PODIUM
Journal of Science and Technology in Physical Culture

UNIVERSITY EDITORIAL

Volumen 17
Issue 3
2022

University of Pinar del Río "Hermanos Saíz Montes de Oca"

Director: Fernando Emilio Valladares Fuente

Email: fernando.valladares@upr.edu.cu

ISSN: 1996–2452 RNPS: 2148
PODIUM Journal, September-December 2022; 17(3):1097-1108

PODIUM
REVISTA DE CIENCIA Y TECNOLOGÍA EN LA CULTURA FÍSICA

Translated from the original in Spanish

Original article

Diagnosis of the Science, Innovation, Technology and Environment System of Physical Culture and Sports

Diagnóstico del Sistema de Ciencia, Innovación, Tecnología y Medio Ambiente de Cultura Física y Deporte

Diagnóstico do Sistema de Ciência, Inovação, Tecnologia e Meio Ambiente de Cultura Física e Esporte

Osvaldo Vento Montiller[1*] https://orcid.org/0000-0001-9181-3813

Melix Ilisástigui Avilés[1] https://orcid.org/0000-0002-2564-8589

Mayda Losada Robaina[2] https://orcid.org/0000-0001-8439-8252

[1]National Institute of Sports, Physical Education and Recreation. Havana Cuba.

[2]University of Physical Culture Sciences. Havana Cuba.

[*]Corresponding author: barbar.lopez-chavez@inder.gob.cu

Received:2022-05-17.
Approved:2022-09-20.

How to cite item: Vento Montiller, O., Ilisástigui Avilés, M., Losada Robaina, M., Diagnóstico del Sistema de Ciencia, Innovación, Tecnología y Medio Ambiente de Cultura Física y Deporte/ Diagnosis of the Science, Innovation, Technology and Environment System of Physical Culture and Sports. PODIUM - Revista de Ciencia y Tecnología en la Cultura Física, 17(3), 1079-1093. Recuperado de https://podium.upr.edu.cu/index.php/podium/article/view/1358

ISSN: 1996–2452 RNPS: 2148
PODIUM Journal, September-December 2022; 17(3):1097-1108

ABSTRACT

Introduction: Cuba, immersed in a tenacious struggle for its identity and development since the beginning of the Revolution, set out to develop its scientific-technical potential. Today it can be talked about science at the National Institute of Sports, Physical Education and Recreation. This organization has a qualified scientific human potential, which directs its research in this branch and the satisfactory results that translate into medals are inescapable evidence. The established policy on science, which establishes the regulations and legal bases for the application of science, Technology, Innovation and the Environment, takes into account the state of the processes that comprise it.
Objective: To determine the causes and barriers that limit the functioning of the System of Science and Technological Innovation of Physical Culture and Sports (SCITMA of CFD) in Cuba.
Materials and methods: A group of methods and techniques were applied for this purpose (documentary analysis, Brainstorming technique, SWOT matrix, CAP survey, Ishikawa Diagram).
Results: These applied techniques revealed the causes and barriers that limit the functioning of the System of Science, Technology, Innovation and Environment of Physical Culture and Sports in Cuba, a result that allowed rationally anticipating and ordering the changes and actions required for this purpose.
Conclusions: The route for change was presented based on strategies with short- and medium-term goals, in which the minimum conditions for its implementation are established.

Keywords: Science; Diagnosis; Innovation; System; Technology.

RESUMEN

Introducción: Cuba, inmersa en una tenaz lucha por su identidad y desarrollo desde los inicios de la revolución se propuso desarrollar su potencial científico-técnico. Hoy se puede hablar de ciencia en el Instituto Nacional de Deporte, Educación Física y Recreación. Este organismo cuenta con un potencial humano científico calificado, que dirige sus investigaciones en esta rama y los resultados satisfactorios que se traducen en medallas son evidencia ineludible. La política establecida sobre ciencia, la cual instaura las normativas y bases legales para la aplicación de la Ciencia, Tecnología, Innovación y Medio Ambiente, tiene en cuenta el estado de los procesos que lo integran.
Objetivo: Determinar las causas y barreras que limitan el funcionamiento del Sistema de Ciencia e Innovación Tecnológica de Cultura Física y Deporte (SCITMA de CFD) en Cuba.
Materiales y métodos: Se aplicaron con ese fin un grupo de métodos y técnicas (análisis documental, técnica Brainstorming, matriz DAFO, encuesta CAP, Diagrama de Ishikawa).
Resultados: Estas técnicas aplicadas revelaron las causas y barreras que limitan el funcionamiento del Sistema de Ciencia, Tecnología, Innovación y Medio Ambiente de Cultura Física y Deporte en Cuba, resultado que permitió prever y ordenar con racionalidad los cambios y las acciones requeridas para tal fin.
Conclusiones: Se presentó la ruta para el cambio basada en estrategias con metas a corto y mediano plazo, en las que se establecen las condiciones mínimas para su implementación.

