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Science and innovation as pillar of the government management: a way towards local food systems

Ciencia e innovación como pilar de la gestión de gobierno: un camino hacia los sistemas alimentarios locales

Ciência e inovação como sustem da gestão de governo: um caminho até os sistemas alimentares locais

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ABSTRACT

The objective of this contribution is to argue the importance of effective government management to connect science and innovation with the solution of development problems and, in particular, those related to food sovereignty and nutrition education. The methods used are document review, participant observation, and action research. In the document it is argued why the government has assumed science and innovation as the pillar of its management and the approaches from which it articulates innovation and government management. It is showed how this management has been oriented in recent months to the issue of food sovereignty and nutrition education and, in particular, examines what is related to local food systems and their practical implementation in the province of Pinar del Río.

Keywords: science; innovation, government; management; food sovereignty and nutrition education; local food systems

Translated from the original in Spanish

RESUMEN

El objetivo de esta contribución es argumentar la importancia de una efectiva gestión de gobierno para conectar ciencia e innovación con la solución de los problemas del desarrollo y, en particular, los relacionados con la soberanía alimentaria y educación nutricional. Los métodos utilizados son la revisión documental, la observación participante e investigación-acción. En el documento, se fundamenta por qué el gobierno ha asumido ciencia e innovación como pilar de su gestión y los enfoques a partir de los cuales articula innovación y gestión gubernamental. Se muestra cómo esa gestión se ha orientado en los últimos meses al tema de la soberanía alimentaria y educación nutricional y, en particular, examina lo relativo a los sistemas alimentarios locales y su implementación práctica en la provincia de Pinar del Río.

Palabras clave: ciencia; innovación; gobierno; gestión; soberanía alimentaria y educación nutricional; sistemas alimentarios locales

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RESUMO

O objetivo desta contribuição é argumentar a importância duma efetiva gestão de governo, para conectar ciência e inovação com a solução dos problemas do desenvolvimento e, particularmente, os relacionados com a soberania alimentaria e educação nutricional. Os métodos empregados são a revisão documental, a observação participante além da investigação-ação. Neste documento, fundamenta se porquê o governo tem assumido ciência e inovação como sustem da sua gestão e as perspectivas a partir das quais relaciona inovação e gestão governamental. Mostra se como essa gestão tem se orientado nos meses finais ao tema da soberania alimentaria e educação nutricional, especialmente examina, o relativo aos sistemas alimentares locais e a sua implementação prática na província Pinar del Río.

Palavras-chave: ciência; inovação; governo; gestão; soberania alimentaria e educação nutricional; sistemas alimentares locais

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INTRODUCTION

Science, technology and innovation (STI) constitute key elements in the advance towards the Vision of the Nation, included in the National Plan for Economic and Social Development (PNDES in Spanish) towards 2030 (PCC, 2017. In the same way, they are decisive in addressing the Sustainable Development Goals and the 2030 Agenda of a global nature. The available evidences show that, although the Revolution has formed significant human potential and created significant scientific and technological capacities, the effective use of that potential is far from being the adequate one.

There are important antecedents that show that interactive dialogue between scientists and government can leave very important balances. Fidel Castro's performance as founder and promoter of revolutionary national science left very good experiences in this

regard. The experience of confronting COVID 19, (Díaz-Canel Bermúdez & Núñez Jover, 2020; Martínez Díaz et al., 2020) corroborates the relevance of this dialogue.

It is begun with a summarized exposition of the conceptual content of the governmental formulation where science and innovation constitute a pillar of government. The conceptual is fundamentally based on the studies on innovation that are developed internationally and also in Cuba, with an emphasis on innovation systems approaches (Chaminade et al., 2018).

The articulated management between the government and scientists, experts and technicians, as well as the people in general in the confrontation with COVID 19, led the Cuban government to address, with a similar management style, another problem of the greatest importance and complexity: the food issue.

The objective of this contribution is to argue the importance of effective government management to connect science and innovation with the solution of development problems and, in particular, those related to food sovereignty and nutrition education.

The management mechanisms implemented by the government and the experts to address food security and nutrition education are described in general terms. One of the issues discussed in the science-government dialogues, around this topic, has been that of local food systems (SAL in Spanish). In this contribution, the importance of these systems and their insertion within the dynamics of local development is argued. Local food systems are presented as a key element in the systemic transformations to which Cuban agriculture is forced.

The experience of Pinar del Río allows to show a work system that has made it possible to tackle the complex problem of design and governance of SAL, articulated to the management of municipal and provincial development strategies based on sustainable local development, assumed this as a process of social construction and structural change (Torres Páez et al., 2018).

