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Strategy to implement knowledge management in the Local Agro livestock Innovation System

Estrategia para implementar la gestión del conocimiento en el Sistema de Innovación Agropecuario Local

Estratégia para implementar a gestão do conhecimento no Sistema Local de Inovação Agropecuária

Mileisys Benítez Odio[1], Alexei Martínez Robaina[2], Magdalena Herrera Gallo[3], Pedro Luis Páez Fernández[4], Armando del Busto Concepción[5]

[1]Universidad de Pinar del Río "Hermanos Saíz Montes de Oca". Facultad de Ciencias Forestales y Agropecuarias. Pinar del Río. Cuba. ORCID: https://orcid.org/0000-0003-1785-817X. Email: mileysis@upr.edu.cu
[2]Universidad de Pinar del Río "Hermanos Saíz Montes de Oca". Facultad de Ciencias Forestales y Agropecuarias. Pinar del Río. Cuba. ORCID: https://orcid.org/0000-0001-9820-0497. Email: amartinez@upr.edu.cu
[3]Universidad Técnica Estatal de Quevedo. Ecuador. ORCID: https://orcid.org/0000-0002-4466-6256. Email: magdalena@gmail.com
[4]Universidad de Pinar del Río "Hermanos Saíz Montes de Oca". Facultad de Ciencias Forestales y Agropecuarias. Pinar del Río. Cuba. ORCID: https://orcid.org/0000-0002-0039-5095. Email: lpaez@upr.edu.cu
[5]Universidad de Pinar del Río "Hermanos Saíz Montes de Oca". Facultad de Ciencias Forestales y Agropecuarias. Pinar del Río. Cuba. ORCID: https://orcid.org/0000-0002-2638-7376. Email: armando@upr.edu.cu

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ABSTRACT

The process of knowledge management poses great challenges, including identifying, acquiring, developing, sharing, using and retaining knowledge relevant to local development in each region. The research aimed at designing a knowledge management strategy for the Local Agro livestock Innovation System in the province of Pinar del Río. This was developed through non-experimental transectional-descriptive research, which was structured in four stages that were defined in the diagnosis of the knowledge management process in the Local Agro livestock Innovation System, the analysis of the SWOT Matrix, the structuring of the strategy and finally the validation of the strategy proposal by the Delphi method. The result of the weighting of the SWOT Matrix showed that the process of knowledge management in the Local Agro livestock Innovation System was found in the quadrant of reorientation, with an adaptive position. This result

indicated that the conditions for the proposal of the strategy were (Mini-Maxi)-(Weaknesses-Opportunities), in which actions were designed to reduce the limitations of the weaknesses, in the maximum use of the opportunities that have been identified in the process of knowledge management in the Local Agro livestock Innovation System.

Keywords: strategy; knowledge management; innovation system

RESUMEN

El proceso de gestión del conocimiento plantea grandes retos, entre ellos, identificar, adquirir, desarrollar, compartir, utilizar y retener el conocimiento relevante para el desarrollo local en cada región. La investigación tuvo como objetivo diseñar una estrategia de gestión del conocimiento para el Sistema de Innovación Agropecuario Local en la provincia de Pinar del Río. Esta se desarrolló mediante la investigación no experimental transeccional-descriptiva, la misma se estructuró en cuatro etapas que se definieron en el diagnóstico del proceso de gestión del conocimiento en el Sistema de Innovación Agropecuario Local, el análisis de la Matriz FODA, la estructuración de la estrategia y por último la validación de la propuesta de la estrategia por el método Delphi. El resultado de la ponderación de la matriz FODA, mostró que el proceso de gestión del conocimiento en el Sistema de Innovación Agropecuario Local, se encontró en el cuadrante de reorientación, con una posición adaptativa. Este resultado indicó que las condiciones para la propuesta de la estrategia fueron de (Mini-Maxi) - (Debilidades-Oportunidades), en la cual se diseñaron acciones para reducir las limitaciones de las debilidades, en el máximo aprovechamiento de las oportunidades que se han identificado en el proceso de gestión del conocimiento en el Sistema de Innovación Agropecuario Local.