Palabras clave: Ciencia; Diagnóstico; Innovación; Sistema; Tecnología.

RESUMO

Introdução: Cuba, imersa em uma luta tenaz por sua identidade e desenvolvimento desde o início da revolução, se propôs a desenvolver seu potencial técnico-científico. Hoje é possível falar de ciência no Instituto Nacional de Esporte, Educação Física e Recreação. Este órgão tem um potencial humano científico qualificado, o que direciona suas pesquisas neste campo e os resultados satisfatórios que se traduzem em medalhas são provas inescapáveis. A política estabelecida sobre ciência, que estabelece as regulamentações e bases legais para a aplicação da Ciência, Tecnologia, Inovação e Meio Ambiente, leva em conta o estado dos processos que a integram.
Objetivo: Determinar as causas e barreiras que limitam o funcionamento do Sistema de Ciência e Inovação Tecnológica em Cultura Física e Esporte (SCITMA do CFD) em Cuba.
Materiais e métodos: Um grupo de métodos e técnicas (análise documental, técnica Brainstorming, matriz SWOT, pesquisa KAP, Diagrama Ishikawa) foram aplicados para este fim.
Resultados: Estas técnicas aplicadas revelaram as causas e barreiras que limitam o funcionamento do Sistema de Ciência, Tecnologia, Inovação e Ambiente de Cultura Física e Esporte em Cuba, um resultado que permitiu prever e ordenar racionalmente as mudanças e ações necessárias para este fim.
Conclusões: Foi apresentado o roteiro de mudança baseado em estratégias com metas de curto e médio prazo, no qual são estabelecidas as condições mínimas para sua implementação.

Palavras-chave: Ciência; Diagnóstico; Inovação; Sistema; Tecnologia.

INTRODUCTION

On February 23, 1961, by Law No. 936, the National Institute of Sport, Physical Education and Recreation (Inder in Spanish) was created, an institution in charge of making this right a reality, based on the creation and implementation of plans and programs of Physical Activity and Sport, and the creation of training centers for professionals to assume the social task.

Mederos (2013), refers that the Organizational System of Physical Culture and Sport It constitutes a particular and specific entity, the economic unit, which through an organization, combines different human, material and financial factors, in certain quantities for the production of sports services, with the aim of achieving certain goals. This system constitutes the structural support of the practices of physical and sports activities.

Since the creation of Inder, the Cuban sports movement has achieved levels of development in the international arena from the very conception of the Cuban System of Physical Culture and Sports, which in its beginnings drank from the source of the socialist countries (1960s- 70), which laid the foundations for the achievement of a human potential that knew how to concretize constitutional law.

In 1965-1966, the first analytical programs were developed, aimed at achieving specific objectives of the disciplines, based on pedagogical laws and didactic principles (Bequer *et al.,* 2013, p. 12) for the training of the Physical Culture professional.

Research in the area of sports was carried out fundamentally at the Higher School of Physical Education (ESEF in Spanish), in this center the coaches and teachers of the organization were trained.

Currently its mission, with a broader focus, in addition to the achievements in the sports sphere at an international level, seeks to raise the health and quality of life of the population based on the application of science, innovation and technology; aspect that is reflected in the strategy presented in the Council of State and Ministers of the Republic of Cuba in the year 2021, based on the National Strategy for Science, Technology and Innovation for the period 2011-2015.

In the Documents of the *7th. Party Congress approved by the III Plenum of the Central Committee of the PCC,* science, technology and innovation (CTI in Spanish), as stated by Díaz-Canel, (2020), constitute key elements in the advance towards the Vision of the Nation, including in the National Plan for Economic and Social Development (PNDES in Spanish) by 2030. Similarly, they are decisive in addressing the Sustainable Development Goals and the global 2030 Agenda. The available evidence shows that, although the Revolution has formed an important human potential and created significant scientific and technological capabilities, the effective use of that potential is far from adequate.

The management of strategies and foresight, as an unavoidable tool, facilitates planning in the Public Administration, as a phase of concretion of these strategies, which must ensure compliance with the Development Plan of the country (Barreiro and Díaz, 2013, p. 40).