MATERIALS AND METHODS

The methodology used was based on the identification of common variables from the authors' criteria related to the concepts of innovation, government management, food sovereignty, nutritional education and local food systems. The use of theoretical methods such as induction-deduction and systemic-structural, accompanied by the application of joint interviews with field work, direct observation and action research, completed the information necessary for the conceptual proposal developed. The systematic meetings of the Food Sovereignty and Nutrition Education Program with more Science, developed with the participation of scientists, experts, agricultural producers and authorities of the Central State Administration Bodies, have served as an important input for the research, which are chaired by the President of the Republic, the Vice President and the Prime Minister.

RESULTS AND DISCUSSION

Why are science and innovation a pillar of the Cuban government's management?

Since 2018, three pillars have been defined in which, integrated, government management must rest. One of them is the computerization of processes to support actions and to facilitate decision-making; another is social communication that allows ensuring adequate interaction with citizens and fostering social participation and, finally, the one that matters most here: science and innovation.

When considering science and innovation as a pillar of government management, the Cuban State relies on the following ideas:

1. The effective use of STI is a necessary condition for advancing the country's development program. There is a lot of usable science that is neither implemented nor generalized, a lot of insufficiently exploited expert knowledge.

2. Government management must be able to permanently and effectively mobilize these capacities, articulate, encourage and coordinate them in solving the most diverse problems that development poses. The success of government management requires appealing to intersectoral and transdisciplinary approaches.

   Expert knowledge must be present in every decision of the public administration and the enterprise sector, both state and non-state; must be linked to the formulation, monitoring and evaluation of public policies, to development programs in all areas and at all levels.

3. As corroborated by the experience of confronting COVID 19, the interactive dialogue between scientists and the government can leave very important balances (Díaz-Canel Bermúdez & Núñez Jover, 2020; Martínez Díaz et al., 2020). It is not always simple to consolidate a fluid and mutually understandable communication between the academic world and decision-makers. In Cuba, the possibility of such collaboration is supported on ethical and political foundations that the Revolution, led by Fidel, was in charge of forging.

   Collaboration between the government and scientists should constitute a permanent style of work, not always easy to materialize. It is a dialogue between different actors who must tackle very complex problems together. This dialogue should facilitate the "deep exercise of innovative thinking" that the country's development demands. The objective has to be "to reach the productive transformation that the country needs at this time, which guarantees processes with more efficiency, productivity, utility and income, which satisfies internal demands, which gives us export possibilities and which, in addition, encourages well-being, development and prosperity" (Díaz-Canel Bermúdez, 2020b).

4. Linking science and innovation in the same formulation means that when mobilizing science, government management should preferably be oriented to generate innovation, that is, to promote creative solutions to the most diverse economic, productive, social and cultural problems. Problems of health, food, housing, energy, attention to vulnerable groups, strengthening citizen participation and many more, demand knowledge and technologies that nurture social practice.

5. A key conceptual pivot for turning science and innovation into a pillar of governance is the multi-stakeholder, interactive and systemic approach to innovation[1]. It supposes displacing the outdated Linear Innovation Model, although it survives despite its proven ineffectiveness (Thomas et al., 2019).

An alternative is the innovation systems that can be understood as the set of actors and organizations and the links between them, as well as the policies, rules, norms, habits and related beliefs that a nation, sector or territory have main roles in innovation processes. Innovation demands strengthened actors (government, universities, and enterprises, among others), strong interactions among them and an adequate institutional framework (norms, regulations, productive routines) that supports all of the above. For this reason, the fertile encounter between STI and development requires government actions of the type that have been mentioned in point 2 and performances in the productive and services sector that generalize the best experiences that the country shows in terms of innovative behavior.

For an innovation system, the performance of the academic sector is also very important: professional and research capacities, "innovation heuristics"[2] (Arocena & Sutz, 2020), tuned to the objectives of sustainable and inclusive development; ethos that lead it (Díaz-Canel Bermúdez & Núñez Jover, 2020), capacity to exceed disciplinary limits and address complex problems with transdisciplinary approaches, among other qualities[3].

This multi-actor, interactive and systemic quality benefits from a governance mechanism that promotes the conjunction and integration of efforts at the scale of the entire society. This approach has influenced the decision to create a National Innovation Council, which is in the formulation and implementation process.

From COVID 19 to food and nutrition security: scientists, experts, producers and the government in action

Undoubtedly, Cuba's confrontation with COVID 19 has been successful. Among the reasons is "The systematic leadership by the Government, early action, the integration of the efforts of different organizations and sectors of society, the direct link between

[1] It refers to the theories on national innovation systems (Chaminade et al., 2018).
[2] The concept of innovation heuristics synthesizes a double process: first, the identification of the problem to be considered; second, the intellectual pathways and physical means through which the solution is built.
[3] This type of scientific and technological practices is usually summed up in the concept of "sustainability science" (Núñez Jover, 2020).

scientists and the Government, social communication and the participation of the people have been determinants in the control of the pandemic" (Martínez Díaz et al., 2020).

