FARM BUSINESS MANAGEMENT :
AN HOLISTIC STOCHASTIC DECISION-MAKING MODEL

A Thesis Submitted for the Degree of
Doctor of Philosophy

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To
Emeritus Prof. Dr John L. Dillon
with our eternal gratitude

CERTIFICATION

I certify that the substance of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in the thesis.

A.A. Charry

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Responsibility for any errors of structure, presentation and analysis is mine.

ABSTRACT

Farm Business Management requires an holistic perspective to understand, manage and direct the purposeful use of the natural resources, and aim for individual and social rewards. A new perspective on physical and financial sustainability is a key component of the overall management strategy of the farm system.

This research attempts to integrate different schools of systems thinking in order to build a method of farm planning which, because it uses a holistic view of farm resource management, is more useful to the decision maker at the farm level.

In order to achieve this integration a case-study was used to identify the system components, using conceptual decision models (i.e. soft systems methodologies in the form of conceptual mapping) and optimal decision models (i.e. hard systems methodologies, here stochastic mathematical programming) to learn more about the operation of the system, aiming to enhance/enrich decision making by improving on-farm information processes.

Conceptual mapping was initially used to have a basic understanding of the farm system. Later stages defined system relationships and critical points from the perspective of the farmer. This exercise showed that systems analysis, while objective, cannot ignore the expectations and immediate objectives of the individual decision maker. Consideration of these facts allows the analyst to construct different levels of conceptual maps, ranging from simplistic models to higher levels of detail on specific purposes of the system.

A mathematical programming model with stochastic characteristics which capture the technical and attitudinal risks of the farm system was constructed in order to simulate farm performance. The exercise showed that stochastic mathematical programming techniques, when integrated to soft systems methodologies in farm

resource management, become a valuable information tool that enable the decision maker to have a better perspective of the farm system, for short-term planning purposes and contingency situations. Quantitative techniques for planning, rather than becoming deductive tools for prescribing system behaviour, should be understood as an opportunity to identify the farm system components, dynamics and purposes more thoroughly and contribute to managing the elements within the system that generate instability and chaos through the use of accepted algorithms of risk analysis and risk management. By doing this, decision making is clearly enhanced and the value of strategic management is reinforced.

ABBREVIATIONS AND ACRONYMS

AFMS	=	Australian Farm Management Society
CARM	=	Centre for Agricultural Risk Management
CRRA	=	Constant Relative Risk Aversion
DEMP	=	Direct Expected Utility Maximising Linear Programming
DSE	=	Dry Sheep Equivalent
E-V	=	Expected Mean Income-Income Variance Analysis
FBM	=	Farm Business Management
FSD	=	First Degree Stochastic Dominance
FSR	=	Farming Systems Research
GAMS	=	General Algebraic Modelling System
HDM	=	Holistic Dynamic Management
HSM	=	Holistic Stochastic Modelling
IOC	=	International Organising Committee
LP	=	Basic Linear Programming
MINOS	=	Mathematical In-core Nonlinear Optimisation System
MOTAD	=	Mean of Total Absolute Deviations
MP	=	Mathematical Programming
0R	=	Operational Research
RINOCO	=	Risk in the Input-output Coefficients
RHS	=	Right Hand Side of the Programming Matrix
SSD	=	Second Degree Stochastic Dominance
SSM	=	Soft Systems Methodology
SWOT	=	Strengths, Weaknesses, Opportunities and Threats
UEP	=	Utility Efficient Programming

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