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Original article

Impact of the constructivist model to manage university innovation in sport

Impacto del modelo constructivista para gestionar la innovación universitaria en el deporte

Impacto do modelo construtivista para a gestão da inovação universitária no desporto

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ABSTRACT

Innovation by projects is considered one of the main sources of impact of science and technology, however, the valuation of these is a problem, not yet fully resolved, despite the efforts made by different researchers and organizations, this reality does not escape the sports organizations. The aim of this article is to assess the impact of innovation by projects, managed by the Faculty of Physical Culture of Granma, from a constructivist model. The research required empirical methods such as the review of official documents, observation and interview, as well as the multivariate graphic method and arithmetic procedures; the latter allowed the impact of the innovations to be evaluated as favourable, relevant, sustainable and with performance in the saturation phase, five years after the financial execution of the projects used as a sample was concluded.

Keywords: impact of science; university management of innovation; innovation by projects; sports organizations.

RESUMEN

La innovación por proyectos es considerada una de las principales fuentes de impactos de la ciencia y la tecnología, sin embargo, la valoración de estos constituye un problema, aún no resuelto en su totalidad, a pesar de los esfuerzos realizados por diferentes investigadores y organizaciones; a esta realidad no escapan las organizaciones deportivas. El objetivo del presente artículo es valorar el impacto de la innovación por proyectos, gestionados por la Facultad de Cultura Física de Granma,

desde un modelo constructivista. La investigación exigió métodos empíricos como revisión de documentos oficiales, la observación y la entrevista, así como el método gráfico multivariado y procedimientos aritméticos; estos últimos permitieron valorar el impacto de las innovaciones como favorable, relevante, sostenible y con rendimiento en fase de saturación, cinco años después de concluir la ejecución financiera de los proyectos usados como muestra.

Palabras clave: impacto de la ciencia; gestión universitaria de la innovación; innovación por proyectos; organizaciones deportivas.

RESUMO

A inovação por projetos é considerada uma das principais fontes de impacto da ciência e da tecnologia, porém, a valorização destes é um problema, ainda não totalmente resolvido, apesar dos esforços feitos por diferentes pesquisadores e organizações, esta realidade não escapa às organizações esportivas. O objectivo deste artigo é avaliar o impacto da inovação por projetos, geridos pela Faculdade de Cultura Física de Granma, a partir de um modelo construtivista. A investigação exigiu métodos empíricos como a revisão de documentos oficiais, observação e entrevista, bem como o método gráfico multivariado e procedimentos aritméticos; estes últimos permitiram avaliar o impacto das inovações como favoráveis, relevantes, sustentáveis e com desempenho na fase de saturação, cinco anos após a conclusão da execução financeira dos projetos utilizados como amostra.

Palavras-chave: impacto da ciência; gestão universitária da inovação; inovação por projetos; organizações desportivas.

INTRODUCTION

University innovation takes shape through the use of new or renewed products, processes or services and their impact on the territories, in the first instance. Universities are a key player in scientific advice and development because of their high-level research and training capacities. However, the assessment of the impact of their results is still a pending subject despite the efforts of researchers and organizations such as Salas (2009); Castro (2002); NC ISO 10006:2007; Barroso (2012); Lozano and Menéndez (2012); Citma (2014); Batista and Pérez (2012); Fernández de Castro and López, (2014) and RYCYT (2017).

In the same vein, in the systems of science, technology and innovation indicators, work has been constant and has evolved at regional levels. Attempts have been made to standardize them to establish comparisons at the country level without total success (RYCYT, 2017). In Cuba, the system of programs and projects for science, technology and innovation has had specific regulations that support and guide management towards obtaining results, establishing a nomenclature for the classification of project impacts as a fundamental form of organizing science, which is a great advance (Fornet, Martínez, Martín y Reyes, 2017).

Yet, in these guidance documents, they have little consistency with respect to impact assessment and relevance. Since they are mainly funded by the government, satisfaction is sought for the financier, not for clients and users, who are only asked for their opinion. Therefore, the current structure facilitates operational successes, which are indispensable but not strategic (Fornet, *et al.,* 2017).

