

FARMING SYSTEMS RESEARCH (FSR): AN APPROACH TO AGRICULTURAL RESEARCH FOR SMALL FARMERS

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Abstract: The purpose of this paper is to give an overview of Farming Systems Research (FSR) as an approach to agricultural research. This paper based on a literature review. These documents have been reviewed within a wider framework which seeks to explore the scope of FSR and institutionalisation of this approach to existing research systems. There are diverse approaches employed under the label of FSR. These differences mainly derive from different people's understanding of FSR. Many observers are using the same words to mean different things. However, there is largely a consensus on what FSR is particularly in key concepts and research procedures. Given the literature review of FSR, it is strongly recommended that FSR needs to be considered as an approach or philosophy to agricultural research instead of as a type of research or development strategy.

Key Words: Farming Systems Research, Small Farmer, Adoption Rate, Extension.

Çiftçilik Sistemleri Araştırması (ÇSA): Küçük Çiftçiler İçin Tarımsal Araştırma Yaklaşımı

Özet: Bu derlemede tarımsal araştırma için bir yaklaşım şekli olan Çiftçilik Sistemleri Araştırması (ÇSA) ele alınmıştır. Çalışma ÇSA üzerinde literatür incelemesine dayanmaktadır. Makalede, ÇSA'nın ne olduğunu ortaya koyabilmek için ÇSA konusundaki literatür gözden geçirilmiştir. Literatürde, ÇSA adı altında birbirinden oldukça değişik yaklaşımlar sözkonusudur. Bu yaklaşım farklılıklarının genellikle ÇSA'nın farklı bir şekilde anlaşılmasından kaynaklandığı söylenebilir. Birçok araştırmacı ÇSA konusunda aynı kelimelerle aslında farklı şeylerden bahsetmektedir. Bununla birlikte ÇSA'nı ele alanlar arasında, ÇSA'nın ne olduğu ve özellikle bu yaklaşımın araştırma yöntemleri ve önemli kavramları konusunda bir uyum bulunmaktadır. Bu derlemeden elde edilen sonuçlara göre; ÇSA yeni bir araştırma ya da kalkınma stratejisi olarak değil, tarımsal araştırma için bir yaklaşım veya filozofi olarak kabul edilmelidir.

Anahtar Kelimeler: Çiftçilik Sistemleri Araştırması, Küçük Çiftçi, Benimseme Oranı, Yayım.

Introduction

FSR has gained huge popularity throughout the world in the last two decades. Due to this development National Agricultural Research Institutes (NARI) and Extension Services from low income countries have shifted their strategies to generate and disseminate more compatible technologies for small farmers.

The principal reason for this wide shift of emphasis was the development of improved technologies, such as new crop varieties and agronomic techniques, and extension recommendations that were inappropriate to the resources of farmers and found limited acceptance. Therefore, policy makers and research workers have begun to recognise the need to develop new technologies in close consultation with its clients.

Many people argue that before recommending a new technology, the existing farming systems should be examined closely.

As Farrington (4) stress: *'local knowledge is paramount in identifying new technology likely to meet opportunities and constraints in these*

complex systems and to satisfy farmers' objectives'.

From this perspective, it seems that the logic of FSR is irrefutable. However, the main problems are to decide what type of FSR to employ in research and perhaps, more importantly how it might be instituted in practice.

Scientist new to FSR approach find a wealth of ideas, concepts and research procedures. But what is FSR? Many people are using similar words to mean different things but all of them claim that they are talking about FSR. Many observers discuss the benefits of FSR but no one says explicitly how successful FSR has been. It is not enough to conduct trials in farmers' farms without considering a systems perspective. What does it really mean to conduct on farm trials of farmer's life systems? Can textbook FSR really be applied in the real world. How can FSR be integrate into current research systems? FSR has lost some credibility in the eyes of major donors (5). Therefore, is FSR just a passing fashion or is it panacea? This paper seeks answer some of these difficult questions.

Farming Systems

Farming systems include all the resources of land, labour, capital and activities involving crops and off-farm employment. These resources are used to produce a flow of outputs such as food, raw materials and cash. Determinants of farming systems are classified into natural and socio-economic groups (7). Natural factors include both physical and

biological factors. Socio-economic factors are divided into two categories, exogenous and endogenous factors (Table 1). The determinants of farming systems are likely to play an important role in farmers' decisions. Therefore, in order to generate technologies compatible with farmer conditions, these determinants should be closely examined (2,10,13).

Table 1. Determinants of Farming Systems

Natural		Socio-economics	
Physical	Biological	Exogenous	Endogenous
Climate	Crop alternatives	Population	Family consumption
Topography	Livestock alternatives	Tenure	Health and nutrition status
Soils	Weeds	Off-farm opportunities	Education
Physical infrastructure	Pests	Social infrastructure	Food preferences
	Diseases	Credit	Risk aversion
		Markets	Attitudes/ goals
		Prices	
		Technology	
		Input supply	
		Extension	
		Saving opportunities	

Source: Maxwell, (1984). Farming Systems Research: hitting a moving target.