In a recent article, it was stated: "The confrontation with COVID 19 brings with it some lessons that enrich future experiences. The capacity and convenience of achieving close collaboration between scientists and the Government has been confirmed" (Díaz-Canel Bermúdez & Núñez Jover, 2020) and later: "if we have to put all our thought into something and take it to a different conception than what we have been doing, it is food production" (Díaz-Canel Bermúdez, 2020b).

Based on the concept of science and innovation as a pillar of government and considering the favorable results achieved in the treatment of the pandemic, it was decided to tackle the problem of food production, initially formulated as the application of the results of science, technology and innovation in food production and later reformulated as the problem of food sovereignty and nutrition education, with a working model that includes some learnings that come from the confrontation with COVID 19. Of course, for government management it is as important to take advantage of the experiences previously obtained in other areas as to recognize the peculiarities of the new problems to be addressed. Obviously, the agro livestock sector differs considerably from the health sector.

On June 25, 2020, a cycle of meetings chaired by the highest level of government began to address the aforementioned issue, considered a top priority on the development agenda.

To address the issue of food sovereignty and nutrition education, a work system was created that includes weekly meetings with scientists, producers and executives. These meetings are chaired by the President, Vice President, Prime Minister and various Deputy Prime Ministers. In each of the meetings, aspects of great importance are addressed, among them the programs identified as priorities by the Ministry of Agriculture (bioproducts for agricultural use, grains, rice and others that will be incorporated successively) and others of a cross-cutting nature such as value chains and agro-chains with a risk management approach within the framework of food and nutritional sovereignty and bases for the governance of local food systems that will be addressed later, as well as others that will emerge.

Although each topic has an expert in charge of presenting it, the agencies and organizations that contribute to its preparation are always varied, thus favoring an intersectoral vision.

Among the meetings at the highest level to materialize and follow up on what has been agreed, the management rests on a national coordinating group, led by the Ministry of Science, Technology and Environment (CITMA in Spanish) and Ministry of Agriculture (MINAG in Spanish) that includes representatives of the Ministry of Higher Education (MES in Spanish), Ministry of Food Industry (MINAL in Spanish), Group of Biotechnology Industries and Pharmaceutical of Cuba (BioCubaFarma in Spanish), AZCUBA Sugar Group, Ministry of Economy and Planning (MEP in Spanish), Ministry of Finance and Prices (MFP in Spanish), National Association of Small Farmers (ANAP in Spanish),

Association of Cuban Sugar Technicians (ATAC in Spanish), Academia of Sciences of Cuba (ACC in Spanish) and other guests according to the topics to be discussed.

Prior to the meeting with the president, groups of experts and executives discuss the information, analysis and proposals that will be brought to the meeting during several sessions.

Each meeting begins with a control of the agreements made in the previous meetings and a point on the agreed agenda is exposed. Then the debate among the participants begins.

The presence of experts from the various areas of knowledge is always ensured, which enables an inter and transdisciplinary perspective. A space is usually granted to the experiences of agro-producers.

At the meeting, the advances that R&D activities that the institutions linked to the different programs carry out are presented in technological matters. This allows to know not only the diversity of available technologies, but also the ways to deploy greater productive capacities that allow them to expand their availability, an element that leads to generating linkages with the industry.

The presentations and debates are guided by an "innovation heuristic" that favors the creation of autonomous technological capacity, as opposed to the importing mentality, with an eye on sustainable development, the satisfaction of food and nutritional needs of the population and the care to the accessibility, quality and safety of food.

Among other results, these debates have made it possible to identify insufficiently used technological capabilities for various reasons and it has been decided to work on the development of two policies, one linked to agroecology and the other to agricultural extension. Experience has shown the convenience of assigning a specialist to prepare an opinion, preferably critical, of the presentation and proposals presented.

Local food systems

This is one of the cross-cutting themes mentioned earlier[4]. The advance towards local food systems is one of the transformations that Cuban agriculture demands. It aims to give greater prominence to municipalities, popular councils, communities, agricultural producers in general and to the various forms of production that operate in municipalities.

The formulation of the SAL is consistent with a set of transformations that are taking place in the country. One of them is the approval of the Policy to Promote Territorial

[4] It was debated in the aforementioned meetings on July 24, 2020. The presentation was signed by: MEP, MINAG, MES, University Management Network of Knowledge and Innovation for Development (GUCID), PIAL program, Pasture and Forage Experimental Station Indio Hatuey (EEPIFH) and the Center for the Study of Management, Local Development, Tourism and Cooperativism (CE-GESTA) of the University of Pinar del Río (UPR).