Palabras clave: estrategia; gestión del conocimiento; sistema de innovación

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RESUMO

O processo de gestão do conhecimento coloca grandes desafios, incluindo a identificação, aquisição, desenvolvimento, partilha, utilização e retenção de conhecimentos relevantes para o desenvolvimento local em cada região. A pesquisa teve como objetivo desenhar uma estratégia de gestão do conhecimento para o Sistema Local de Inovação Agropecuária na província de Pinar del Río. Isto foi desenvolvido através de pesquisa transeçoal-descritiva não experimental, que foi estruturada em quatro etapas que foram definidas no diagnóstico do processo de gestão do conhecimento no Sistema Local de Inovação Agropecuária, a análise da Matriz FODA, a estruturação da estratégia e finalmente a validação da proposta da estratégia pelo método Delphi. O resultado da ponderação da Matriz FODA, mostrou que o processo de gestão do conhecimento no Sistema Local de Inovação Agropecuária, foi encontrado no quadrante de reorientação, com uma posição adaptativa. Este resultado indicou que as condições para a proposta da estratégia foram (Mini-Maxi) - (Fraquezas-Oportunidades), em que as ações foram concebidas para reduzir as limitações das fraquezas, no aproveitamento máximo das

oportunidades que foram identificadas no processo de gestão do conhecimento no Sistema Local de Inovação Agropecuária.

Palavras-chave: estratégia; gestão do conhecimento; sistema de inovação

INTRODUCTION

Food production is an issue of international concern, influenced by climate change, the economic crisis and the unequal distribution of resources. For Cuba, food production is a matter of national security and is materialized in the food self-sufficiency programmes implemented in each municipality of the country (Expósito & González, 2018).

The most important stakeholders are the community of people living in the localities, technicians and farmers. These need to be educated in order to transform the agricultural systems (Vázquez, 2009). Knowledge management (KM) is an essential way for transition and collaboration in the identification of local problems that require knowledge for their solution, also helps to identify organizations or individuals who can provide it, among other benefits (Garcia & Gonzalez, 2016).

The contribution of KM in the Cuban local context must create an environment, which fosters the development of a culture of social participation for the solution of problems that allows the generation, processing and management of information to transform it into knowledge and transmit it to people, so as to encourage knowledge strategies that meet the needs of the locality and solve them, involving different disciplines and technologies (Boffill et al., 2009).

Among the main experiences of agro livestock KM is the Local Agro livestock Innovation Program (PIAL). However, farmers still need to develop capacity to face current challenges, which will allow them to acquire the necessary knowledge to make both operational and creative decisions on their own farms. This problem led to propose as an objective of this research: to design a knowledge management strategy for the Local Agro livestock Innovation System (SIAL in Spanish) in the province of Pinar del Río.

MATERIALS AND METHODS

Research methodological design

The research was developed through the non-experimental transactional-descriptive research described by Hernández, Fernández and Baptista (2006). It was structured in four stages (Fig. 1).