Cuban sports organizations are no exception, despite the projection of the National Institute of Sports, Physical Education and Recreation (Inder) and the development of a coherent system of changes to enhance sports results, through scientific and technological activity.

Assessing the impact of university innovation on sporting activity in Cuba, where conditions and needs are shown from the social point of view and the lack of a consolidated body of indicators, is novel, and demands that this objective be undertaken from autonomous positions.

This article aims to disseminate to the scientific community the assessment of the impact of innovation by projects, managed by the Faculty of Physical Culture of Granma, from a constructivist model. To this end, it is structured on the basis of a brief commentary on the methods applied, followed by the development of two chapters; in the first, a necessary and brief theoretical foundation on the impact of innovation by projects, and in the second, the assessment of the impact of innovation by projects at the Faculty of Physical Culture in the province of Granma. The impact of the model was assessed as favourable, sustainable, relevant and in the saturation stage.

MATERIALS AND METHODS

The innovation was selected by projects in the field of sports performance, managed by the Faculty of Physical Culture in the province of Granma, from a constructivist perspective, with a financial execution framed in the period between January 2011 and December 2012. It was developed in terms of "impact evaluation" (five years after the end of the financial execution of the projects) from January 2013 to January 2018.

Among the empirical methods, the review of official documents available at the Faculty of Physical Culture, in the files of the eight innovation projects for sport, stands out. In addition, the databases of the Provincial Centre for Information Technology were consulted.

Finally, the conversational (unstructured) interview with the members of the sports organizations that participated in the first phase of the research in which the model was implemented, through the associated procedure, to assess their levels of satisfaction, based on their expectations.

The multivariate graph as a statistical procedure that allows visualizing the results of several variables and assuming trends without great statistical complexities. Was used through the Microsoft Excel 2016 program as a fundamental computer tool, as well as the linear correlation, by means of Spearman's coefficient (Cuesta and Valencia, 2015) to correlate the performance in sports with and without direct influence of the projects.

RESULTS AND DISCUSSION

Brief theoretical basis of the procedure to assess the impact of university innovation by projects

The starting point was to consider university research as a space for scientific projects of great risk and potential return. According to De Castillo (2017), sometimes university research teams are unaware of the value generated by innovation and

concern about the degree of participation of the results and their fair distribution among those involved continues to be a major issue.

On occasions, university research teams present situations where the value generated by an innovation, the ways in which it is commercialized and the ways in which it is effectively negotiated with the national and international business system are unknown. The concern about the degree of participation of the results of the final commercialization of an innovation and its fair distribution among those involved continues to be a very important issue.

Consequently, the definition of expected impact, disclosed by the Ministry of Science, Technology and Environment (2014), is assumed in the Methodological indications for the activity of science, technology and innovation programs and projects, as it is considered to be:

> "estimated quantification of the change that is expected to be produced in the scientific, economic, political, social, technological, environmental or other field considered (Citma, 2014 p.22).

The evaluation of the impact of the results of science and technology has been the subject of several designations over time. In the context of the present research, the classification disclosed by the authors Barroso (2012); Fornet *et al.,* (2017), was assumed to be that which is carried out three to five years after the financial execution of the projects has ended.

According to Serrano, Alarcón, Moreno, Fornet and González (2019) in Cuba, not all project results in sport are associated with economic or direct benefits; therefore, their impacts can be assessed through benefits that are sometimes indirect, intangible or subjective and are qualified with adjectives on prestige or recognition. The practice of sport in Cuba is carried out, fundamentally, with the objective of satisfying the needs of health, education, recreation, culture and communication with the people, which constitute an achievement that cannot be renounced in spite of the transformations in this globalized world.

According to Fornet *et al.,* (2017) innovation projects are carried out with the aim of solving the problems identified in social priorities in order to obtain impact and contribute to the solution of the problems that determined their implementation. They are the basic cell for the organization of the Cuban Science and Innovation System and offer an appropriate context for measuring their impact.