Development (PIDT in Spanish) (MEP, 2020). Its declared objective is "To promote the development of the territories based on the country's strategy, so that municipalities are strengthened as a fundamental instance, with the necessary autonomy, sustainable, with a solid economic-productive base and that the main disproportions between them are reduced, taking advantage of their potentialities".

This policy is key in the set of important transformations in the Cuban economic and social development model. It advances us towards a more decentralized model where municipalities play a leading role, in accordance with the provisions of Article 168 of the Constitution of the Republic (National Assembly of People's Power, 2019) that emphasizes municipal autonomy and legal personality that supports it. In this context, local development takes on special significance. Most of the municipalities have a markedly agricultural productive profile; it is on this scale where food is produced, but to date the competences they have to conduct the processes that take place in their political-administrative demarcation are limited.

Some of the main problems that illustrate these limitations are the following: verticality of economic decisions from higher levels that limit the autonomy and leadership of the territorial authorities for local development; insufficient citizen participation in local development management processes; insufficient capacities in local governments and the enterprise system for the strategic management of local development; there are no local innovation systems that articulate state and non-state actors, the educational sector, governments, among others. For all this, it is necessary to move from the centralist and vertical approach to the interactive dialogue between the national, provincial and municipal levels.

The SAL aspire to constitute tools that transform these realities, transferring to local actors, with their governments at the fore, a multiplied role.

The same day[5] that the PIDT was approved in the Council of Ministers, the Plan for Food Sovereignty and Nutrition Education (SAN) of Cuba was approved[6], which is highly relevant to the SAL approach as it makes it clear that it is not just about producing food.

In it, food sovereignty is formulated as: "The nation's capacity to produce food in a sustainable way and give the entire population access to sufficient, diverse, balanced, nutritious, safe and healthy food[7], reducing dependence on external resources and inputs, with respect to cultural diversity and environmental responsibility" (MINAG, 2020, p. 13).

Altogether, the PIDT and SAN Plan are two instruments, above all, for work at the grassroots and fundamentally in the municipalities: "The municipal government is the local actor with the greatest capacity to organize and lead, and for that the operation

[5] At a meeting of the Council of Ministers dated July 22, 2020.
[6] Dozens of professionals, researchers and managers took part in its preparation, and it had the leading role of MINAG, FAO, OXFAM and the co-financing of the European Union.
[7] All this supported by Decree-Law 9/2020 on food safety.

comprehensive, stable, proactive and autonomous from the municipality"[8] (Díaz-Canel Bermúdez, 2020a).

One of the strategic issues considered in the SAN Plan is the consolidation of territorial food systems.

The SAL are oriented towards the objectives set by the SAN Plan and this has several consequences:

- SAL should start from a holistic approach that includes food production, transformation, marketing and consumption.
- SAL require an inter-institutional approach, that is, their leadership requires broad collaboration between various ministries, organizations and actors. It is an inter-institutional and multi-stakeholder issue, which shows the complexity of its governance.
- SAL require a transdisciplinary approach. The knowledge necessary to properly conduct SAL should be based on their having a closed loop approach: produce, transform, market and ensure the consumption of quality food. This forces to mobilize not only the expert knowledge that is usually the most recognized and directly taxed in the agricultural field (fertilizers, soil, irrigation, seeds, animal feed, etc.), but also to the humanities, social and economic sciences (SAL incorporates important social, economic and human dimensions) and what is very important: the knowledge of the agricultural producers.

The SAL articulate the perspectives and possibilities that the SAN Plan and the PIDT make possible. They are a relevant component of the systemic changes demanded by Cuban agriculture, as well as a key to the success of territorial policies.

There are multiple actors that operate in the municipalities. Among them, the following are mentioned here: state entities: Councils of the Municipal Administration (CAM in Spanish), municipal directorates and delegations of the organisms, Banco de Crédito y Comercio (BANDEC in Spanish), Banco Popular de Ahorro (BPA in Spanish), etc.; state productive structures: diverse productions, industries and mini-industries, urban agriculture, state markets, etc.; non-state productive structures: Agricultural production cooperatives (CPA in Spanish), Basic Cooperative Production Units (UBPC in Spanish), Credit and Service Cooperatives (CCS in Spanish), farms, family farming, mini-industries, etc .; training and research entities: Municipal University Centers (CUM in Spanish), science, technology and innovation entities (ECTI in Spanish), municipal education directorate, polytechnic institutes, etc.; non-governmental organizations: National Association of Small Farmers (ANAP in Spanish), Cuban Association of Agricultural and Forestry Technicians (ACTAF in Spanish), Cuban Association of Animal Production (ACPA in Spanish), National Association of Economists and Accountants of Cuba (ANEC in Spanish), etc.