It is through strategic planning recognized by the government in Cuba, that sports development is promoted. Montero (2014), maintains that strategic planning is a fundamental management tool to prevent and face crises that occur today, since it provides the techniques and instruments for the action of the Public Administration (Montero, 2014, p. 10).

It can be affirmed, then, that one of the essential "ingredients" that sustain the achievements that the Cuban sports movement shows today has been the role played by the application of science and advances in scientific-technical knowledge in the solution of the problems related to the fulfillment of the mission of the Cuban System of Physical Culture and Sports; this was closely related to the qualification of human resources, materialized in the training of the first PhD in science in countries of the socialist camp.

Thus, from the very beginning of the organization, multiple research was carried out that at first (in the 1970s) were mainly linked to the biomedical area applied to sports (morphology, physiology, psychology) and Social Sciences, later being incorporated (1980s) research in the areas of sports pedagogy, theory and methodology of training in different sports.

With the creation of the Ministry of Science, Innovation, Technology and Environment (CITMA) in 1976, science began to be organized and in 1996 the gradual implementation of the new System of Science and Technological Innovation began, which main purpose declared was to place the production of goods and services at its center, on the basis of efficiency and competitiveness, which would lead to a modern economy and its advantageous insertion in the international market (Núñez and Montalvo, 2013, p. 41).

Inder, as the governing body for the practice of Physical Education, Sports and Recreation, is linked to the CITMA policy and establishes actions to be carried out in priority areas for scientific-technological activity, particularly with regard to reaching or maintain the excellence and competitiveness of the services it offers.

And in 1998, the Science and Technological Innovation System for Physical Culture and Sports (SCITMA of CFD) was created at Inder, which strengthens science, aligned with the needs of the organization and the country's scientific policy. The results it shows support the actions of the organization on its social mandate, but there are still dissatisfactions of the organization, the population and the direction of the state, which threaten the sustainability of the achievements obtained and that require in their solution the application of Science, Innovation, Technology and the Environment from another perspective or form of organization, hence the need to update the System. Taking for it the importance of knowledge and its management. Castro (2001), states that, "Knowledge management is one of the most important organizational responsibilities today" (p.294).

The Cuban government, which since 1959 has always considered science an essential element of national development, has declared the need to have a Government Work System oriented towards Innovation and has promoted its discussion in the academic field (Díaz-Canel & Thin, 2020).

According to Rodríguez & Núñez (2021), the vision of survival or short-term, partly as a result of the economic adversities that the country has experienced, has limited the confidence of managers, officials and businessmen in science, technology and innovation (p.13).

But, without a question, knowledge, science, technology and innovation are key elements to advance development. However, it is important to underline the reciprocal connection between STI and development. On the one hand, STI are driving forces of economic and social development (Díaz-Canel, Núñez 2020, p. 4).

Currently the challenge is greater, when this organization is required as part of the Social Economic Development Policy of the country until 2030 (Pndes) to raise the quality of the offers to be offered to society, in such a way that it impacts the quality of life of Cuban men and women; as well as in the training of professionals and athletes with the corresponding improvement that this implies, in the organization itself. This cannot be achieved without a solid action from science, innovation, technology and environmental protection as axes of the Physical Culture and Sports System and of the culture of the organization.

In correspondence with the country's policy on territorial development and the decentralization of decisions in municipal governments (Díaz-Canel, *et al.*, 2020) it is prioritized the importance of the expression of the SCTI in the sectoral, territorial and local spheres as proposed by Arocena & Sutz (2020) and referred to by Rodríguez and Núñez Jover (2021).

UNIVERSIDAD DE PINAR DEL RÍO HERMANOS SAÍZ MONTES DE OCA
PODIUM
REVISTA DE CIENCIA Y TECNOLOGÍA EN LA CULTURA FÍSICA

In the analysis of the deficiencies and weaknesses detected both in the self-diagnosis made for the Work Balance of 2014, as well as in visits from the Ministry of Science, Technology, Innovation and Environment (CITMA) and in the review of the documentation prepared by the organization as legal support for the implementation of the CFD SCITMA, a dysfunction of the advisory bodies and control of scientific activity is detected, not achieving the full participation of the organization from its management to the base in the implementation of its system and the outputs of the same.

Regarding the problem raised, a contradiction is then established between the legal norm established by the CITMA, the needs of the organization in terms of the development, application and results of Science, Innovation, Technology, the partial ignorance of the causes and barriers that slow down the implementation of the system and the impact of the application of the current System of Science and Technological Innovation of Physical Culture and Sports (SCITMA of CFD) in Cuba.

