

A large, abstract, dark-colored sculpture resembling a stylized 'C' or a bridge structure, set against a blue sky and green ground. The sculpture is made of dark, possibly metal or stone, blocks. The text 'Organizational Engineering in Industry 4.0' is overlaid on the sculpture in a bold, blue, sans-serif font.

**Organizational
Engineering
in Industry 4.0**

BOOK OF ABSTRACTS

Gijón, 11th-12th July 2019

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**“13th International Conference on
Industrial Engineering and
Industrial Management” and
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Servicio de Publicaciones de la Universidad de Oviedo
Campus de Humanidades. Edificio de Servicios. 33011 Oviedo (Asturias)
Tel. 985 10 95 03 Fax 985 10 95 07
[http: www.uniovi.es/publicaciones](http://www.uniovi.es/publicaciones)
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I.S.B.N.: 978-84-17445-38-6
DL AS 1875-2019

Imprime: Servicio de Publicaciones. Universidad de Oviedo

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Industry 4.0 for the development of more sustainable Decision Support Tools for Agri-food Supply Chain Management

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Keywords: Industry 4.0, Environmental sustainability, Decision models, Agri-food supply chain,

1 Introduction

Environmental and social sustainability issues in Agri-food Supply Chains (ASC), are becoming very relevant mainly due to two factors. Firstly, the increasing number of public legislation rules and technical specifications to be met and, secondly, the growing awareness throughout the different ASC members (producers, processors, distributors, retailers...) mainly as a consequence of final clients concern about purchasing sustainable products and services (Pérez et al. 2019).

This fact makes that the traditional economic-driven management methods are no longer efficient and must be accommodated to these new sustainable conditions. In order to meet this new scenario, SC decision models/methods that account for environmental and social issues must be developed.

On the other hand, new technologies have emerged in the last years as a consequence of the “Industry 4.0” revolution. However, just a few works have addressed in which extent Industry 4.0 - related technologies have positively contributed to this new sustainable scenario in ASC management (ASCM).

Due to space constraints, only environmental issues are addressed, and how these technologies have brought important and relevant impacts to environmental sustainability in the practical arena allowing the development of more sustainable decision support tools for ASCM.

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2 Decision models for Sustainable ASCM

In this section a brief review about the extent in which decision models (either conceptual or operations research-based) address environmental sustainable issues in ASCM is conducted. The most addressed ones (from that review) are: crop protection, soil management, water management, animal welfare, energy efficiency, pollution control and waste control.

3 Contribution of Industry 4.0 technologies for the development of more sustainable decision support tools for ASCM

First, a classification scheme of Industry 4.0 - technologies, based on some of this paper's authors (Boza, et al. 2019) is followed. This classification addresses 5 clusters (Internet of Things, Cyber-Physical Systems, Smart Data, Advanced Processing Analytics and Human Machines interaction), as well as their definitions/scopes and specific technologies.

Secondly, the contribution of some of these technologies to enhance the most addressed ASC environmental issues in decision models is shown. Additionally, the ASC actors (producers, processors and distributors) being the most benefited of the implementation of these technologies are also shown.

Some insights that can be pointed out are the following: Input oriented issues mostly concern to producers/farmers while output oriented (pollution and waste control) concern to the whole ASC; Some of these technologies allow the producers the so-called "precision agriculture", leading to an immediate effect in the economic benefit (no trade-off is done in this case between economical and environmental sustainability); Some of these technologies can help, specially to producers, to reduce the uncertainty in the behaviour of external variables (f.e. the reduction of the demand uncertainty allows producers to take more accurate decisions resulting in not only economical benefits but also environmental, because waste is reduced drastically).

7 References

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