Application of the Analytic Hierarchy Process in a Multi-Criteria Selection of Preferences Expressed by Stakeholders to Improve the Use of IAS - Abstract

Itzel Inti Maria Donati [1], Davide Viaggi [2], Zorica Srdjevic [3], Bojan Srdjevic [3], Antonella Di Fonzo [1], Teresa Del Giudice [4], Orlando Cimino [5], Andrea Martelli [1], Anna Dalla Marta [6] and Filiberto Altobelli [1]

[1] *Council of Research in Agriculture and Analysis of Agricultural Economics-Research Centre for Agricultural Policies and Bio-economy, Via Barberini, 36, 00187 Rome, Italy*
[2] *Department of Agricultural and Food Sciences, Alma Mater Studiorum Università di Bologna, Via Zamboni, 33, 40126, Bologna, Italy*
[3] *Department of Water Management, Faculty of Agriculture, University of Novi Sad, Trg D. Obradovica 8, 21000 Novi Sad, Serbia*
[4] *Department of Agricultural Sciences, University of Naples Federico II, Reggia di Portici - Via Università, 100, 80055 Portici, Naples, Italy*
[5] *Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA), Centro di ricerca Politiche e Bioeconomia, Postazione regionale Calabria, C/DA Li Rocchi Vermicelli, 83, 87036 Rende (CS), Italy*
[6] *Dipartimento di Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali (DAGRI), Università di Firenze Piazzale delle Cascine 18, 50144 Firenze, Italy*

Summary

In recent decades, global social and economic development has brought a steady increase in water demand. Water scarcity has occurred in many countries and regions, and water competition among various users and uses is spreading. Under a sustainable development scenario, FAO estimates that the increase of global annual irrigation water withdrawal will have to be limited to 10 percent (UN-Water, 2018). The overall aim of this paper is to analyze the exogenous variables that affect decision making of stakeholders and farmers to use Irrigation Advisory Services (IASs). IASs can play a key role in assisting users to adopt new techniques and technologies for more efficient water use and increased crop production. The efficient use of water in agriculture is one of the most significant agricultural challenges that modern technologies are helping to cope with through IASs and Decision Support Systems (DSS). Under this perspective, IASs are considered powerful management instruments to help farmers achieving the best efficiency in irrigation water use and to increase their incomes through obtaining the highest possible crop yield (Bonfante et al., 2019). Under this perspective, our paper presents an application of a methodology which involves the conversion of a linguistic judgement of farmers and carry out a ranking of weights of criteria by case study, through ranking groups and associated properties between farmers' profile. Furthermore, the present study tackles a decision- making process, aimed to improve the use of IASs by evaluating the preferences expressed by stakeholders. The stakeholders/farmers belong to four different European areas each one representative of a case study: Campania (IT), Kujawsko-Pomorskie (PL), Limburg (NL), Andalusia (ES). In this context we applied a Modelling Multicriteria Decision Making Process methodology (Analytic Hierarchy Process, AHP) by 120 questionnaires dispensed to the potential end-users of IAS of the agricultural sites to individuate the weight/priority between the preferences expressed by stakeholders and to

Proceedings of HAICTA 2022, September 22–25, 2022, Athens, Greece
EMAIL: itzelinti.donati@gmail.com (A. 1); davide.viaggi@unibo.it (A. 2); zorica.srdjevic@polj.uns.ac.rs (A. 3); bojan.srdjevic@polj.uns.ac.rs (A. 4); antonella.difonzo@crea.gov.it (A. 5); teresa.delgiudice@unina.it (A. 6); orlando.cimino@crea.gov.it (A. 7); Andrea.martelli@crea.gov.it (A. 8); anna.dallamarta@unifi.it (A. 9); filiberto.altobelli@crea.gov.it (A. 10)
ORCID: 0000-0002-2936-7434 (A. 1); 0000-0001-9503-2977 (A. 2); 0000-0003-1034-9540 (A. 3); 0000-0002-4922-0798 (A. 4); 0000-0002-5258-4699 (A. 5); 0000-0001-9417-7816 (A. 6); 0000-0001-9841-7223 (A. 7); 0000-0001-5754-6344 (A. 8); 0000-0002-4606-7521 (A. 9); 0000-0002-2499-8640 (A. 10)

realize a ranking of criteria's weights by case study, through ranking groups and associated properties between farmer’s profile. The AHP methodology is used to determine the relative weights of the assessment criteria and finally to select the best. Our goal is to contribute to existing literature to describe how the AHP creates a decision-making framework by analyzing the stakeholder’s feedback and by identifying the needs and demands of the IAS users. The findings suggest that farmers attribute a high value to economic sustainability in the IAS use and highlight the contribute of IAS in assisting end-users to adopt new techniques and technologies for more efficient water use and optimizing water balance.

Keywords
Multicriteria Decision Analysis, AHP, Irrigation Advisory Services, Agricultural Decision Making, Economic Sustainability