The objective of this work is to determine the causes and barriers that limit the functioning of the System of Science and Technological Innovation of Physical Culture and Sports (SCITMA of CFD) in Cuba.

For the development of this research, the following documentary references that are part of the methods used were taken into consideration: (Hill & Westbrook, 1997; Chang & Huang, 2006; Lee & Lin, 2008)

MATERIALS AND METHODS

To determine the causes and effects impacting on the obsolescence of CFD SCITMA in Cuba, a strategic diagnosis was carried out that integrated the evaluation of the results of the techniques used, which allowed, from a greater depth and solidity of analysis, to establish the route of the desired change and the bases for the design of a strategy for the implementation of the mentioned system.

The main methods used for the development of the research were: the documentary analysis, being able through this method to collect an important volume of information on the investigated topic, the Brainstorming technique, and the knowledge, attitudes and practices survey (CAP), applied to specialists in diagnosis, which results allowed the construction of the Ishikawa diagram determining causes and sub -causes of the problem. The SWOT analysis (weaknesses, threats, strengths and opportunities) was also used in order to know the general state of the system and be able to make decisions based on it.

Both the difficulties indicated in the work balance of 2014, as well as the weaknesses indicated in the CITMA visit, were taken as a pre-diagnosis for the realization of this work and as a reference for contrasting with the approaches of specialists collected in the course of the research.

To determine the causes that gave rise to the problem studied, the criteria of nine specialists were taken, all related to the activity of Science, Technology, innovation and Environment and with responsibilities that allow them to be classified as such. Of them, four PhD, three Senior Researchers, the Director of Science and Technology of Inder,

the Vice President of Physical Culture of Inder, the Vice Chancellor of Research of the University of Physical Culture and Sports Sciences (UCCFD in Spanish), the President of the Examining Board of Sciences of Physical Culture, the coordinator of the former national program "Sport and Human Development" (today the Sectorial Program) and two methodologists from the Directorate of Science and Technology.

All were asked to express three problems that in their opinion affected the development and application of science, technology and the environment in the Cuban System of Physical Culture and Sports. From the answers to this question, 31 proposals were derived, which were analyzed and grouped by similar areas or problems. This made it possible to determine the six groups of main causes related to the problem to be solved *(Human Resources, Regulations, Innovation-Technology, Organizational, Intellectual Property and System).*

Subsequently, a second round of consultation was carried out and the 31 approaches were put to the specialists' consideration, to which were added some of those identified in the proposed pre-diagnosis and in the CITMA visit to Inder, so that they could carry out their analysis and propose of them, which ones, by vote, should finally stay based on the levels of coincidence that manifested in some of the proposals, for a total of 34.

The SWOT is an analytical method that emerged in the business world in the 1960s, and has quickly spread to other areas. It aims to analyze the main factors that imply a product, service or organization, in order to formulate action strategies for its improvement. Therefore, it is a tool of strategic thinking, valid for diagnosis and planning, and not a merely descriptive instrument.

Table 1 below shows the actions for the strategic diagnosis, as well as the indicators and expected results (Table 1).

Table 1. - Actions for the strategic diagnosis

Actions	Indicators	Expected results
Determination of the relationship and specific weight of the Communist Party of Cuba Guidelines that involve the Inder system and the objectives of its Conference with the problem to be solved. Determination of the causes and sub - causes of the problem. Determination of barriers to change, their weight and levels of difficulty. SWOT list	Internal environment: analysis of the internal functioning and performance of the organization External environment: operation of external organizations with which there are alliances, to carry out all the processes and that influence the strategy.	Determination of weaknesses Determination of threats Determination of strengths Determination of opportunities - Determination of barriers. Determination of the possible route for change.

UNIVERSIDAD DE PINAR DEL RÍO HERMANOS SAÍZ MONTES DE OCA
PODIUM
REVISTA DE CIENCIA Y TECNOLOGÍA EN LA CULTURA FÍSICA

RESULTS AND DISCUSSION

Cause and effect analysis

To determine the causes, the results of the work balance for the year 2014 were first taken into account, which were the basis for the renewal of SCITMA of CFD in Cuba. These results showed that there was a group of main difficulties in the operation of the system, which constituted barriers to the development of science, technology, innovation and the environment and the application of the aforementioned system; these were:

- Insufficient control and evaluation of the impact of scientific projects that contribute to sport for all and the sports strategy, which are executed with a minimum of resources.
- The potential offered by the Science and Technological Innovation Councils at different levels for solving the various problems faced by sport for all and high-performance sport is not fully exploited.
- The desired levels in linking scientific potential to the technological demands of sport for all and high performance are not achieved.
- In some cases, the process of determining technological demands does not reflect the crucial needs of sport and physical activity, which makes it difficult to specify offers for their solution.
- In the Management System, in some cases, the Boards of Directors do not project in their Theme Plan, the systematic analysis of the fulfillment and impact of the objectives and their indicators.
- The presence of collaborative projects has not yet reached the desired levels.
- Non-correspondence in all cases between demand and Technological supply.
- The number of personnel categorized as researchers is insufficient. according to the current demands of the scientific-technological development of the country: Project Management, Intellectual Property and Technological Management.
- The projection of the financial resources of the scientific projects is insufficient, due to the non-existence of cost centers and partial ignorance of the cost of the resources to be used in them.
- The introduction and generalization of results have not yet reached the required levels, not guaranteeing in all cases the closure of the cycle of science (R+D+I).
- The desired levels of stability and systematicity in the functioning of the Movements of the Juvenile Technical Brigades (BTJ in Spanish) and Innovators and Rationalists National Association (ANIR in Spanish) are not achieved.
- It is not possible to generalize the application of Law #38 for the stimulation of researchers and innovators.
- Stability in connectivity between centers with certified scientific potential has not been achieved.

- There is no record of the intangible assets of intellectual property of the subordinate entities.
- They do not make use of patent information during the different stages of the investigation.
- They do not *Intellectual Property and Confidentiality* clause in the Collaboration Agreements.
- Specialists and managers have not been trained in industrial property matters.

The work with the specialists allowed to determine the following causes, reflected in the Ishikawa Diagram.

The percentage distribution of the causes by area behaved with 22.5 % for the Organizational area, 20 % for Human Resources; on the other hand, the area of Innovation - technology had 17.5 % of related causes, the Protection of Industrial Property 15 % and a behavior of 12.5 % for the areas of System and Regulations; which showed levels of coincidence in 20 %, being the ones that were most related to the different areas, the non-implementation of Res. 15, 21 and 44 of the CITMA and the lack of integration and teamwork (Figure 1).

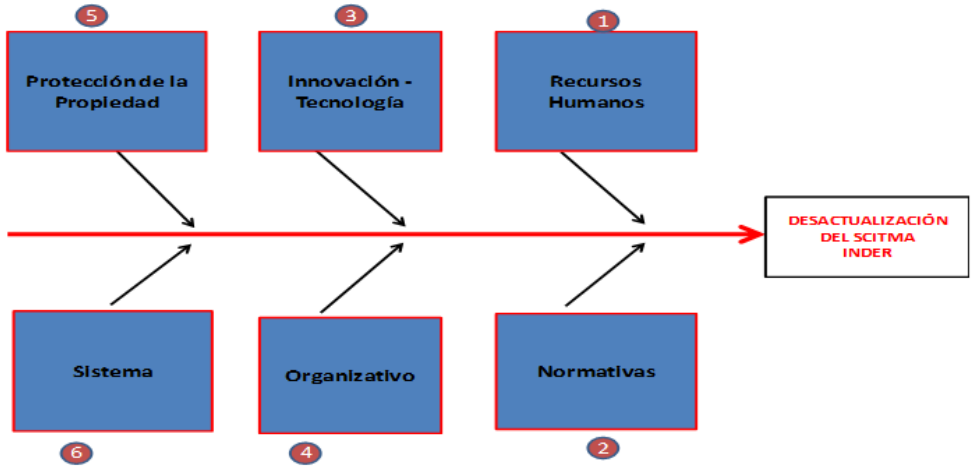

Fig. 1 - Ishikawa diagram

Barriers to the change

Once the causes and sub-causes that affect the obsolescence of the CFD SCITMA were determined, the specialists were once again resorted to and based on the analyzes carried out, an assessment was made of which of them had the greatest difficulty as barriers to change towards update of the system evaluated based on its dependence on knowledge, attitudes and practice- CAP (Table 2).

Table 2. - Results of existing barriers

Barriers of Knowledge, Attitudes and Practice. CHAP	20.58%
Lack of integration and teamwork.	
Frame insensitivity	
Schematic, formal and limited vision.	
Non-instrumentation of the current legislation of the CITMA	
Little scientific production.	
Lack of Incentive.	
Lack of managers capacity	
Practical Barriers. P	29.41%
Barriers of Knowledge and Praxis. PK	26, 47%
Practical Attitude Barriers. AP	17.64%
Knowledge Attitude Barriers. AC	2.94%
Practical Barriers. P	29.41%
Barriers of Knowledge and Praxis. PK	26, 47%

Table 2 shows the results obtained where of the 34 registered barriers, 20.58 % were recognized as the most complex for their overcoming, those of CAP; the practical barriers - P were the ones with the highest concentration (29, 41 %), followed by those where knowledge and praxis converge (26,47 %) - CP. Figure 2 shows more clearly the behavior of the identified barriers (Figure 2).