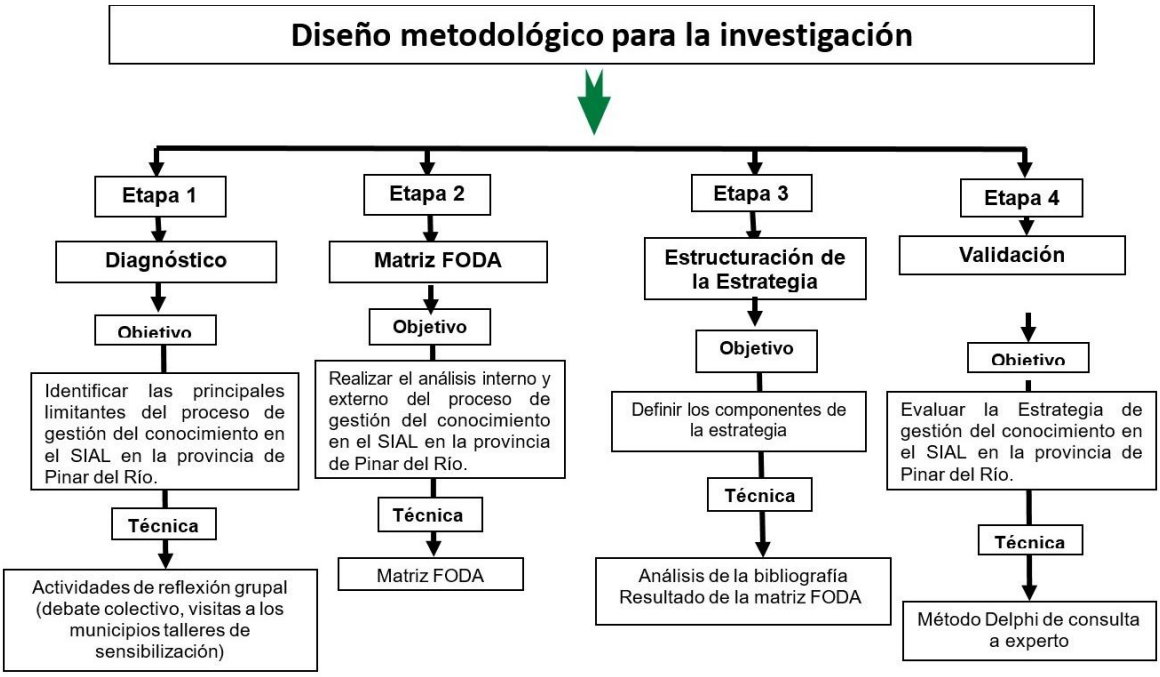


Fig. 1 - Research methodological design
Source: Own elaboration

Research stages

The methodology designed for the development of the research was conducted in a participatory manner and in stages, where each one of them originated the necessary information for the conception of the Knowledge Management Strategy in the SIAL in the province of Pinar del Río.

Stage 1: Diagnosis of the knowledge management process in the SIAL

During this stage, group reflection activities were carried out, such as: collective debate, visits to municipalities and awareness workshops for the provincial PIAL team with the knowledge management axis. In addition, a workshop on local development strategies in each municipality was developed. All this contributed to the identification of the main strengths, weaknesses, threats and opportunities of this process.

Stage 2: SWOT Matrix Analysis

In this stage, the SWOT matrix was analyzed using a double-entry table made up of four quadrants distributed as follows: strengths-threats, strengths-opportunities, weaknesses-threats and weaknesses-opportunities.

Once the matrix has been constructed, the impacts (relations between problems) are located in accordance with the following questions: Does this strength allow me to

mitigate or resist this Threat? Does this strength allow me to take advantage of this opportunity? Does this weakness prevent me from resisting this threat? Does this weakness prevent me from taking advantage of this opportunity?

If the answers to these questions are positive, one, two or three are placed depending on the weight of the answer, if it is negative, a zero is placed.

Stage 3: Structuring of the strategy

In order to structure the strategy, some actions were carried out, among which:

- Study of the theory of knowledge management where the structuring of the Knowledge Management systems, the different processes of knowledge management, as well as, the knowledge management in the agricultural sector were taken into account.
- The shortcomings of the knowledge management process in the SIAL were analyzed.
- Preparation of the strategy proposal, which took into account the rationale, diagnosis, problem statement and strategic objective and strategic planning.

Stage 4: Validation of the strategy proposal by the Delphi method

The strategy proposal was validated by the Delphi method of expert consultation, considered one of the most reliable subjective forecasting methods by combining subjective-based analysis criteria with mathematical-statistical analysis of the results (Fernández & López, 2013). The theoretical validation was divided into three phases:

Stage of preparation:

In this phase, the experts were selected according to the criteria of Landeta (1999) who indicated a range of 7-30 possible experts as necessary. Twenty-three potential candidates were identified, of which 14 potential experts were selected, corresponding to members of the provincial team and the coordinators of the knowledge management axis in the municipalities. The procedure used was the self-evaluation of the experts, as these reflect their skills and the sources that allow them to argue their criteria on the subject, as indicated by Ferriol (2011).

For the processing of the data, the competence coefficient (K) was applied, using the formula $K = (Kc+Ka)/2$ where:

(Kc): average competence coefficients

(Ka): average of the argumentation coefficients

Phase of consultation:

An analysis and evaluation questionnaire was used, which was socialized together with the theoretical proposal of the strategy, which allowed a feedback with the experts.

Phase of consensus:

The data offered by the experts were processed through the absolute, cumulative frequency matrices and the calculation of cumulative probabilities, which allowed the determination of the cut-off points, from which each of the indicators was catalogued according to its nomination (very adequate, quite adequate, adequate, poorly adequate and not adequate). Finally, the results were reported.

RESULTS AND DISCUSSION

Argumentation of the knowledge management process for the Local Agro livestock Innovation System in Pinar del Río

The updating of the Cuban economic model favours the local scenario to make the country's development more sustainable. Institutional and governmental authorities are taking on new challenges in the face of the transformations in the process of knowledge management (Boffil & Reyes, 2016). Furthermore, planning and decentralized management of development is being promoted, based on endogenous potentialities and resources, according to Expósito and González (2018).

The challenges of development in agricultural systems are complex; it is difficult for individuals or isolated institutions to manage them successfully, because they often imply changes in different instances (Alcázar, 2017; Ortiz et al., 2015).

