

## Farming systems research in Australia; origins and integrations

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### Abstract

Contemporary farming systems research (FSR) is a composite of at least six disciplines;

1. Systems research; studies of hierarchies, information and energy flows, etc.
2. Farm management economics (FME); begun by agronomists, farm advisors and other non-economic specialists who self-trained in economics.
3. On-farm research (OFR) in low-income countries (LICs).
4. Systematic agronomy; experimental identification of constraints to crop production.
5. Adult learning.
6. Participatory action and participatory research.

The ideological barriers between the hard and soft schools of FSR have been broken down by the pragmatism of practitioners, resulting in the development of a more complete and effective FSR.

### Key Words

Science, learning, participation, agronomy, economics, action.

### Introduction

Farming systems research (FSR) is a mainstream activity in Australian agronomic R D and E, with annual spending of several million dollars. However, it is also a poorly defined style of research, and is often confusing to farmers, funding agencies and researchers. Why? This study reviews the origins and lineage of contemporary FSR to better understanding the current methods and philosophies.

### Review

Contemporary FSR is a meld of several earlier forms of research and learning. These include;

Farming systems theories; (i) In the late 1950s and early 1960s physical scientists were taking an interest in systems as subjects of study (e.g. hierarchies, information and energy flows). (ii) By the late 1960s computer scientists had developed frameworks for describing and analysing systems (e.g. flowcharts, *etc*). (iii) By the late 1980s systems approaches had multiplied into confusion, and systems practice has taken a long time to dispense with unmanageable theory. "Authors would better keep their models and methodologies to themselves until they can demonstrate a problem solved by the use of them..." (1). (iv) Systems theory still underpins soft systems research, and is increasingly accepted as a valid part of contemporary FSR.

Farm management economics; (i) About 1900 there was an active interest in farm economics by agronomists, farm advisors and other non-economic specialists. (ii) By the late 1950s "proper" theories of farm economics were devised. In the 1960s and 1970s these became highly complex

(iii) By about 1990 computers and software overcame most of the computational difficulties (of linear programming, simulation, etc). (iv) By the mid 1990s farm management economics was virtually dead, and the contribution to contemporary FSR consists mainly of a few part-time economists that mainly use simple budgeting tools, especially spreadsheets.

On-farm research in low income countries; (i) In the late 1950s and early 1960s agronomists from western countries working in low-income countries increasingly adopted indigenous knowledge and methods. (ii) By the late 1970s farming systems theories were being developed concerning appropriate technology and extension methods; this was boosted by the parallel development of systems theories in the biological and computing sciences. (iii) By the late 1980s this approach was being applied in western countries, and has become a feature of industry-funded FSR in Australia.

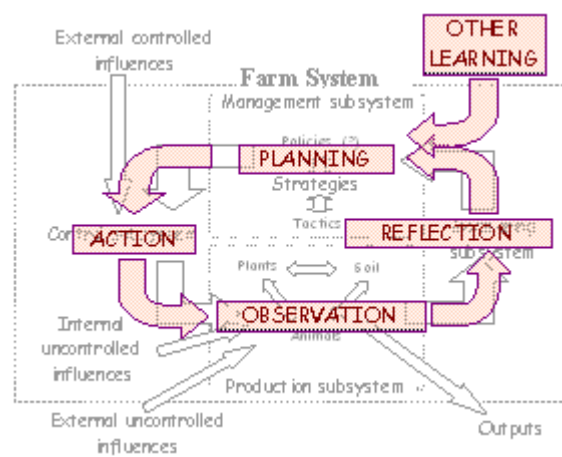
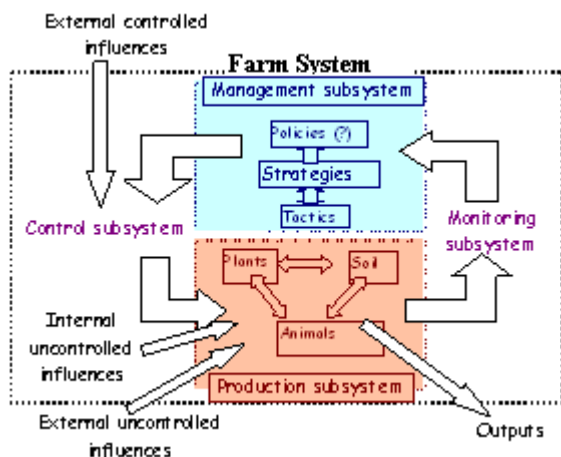
Comprehensive agronomic research; (i) By the late 1950s agronomists were conducting highly systematic experiments, crossing discipline boundaries. (ii) By the 1960s and 70s farming systems research included multi-factorial small-plot research targeting bio-physical constraints in farming systems. (iii) Systematic research is now highly integrated into FSR and is represented in most Australian FSR

Adult learning concepts; (i) By the 1970s, books, TV and research were documenting the importance of learning in social and technological change. (ii) New theories of learning and behaviour have been rapidly adopted in agricultural extension. (iii) However, by the late 1990s extension practice was separating from the more esoteric extension theories. (iv) Adult learning concepts and extension have a high profile in contemporary Australian FSR.

Participation concepts; (i) The public has aspired to wholesale participation in policy and decision-making since the 1950s and 1960s. (ii) This devolved to local and personal issues in the 1970s and 1980s, where the “right to choose” was debated and often became institutionalised. (iii) By the mid 1990s, a few people in FSR were questioning the over-prescription of participation. (iv) Nevertheless, participation remains an essential element of FSR, both in Australia and internationally.

### Hard and Soft systems approaches

The differences between hard and soft FSR goes back to conceptual views of systems as either problem-laden biological networks begging solutions (hard systems, Figure 1), or social networks already in motion (soft systems, Figure 2). In the 1990s a form of FSR emerged which accepted and combined the methods and ideologies of both soft and hard systems research. This form of FSR has been highly successful, with a dozen or more FSR projects established nationally, and significant expansion of facilities such as APSRU (the Agricultural Production Systems Research Unit).



**Figure 1. A hard systems view of a farming system; a biological network suitable for mathematical solution.**

**Figure 2. A soft systems view of a farming system; an arena for gaining experience and increased understanding.**

### **Conclusions**

FSR is more a collection of methods and concepts than a discipline in itself. During the 1980s and early 1990s, the proponents of the hard and soft schools *differentiated* their approaches, but it has been the *integration* of the methods of these schools that has resulted in a more successful FSR. Although superficially confusing, the multi-method approach of contemporary FSR is being judged positively.

### **References**

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