. Each technology package consisted four stress elements (recommendations) pertaining to an identified discipline. Adoption of a technology package is defined as the use of a technology package is defined as the use of stress elements. A farmer received a score of 4 for a technology package, the maximum adoption score carned by a farmer is equal to 24. F or particular technology package, 100 percent of adoption was given 4 points; 75 percent, 3 points; 50 percent, 2 points; 25 percent, 1 point; and a score of zero was assigned for non-adoption. Next, thee adopter categories were made as low (1-8), me-

dium (916) and high (17-24) dividing the entire score range. Finally, every farmer was located on this scale; adoption index, depending on the score he earned. This procedure facilitated to cluster farmers as low, medium and high adopters in the utilizer sub-system. The mena score for a particular package was regarded as an index to express the level of adoption. The mean score was rated on the scale of 0-4 and this rating scale has been classified into three adoption levels as, low (o-1. 33), medium (1. 34-2. 66) and high (2. 67-4). Paraveen and Depositario (1991) have employed similar scoring procedure and adopter categorization in their investigations.

Results and Discussion

MEC as a Source of Foreing Revenue

The total export earnings in the Sri Lankan economy and contribution from the agricultural exports to the total export revenue have shown increasing trends during the recent past. As an example, in 1985 total and agricultural export earnings accounted Rs. 36,207 M. and Rs. 19, 026 M. respectively. In 1990, the values of same components have increased to Rs. 79,481 M. and Rs. 28,886 M., respectively (Central Bank, 1985-90). The share of agricultural export earnings has decreased from 56% to 40% during the above mentioned period. The main reason for above situation is that rapid increase in the contribution of industrial exports. The interesting fact is that share of minor agricultural export earnings remained unchanged at 4% level. In fact, the cxport revenue of this sector has almost doubled during 1985-90 period. Such data highlight the vital need of

recognizing the MEC sector as a separate agricultural system in the Sri Lankan export economy. Table 1 demonstrates the composition of the Sri Lankan export revenue.

Table 1 : Cultivation Extents of MEC, Marara District, 1985-90 (ha)

Cuitivation Extents (hs)						
Year						
Cinnamon		Citronella	Cloves	Coffee	Pepper	Total
1985	6544	610	226	386	132	7897
1986	6546	610	274	432	156	8019
1987	6546	610	324	456.8	180	8117
1988	6546	610	324	464.4	226	8176
1989	6546	610	324	470.8	249	8206
1990	6547	610	324	470.8	269	8227

Source : SMEC, 1985-90.

Matara is regarded as one of the MEC growing districts in the southern region. Table 2 demonstrates the cultivation extents of MEC in Matara district. It is evident that cinnamon is the prominent of the cultivation extent. However, the total area under MEC has shown a marginal increase during 1985-90. In fact, the major crop, cinnamon has remained at the same cultivation extent of 6540 ha. Whereas cloves, coffee and pepper have increased their cultivation areas insignificantly. Such facts demonstrate that in Matara district this sector has not shown a progress. In fact, this agricultural

system has a great potential in the smallholding sector. Study reveals that appproximately 70 percent of the MEC farms in the district ate below .5 ha. And further, in most instances, cropping pattern implies a mixed cropping system.

Table 2: Knowledge Utilization : Adoption Levels of Technology Packages.

No	Technology Package	Weighted Score	Mean Score	Level of Adoption
1	Area selection and land preparation	364	1.61	medium (1.34-2.66)
2	Varieties and plant establishment methods	616	1.72	high (2.67-4)
3	Fertilization	282	1.24	low (0-1.33)
4	Pests and diseases control	532	2.35	medium (1.34-2.66)
5	Crop management	318	1.40	medium (1.34-2.66)
6	Harvesting and post harvest operations	422	1.95	medium (1.34-2.66)
	Total	2554	1.88	

N= 226

Research and Dissemination efforts

The district MEC cultivators still depend on the technology generation and transfer programmes launched by the national research institute which is situated mote than 200 km away from the district. The regional sub-station has not been strengthen enough to undertake a sound, appropriate research agenda to evolve location-specific recommendations. During the period of 1987-91 the southern sub-station has undertaken only 18 research programmes as twelve for cinnamon, five for citronella and one for cardamoms. On discipline-wise, research activities were confined to fertilizer trials, development of planting materials and yield evaluations.