The knowledge management process for the Local Agro livestock Innovation System does not aim to deny the contributions of experts and basic or applied researchers, but to produce a dialogue between academic and peasant knowledge and to complement scientific contributions with local capacities to:

- Manage its practical implementation through collective action
- Assimilate new knowledge and effectively contextualize it.
- Build new proposals through dialogue with farmers' perceptions.
- Multiply the knowledge and disseminate it to a significant mass of innovators.
- To propose more integral visions based on the challenges of agricultural development in the territory.
- To stimulate participatory processes in learning management based on existing demands in the territory (Romero et al., 2017).

Results of the identification of strengths, opportunities, weaknesses and threats (SWOT) involved in the knowledge management process for the Local Agro livestock Innovation System

The results of the participative diagnosis and the triangulation carried out, allowed defining the main strengths, weaknesses, opportunities and threats involved in the knowledge management process of the Local Agro livestock Innovation System in Pinar de Río, allowing evaluating its present and future.

The result of the SWOT matrix weighting showed that the knowledge management process in the Local Agro livestock Innovation System is in the reorientation quadrant, with an adaptive position. This result indicates that the conditions for the proposal of the strategy are (Mini-Maxi)-(D-O), in which actions are designed to reduce the limitations that certain weaknesses can impose on the company, in order to take maximum advantage of the opportunities that have been identified in the process of knowledge management in the Local Agro livestock Innovation System.

Proposal of the knowledge management strategy for the Local Agro livestock Innovation System

Strategic general objective

To develop a strategy for knowledge management in the Local o livestock Innovation System in the province of Pinar del Río, based on the consolidation and extension of experiences in agro livestock innovation as a necessary tool to achieve food sustainability in the territories.

Strategic general solution

The knowledge management process in SIAL is influenced by programs and strategies for local development and the presence of established policies for food production. In addition, this process has a network of local actors, the capacity to articulate students, teachers, researchers and producers, as well as, the identification of peasant leaders for the development of training and the relationship with universities and institutions linked to research and teaching. Taking into account the above elements, the SIAL will be in a better position to resist the inadequate attention to knowledge management issues for food production and the inadequacies in the functioning of the Agricultural Extension System.

Vision

Local Agro livestock Innovation System, with collective action and shared vision approach among local development actors, based on farmers' demand.

Mission

To facilitate knowledge management based on action-reflection in the Local Agro livestock Innovation System, through the integration of local actors in participatory innovation management processes, promoting good agricultural practices and capacities for local development, on an agro-ecological basis.

Principles of the strategy

The SIAL is based on several principles that act from the ideological level, on its conceptual and methodological bases, and are transverse in action. Horizontality, equity and social inclusion are principles that set guidelines for the type of participation promoted by SIAL (Ortiz, 2017).

Specific strategic objectives

1. Strengthen knowledge management networks at the local level linked to agricultural innovation, achieving greater identification with the SIAL.
2. To manage the good agricultural practices provided by local agricultural innovation with the farmers, based on their experience.
3. To train local actors to influence municipal development strategies and public policies in the agro livestock sector.

Lines of action and activities by specific strategic objectives

Objective 1. Strengthen knowledge management networks at the local level linked to agricultural innovation, achieving greater identification with the SIAL.

Actions:

- To form an auxiliary team for the knowledge management network at a local level, which will facilitate, dynamize, and catalyze the innovation processes in the Multiactor Management Platforms. Responsible (Coordinators of the municipalities), 2019.
- To carry out in each municipality workshops on synergies between the SIAL and the Local Development Strategy. Person in charge (Knowledge management axis), 2019.
- Select facilitators on the farms that show confidence in each municipality, as promoters of the knowledge management networks. Person in charge (Coordinators of the municipalities), 2019-2021.
- Carry out meetings with the Municipal University Centers (CUM) for the visualization of the results of the PIAL, through the writing of scientific articles, presentation to calls for innovation awards and participation in events. Person in charge (Knowledge management axis), 2019-2021.

Objective 2. Managing good agricultural practices brought about by local agricultural innovation with farmers, based on their experience.

Actions:

- Carry out awareness workshops with the auxiliary group regarding the classification of the information needs of the farmers. Responsible (Knowledge management axis), 2019-2021.
- Conduct awareness-raising workshops on the inclusion of the gender and leadership perspective in trusted farms and basic productive units. (Gender axis), 2019-2021.
- Conduct workshops on the use of biodigesters as sources of responsible energy (Climate change axis), 2019-2021.
- Conduct awareness-raising workshops in each municipality for the rational use of water in agricultural systems. Responsible (Axis of climate change), 2019-2021.
- Develop at least one diversity fair in each municipality. Responsible (Biodiversity axis), 2019-2021
- Disseminate good agricultural practices with the best results by means of folding. Responsible (Communication axis), 2019-2021.