Serrano, *et al.,* (2019) state that, in the last decade, several Cuban authors have developed their research with respect to the evaluation of project results, however, they have limited themselves to the exante, effect, and conclusive phase and have not developed in their studies the process of evaluation in the four fundamental moments (exante, adinterim, expost and impact) in sports activity in particular. Each of these authors provides the essential elements for the evaluation of the innovation management process in all its dimensions.

These authors Serrano *et al.,* (2019) designed a procedure to assess the impact of university innovation projects on sport, which is based on the referenced authors and international standards, which made it possible to contain the essential elements for assessing the impact, such as:

1. Coherent results in core and structure,
2. According to the clients, users or beneficiaries.
3. Needs, in correspondence with research and development priorities.
4. Well-defined social or commercial use.
5. Compliance with the country's science, technology and innovation regulations and indicators.
6. Particularities of the new or renewed processes, products or services that are generated in or by the university organizations.
7. It uses performance and perception indicators.
8. Particularities of the technology performance cycle in the form of that, with the successive phases of emergence, growth, maturity and saturation.
9. Demonstrative, orienting, motivating and integrating effect of science.

For a better understanding, the activities foreseen in the step-by-step procedure are set out below:

Step 1. Contextualization of the impact assessment

Activities

1. Determination of the general objective of the valuation.
2. Selection of organization, period, projects and sports.
3. Evaluation and assurance of the premises in the organizations involved.
4. Determination of the sources of information and tools.

Step 2. Valuation using perception indicators

Activities

1. Development of the conversational interview guide.
2. Selection of the interviewees.
3. Application of the interview.
4. Processing of the interview.

Step 3. Valuation using performance indicators

Activities

1. Standardization of performance.
2. Location and analysis of performance indicators.
3. Analysis of the fulfilment of the objective.

In the specific case of the model designed by Serrano, González, Fornet, Ramírez and Lahera (2017), they consider the university management of innovation by projects in the Cuban sports context, with a predominantly constructivist psychological positioning, as:

> (...) the conscious influence of some people on others in an appropriate environment, which favours the emergence of their skills and the integration of university processes in terms of generating and applying new or adapted products, processes and services based on problems, opportunities, ideas and knowledge through relevant and effective

> projects, in a social scenario mediated by activities for the purposes of competition and athletic development (p.86).

In this model, Serrano *et al.,* (2015), assume the constructivism as that model that maintains and develops the person, both in the cognitive, social and affective aspects of behavior; it is not a mere product of the environment nor a simple result of its internal dispositions, but a construction of its own that is produced day by day as a result of the interaction of these two factors with a predominantly constructivist psychological positioning.

For their part, Serrano, Moreno and Fornet (2017) designed and applied a procedure associated with the model, which conceived from the very process of identifying and planning the projects, the expected impacts with a nomenclature of impact in accordance with the methodological indications in force in the original country, Citma, (2014) and the particularities of the sports activity. This research carried out an exante evaluation, implicit in the phase of identification and planning of the projects, another one of process (adimterim), during the execution and control of the results and an evaluation of effect when concluding, the ex post evaluation was developed three years after the conclusion of the financial execution. However, it has not developed the necessary impact assessment to close the model evaluation cycle developed.

The model implemented facilitates the development of the evaluation process, since the evaluation of the impact of the innovation must be in correspondence with the objectives proposed by projects, the level of satisfaction of the clients and the priorities declared in the original program, besides considering the following elements: current legislation, particularities of the new or renewed processes, products or services that are generated in or by the university organizations, indicators of performance and perception, particularities of the cycle of performance of the technology, as well as the effect that produces the knowledge of the impact of the research.

Application of the procedure for assessing the impact of innovation by projects at the Faculty of Physical Culture in the province of Granma

In this section, the assessment of the impact of innovation by projects in the Faculty of Physical Culture in the province of Granma is presented as the selected organization. This university organization has a set of characteristics that favor the application of the procedure.