[8] Words by President Díaz-Canel in videoconference with governors and mayors on July 22, 2020.

The list is actually much longer. It is obvious that it is a complex governance mechanism where the CAM and the Municipal Assemblies of People's Power (AMPP) have the main leading role.

SAL are conceived based on: articulating the vertical-sectoral and the horizontal-territorial, in favor of a comprehensive vision of the processes of production, transformation, commercialization and consumption of food; generate interactions, synergies and complementarities between all local actors so that they act in an integrated and horizontally articulated manner; promote social participation in its design and management, and increase the powers of local actors; promote greater capacities for techno-productive, process, organizational and social innovation in municipalities, promoting local innovation systems as one of their coextensions; improve regulatory processes at the local level; favor the formation and qualification of the human talent that its activities demand; improve the ways of disseminating innovation (generalization of innovation) so that technologies are within the reach of agricultural producers and other actors: ensure that learning processes, technology transfer, R&D activities effectively generate innovation, preventing innovative trajectories from being truncated and not reaching all possible areas.

For this to be possible, many problems must be solved, for example: the subordination from the province and nation of the enterprise system that operates in the municipalities, This limits the capacities of the local government to make better use of the endogenous resources of the territory, does not favor decision-making and hinders effective and efficient food management with a territorial approach. The issue of respecting the autonomy of management of cooperatives, for example, is another of the many problems to be solved.

SAL have to be integrated into local development processes that the PIDT itself defines as: "an essentially endogenous, participatory, innovative process of articulation of interests between actors, territories and scales (municipal, provincial and sectoral / national). It is based on the leadership of the municipal and provincial governments for the management of their development strategies, directed, from the management of knowledge and innovation, to the promotion of projects that generate economic-productive, socio-cultural, environmental and institutional transformations, with the objective of raising the quality of life of the population" (MEP, 2020, p. 3).

Local development is supported by fundamental tools such as the Municipal Development Strategy (EDM in Spanish)[9]. The key to the governance of SAL is in their effective integration into EDMs and the groups, mechanisms, policies, work systems that the strategies create[10].

[9] Defined in the PIDT as "an integrating instrument that contributes to orient the management of the municipal government based on the priorities defined based on national and territorial interests. From its design and management, it articulates the diagnoses and projections that are defined by other planning instruments, fundamentally by the territorial and urban planning plan".
[10] For example, within the Jesús Menéndez Municipality EDM, the first strategic line is that of food sovereignty, which includes several subprograms: various crops, livestock; forest; local seed production and knowledge management, as well as programs for self-sufficiency and agro-food industrialization.

Key elements of EDMs are local development projects. The PIDT declares that it constitutes a policy principle "to promote local development projects for food production destined for domestic consumption, as well as those that generate exports, import substitution, productive chains and monetary-mercantile flows within the territory" (MEP, 2020, p. 5). To execute them, there are various sources of financing that the PIDT identifies.

The deployment of SAL requires the conception and implementation of a coherent system of knowledge management, training, education and innovation that reaches all actors (managers, farmers, producers, among others) through participatory dialogue, collective leadership, learning in action, etc.[11]

At the end of this section, it should be emphasized that SAL have many created capacities. There are EDMs in 67 municipalities. It is foreseen in the PNDES 2030, that by 2021 all municipalities have their strategies.

Various programs and initiatives have created capacities and tools of undoubted value, among them: Articulated Platform for Comprehensive Territorial Development (PADIT), Project for the Strengthening of Municipal Capacities for Local Development (PRODEL); Local Agricultural Innovation Program (PIAL); Agro chain project and Support for Sustainable Agriculture (PAAS), among others.

There are CUM in practically all the municipalities of the country and universities in all the provincial capitals. The MES has a strategy to strengthen the link between higher education and local development, and growing links between governments, universities, CUM, companies and other actors are observable in many municipalities. In the country there are 191 polytechnic institutes with agricultural specialties, agronomy careers in 62 municipalities[12] and progress is being made in the development of university higher technical programs.

Three hundred facilitators in local agricultural innovation systems have been trained in the country and there are numerous education and training programs. The agricultural sector has significant R&D capabilities.

There are very good experiences in dozens of agro-energy farms on agro-ecological bases of the type promoted by the Experimental Station of Pastures and Forages "Indio Hatuey" (EEPFIH in Spanish).

Of no small importance is that international cooperation is supporting these efforts.

[11] Methodologies such as those of the Local Agricultural Innovation System that operates in 12 provinces and 75 municipalities of the country, coordinated by the National Institute of Agricultural Sciences (INCA), can be very important tools for, through dialogue with agricultural producers, to promote management social innovation.
[12] With some very successful cases such as EEPFIH that trained more than 100 agronomists and veterinarians in 6 years, the vast majority today working in the sector.

