

RECIBIDO EL 21 DE ENERO DE 2023 - ACEPTADO EL 22 DE MARZO DE 2023

# DIAGNOSIS ON SOCIAL IMPACT MEASUREMENT IN THE MATANZAS SCIENCE AND TECHNOLOGY PARK

## DIAGNÓSTICO EN MEDICIÓN DE IMPACTO SOCIAL EN EL PARQUE CIENTÍFICO TECNOLÓGICO DE MATANZAS

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### Summary

The current Cuban context evidences a boom in research projects involving science, technology and innovation. Our National Innovation

Management System is focused on the solution of the problems presented by our socialist social development economic model, with the use of knowledge and innovation. As part of

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the Informatization Policy of the country, the Scientific and Technological Parks (PCT) arise in Cuba, with which an accelerated development of R+D+i projects is propitiated in order to solve the fundamental problems of this model.

At the express request of the country's management, the projects generated by the PCTs in order to fulfill their mission and social transformation, it is essential to measure their social impact; however, the review of their design and a diagnosis (using methods such as surveys, interviews, documentary analysis) of the skills of the project managers working in the PCTCs, show marked weaknesses in measuring the social impact of their projects, which is the main objective of the present work: to show the results of the diagnosis carried out from the definition of indicators and measurement criteria for this purpose, as well as the authors' analysis of the possible ways of solution.

### Resumen

El contexto cubano actual evidencia un auge de proyectos de investigación que involucran la ciencia, la tecnología y la innovación. Nuestro Sistema nacional de Gestión de la Innovación está enfocado hacia la solución de los problemas que presenta nuestro modelo económico de desarrollo social socialista, con la utilización del conocimiento y la innovación. Como parte de la Política de Informatización del país; surgen los Parques Científicos Tecnológicos (PCT) en Cuba, con los que se propicia un acelerado desarrollo de proyectos de I+D+i en aras de resolver los problemas fundamentales de dicho modelo.

A petición expresa de la dirección del país, los proyectos que generan los PCT para que cumplan con su misión y transformación social, se hace imprescindible la medición del impacto social de los mismos; sin embargo la revisión del diseño estos y un diagnóstico (con la utilización

de métodos como encuestas, entrevistas, análisis documental) de las habilidades de los gestores de proyectos que trabajan en los PCTC, evidencian marcadas debilidades para la medición de impacto social de sus proyectos, lo que constituye el principal objetivo del presente trabajo: mostrar los resultados del diagnóstico realizado a partir de la definición de indicadores y criterios de medidas para ello, así como el análisis de los autores de las posibles vías de solución.

### Resumo

O contexto cubano atual mostra um boom em projetos de pesquisa que envolvem ciência, tecnologia e inovação. Nosso Sistema Nacional de Gestão da Inovação está focado na solução dos problemas apresentados por nosso modelo econômico de desenvolvimento socialista, com o uso do conhecimento e da inovação. Como parte da Política de Informatização do país, surgem em Cuba os Parques Tecnológicos de Ciência (PCT), com os quais se promove um desenvolvimento acelerado de projetos de I+D+i, a fim de resolver os problemas fundamentais desse modelo.

A pedido expresso da liderança do país, os projetos gerados pelos PCTs para que cumpram sua missão e transformação social, é essencial medir seu impacto social; entretanto, a revisão de seu desenho e um diagnóstico (com o uso de métodos como pesquisas, entrevistas, análise documental) das habilidades dos gerentes de projeto que trabalham nos PCTCs, mostram fraquezas marcantes para medir o impacto social de seus projetos. O objetivo principal deste trabalho é mostrar os resultados do diagnóstico feito a partir da definição de indicadores e critérios de medidas para ele, assim como a análise dos autores das possíveis formas de solução.

## Introduction

Cuban society is going through a process of updating its Economic and Social Model of Socialist Development. For this reason, profound transformations are being carried out in all sectors of society and the economy, as reflected in the normative documents of the 8th Congress of the PCC. For the management of development, by this Model, three fundamental pillars have been defined: science and innovation, informatization and social communication. This shows that Science, Technology and Innovation (STI) in Cuba are in a relevant moment of its development, with opportunities that justify the need to promote the use of scientific knowledge, the systematic improvement and training of professionals and managers who participate, or should participate, in the innovation processes required by the country.

Since the creation, as part of the country's Informatization Policy, of Cuban Scientific and Technological Parks (PCTC), "a greater impact of universities and Science, technology and innovation entities attached to the MES on economic and social development is sought" (Torralbas and Delgado, 2021, p. 351).

To date, two Science and Technology Parks have emerged in Cuba (PCTC)<sup>7</sup> with which the objectives of stimulating and managing the flow of knowledge and technology between higher education institutions are enhanced (it should also facilitate the transfer of technologies and knowledge between the academic and productive sectors (Cadorin et al, 2017, McCarthy et al, 2018, Valdés and Delgado, 2018, Albornoz and Barrere, 2020, IASP; 2021, Torralbas and Delgado, 2021, among others), research institutions, companies and markets (according to (IASP,2021), more than 50% of its members are located in or near universities,

<sup>7</sup> *Sociedad Mercantil Parque Tecnológico de La Habana S.A. (PCT La Habana); and Sociedad Mercantil Parque Científico Tecnológico de Matanzas (PCTM).*

an element that highlights the importance for a PCT to be close to a student community and to be connected to an international network with a marked recognition (Cadorin, et al. , 2017). A study in 60 PCTs allowed corroborating the role of universities as the main source of talent, and in the role of the government in promoting collaboration between companies and universities, where attracting talented students is a success factor (Löfsten, et al., 2020, p. 25)); boosting the creation and growth of innovative companies through incubation and centrifugal generation mechanisms and providing other value-added services

On Science and Technology Parks and their relationship with universities, there is an extensive bibliography, in which the research of: Odantegui and Sánchez (2004), Rodeiro and Calvo-Babio (2012); Restrepo (2017), Cargo and Picón (2018), Valdés and Delgado (2018), González (2019); Hernández et al (2019); Torralbas and Delgado (2021) and IASP (2021). In their texts can be found the definition of their characteristic elements, their social function, classifications, the importance of their linkage with universities and companies and their ways of contributing to the solution of social, economic, technological and environmental needs of the places where they are embedded.