The impact evaluation was developed, starting from the introduction of the projects' results in the practices of sport activity, as medium and long term changes that occur in scientific and technological knowledge, production of goods and services, social processes or in the environment, as a consequence of the projects' execution, starting from the following steps and activities.

The objective was to assess the impact of the projects carried out by the Faculty of Physical Culture in Granma, from a constructivist perspective, using perception and performance indicators to inform science and innovation managers of the degree to which results have been obtained, as a way of motivating all those involved in the innovation process and contributing to the integration of the entities.

Activities 2 and 3. Selection of organization, period, projects and sports and evaluation and assurance of the premises in the organizations involved

These two activities were developed simultaneously because of the great relationship expressed in the process). The Faculty of Physical Culture in Granma was selected because this university organization has a set of characteristics that favor the application of the procedure, among which the following can be mentioned:

- In its strategy, there is a commitment to the sporting results of the territory, explicit in its mission, which consists of training professionals committed to the Cuban project, guaranteeing scientific production and postgraduate improvement, through a strengthened universalization process, a faculty with scientific level and pedagogical experience. In addition, it exposes as a vision, to be a leader in the consistent application of the scientific and technological policy that facilitates the satisfaction of the demand of Science and Technological Innovation of the Inder (National Institute of Sport and Physical Culture); therefore, the effectiveness of the innovation is a social demand.
- In the period from January 2011 to December 2012, it managed the financial execution of eight innovation projects in the sports sphere, in the different explicit denominations in the model for the management of university innovation by projects in the sports context; therefore, it facilitates the evaluation of the impact of this model through the different phases of the process, since the five years necessary to evaluate the impact of the technology in all its extension have passed.
- In this organization, there are other necessary premises for the application of the procedure among which we can mention: commitment of the Faculty management and the Inder, availability of specialists with previous knowledge and experience, as well as valid, reliable information available in the databases of the territory.
- The "impact evaluation" was developed five years after the end of the financial execution of the projects, so the process began in December 2017, taking as a time of evaluation the sports results and the university, from the academic year 2012-2013 to 2017-2018.

Activity 4. Determination of information sources and tools

For each of the subsequent steps, the main sports clients, composed of sports system officials and coaches, were identified as sources of information, and as a fundamental instrument for perception indicators the conversational interview for the first step. For the second step, the main source of information was determined to be sports performance statistics, since this expresses the result obtained in a valid, reliable, verifiable and affordable way, which will facilitate further research, in greater depth.

Step 2. Valuation using perception indicators

Activity 1. Elaboration of the conversational interview guide

The guide for the interviews focused on the level of satisfaction of the main sports clients, in three moments: a first moment with the presentation and assessment of the state of mind of the interviewees; a second moment of establishing a positive emotional bond and a brief reminder of the projects and the context where they were implemented; for this purpose, the names of the project managers and their main participants were used as a reference and, finally, the questions associated with the level of satisfaction with the results.

The main questions asked were:

- Do you remember the project managed by (...) in the year (...)?
- Are the results of that project currently being applied?
- Are you satisfied with the changes that were introduced as a result of that project?
- Are the technologies applied currently being used?
- Why are they currently applied?
- Why are they not currently applied?
- What changes were made to you? Are these changes substantial?
- Are you satisfied with the results of these projects?

This last question should be asked in different ways, taking into consideration the culture, timing, vocabulary and mood of the interviewees.

Activity 2. Selection of interviewees

Three officials from the National Directorate of Inder, three officials from the Provincial Management of Sports and eight coaches (one for each selected sport) were selected. This sample was selected and considered to be associated with the research activity at the time of financial execution of the projects and are still working in the organization.

Activity 3. Application of the interview

The interview was conducted individually, based on the disposition and mood of the interviewees. It was not possible to interview the athletes because one of the selection criteria of the interviewees is their permanence in the organization during the whole analyzed period and this was not possible; likewise, no family members were interviewed.