Though coffee, cloves and pepper are also grown in the district, research agenda has not granted even a marginal attention. In fact, this sub-station should severe not only the Matara district but also for the entire southern province which covers two other districts, namely Galle and Hambantota. Further, research focus was not directed to exploit the potential of new crops. As an example, there are few successful cacao farmers in the district and some of them produce grade 1 cacao beans. Such performance was achieved without research or extension input. It is evident that cacao can grown successfully under coconut plantations and therefore, this crop can be introduced as an income-generating venture (Amarasinghe et al, 1991(. Even though there is a farmer demand for this crop, researsh has still not in clined to undertake at least a feasibility study. The investigation reveals that researsh programmes were not oriented to evolve technical recommendatioms based on well defined locational sub-station has failed to generate knowledge for the area. As

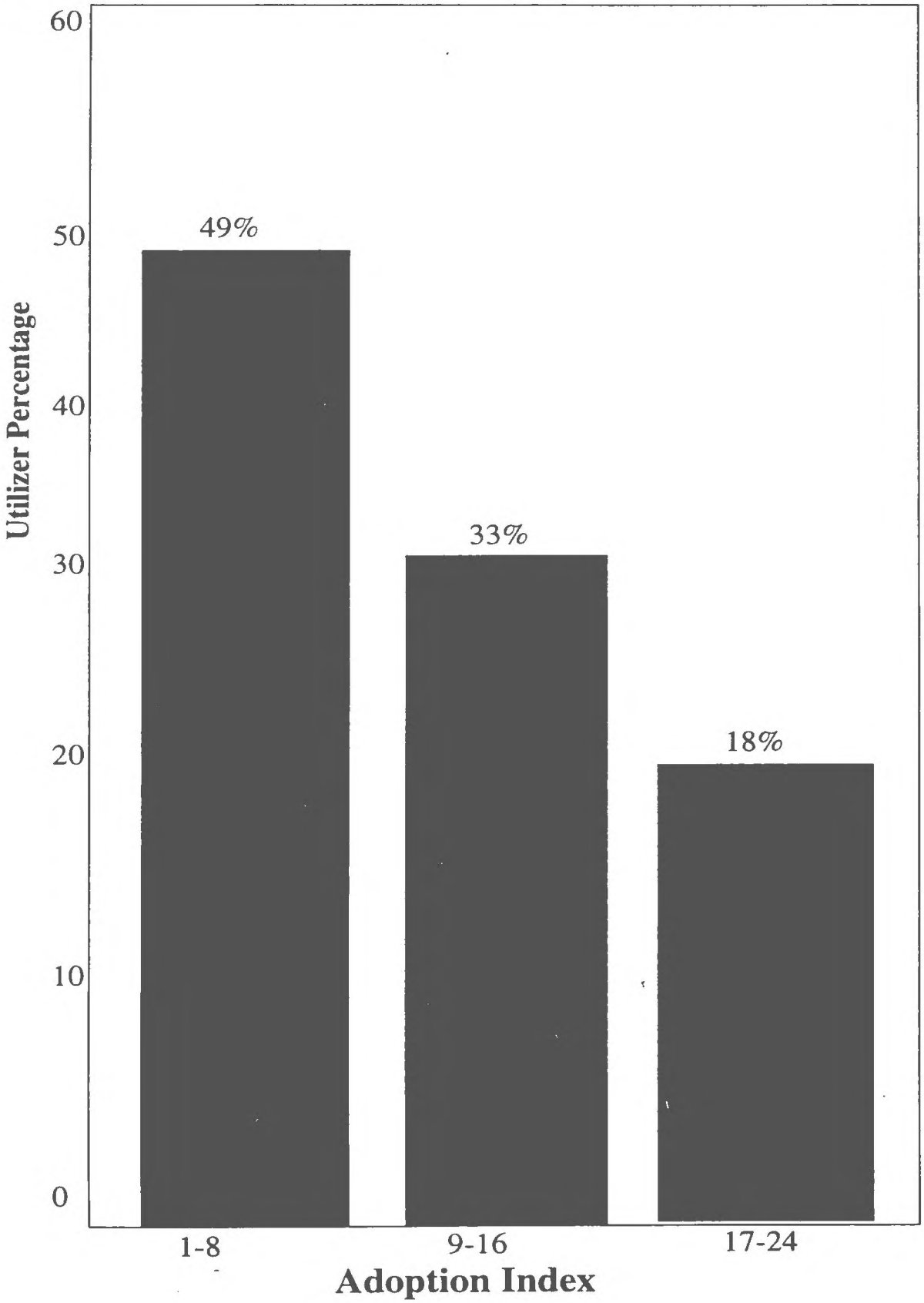
a result, extension sub-system too was unable to deploy any extension output on the sub-station basis. Unfortunate fact is that extension recommendations for the area are mostly developed on the research programmes carried out in other agro-ecological zone, especially in the mid-coun-try.