Objective 3. Training local actors to influence municipal development strategies and public policies in the agro livestock sector.

Actions:

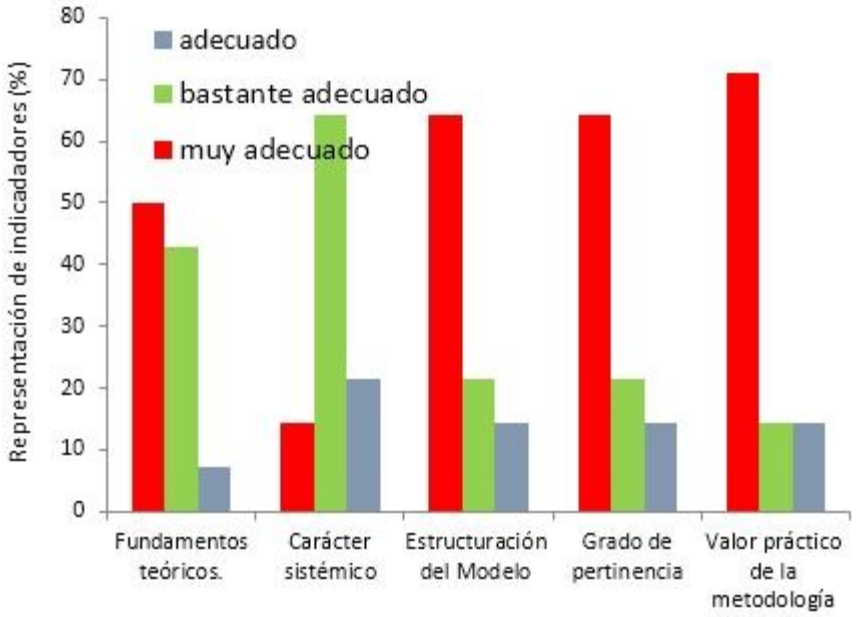
- To develop the SIAL diploma in the province of Pinar del Río. Responsible (Knowledge Management Axis). 2019-2021
- To train technicians, specialists and producers of the productive poles in the province. Responsible (provincial and municipal coordinator) 2019-2021.
- To introduce topics related to local and participatory innovation in the curriculum of the agronomy career. Person in charge (Knowledge management axis) 2019-2021.

Result of the application of the Delphi Method

In the application of the Delphi method, the values of K (Coefficient of Competence) considered for determining the inclusion of experts were determined.

The behaviour of the self-evaluation in the answers given, showed that the 14 experts have values equal to and higher than 0.7. In this regard, Okoli and Pawlowski (2004), recommend an optimal range between 10 and 18.

The results of the evaluation of the model based on the experts' opinions showed that, of the five indicators evaluated, four were categorized as very adequate and one as quite adequate. The percentage of representation of the indicators (Graph 1) - theoretical foundations, degree of scientific and social relevance, the practical value of the methodology and the structure of the model - were categorized as very adequate and the systemic and integrative character as quite adequate, which indicated the validity of the theoretical conception of the proposed strategy.



Graph 1 - Percentage representation of strategy evaluation indicators
Source: Own elaboration

The results of the analysis of Mann Whitney's U-test show significant differences (p=0.00), which indicates an acceptable approach to the consensus of the criteria issued by the experts regarding the design of the strategy to implement knowledge management in the SIAL in Pinar del Río province.

The analysis of the current trend of the knowledge management process revealed that it is considered a key element for the development of the local agricultural innovation system. The analysis of the knowledge management process in the Local Agricultural Innovation System in the province of Pinar del Río, allowed the identification of weaknesses, strengths, threats and opportunities due to the absence of procedures and systematization of this in the context.

The proposed knowledge management strategy represents a tool to implement the Local Agro livestock Innovation System in the multi-stakeholder management platforms. The general assessment of the strategy based on the consultation with experts allowed to corroborate the validity and feasibility of the strategy, since of the five indicators evaluated four were categorized as very adequate and one as quite adequate.

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Conflict of interest:

Authors declare not to have any conflict of interest.

Authors' contribution:

The authors have participated in the writing of the paper and the analysis of the documents.