The Origin and Scope of FSR

Although the FSR approach has recently become prominent, the idea of understanding existing farming systems

is not new. This idea was first noted by Volcker in 1989 and concept of the rationality of small farmers' was mentioned by Mellor in 1966 in India (14).

After the Green Revolution era conventional agricultural research and extension agencies were not successful in generating and disseminating technologies for small farmers. Conventional agricultural development activities follow a "top down" approach and tended to ignore small farmers circumstances and priorities. Norman and Collinson (11) have defined FSR as 'a research methodology for understanding the real world economic systems that farmers operate'.

The Original Key Concepts of FSR

The original key concepts in FSR have been discussed by Merrill-Sands (8). She reviews them as follows:

- *FSR is farmer oriented.* It considers small-farmers as clients for agricultural research and technology development. Thus, its main objective is to produce suitable technology which fits farmer circumstances and priorities. The main characteristics of this activity are;
 - i) farmers are integrated into the research process,
 - ii) the present farming system is studied before recommending new technological solutions,

iii) technologies are adopted to local circumstances and needs of homogenous groups of farmers recommendation domains.

- *FSR is systems oriented.* It is an holistic view and focuses on interactions between components of the system
- *FSR is a problem solving approach.* It is a continuous, dynamic and iterative process based on analysis and testing, monitoring and evolution. In this approach, diagnosis of technical and socio-economic limitations is carried out
- *FSR is interdisciplinary.* Natural and social scientists should collaborate in order to better appreciate existing farming constraints and development possibilities.
- *FSR is a complement to the mainstream commodity and disciplinary research.* FSR does not replace it. FSR adapts developed technologies by employing commodity research and discipline in the environment of target groups.
- *On-farm research is central to the FSR approach.* It instills a

collaboration between researchers and farmers.

- *FSR provides feedback from farmers.*

Researchers explore small farmer circumstances, their priorities, goals and needs. This information is very valuable for the station based research activities and the development of national policy.

Today there are substantial diversities of opinion and points of confusion on FSR (8, 12). Clarification of terminology in FSR has become an urgent issue. Merrill-Sands (8) proposes six types of research activity which can all be included within the frame work of FSR.

Methodology and Research Procedure in FSR

Methodologies in FSR are not uniform and its descriptive terminology also varies in the existing literature. FSR methodology should involve three interlocked, interdisciplinary activity areas, namely, base-data analyses, research station studies and on-farm studies. The activity areas are discussed by Plucknett et al (12) as follows:

- Based data analysis (BDA) involves the collection, collation and analysis

of data on the many factors characterising the environment and farming system of a region.

- Research station studies (RSS) involve a focused research program aimed at the development of components for the improvement of existing systems or for the putting together of new systems.
- On-farm studies (OFS) involve studies of existing systems, on-farm experimentation studies of technology adaptation, and assessment of the impact of new technology.

FSR should be kept to local conditions and institutions since there is no single best research procedure to apply to all conditions. In the literature, FSR is subdivided into five steps; classification, diagnosis, recommendation, implementation and evaluation (7, 15). Collinson (3) divides the FSR process into three main areas: Diagnosis, Planning, and Experimentation and Assessment. Each of these stages involves linking of five groups of actors: farmers, FSR scientists, commodity and specialist scientists, extension staff and policy planners.

Diagnostic stage consists of identification of target groups, selection

of priority target groups, and problem diagnosis. Each target group is composed of farmers operating the same system in fairly homogeneous local circumstances. Target groups are further divided into recommendation domains.

Target groups can be identified from existing censuses and surveys or by questionnaires administered to key informants in the research area. In this stage, information is needed on a wide range of enterprises combinations, enterprise calendars, the size of holdings etc. Diagnostic stage carried out in collaboration with farmers from selected group. Byerlee and Collinson (2) have described the initial diagnostic steps are: the study of background information, informal survey, and the formal verification survey.

Planning is the second main stage of FSR procedure. Planning brings together two information streams; the understanding of the target groups in farming system which has been gained in the diagnosis stage and collection of technical information from past and present research held by specialist.

Experimentation and Assessment are the third main stage of the FSR procedure. In this stage the

experimentation sequence and assessment work are conducted on-farm with three types of on-farm trials; exploratory, determinative and verification trials. There should be a constant link between conventional and FSR experimentation in terms of objectives. Two research approaches should be complementary as Hildebrand and Poey (6) have pointed out:

“the conventional research systems gives an estimate of what would happen if farmers were to control variables as the researcher does. It does not, however, furnish an estimate of results if farmers were actually to use the new technology. Both estimates are important but without on farm research the later is missing”.