Knowledge utilization

Adoption of MEC technologies in the utilizer sub-system was evaluated on six technology packages developed by this study. Each farmer was located on adoption index (1-24) and later, they were classiried into three adopter categories as low (1-8), medium (9-16) and high (17-24). Fig. 1 demon strates the adoptier categorization in the MEC utilizer subsystem. It reveals than only 18 percent of farmers confined to high adopter category but in contrast, 49 percent of the farmers represent the low adopter category. Such distribution implies that in general, majority of the MEC farmers are still not well adopted to the technological recommendations. Therefore, ther the is a potintial to increase the utilization of new technologies through dissemination efforts and producer incentives.

Table 3 illustrates the knowledge utilization levels of each technology package. It implies that only the technology package (package 2) dealing with varieties and plant establishment methods has reached packages, namely, area selection and land preparation (package 1), pests and diseases control (package 4), crop management (package 5) and harvesting and post-harvest operations (package 6) have reached to medium level of adoption (1. 34-2. 66). However, the technology package dealing with fertilizer

Fig. 1 Adopter Categorization in the Utilizer Sub-System



tions (package 3) has fallen into the low adoption level (0-1 . 33). Such evidence reveal that there is a significant tedhnolotical gap pertaining to most of the recommendatioms.

The above situation can be explained with cost of the hardwear and complex of the softwear pertaining of a particular technology package. The technology package 2 consists low cost hardwear. In fact, planting materials are relatively less expensive. Next, as majority of the farmers are small scale, they utilize family labour for plant establishment operations. Furthermore, a softwear component is less complex. Such favourable factors have contributed to recorded a higher level of adoption. For the four technology packages 1, 4, 5, 6 cost of the hardwear is relatively expen sive (Ex. pesticides) and further, software component is complex. Hence, such packages have reach to the medium level of adoption. The cost of fertilizer is much expensive and further, it is responsible for a significant shares of the cost of production. Softwear component is also complex to the farmer. Hence, the technology package 3 has recorded a low adoption level.

Conclusions

This investigation reveals that in the national context MEC have maintained a stable level of 4% of the total export revenue. Inn Matara district MEC extent has shown a stagnated condition. In fact, cinnamon is the major crop anong MEC which claims 80 percent of the MEC cultivation extent. However, the knowledge generation component of this agricultural system is very much centralized and the regional sub-station plays a marginal role in this process. The research agenda has not granted proper attention to the crops

grown in the area and as a result, knowledge dissemination sub-system has failed to male location-specific recommendations. The system still depends on the technology generated in other agro-ecological zones. The adopter categorization implies that approximately 50 percent of the farmers belong to low adopter category. This indicated that technology utilization process has encountered certain limitations. Next, technology packages with expensive hardwear complex softwear components have limited knowledge utilization levels. Hence, knowledge generation process should focus on developing low-external input technologies and the dissemination efforts should concentrate on developing location-specific civic, less complex recommendation. At the same, policy measures have to be taken to provide relevant incentives to remove the financial barriers associated with the process of utilization of knowledge.

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