Integration of local food systems to the strategic management of territorial development in the Pinar del Río province

As mentioned, local development in Cuba has become a public policy of strategic importance as a complement to the PNDES until the year 2030, as well as a central axis and articulator of the public agendas of the governments at the municipal and provincial levels. From this logic that requires multilevel governance processes, progress can be seen in terms of overcoming the welfare vision of previous stages, betting on a culture of development and not subsistence, and adopting strategic decisions for the institutionalization of its management.

The Pinar del Río province has been working on local development management issues since the mid-1990s, based on research and training actions, developed by the University of Pinar del Río, which were references for that time.

As of 2011, work began with the General Plans for Territorial Organization and the Comprehensive Municipal Development Plans, from which practical experience two methodological proposals for the design of municipal development strategies and the provincial development strategy (EDP in Spanish) were derived in 2014, with a more comprehensive approach to the phenomenon and its complexity, for which all the entities and actors of the territory were integrated regardless of their level of subordination and development programs were defined in all sectors and dimensions of development (economic-productive, socio-cultural, environmental and institutional).

These tools have been conceived in conjunction with the priorities defined by the National Plan for Economic and Social Development until 2030 and consider those territorial policies and models that are included in the National Scheme for Territorial Planning and that are indexed in our municipalities and province. In this way, it contributes to the necessary integration process between economic planning and physical planning (Cardoso Carreño et al., 2016).

As basic concepts, the following have been proposed, among others: a strategic alliance among the government - university - enterprise system - community; capacity building for local development management (Arias Gilart et al., 2019); articulation of local state and non-state actors (Flores Lóriga et al., 2017); management of financing for local development (Capote Pérez et al., 2018); promotion and diversification of exports (Barrios Cruz & Torres Páez, 2019); knowledge and innovation management; public management of the quality of life of the population (Mirabal Sarria & Torres Páez, 2018).

As a result of this process in the province, the 11 Municipal Administration Councils have validated the strategy of their territories until the year 2030 and in seven of them they have been approved by their Municipal Assemblies of People's Power as the body empowered to do so. In the case of EDMs, they range from 25 to 35 development programs, which together make up a total of 273. In the case of EDP, 39 development programs have been defined and their final approval is projected in the Provincial Council, in the month of December 2020.

Based on the indications received from the President of the Republic, MINAG and CITMA, to generate in the provinces a work system to attend to the production of food with more science and taking into account the guiding and fundamental principle of achieving the integration of processes and avoiding atomizing the management of municipal governments, it was proposed, in Pinar del Río, articulating this task to the strategic management of local development that had been promoted in the territory.

It was therefore decided to conceive a working system for the SAN based on the governance of the SAL. It is focused conceptually on the process of planning, organization, implementation and evaluation of programs that contribute to the strategic line of "food sovereignty and nutritional education" defined in the 11 EDM and the EDP, for which it articulates a local food system with a holistic approach (production, transformation, commercialization and consumption), inter-institutional and transdisciplinary.

The essential components that structure the work system are the following: objectives, principles, premises, composition and functions of the Provincial Coordinating Group and the Municipal Coordinating Groups; development programs and prioritized issues; Provincial Work Groups by prioritized programs and themes; activities to develop and work schedule, as well as the methodology for the preparation of development programs. They have been defined from a joint work between the government, the university, the MINAG delegation and the CITMA delegation and validated in an expanded composition of actors in the territory. The fundamental elements of these components are synthesized below.

The specific objectives of the work system are:

- Strengthen the connection among knowledge, development and innovation in the food production process at the local level to achieve progress based on SAN.
- Maximize agricultural production, prioritizing short-cycle crops and making the most of available endogenous resources.
- Develop the increase and diversification of the food industry productions based on the use of endogenous resources.
- Satisfy the food needs of the population of municipalities and other territories, based on municipal self-sufficiency and compliance with commitments to the national balance.
- Promote a nutritious, safe and healthy diet, as well as the generation of a nutritional culture in the population.
- Develop exports of agro livestock products and the food industry of high quality and added value, as well as their commercialization with Zed Mariel, tourism and business with foreign investment.
- Maximize the national production of animal feed based on increased production of milk, pork, large livestock and small livestock (sheep, goats, rabbit, and poultry), as well as aquaculture.
- Articulate national and local capacities (knowledge, experiences, and resources) related to sustainable food production.

