Agricultural Research & Technology
Open Access Journal
ISSN: 2471-6774

Juniper Publishers
key to the Researchers

Mini Review
Volume 22 Issue 4 - September 2019
DOI: 10.19080/ARTOAJ.2019.22.556204

Agri Res & Tech: Open Access J

Knowledge Management for Agricultural Development

Ahiram Brunni Cartaxo de Castro[1]*, Arthur William Pereira da Silva[2] and Juliana Carvalho de Sousa[3]

[1]*Federal Institute of Education, Science and Technology of Rio Grande do Norte, Brazil*

[2]*Lecturer in Administration, Federal Institute of Education, Science and Technology of Ceará, Brazil*

[3]*Lecturer in Administration, Vidal de Limoeiro College, Brazil*

Submission: August 09, 2019; **Published:** September 09, 2019

***Corresponding author:** Ahiram Brunni Cartaxo de Castro, 1559 Senador Salgado Filho Avenue, Rio Grande do Norte, RN 59015.000, Brazil

Abstract

People's technological, political and cultural and consumption habit changes have a strong impact on economic sectors, as the methodology for using data, information and knowledge changes, with emphasis to the modern agricultural sector. This delimited the objective of this research, which focused on raising antecedents that favor the nations' knowledge management and agricultural development. Concerning the research methodology, this study uses a descriptive approach and was developed through a meta-analysis of results of studies selected from the Scopus database on "knowledge management" and "agricultural development", from 2008 to 2018. As for the main results found, among the ten antecedents of knowledge management identified for the promotion of agricultural development, half of them related with data science. Thus, the investment in data science can be seen as substantial for the agricultural development in nations. This way, as a conclusive summary, there is the promotion and adoption of several applications for science data, as well as the generation of national environments of innovation, which are the most relevant aspects of knowledge management for the agricultural development in nations.

Keywords: Knowledge management; Agricultural development; Antecedents

Introduction

Several economy sectors have gone through transformations in the past few decades due to technological advancements, international geopolitical rearrangements, modification in people's consumption and cultural habits. In this context, one of the main transformations that have affected the global economy sectors is the way data, information and knowledge have been used. With the increasing data processing capability offered by new and powerful software and hardware [1], as well as through new ways of exploring, analyzing and using such data, such as Big Data, Data Science, Data Mining and Machine Learning [1-5], the nations will be able to reinvent the role of knowledge upon guiding their strategies and, consequently, expand their impact on the development of their activities or economic/social/environmental objectives. Therefore, knowledge became the structural axis to market and society. The result is that knowledge management – obtain, systematize and share human capital – became the most important task in the countries [6]. In the delimitation of the nations' agricultural sector, the development of human capital is considered as a fundamental aspect of the intelligence agenda established in the national strategies of agricultural development [7], for its management may maximize the mechanisms for the sustainable development, and favor the economic, social and environmental development nation-wise [8]. These arguments reinforce the premise that knowledge is a production factor that has become more and more meaningful in modern agriculture [9].

Thus, in the process of agricultural development in the countries, having management strategies of knowledge in the research and development portfolio; keeping national sustainable operations [10]; having processes of continuous innovation [11]; and changing to a new paradigm [8] by demanding more attention to economic feasibility, knowledge and technology management and to international interaction [12], are assertive attitudes for the development of an intelligent agriculture in order to deal with climatic changes and agricultural production, for example [13]. The sustainable development and the agricultural sector's growth demand improvements in their competitiveness through a better comprehension of land, climate and crop, especially the forecast of climate events with a higher accuracy and a systematic integration of information in order to facilitate the taking of decisions which will favor the agricultural development [14]. In this collection,

the absence of knowledge management may, therefore, inhibit the guidance of national strategies of agricultural development in nations [15] and deconstruct or decrease the essence of rural extension services [16], making it necessary to investigate the antecedent dimensions that favor the countries' knowledge management and agricultural development.

Objective

The objective of this research was to raise the antecedents that favor the nations' knowledge management and agricultural development.

Method

This study uses a descriptive approach and was developed through a meta-analysis of results that are concentrated in ten studies selected from the Scopus database about "knowledge management" and "agricultural development" from 2008 to 2018, according to Table 1, below. The research corpus' collection took place between July and August 2019 with filters such as type of document (article) and language (English). The corpus' suitability was assessed by reading the articles' abstracts. Moreover, other periodical articles were used, for they allowed both the expansion of geographical representativeness and the study analysis.

Table 1: Research corpus.

Manuscript	The Study's Geographical Representativeness
Knowledge management for the sustainable development of the semi-arid region in Northeastern Brazil [17]*	[South] America
Knowledge sharing strategies on traditional vegetables for supporting food security in Kilosa District, Tanzania [7]	Africa
The impact of formal agricultural education on farm level innovation and management practices [11]	Europe
Status of climate-smart agriculture in southeast Nigeria [10]	Africa
Knowledge at the boundary between science and society: a review of the use of farmers' knowledge in agricultural development [11]	Literature analysis**
Research and development portfolio of the Sustainability Science Team national sustainable operations USDA Forest Service [9]	[North] America
Are agriculture and nutrition policies and practice coherent? Stakeholder evidence from Afghanistan [16]	Asia
A framework for implementing information and communication technologies in agricultural development in India [18]	Asia
New trends on rural extension for the development of community self-management abilities [12]	[South] America
An integrated approach for agricultural ecosystem management [20]	Asia

Source: Elaborated by the authors.
*The article was included in order to enable the geographical representativeness of the research.