Assessment of the results on-farm experiments may be agronomic, statistical, economic and/or through solicitation of farmers opinions. Agronomic assessment depends on the type of trials. In exploratory experiments, the aim is to try to understand the causes of problems whereas the aim of assessment in determinative experiments is to explain the logic of the changing relationship over levels of factor inputs.

Finally verification experiments are used to understand the interactions between sources of variation and treatment responses.

Some Shortcomings of FSR

FSR offers potential to solve farmers' problems in terms of generating and disseminating new technologies. However despite the usefulness of this approach there appears to be some confusion and limitations.

FSR has important limitations particularly methodological and institutional, conceptual and strategic aspects. Some of these problems stem from its holistic nature and its inherent site-specificity. At the same time FSR is relatively new and still evolving. If the FSR programme is not integrated well within the existing research system, it will be less likely to obtain effective results.

There is ambiguity in FSR in terms of conceptualisation and strategy. The conceptual points vary but four primary areas of confusion are considered (8):

- *Precision in the use of the concept.*

FSR is considered in the literature in a variety of different ways; as a framework for agricultural research, as strategies for rural development, as

a specific methodology for adaptive research and a systems analysis of existing farming systems.

- *Definition of the boundaries of the system.* Although FSR workers say that they have considered the whole farm system when they carried out their research, in practice system analysis has been carried out either in a simple agroclimatic zone, in a simple cropping or livestock system with restricted set of bio-physical interactions.
- *The level specificity employed to define target areas for FSR.* The definition of recommendation domains in FSR is often made in different ways.
- *The level of incorporated socio-economic analysis.* Although socio-economic considerations are a central concept of FSR, they are frequently ignored, in practice.

Some observers consider that FSR is a development policy. FSR should rather be considered as an approach or philosophy to agricultural research. In fact, there is a consensus that the term FSR has somewhat fallen into disrepute. It may be argued that most of criticism of FSR, particularly with regard to its

political and economic perspectives are due to its being considered as a development policy. Once again FSR is not a cure-all, but it does suggest some valuable ways in which research effectiveness may be improved. The biggest challenge to FSR in the future is how these shortcomings can be improved without undermining its effectiveness.

Institutionalisation of FSR Programmes

Past experiences of FSR programmes in many countries, have shown that they become marginalised and have not had the intended impact on the NARS due to poor integration stemming from managerial and organisational issues. The challenge is that there is no single best institutionalisation model of FSR to apply to all situations. Apart from integration of FSR programme its sustainability is also not a simple task, often demanding more management skills than that of conventional research. As Merrill-Sands & McAllister (9) have pointed out:

“integration involves establishing new communication links between researchers of diverse disciplines, extension agents and farmers. It requires hiring people with right skills or

systematically training existing staff. It requires changes in planning programming review, and supervisory procedures. It creates increased demands for operational funds and logistical support for researchers working away from headquarters”.

In order to achieve effective integration research managers should combine FSR and conventional research activities with a common goal. For this purpose some management strategies and mechanisms are required. Case studies show that two types of institutional conditions affect the integration of FSR; environmental and facilitating conditions. Environmental conditions involve basic constraints and opportunities. Managers have little or no control of these factors but should take them into account when designing their management strategy. Conversely managers have control over facilitating conditions. This is why research managers can be held responsible for poor integration and implementation of FSR. Furthermore, managers need to employ some management mechanisms to achieve a strong integration. Case studies reveal

that integration of FSR integration of FSR encounters several important factors which have undermined the credibility of FSR approach in many countries. These past experience provide a body of knowledge and may be used to give a warning signal to research managers.

In order to a provide a strong institutionalisation of FSR programmes managers need to pay attention to improved organisation and management skills. Above all, they must concentrate on building an effective interdisciplinary team work. If the institutional challenge is underestimated then" the baby will be thrown out with the bathwater".

Conclusions

FSR has emerged because of disappointing results from conventional research efforts particularly for small farmers in low-income countries. Small farmers do not or cannot obtain much benefit from conventional research or the Green Revolution approach because

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these types of research are suitable for favourable areas and large-commercial farmers only.

Small farmers need research which considers their real world economic environments better understanding of the nature of the overall system can lead to the generation of technologies compatible to existing problems. As Biggs & Farrington (1) have pointed out '*a strong FSR research capability is like a master key, it can be used to unlock many doors*'.

From the review of the literature, it is concluded that the FSR approach is useful to agricultural research and to be key factor in terms of generating relevant technology. However, it is neither a development policy nor a universal panacea since the alleviation of poverty and the achievement of equitable income distribution are not immediate realistic objectives for any agricultural research including FSR.

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