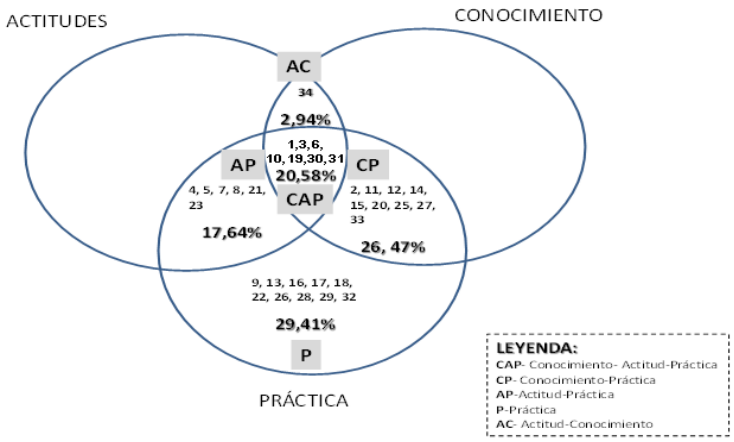

Fig. 2. - CAP diagram

SWOT list

Based on the analyzes carried out and the results obtained that allowed the determination of causes, sub-causes and barriers and their behavior trends, it was possible to support the bases of the SCITMA strategy, as a solution to the formulated problem, however, the experts for the analysis of the internal and external scenarios in which the work of the CFD SCITMA will be carried out, after studying the scenarios

declared in the strategies of the three key result areas of the Inder system (high-performance sports, sports for all and training of human talent) and from the use of the Brainstorming technique, make a list of the weaknesses, threats, strengths and opportunities of this system. To do this, the proposals were listed, after listing the barriers, which were finally voted upon once drafted, leaving those with the highest level of coincidence.

A total of 20 weaknesses, six threats, 11 strengths and eight opportunities were determined; analyzing that anticipating in advance the changes to be made in a planned, orderly and rational manner will be able to reverse the determined weaknesses and minimize the threats with the search for new opportunities, and, thereby, achieve greater efficiency and relevance of the system, for which the path The most appropriate would be the determination of the bases of a future strategy for the operation of the SCITMA of CFD, taking into account what Fidel raised in the *VI National Forum of spare parts* when he stated that " abandoning or forgetting about science is a mistake" (Castro, 1991).

Weaknesses

- The legal basis for compliance with the CITMA regulations has not been implemented and updated.
- Insufficient organizational culture.
- Non-correspondence in all cases between technological demand and supply.
- Dysfunction of the advisory bodies (Technical Advisory Councils)
- Partial dysfunctionality of SCITMA
- Closing the cycle of science (R+D+I) is insufficient.
- Insufficient moral and material recognition of human resources.
- Little access to advanced technologies and the Internet.
- Obsolescence and deterioration of existing equipment and media and facilities
- Aged scientific potential
- Decrease in scientific potential.

Roadmap for the change

According to results of the 3rd. National Innovation Survey of the Republic of Cuba, only 50 % of the companies surveyed have a strategic projection for CTI.

The use of Technical Advisory Councils is incipient in companies and Superior Organizations of Business Management, while more than half of those that work in OACE and National Entities are of recent creation. Numerous ministries weakened their science attention structures during their reorganization processes and decreased sectoral financing for CTI activities (Rodríguez and Núñez, 2021).

Predicting the modifications to be made in the organization for its development should be based on future projection, modeling which is the organization to which it aspires and which ones, how, magnitude and in what time to make the changes for that purpose, this will trace the path to bring about successful change. Sorolla *et al.* (2016), address the few occasions in which the changes to be made in the organization are foreseen, determined and studied, which minimizes the perception of their effects; therefore, the elaboration of a change route map is required, since this is "... *a tool that describes the destination of the change, the possible paths to follow and the possible travel companions that will accompany the change.*"

Sánchez & Calves (2015), citing Calves & Gutiérrez (2013), state that what is sought with state policies, laws and legal regulations is to generate growing and sustainable levels of economic and social development that have repercussions on the quality of life of society, in the consolidation of independence and national sovereignty (Calves and Gutiérrez, 2013: 5-9).