Activity 4. Interview processing

The results were tabulated according to the criteria stated by the interviewees, the following categories:

Unsatisfied: clients who said they did not perceive the introduction of the project results, considered them to be of poor quality or with counterproductive results. Satisfied: clients who considered the introduced results with impacts, according to the expected ones and the conditions in which they were performed. Pleased: clients who stated that the performance was better than expected, that is, it exceeded their expectations and was sustainable over time.

In table 4, several results are clearly shown; the first one is that the three directors of the National Sports Institute say they are pleased with the results obtained since they exceeded their expectations. In the criteria of the interviewees, there were evident results, from the quantitative point of view, among which we can list:

1. The sustained increase in national sport and the achievement of the title in the national series for two consecutive years.
2. The improvement of the position in the national school games.
3. The recent results obtained by the athletes of the province in the most important competition of the year (Central Americans of Barranquilla).
4. The international results obtained in weights, cycling.

5. The satisfactory evaluations obtained systematically in the controls developed at national level, in the areas of teaching and research.

In the interview with the directors of the Provincial Sports Management in Granma, they expressed their satisfaction with some of the projects and are pleased with others, however, they emphasize that not all the projects obtained the expected results, therefore, their results were not introduced into sports practice. With respect to the improvement and preparation activities of coaches and officials, they did show clear satisfaction, with a tendency to be complacent.

With regard to the coaches, they largely coincide with the criteria set out by the officials, whose favorable criteria show a certain degree of satisfaction with the performance of some projects and dissatisfaction with others. Although they consider that the activities that were implemented as part of these projects are not currently being carried out. They also insist on the negative impact of the changes that have been perceived as a consequence of the structural modifications made, which currently consider the Faculty of Physical Culture as an organization of the Ministry of Higher Education and not of the Inder system, although it maintains the social objective and its functions without substantial change.

This allowed us to affirm that the degree of satisfaction of the main coaches and officials interviewed as a sample of the main clients of the new or renewed products, processes or services, resulting from the projects executed in the period analysed, is very high with a modal value of complacency, since the performance obtained exceeded their expectations (Table 1).

Table 1. - Level of satisfaction of the main sports clients interviewed

Project	Planned impact on projects by sport	INDER officials			Officials Provincial Management			Coaches								Moda
		1	2	3	1	2	3	1	2	3	4	5	6	7	8	
1	1 a)	C	C	C	C	C	C	C	_	_	_	_	_	_	_	C
	1 b)	C	C	C	C	C	C	C	_	_	_	_	_	_	_	C
2	2 a)	S	C	C	C	C	C	_	C	_	_	_	_	_	_	C
	2 b)				I	I	S		C							I
	2 c)	_	_	_	C	C	C	_	C	_	_	_	_	_	_	C
3	3 a)	_	_	_	S	I	S	_	_	S	_	_	_	_	_	S
	3 b)	_	_	_	C	C	S	_	_	C	_	_	_	_	_	C
4	4 a)	_	_	_	I	S	C	_	_	_	I	_	_	_	_	I
	4 b)	_	_	_	C	C	S	_	_	_	C	_	_	_	_	C
5	5 a)	_	_	_	I	S	I	_	_	_	_	I	_	_	_	I
6	6 a)	_	_	_	S	I	I	_	_	_	_	_	S	_	_	I
	6 b)	_	_	_	I	S	S	_	_	_	_	_	S	_	_	S
7	7 a)	C	C	C	C	C	S	_	_	_	_	_	_	C	_	C
	7 b)	_	_	_	S	S	S	_	_	_	_	_	_	S	_	S
8	8 a)	_	_	_	S	S	S	_	_	_	_	_	_	_	C	S
	General valuation (Mode)	C	C	C	C	S	S	C	C	S	S	I	S	S	C	C

Legend: I: Unsatisfied ; S: Satisfied ; C: Pleased
Source: Conversational interview with major sports customers

These elements, although valuable, are not conclusive in demonstrating that the management of university innovation, from a constructivist perspective, was effective in the applied organization. For this reason, the assessment was developed on the basis of performance indicators, which is set out in the following step.

