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«In search of Maturity Models in Agritechs»

J A J Mendes, C B Careta, V G Zuin, M C Gerolamo
Problem Statement

• The agribusiness sector has great importance in the economy, and in order to remain competitive, the number of investments in disruptive technologies and concepts, such as Internet of Things, Physical Cyber Systems, Artificial Intelligence, among others, grows. These concepts are often applied by agribusiness startups, known as Agritechs. To help these startups spread their technologies, and mitigate their high mortality level, the use of a maturity model is a good tool, as maturity models help to identify factors that need to be worked on and improved. The creation of a maturity model for Agritechs is innovative, which makes the definition of possible maturity models to be used as a basis challenging.

• Thus, this research seeks to present the core constructs related to Agritechs in order to identify possible maturity models that can be used as a steppingstone in creating a new maturity model, specific to Agritechs.
The bibliometric analysis software, SciMAT, was used, to define the most relevant themes for the area of Agritechs, so that, based on these themes, it is possible to more properly research maturity models relevant to the definition of dimensions, basis of an Agritechs maturity model.

The SciMAT software, through a holistic analysis of the Agritech area in the periods of 2015-2018 and 2019-2021, showed that some of the concepts that are being most researched are (Figure 1): Agriculture 4.0, Smart Farming, Digital Agriculture, Sustainability and Startups. These concepts were considered the most researched ones given the size of their sphere and the thickness of their lines (see Figure 1). As for the technologies being researched in this field (Figure 2), the main ones being researched are: Agricultural Robots, Internet-Of-Thing-(Iot), Big-Data, ICT (Information and Communication Technologies), Sensors, Artificial-Intelligence, Blockchain, Cloud-Fog-Computing, Smartphone. All these technologies are part of the technologies that characterized the concept of Industry 4.0 (I 4.0) [27-28].

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**Figure 1 - Thematic Clusters One**

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**Figure 2 - Thematic Clusters Two**

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Own Authorship (2021)
Conclusions

Maturity models are of fundamental importance for understanding what needs to be improved in an organization, as they assist in the assessment of factors such as organizational culture, strategy, technological management, often ways of prioritizing improvement measures and monitoring progress. Thus, it is believed that the adoption of disruptive technologies in agribusiness, at the heart of the adoption of agribusiness 4.0, can be facilitated through the development of specific maturity models for this context.

In this paper, a bibliometric analysis, done with the SciMAT software, identified the main thematic areas of importance of the works that deal with Agritechs. From this, it was possible to realize an exploratory analysis of maturity models that could be the basis of an Agritech maturity model. The Agritech maturity model being developed is still incipient, but has the potential to bring great contributions, both to the academic field and for real world applications. For future researches, a systematic review of the literature should be made, to identify more relevant maturity models. Additionally, in order to collect data for the improvement of the maturity model, questionnaires should be applied with Agritechs leaders.

- Using the information acquired from the works of [45-52], we have synthesized four initial dimensions for a maturity model geared towards Agritechs, as described below.

- Change management dimension: In this dimension, the culture, leadership and behavior of workers in the face of changes will be analyzed. This will require the expansion mindsets, commitment and cooperation between leaders and workers, envision, communication, elimination of obstacles and coordination the change, as indicated by Yang et al. [53].

- Strategic dimension: Factors such as knowledge management, Governance (mainly ecosystem governance), Decision Support / Decision Making will be analyzed, which would include business modeling practices, resuming the bottleneck pointed out by the author [12], and, once again related to the ecosystem, it would include practices (like marketing) for approaching partners (investors) and presenting the technology in the consumer market; Standards. We highlight that the integration with the ecosystem (especially with universities, cited by author [7]) is usually related to knowledge management, which will be investigated in this dimension.

- Technological dimension: The use of digital resources, of machine-to-machine communication, as well as other technologies used will be analyzed. This will include the use of technology in an integrated and “personalized/optimized” way for the producer’s needs and focus on sustainability; accessibility to technology (open innovation [50]). In this dimension, the usability of technology is also highlighted, as pointed out by the authors [13, 17-18]. This dimension also includes user training, complementing the knowledge management of the "strategic" dimension.

- Sustainability dimension: The importance given to environmental sustainability policies will be analyzed. One way to achieve sustainability can occur through the "customization/optimization" of technology to the user's needs, which would link this dimension with the technology dimension.
Contacts

J A J Mendes¹, C B Careta², V G Zuin³, M C Gerolamo⁴
University of São Paulo (USP)¹-², Federal University of São Carlos (UFSCar)³,
University of São Paulo (USP)⁴
E-mail: jessy.a.j.mendes@usp.br