It is started for the change of the existing context, in which the non-application of the CITMA legal norm is presented by means of an internal legal basis; the non-implementation and obsolescence of the Internal Industrial Property System, insufficient scientific potential and partially ineffective in its performance, insufficient support and scientific, innovative and technological contribution, dysfunctionality of the SCITMA, dysfunction of the advisory and control bodies, lack of organizational culture, low participation and poor information management (Figure 3).

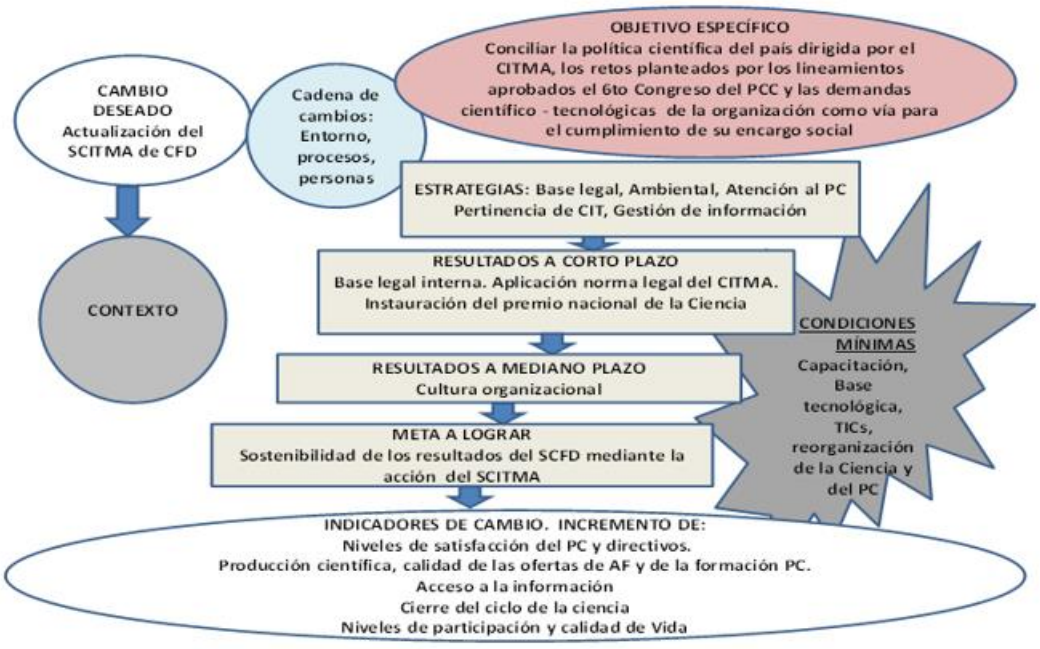

Fig. 3. - Road map for change

CONCLUSIONS

The causes of the obsolescence of the SCITMA of Physical Culture and Sports in Cuba were centered on Human Resources, Regulations, Innovation and Technology, Organization, Industrial-Intellectual Property and the functioning of the system.

Of the sub -causes, the ones with the greatest incidence in the obsolescence of the SCITMA of Physical Culture and Sport correspond to: the lack of a political platform, non-implementation of the current legislation of the CITMA, lack of integrality and coherence in the functional and organizational structure, dysfunction of advisory and control bodies, insufficient control and evaluation of the impact of research projects, failure to close the cycle of science, low participation and lack of integration and teamwork.

Thirty-four barriers to the change were determined, having their highest concentration in practices with 29.41%, in the conjunction of Knowledge-Practice and Attitude-Practice with 26.47 % and 17.64 %, indistinctly, which is indicative of: disorganization of the management of science, partial immobility in the activities of the organization with respect to CITMA, not seeing in it the possibility of change, there has been no change in mentality.

The route for change is presented based on strategies with short and medium-term goals, in which the minimum conditions for its implementation are established.

REFERENCES

Arocena, R., & Sutz, J. (2020). The need for new theoretical conceptualizations on National Systems of Innovation, based on the experience of Latin America. *Economics of Innovation and New Technology*, *29*(7), 1-16. https://doi.org/10.1080/10438599.2020.1719640

Barreiro, L. y Díaz, I. (2013): "Estrategia, prospectiva y planificación en la Administración Pública". Problemas de la gestión en Administración Pública". ESCEG, La Habana.