- Strengthen the role of local governments in the management of SAN with more science based on territorial development, based on the governance of local food systems.
- Strengthen the interaction between decision-makers, scientists and producers to promote the development of agro-food chains in correspondence with local contexts, advancing in the improvement of the Technical Assistance, Agricultural Extension and Training System and the computerization of the processes.
- Design a communication strategy that contributes to the promotion of a nutritional culture and the visibility of the results and impacts in terms of food sovereignty and nutritional education with more science.
- Transform the Territorial Information and Statistics System in such a way as to enable the timely and quality management of statistical information to support local food systems, guaranteeing its transparency and correspondence with the characteristics of each municipality.
- Create the Technological Observatory on the management of Local Food Systems and their connection with other info technology platforms at different scales, as a priority with the government network and MINAG.

The principles for the operation of the work system are associated with:

- Integration, cooperation, and collaboration among all stakeholders to advance SAN. The principle of integrating, joining forces, identifying problems and fostering the search for solutions should be maximized, as well as specifying the responsibilities of each of the actors linked to each program (government, agencies, academic and scientific research entities, system state and non-state business, ANAP, professional organizations, among others).
- Complementarity among all actors in SAL management.
- Direct link with the productive base.
- Assume innovation as a social, interactive and preferably systemic process, where local capacities (knowledge, experiences, and resources) are articulated, based on SAN and achieve municipal self-sufficiency.
- Transversality of the themes of demographic dynamics and knowledge and innovation management. Similarly, actions for the conservation and rational use of natural resources and the commitments of the State Plan to Confront Climate Change (Life Task).
- The results that are decided to be implemented are organized into programs for their follow-up until generalization is achieved, foreseeing the linkages between the national industry, the universities and the other centers.
- The topics that are presented for the evaluation contain the elements that intervene in the value chain with a risk approach, including good practices, marketing, distribution and consumption, among others.
- It is an objective to prioritize the dynamization of the government-science relationship, managing innovation with the closure of the Research + Development + Innovation cycle and the generalization of the results, for which it must work together with all factors, incorporating with priority to leading producers.

The premises that have been defined for the proper functioning of the work system are the following:

- Availability and capacities of governments to assume the management of the system at both the provincial and municipal levels.
- Knowledge and understanding by all the actors involved about the policies, programs and indications, defined by the national government within the framework of the management of SAN with more science.
- Creative thinking to adapt national policies, programs and indications to the characteristics of the province and each municipality, as well as to make new contributions.
- Formation of inter-institutional, multidisciplinary and intersectoral work teams, under the coordination of the municipal and provincial government.
- Every week the governor and the coordinators of programs and objectives meet with scientists and experts for the SAN and the directors of the companies and the provincial delegation of MINAG related to the programs, topics and agreements to be checked. They promote analyzes with the participation of all knowledge, including economic and social sciences. This meeting is preceded by weekly spaces for debates on existing problems and possible solutions from science.
- The construction of an innovation system that allows the development of SAL at the local level with the integration of researchers, teachers, students, social scientists, economists, experts and producers, under the leadership of the government.

The functions of the municipal and provincial coordinating groups are:

- Coordinate the stable operation of the designed work system.
- Know the indications issued from the national level and define the actions that fall within the province and the municipalities.
- Evaluate the level of assurance and inclusion of the indications issued by the President in the science plans, economic plans and work systems of these organizations in the territory, as well as define the responsibility of the provincial / municipal science system in its evaluation and control.
- Define a control system for the implementation of these indications in the territory that includes (as appropriate): exchange with those in charge, on-site visits to the implementation sites, participation in discussions and analysis of these issues (technical advisory council, productive scientific pole or other enabled spaces), participation in weekly checks, use of the Productive Scientific Pole as a stage to present science, technology and innovation results that contribute to the development of local production systems.
- Participate in the preparation of the accountability report to the higher authority on the progress of the implementation of the indications derived from the national meetings.
- Verify the existence of impact indicators that show the contribution of each of the actions to the increase and efficiency of each of the development programs associated with the strategic line of the SAN in the territory and evaluate their behavior.

- Present organizational and control proposals to the government authorities that contribute to fulfilling the President's instructions.
- Monitor the improvement of the provincial / municipal development strategy in relation to the programs associated with the SAN, based on the introduction and generalization of scientific results, both those generated in the province and outside it.
- Evaluate the results of science, technology and national innovation and that of the province / municipality, which are feasible to apply in the different local production systems with an integrative, systematic and multisectoral vision based on local development.
- Indicate studies on priority issues and analyze their results as input for decision making.