**The study didn't have a specific geographical focus.

Knowledge management antecedents for agricultural development

Knowledge management is a model that involves operational systems, local and transcultural skills and know-how that are necessary to solve problems, from the individual level to the level of alliances among nations. Knowledge processes are infrastructures (information and communication technology), cultural factors and management capabilities (dynamic and absorptive capabilities) which, when managed, generate and improve the organizations' performance in the search for innovation, or the nations' performance, when economic and social development is the result [21]. Knowledge management is, therefore, an approach that is planned and structured in order to manage knowledge creation, acquisition and sharing which will be able to generate development [13]. This reality applies to agricultural development for, from reference literature on the topic, a series of antecedents which favor knowledge management was raised for the nations' agricultural development. They are:

a. The institutionalization of national leaders in order to integrate the public policies of agriculture [13,15];

b. The development of innovation and management practices, and technological transfer [7,8];

c. The development of national competencies through formal agricultural education [7,8];

d. The government policies need to support the researches that develop and spread intelligent technologies of the climate [13];

e. The achievement of a rural extension approach for the development of self-management capabilities on sub-national levels, knowledge management, development of social capital,

How to cite this article: Ahiram Brunni Cartaxo de Castro, Arthur William Pereira da Silva, Juliana Carvalho de Sousa. Knowledge Management for Agricultural Development. Agri Res& Tech: Open Access J. 2019; 22(4): 556204. DOI: 10.19080/ARTOAJ.2019.22.556204

by considering the areas' peculiarities and the strengthening of a network of knowledge and innovation exchange [16];

f. The development of national databases on production, consumption and food conservation in order to increase the spread of these pieces of knowledge [21];

g. The rural producers' knowledge management through knowledge management processes (knowledge assessment, documentation and sharing) in order to either capitalize or legitimate the agricultural development processes by using knowledge as a resource for innovation and by facilitating the sharing of several sources of knowledge in order to increase the efficiency of development projects [11];

h. The interconnection of information systems of reference in order to guide the nations on formal instruction, recommended guidelines and document requirements for several decision-taking processes [12];

i. The development of integrated systems of information in order to generate managerial strategies in the use of land, species / variety cultivation and ideal plant coverage [14]; and

j. The introduction of information and communication technologies (ICTs), since they can speed up the agricultural development by facilitating knowledge management [9].

Potential Impacts of knowledge management for agricultural development

As a result of the antecedent dimensions that favor knowledge management and the nations' agricultural development, as addressed in the previous section, here are the potential impacts:

i. Integration of public policies of agriculture and nutrition [13,15];

ii. Technical efficiency and innovation adoption improvement [7];

iii. Simplification of the agricultural development [13];

iv. Reinforcement of sub-national governments [15];

v. Improvement in nutrition and food security in the country's populations [16];

vi. The development of knowledge management through "practitioners' knowledge" by emphasizing the need to go beyond the dichotomy between scientific and empirical knowledge and acknowledging the hybrid nature of knowledge [11];

vii. Reinforcement on the innovations guided by science by defending more knowledge management efforts in the boundary between science and society [11];

viii. Integration helps to generate managerial alternatives / policies by aiding in queries, not only with specialists in agriculture and ecology, but also with agriculture and ecosystems' operation [14];

ix. The generation of an efficient management of agriculture and ecosystems, which is essential to a systematic approach, and the creation of an agricultural development culture [6]; and

x. Stimulation to meaningful policies, institutional networks and qualification initiatives in several levels in order to overcome the restrictions and effectively incorporate the ICTs into the agricultural development process [7-9].

Conclusion

Through the study's objective, and considering the previous sections, it was possible to identify the relevance of data science, which is an element of support to knowledge management, for the agricultural development, for, among the ten knowledge management antecedents identified for the promotion of agricultural development in this literature review, at least five of them (50%) are intimately related to data science. They are: the incentive to the development of weather intelligent technologies; the development of national databases on food production, consumption and conservation; the rural producers' knowledge management through knowledge management processes; the development of integrated systems of information in order to generate managerial strategies for the use of the land, species variety / cultivation and ideal plant coverage; and the implementation of information and communication technologies (ICTs) to speed up the agricultural development. This way, the investment in data science for the nations and the organizations' agricultural development is sees as vital, whether in the organization's knowledge produced by the agricultural sector's actors, or in the creation of databases related to the production and consumption of the sector's products [22].

