Design of Environmental Performance Measurement Systems for Agriculture

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University of Technology Sydney
Certificate of original authorship

I certify that the work in this thesis has not previously been submitted for a degree, nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Abstract

The research question addressed in this thesis is: how can Environmental Performance Measurement Systems (EPMS) be designed and used in an agricultural setting to support managers in water and economic sustainability-related decision making and control.

Sustainability and the increasing scarcity of natural resources such as freshwater are of growing social interest. Agriculture has a significant impact on the sustainability of freshwater at both global and local levels. As agriculture is economically and socially significant in meeting human needs for food and clothing, it is surprising that there has been very little management accounting research conducted within an agricultural setting and almost none on its role in environmental sustainability.

Extant EPMS research manifests two underlying theoretical problems, which are also reflected in broader performance measurement systems research. First, the research provides little insight into how to design valid environmental performance measures which could provide managers with precise information to enable decision making and control over environmental sustainability. I argue that there are two key reasons for this: that theories from natural science are yet to inform EPMS design; and that while environmental management typically occurs at an operational level, EPMS typically reside at the organisational level. The second theoretical problem is the lack of existing research that considers how environmental performance standards can be developed for use as targets to support managers in improving sustainability-related decision making and control.

I address these two problems with a new theoretical construction of a multi-level decomposition EPMS model - which I label, Water and Economic Sustainability Performance Measurement (WESM). The model integrates science into an accounting framework. This design overcomes the two key challenges with EPMS validity. I subsequently examine how the WESM model can be used to support managers in improving sustainability-related decision making and control using a two-phased crop production simulation modelling approach. The simulation results provide significant implications for the cotton industry (and agriculture more broadly) with the potential to save hundreds of gigalitres of water and increase profitability by tens of millions of dollars per crop season for cotton farming in Australia.
The research also makes a theoretical contribution to the accounting literature by developing and applying theory from science to overcome inherent validity and target setting problems in PMS design. In addition, I demonstrate the usefulness of simulation modelling as a research method, which has yet to have a great deal of application in accounting research designs beyond few costing studies.
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