The following actors are permanent members of these groups (some vary depending on their presence or not, at the municipal level): governor / mayor (general coordinator); lieutenant governor; coordinators of programs and related objectives; delegates from MINAG (Technical Coordinator) and CITMA; director of the Provincial Meteorological Center; director of the Center for Information and Technological Management; Rector of the University of Pinar del Río or directors of CUM; director of the Territorial Office for Standardization (OTN in Spanish); director of the Provincial Center for the Strategic Management of Local Development; coordinators of the ministries of industry and food industry (municipal entities); representative of the Academy of Sciences of Cuba; deans of the faculties of Social and Humanistic Sciences; Agronomic and Forestry Sciences and Economic and Business Sciences of the University of Pinar del Río (UPR); director of the CE-GESTA Study Center (UPR); directors of Economy and Planning; Finance and Prices; Physical Planning, Health, Education, Hydraulic Resources and Foreign Trade; Foreign Investment and International Cooperation; presidents of ANAP, ACTAF, ACPA, ANEC, Animal Health Association and Association of Communicators; coordinator of the PIAL and the strategic food production front of the Productive Scientific Pole.

Researchers, specialists, academics and producers are invited to the work sessions to check the Food Sovereignty and Nutrition Education Program with more Science, according to the programs, topics and agreements that are checked.

The most frequent programs are the following: rice; grains (includes beans, corn, sorghum, chickpeas, soybeans); meats; vegetables; citrus and fruit trees; fruit and vegetable canning industry; coffee and cocoa (includes roasted coffee); beekeeping; animal feed (includes the development of alternative food sources with national raw materials); porcine; poultry; small cattle; bovine livestock; dairy and meat industry; soil and agricultural engineering; bioproducts for agricultural use (plant health); medicinal products for veterinary use (including those of natural origin); aquaculture and platform fishing.

For each program it is indicated to define the following fundamental elements:

- Relationship of the program with the Guidelines, with the National Plan for Economic and Social Development until 2030 and with the Sustainable Development Goals 2030 (CEPAL, 2017).

- Map of productive actors and/or involved services (state and non-state).
- Diagnosis of the potentials and restrictions of the program (natural resources, material and infrastructure resources, economic-productive resources and human resources.
- Main difficulties or barriers that limit the generation and application of science.
- Determination of strengths, weaknesses, threats and opportunities.
- Definition of the strategic objectives of the program.
- Projection of production indicators both in physical units and in value (specify production levels depending on the different destinations: national balance, municipal self-sufficiency, animal feed, national industry, local industry, seeds, export, Mariel Special Development Zone, tourism, businesses with foreign investment and social consumption).
- Projection of investments in their different components and currencies, as well as construction maintenance actions (emphasizing technology transfer, modernization of existing ones, technology-based projects, etc.).
- Projection by year of the demand for labor force (skilled and unskilled).
- Projection per year of the general balance of energy carriers and water demand.
- List of science results that are projected to be introduced to achieve the objectives, indicators and goals, defined in the program (specifying if it is to validate, scale or generalize, as well as introductory and receiving entities).
- System of technical assistance and agricultural extension up to the available productive base and needs in this regard.
- System of actions to be carried out (innovative solutions) and their cost (hierarchical), specified for each year to influence the weaknesses and barriers identified.
- Indicators for evaluating the impact of the introduction of science in food sovereignty and nutritional education that is the responsibility of the specific program.

The issues identified as priorities are: municipal food self-sufficiency; system of collection, benefit and commercialization for the supply to the population; development of local micro and mini industry; metrology, safety and health for food production; scientific-technical services for food production (includes agro-meteorology, technological surveillance and agricultural extension to the productive base); nutrition education and communication; efficiency in state and non-state business management; economic incentives and prices in food production; management of agro-industrial value chains; sociocultural studies linked to agro-industrial activity; computerization and automation of agro-industrial processes.

The learning that Pinar del Río is accumulating in terms of the territorial implementation of the SAN, through the SAL, helps to identify work approaches and management formulas that can eventually be used by other territories engaged in similar efforts.

Government management, supported by science and innovation, aimed at facing the great challenges that the country faces, seeks to strengthen decision-making at all levels and in all areas with the support of expert knowledge, while allowing experts to find more expeditious ways to advance their proposals.

Although it has important antecedents in the country, the construction of systematic links between governments and experts has not yet materialized with the expected breadth. The science-government relationship is not simple or linear. It is about building communication channels between actors who, although they share some objectives and values, have very different capacities, operate under different conditions and are carriers of dissimilar rationalities.

But there are very good examples. That of the confrontation with COVID 19 is one. The science-government link in various territories, particularly in Pinar del Río, is another.

In the SAN field, firm steps are being taken in the right direction. It is an experience, still young, that will mature over time as it is implemented as a relevant and strategic component in the public agendas of governments at different scales, as well as in their local public management instruments. The consolidation of the SAL, strongly articulated with the municipal and provincial development strategies, will also require an appropriate government leadership that manages to integrate all the local actors and performances of the ministries and organizations whose policies, decisions and work systems can help or limit the deployment of SAL.

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