Bequer Díaz, G., Pascual Liermo, A., Ramos Puig, A., & Berroa Savigne, M. (2013). Historia de la Educación Física en Cuba. *Revista Electrónica Actividad Física y Ciencias*,*5*(1). http://revistas.upel.digital/index.php/actividadfisicayciencias/article/view/5594

Calves, S. y Gutiérrez, O. Gutiérrez (2013) "Conceptos básicos de la Administración Pública". Problemas de la gestión en Administración Pública". ESCEG, Empresa Editorial Poligráfica Félix Varela, La Habana.

Castro Díaz-Balart, Fidel (2001). Ciencia, innovación y futuro. Ediciones Especiales, Instituto Cubano del Libro. https://books.google.com.cu/books/about/Ciencia_innovaci%C3%B3n_y_futuro.html?id=RxiyAAAACAAJ&redir_esc=y

Chang, H. H. & Huang, W. C. (2006). Application of a quantification SWOT analytical method. Mathematical and ComputerModelling, 43(1), 158-169. https://www.sciencedirect.com/science/article/pii/S0895717705004796

Sorolla Fernández, I., Gutiérrez Castillo, O. y Calves Hernández, S. (2016). Problemas de gestión en la administración pública. Plaza de la Revolución, Cuba: Empresa Editorial Poligráfica Félix Varela https://www.researchgate.net/publication/317588252_Problemas_de_la_gestion_en_la_Administracion_Publica_Problems_of_the_management_in_the_Public_Administration

Díaz-Canel Bermúdez, M. (2020). Modelo de Gestión del gobierno orientado a la innovación. *Revista Cubana de Administración Pública y Empresarial*, *4*(3). https://apye.esceg.cu/index.php/apye/article/view/141

Díaz-Canel, M., & Delgado, M. (2020). Modelo de Gestión del gobierno orientado a la innovación. Revista Cubana de Administración Pública y Empresarial, 46(1). https://apye.esceg.cu/index.php/apye/article/view/141

Díaz-Canel Bermúdez, Miguel Mario, Núñez Jover, Jorge, & Torres Paez, Carlos Cesar. (2020). Ciencia e innovación como pilar de la gestión de gobierno: un camino hacia los sistemas alimentarios locales. Cooperativismo y Desarrollo, 8(3), 367-387. http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2310-340X2020000300367

Díaz-Canel Bermúdez, M., & Núñez Jover, J. (2020). Gestión gubernamental y ciencia cubana en el enfrentamiento a la COVID-19. Anales de la Academia de Ciencias de Cuba, 10(2), e881. http://www.revistaccuba.cu/index.php/revacc/article/view/881/887

CITMA (2011). Estrategia Nacional de Ciencia, Tecnología e Innovación para el periodo 2011-2015. La Habana: CITMA; 23p.

Hill, T.& Westbrook, R. (1997). SWOT analysis: it's time for a product recall. Long Range Planning, 30(1), 46-52. https://www.sciencedirect.com/science/article/abs/pii/S0024630196000957

Lee, K. L. & Lin, S. C. (2008). A fuzzy quantified SWOT procedure for environmental evaluation of an international distribution center.InformationSciences, 178(2), 531-549 https://www.sciencedirect.com/science/article/abs/pii/S0020025507004161

Mederos, I. G. (2013). El sistema organizativo de cultura física y deporte en Cuba. Un sistema complejo. EFDeportes. com. *Revista Digital*, *17*, 178. http://revistaciaf.uclv.edu.cu/index.php/CIAF/article/download/42/39/

Montero, G. (2014): "Planificación estratégica gubernamental: desafíos para América Latina". ENAP. Brasilia.

Núñez Jover, J., & Montalvo Arriete, L. F. (2013). La política de ciencia, tecnología e innovación en la actualización del modelo económico cubano: Evaluación y propuestas. *Economía y Desarrollo*, *150*(2), 40-53. https://www.redalyc.org/pdf/4255/425541208003.pdf

Rodríguez Batista, A., & Núñez Jover, J. R. (2021). El Sistema de Ciencia, Tecnología e Innovación y la actualización del modelo de desarrollo económico de Cuba. Revista Universidad y Sociedad, 13(4), 7-19.

http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2218-36202021000400007

Sánchez Vignau, B. S. y Calves Hernández, S. (2015), La planificación estratégica gubernamental en la gestión de la administración pública cubana: nuevos escenarios, nuevos aprendizajes. Revista Cubana de Ciencias Económicas-KOTEMAS-1(2) RNPS: 2429. ISSN 2414-4681. https://www.ekotemas.cu/index.php/ekotemas/article/view/42

Conflict of interest statement:
The authors declare that there are no conflicts of interest.

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