Step 3. Valuation using performance indicators

Activity 1

This assessment began with performance standardization. For this purpose, a variable was identified that integrates the results of the different projects in terms of priorities established in the institutional program that integrates the projects and the sports strategy of the territory. In accordance with this, the number of points obtained in the national school games was determined as a fundamental variable, based on the contribution to the following priorities:

a) Methodologies for sports preparation, with emphasis on the development of strength in the prioritized sports.
b) The development of the sports show as an achievement of the Revolution.
c) Improvement of the didactic activities, direction and management according to the school sport.
d) Identification of sports potentialities in the communities.

This variable was determined by means of a conversational interview with twenty-two direct clients of the projects. These are broken down as follows: three officials from the Inder, three officials from the Provincial Sports Management, eight professionals from the original university (members of the projects) and eight coaches from the selected sports.

This instrument applied allowed to confirm several elements of the model designed; the first result was to corroborate the multifactorial, multidisciplinary character of the sports results. The other result is the perception of sports results, as stated by the interviewees, by confirming that in the case of Cuba, sports results exceed the limitations of the models that emphasize championism.

It also emphasizes a level of satisfaction with some projects and a state of complacency with others, which ratifies the evaluation of the effect and outcome of the model, set out in the publication "Procedimiento para la gestión de la innovación por proyectos en organizaciones deportivas" by the authors Serrano, Moreno and Fornet (2017).

With regard to the variable selected, the criterion was ratified in several of them, that it is very difficult to assess the impact of the projects implemented by means of a single variable; therefore, some of them (three), did not decide on any quantitative indicator. The rest agreed that the results obtained in school sport over the last eight years and their behavior in terms of scores were the main indicators of sporting development in the territory. Some of the criteria used by them refer to the fact that school sport shows all the priorities established for the period. From that perspective, the interviewees agree that the points obtained by the province in the national school games are associated with the development of strength in the athletes, the achievements of the Revolution, the identification of potentialities, which could have a synergic influence and, therefore, integrate in some way the sports results of the territory.

Another of the elements considered to assume such a statement is that these results show the sports development of the projects in an explicit way, since it was in the Eide and the academies of the territory where the execution of the projects used as a sample in the study was concentrated.

Activity 2

The variable identified was shown in a table with the results in points obtained, by school year. The score was broken down into two groups, the first group showing the results in the sports in which the projects were implemented, and the second group showing those that were not directly influenced by the projects. In addition, the percentage of each was calculated by year (Table 2).

Table 2. - Score obtained by the province of Granma in the school games of 2010 to 2018. According to sports with projects and without projects

Points scored by school years	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Total	276	285	328	334	352	343	345	367
Sports with direct project influence (9)	88.0	107.0	111.0	116.0	135.0	117.0	122.0	126.0
Percentage by sports with direct influence of the projects	31.9	37.5	33.8	34.7	38.4	34.1	35.4	34.3
Sports without direct project influence (17)	188.0	178.0	217.0	218.0	217.0	226.0	223.0	241.0
Percentage for sports without direct influence of the projects	68.1	62.5	66.2	65.3	61.6	65.9	64.6	65.7

Source: Provincial Sports Management Granma.

The first thing that could be established is that the sports in which the projects were managed, at the beginning of the investigation, only contributed 88 points, representing 31,9 % of the points obtained; at the end of the analysis period they contributed 149 points for 38,7 %. This shows a positive and significant change in these sports and is even more relevant if one considers that at the time of the initiation of the investigation they were in ninth place per province and in the last three years they have been in third place, above 13 provinces in the territory.

The sustained change over time can be assessed; each year the province increased the score with respect to the previous year, however, it can be seen that in the years 2016 and 2017 there was a decrease as the first evidence of a technology in a state of saturation; therefore, it shows the possibility of new technologies or of introducing changes in some of them, based on the specific results of each sport.

The management is clearly defined as effective, as well as the ex-post evaluation, however, the impact of the projects, in general, is questionable and shows a tendency towards the saturation phase, from year six of application (2016).

