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Introducing Direct Costing and Activity Based Costing in a Farm Management System: a conceptual model

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Abstract

We present the model of a new information system for agribusiness management that supports Direct Costing and Activity Based Costing methodologies. We conducted interviews with key-informants to evaluate their needs and identify the information requirements for the introduction of structured cost management approaches in a Farm Management Information System. The paper presents a viable design of the system supported by a working prototype and a set of reports for farm decision makers. This system offers precise information about crop costs, with general costs allocation procedures based on the consumption of activities, and enables sensitivity analyses.

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1. Introduction

Farm Management Information Systems (FMIS) are the subject of growing attention in research since they can benefit from recent technological developments in terms of new Web-based services and Precision Agriculture (PA) technologies [1]. Nevertheless, large part of the interest is on the interfaces between FMIS and machines, operators, and PA devices, and there is a consistent lack of attention on how the large amount of data is processed to support farm management [2]. In particular, cost analyses appear not particularly developed in actual FMIS. Costs are central elements in managerial decisions and especially in complex organizations that typically manage several

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products in the same production facility, such as farms: the appropriate allocation of general costs to products impacts the way in which products economic performance are interpreted and reported. Therefore, we propose a model of a FMIS that introduce modern approaches to manage costs in farm businesses: Direct Costing (DC) and Activity-based Costing (ABC) approaches.

The aim of this paper is to identify the information requirements for the development of a DC and ABC in a FMIS.

In the next sections, we review relevant literature about FMIS, DC, and ABC approaches. Then, we depict the methodology applied in defining the model with the involvement of key-informants from agribusiness. Finally, we propose the results explaining the design of the model of the system with diagrams to highlight data structure and data flows.

This study is part of the on-going EU ICT-AGRI ERA-NET research project "RoboFarm", funded by the Italian Ministry of Agriculture, Food and Forestry Policies, which aims at combining ICT, sensors, and Robotic technologies to develop an evolved FMIS for farm management.

2. Theoretical background

Research about Farm Management Information Systems has raised a growing interest in recent years, for agricultural activities have become more and more complex and decision-making activities need to be supported by a larger amount of information. Despite many farmers are still used to carry on analytical activities by using pen and pencil, the information processing workload has become higher and higher [2], thus creating a strong pressure on farm managers to adopt IT solutions. The advent of Precision Agriculture (PA) further increased the need to analyze sparse and different types of information. Moreover, the management of information and decision making are now core issues in developing successful PA applications [3]. Research about FMIS has developed rich framework to address the data management issues of modern agriculture and PA applications. We review the core findings of this literature in Section 2.1. Then, in Section 2.2, we focus on the specific applications of DC and ABC in agriculture, depicting the open questions in research and the subject of this study.

2.1. FMIS development

Many research efforts have been spent in systematizing the framework of FMIS, because that class of systems addresses the specific attributes of farms: presence of biological processes, fixed supply of land, small company size, weather forecast and perfect competition [3,4]. In this context, substantial improvements have been made in terms of machinery performance monitoring, collection of site specific data [5], but there is a relevant gap "between the acquiring of such data and the efficient use of in agricultural management decision making" [2]. Special attention has been devoted in defining the information flows with detailed data-flow-diagrams [5], data streams related to different processes [6], architectural designs for the information systems [1,7], conceptual models and functional requirements for future FMISs [2,3,8].

In this rich context, we focus on the data processing systems oriented at decision making support with specific cost analysis approaches. Many information flows can become the input sources for specific cost analyses and support a more conscious decision making process. The development of an FMIS model focused on managerial decisions is a particularly relevant area of investigation, because there is a growing interest in increasing the level of cost control on farm activities. However, currently, the managerial approaches oriented towards this goal developed in other industries have not really gained ground in the agricultural context, yet.

2.2. Direct Costing and Activity Based Costing in farm management

Economic analyses can be significantly improved by the availability of detailed and specific data provided by the new tools and systems adopted in PA. This richness of data needs to be directed through a structured process of elaboration that enables the transformation of raw data into a structured and synthetic form, that conveys the information required in decision making. Crop choices, machinery renewal, the use of external services are some examples of decisions that require the adoption of specific management and accounting tools to set cost comparisons

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