This research's results also highlighted some knowledge management antecedents for the promotion of the agricultural development. They also represent relevant aspects for the sector's success, which are: the incentive to innovation and management practices and technological transference; the need to integrate the public policies related to agriculture; the promotion of formal agricultural education; the viabilization of self-management on sub-national levels and the interconnection of agricultural information systems of reference. Such actions can be understood as the need to develop national systems of innovation for the development of the agricultural sector. Thus, it is believed that the promotion and the adoption of several applications of science data, as well as the generation of national environments of innovation, are the most relevant aspects of knowledge management for the nations' agricultural development. In conclusion, future researches will be able to investigate which are the main applications/practices of knowledge management for agricultural development, and how these applications have collaborated with the development of the sector in several parts of the world.

How to cite this article: Ahiram Brunni Cartaxo de Castro, Arthur William Pereira da Silva, Juliana Carvalho de Sousa. Knowledge Management for Agricultural Development. Agri Res& Tech: Open Access J. 2019; 22(4): 556204. DOI: 10.19080/ARTOAJ.2019.22.556204

Conflict of Interests

The authors declare no conflict of interest.

References

1. Gua W, Foster K, Shang J, Wei L (2019) A game-predicting expert system using big data and machine learning. Expert Systems with Applications 130: 293-305.
2. Coble KH, Mishra AK, Ferrell S, Griffin T (2018) Big data in agriculture: A challenge for the future. Applied Economic Perspectives and Policy 40(1): 79-96.
3. Kamilaris A, Kartakoullis A, Prenafeta-Boldú FX (2017) A review on the practice of big data analysis in agriculture. Computers and Electronics in Agriculture 143: 23-37.
4. Klauser F (2018) Surveillance Farm: Towards a Research Agenda on Big Data Agriculture. Surveillance & Society 16(3): 370-378.
5. Rao NH (2018) Big Data and Climate Smart Agriculture-Status and Implications for Agricultural Research and Innovation in India. Proceedings of the Indian National Science Academy 84(3): 625-640.
6. Serenko A (2013) Meta-analysis of scientometric research of knowledge management: discovering the identity of the discipline. Journal of Knowledge Management 17(5): 773-812.
7. Chipungahelo MS (2015) Knowledge sharing strategies on traditional vegetables for supporting food security in Kilosa District, Tanzania. Library Review 64(3): 229-247.
8. Barrick RK (2019) The 4th Industrial Revolution: Implications for School-based Agricultural Education. Agri Res & Tech: Open Access J 22(1): 1-4.
9. Patterson T, Nicholls D, Long J (2015) Research and development portfolio of the Sustainability Science Team national sustainable operations USDA Forest Service. Research Note. US Forest Service 18: 572.
10. Onyeneke RU, Igberi CO, Uwadoka CO, Aligbe JO (2018) Status of climate-smart agriculture in southeast Nigeria. Geo Journal 83(2): 333-346.
11. O Donoghue C, Heanue K (2018) The impact of formal agricultural education on farm level innovation and management practices. The Journal of Technology Transfer 43(4): 844-863.
12. Du Plessis M (2007) The role of knowledge management in innovation. Journal of knowledge management 11(4): 20-29.
13. Sørensen CG, Fountas S, Nash E, Pesonen L, Bochtis D, et al. (2010) Conceptual model of a future farm management information system. Computers and electronics in agriculture 72(1): 37-47.
14. Paraponaris C, Sigal M, Girard N (2015) Knowledge at the boundary between science and society: a review of the use of farmers' knowledge in agricultural development. Journal of Knowledge Management 19(5): 949-967.
15. Poole N, Echavez C, Rowland D (2018) Are agriculture and nutrition policies and practice coherent? Stakeholder evidence from Afghanistan. Food Security 10(6): 1577-1601.
16. Brito LMP, Silva NEA, Castro ABC, Nodari CH, Silva AWP (2019) Knowledge management for the sustainable development of the semi-arid region in Northeastern Brazil. Ciência Rural 49(4): e20180762.
17. Rao NH (2007) A framework for implementing information and communication technologies in agricultural development in India. Technological Forecasting and Social Change 74(4): 491-518.
18. Xu L, Liang N, Gao Q (2008) An integrated approach for agricultural ecosystem management. IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews) 38(4): 590-599.
19. Alegre J, Sengupta K, Lapiedra R (2013) Knowledge management and innovation performance in a high-tech SMEs industry. International Small Business Journal 31(4): 454-470.
20. Brito LMP, Oliveira PWS, Castro ABC (2012) Knowledge management in a public institution for technical assistance and rural extension of northeastern Brazil. Revista de Administração Pública-RAP 46(5): 1341-1366.
21. Stewart T, Ruckdeschel C (1998) Intellectual capital: The new wealth of organizations. Performance Improvement 37(7): 56-59.

DOI: 10.19080/ARTOAJ.2019.22.556204

How to cite this article: Ahiram Brunni Cartaxo de Castro, Arthur William Pereira da Silva, Juliana Carvalho de Sousa. Knowledge Management for Agricultural Development. Agri Res& Tech: Open Access J. 2019; 22(4): 556204. DOI: 10.19080/ARTOAJ.2019.22.556204