The evaluation of the impact of the projects, in general, measured through the performance obtained in the main indicator selected, shows a high relationship in correspondence with the performance cycle of the technology in the form of that one. In figure 1, the clear analogy between the two performance curves can be seen, which is evidence of the relationship between the results obtained in sports with respect to the main performance indicator selected (Figure 1).

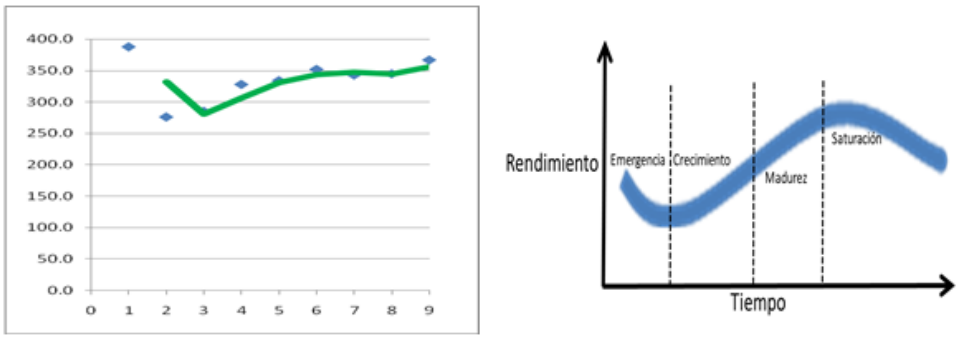

Fig. 1 - Number of points obtained in the school national games of the last nine years. Trend from moving average
Source: Data available at the Provincial Sports Management in Granma. Elaborated in Microsoft Excel 2016.

In figure 2, the number of points obtained shows a clear trend of increasing, positive, significant and sustained impact, both in sports with direct influence of the projects and in the rest, which does not necessarily indicate a relationship between the results obtained by the projects implemented. To confirm or refute this statement, a more in-depth analysis was carried out in which the percentage calculation is correlated to the data obtained by means of a more standardised value. The percentage of points obtained by sports with or without direct influence of the projects is again correlated in two scatter plots.

These graphs show how sports without direct influence of projects show a clear trend of decreasing, significant negative and not sustained impact. Sports with influence of projects show a clear trend of increasing, positive, significant and sustained impact (Figure 2) and (Figure 3).

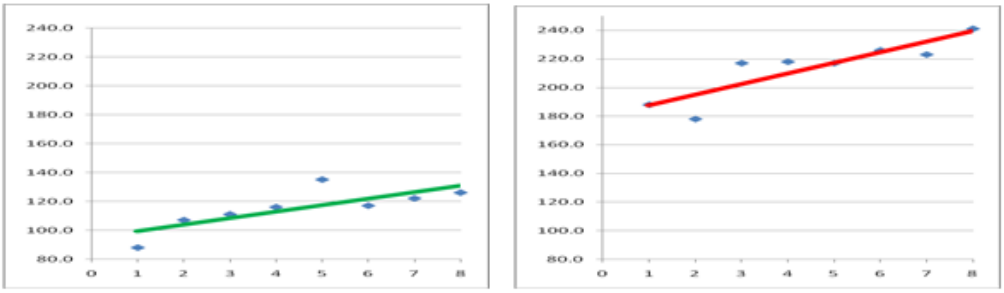

Fig. 2 - Score in national school games for sports with and without direct influence of the projects
Source: based on data obtained from Microsoft Excel 2016.

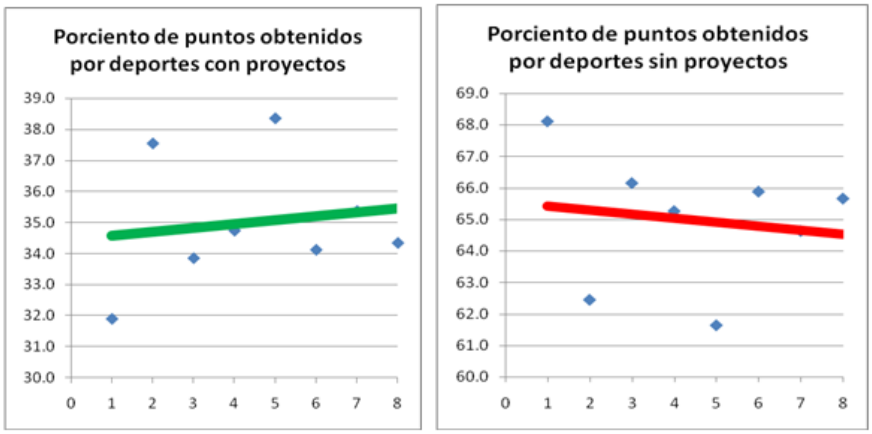

Fig. 3 - Linear trend of the percentage of points obtained by the sports according to the influence of the projects per year
Source: data available at the Provincial Sports Management in Granma. Elaborated in Microsoft Excel 2016.

As can be seen in table 3, the correlation between the total points obtained and those obtained with the nine (9) sports that had direct influence from the projects is very high, with an appropriate significance level by exhibiting values of 0.976 Spearman's coefficient, with a significance level of 0.01. Far higher than the Spearman coefficient of 0.766, with a significance level of 0.05, obtained by the seventeen (17) sports without direct influence of the projects. This shows a high level of relationship between the influence of the projects managed in the period and the sports performance, as an example of the performance of the procedure (Table 3).

Table 3. - Correlations between total score in national school games and points for sports with and without direct influence from projects

			Sports with projects (9)	Sports without projects (17)
Spearman's rho	Total points	Correlation Coefficient	.976(**)	.766(*)
		Sig. (1-tailed)	.000	.013
		N	8	8

* Correlation is significant at the 0.05 level (1-tailed).
** Correlation is significant at the 0.01 level (1-tailed).
Source: preparation of the authors by SPSS 11.5

Activity 3. Analysis of objective compliance

The procedure allowed the impact on sport of the innovations by projects managed by the university organization where the constructivist model was applied to be evaluated as: Very significant, since the magnitude of the change was such that the score obtained contributed to the advancement of school sport from the place where it was, in the 9th year, to a third place for two consecutive years.

The change was positive since it is in full correspondence with the organizational strategy of the original university, explicit in the mission and vision and the sports strategy of the territory.

The impact is lasting since the score obtained in the years analyzed is sustained and increases substantially. It is also important to highlight that the performance obtained shows a decreasing trend as an evident sign of saturation. It is therefore essential to develop other projects and establish new strategies in line with the new requirements.

Therefore, the procedure applied made it possible to assess the impact of the projects carried out by the Faculty of Physical Culture in Granma, using perception and performance indicators to inform science and innovation managers of the degree to which results have been obtained, as a way of motivating all those involved in the innovation process and contributing to the integration of the entities.

The means were effective in measuring the level of achievement, which was appreciated by the staff members who participated in the various presentations of the results. They showed interest in applying the procedure systematically since it allowed them to evaluate, with a greater level of certainty, the state of the investigative or innovative result, its achievement or not, and its degree of compliance.

On the other hand, it guided the science and technological innovation managers of the Provincial Sports Management in the process of identifying the key sectors to direct towards them the fundamental effort of the actions with more reliability, which, according to the authors' criteria, would increase the motivation of those involved in the innovation process; therefore, it will contribute with the integration of the entities involved in the process of obtaining, introducing and commercializing a scientific result.

From this assessment, new projects, lines of research and results to be protected can be proposed, but, above all, it will allow the team of each project to assess the progress with respect to the results obtained and their importance, their level of competence with respect to the subject matter of each project.

It could be concluded that the procedure applied allowed the impact of the projects carried out by the Faculty of Physical Culture in Granma to be assessed, using perception and performance indicators to inform science and innovation managers of the degree to which results have been obtained as a way of motivating all those involved in the innovation process and contributing to the integration of the entities.

The model for the management of university innovation by projects in the sports context, from a constructivist perspective, demonstrates its effectiveness, as it shows in practice positive, significant and sustained impacts over time, although in a state of saturation.

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