The functional model of the PCTC, has as its center the Research + Development and Innovation (R+D+i) project that is designed based on ideas and innovation needs, and that can be submitted by legal or natural persons, whether national or foreign. After its evaluation and approval, it will be executed by receiving basic, technological, value-added services or other incentives, and quickly obtaining a new product or service or a functional component of an existing product or service, destined for the domestic market or export (Torralbas and Delgado, 2021, p. 355).

On its second anniversary, the Matanzas Scientific and Technological Park (PCTM) is immersed in a process of implementing a wide range of projects, mostly aimed at developing the computerization of society and electronic government. Among these projects, the following stand out: Varadero Digital City, Digital Self-Service Station and the Electronic Government Platform "Bienestar". One of the transversal elements of the PCTM projects lies in the importance of measuring their social impact, taking into account that they must respond satisfactorily to the development model proposed by the country.

The work presents the exploratory diagnosis carried out in this research, which evidences the existence of the following problematic situation:

- The bibliography consulted does not refer to research with theoretical-methodological proposals for the realization from the Science and Technology Parks of professional training actions on issues of social impact measurement to their project managers.
- The use of the (STS) approach is not always a consistent reference for the design of indicators and the measurement of the social impact of the projects incubated in the PCTC, an essential element for analyzing the role of social factors in scientific development and its repercussion on Cuban social development.
- Limited theoretical and methodological references based on the measurement of social impact with an STS approach.
- Research on professional development does not address so far the managers of R&D&I projects in Cuba.
- Relevance of the knowledge on social impact measurement with STS approach for the performance of STCP project managers.
- The previous preparation of STCP project managers does not include, in most cases, content related to social impact measurement.
- The offers of Professional Supervision by the

STCPs and the institutions to which the project managers professionally contribute on social impact measurement are limited and are not recorded in the bibliography consulted.

### **Methodology and Methods.**

The research population is made up of the managers of MTCP projects belonging to the Professional Exchange of this institution (50); while the sample are the leaders and members of research teams of the projects under execution within the MTCP (17).

In the research, the dialectical materialist method is used as the general method of knowledge, which will serve as the basis for the system of methods used to solve the defined scientific problem. Through them it will be possible to reveal contradictions that exist and promote the solution of the problem of professional improvement and determine the relationship of this with the other elements of the environment. In the same way to reach the essence of the investigated phenomenon, from the historicism and to find solutions to modify the current state and the preparation of the project managers to overcome.

Throughout the study, theoretical methods that facilitate the research were used. These are: The historical-logical, allows to study the history of the process and logically reflect its essence. The analytical-synthetic method for the theoretical-methodological foundation referenced in the different bibliographical sources and for the researcher's evaluation of the results. The inductive-deductive to establish regularities, manifestations of facts with general character or to infer, from specific knowledge, regularities of general character and vice versa. This research analyzes the historical background of professional development in measuring the social impact of STS projects and how it has evolved until reaching the proposed strategy.

Systematization is used in this research for the exhaustive study of the bibliography and the systematic registration of the research process that allows establishing the conceptual, theoretical, practical and methodological axes of professional development and the proposals for the practical implementation of professional development actions.

The modeling method is used for the theoretical-methodological design of the proposed strategy, with which the components that make up said strategy are determined, as well as their intrinsic relationships.

#### **The Empirical Methods applied are:**

Scientific observation, with the objective of characterizing the use and treatment of social impact measurement with STS approach by project managers. Coordination meetings, project meetings and project activities are observed to identify the dynamics and application of social impact measurement, STS approach in their objectives, projections and planned activities.

The analysis of documents is used to review the project files, the call for projects, the projects belonging to different research centers in the university context, the documentation to measure and evaluate the impact of the projects already drafted and in execution within the MTCP. It also includes the Postgraduate Plan of the University of Matanzas (2023); since most of the project managers included in the PCTM Professional Exchange are professors of this institution or receive training in this center.

The survey, through the questionnaire to project managers, is applied to define the state of knowledge, motivations, disposition, interest, the state of training in the subject and the demands for professional training they have on the subject of measuring social impact; as well as in-depth interviews to the directors of the PCTM and the UM to know the function of the

projects, the training offers of these entities and the relevance of measuring the social impact with STS approach in the projects they carry out. From the experts' criteria, opinions are collected about the theoretical and methodological foundations of training, its essential features, its organizational forms, its design and evaluation of the proposed actions.

In the stage of analysis of the results, the triangulation method is applied to contrast the information obtained with the different techniques and the results obtained at different moments of the research, with the help of statistical methods when processing the information. The SPSS computer program is also used.

For all this, after the study of the theoretical references, the variable object of diagnosis was operationalized with its categories of analysis and its dimensions.

#### **Operationalization of the variables**

##### Categories of analysis

Category 1. Status of professional development in social impact measurement with STS approach for PCTC project managers.

##### Dimensions

1.1 Knowledge, 1.2 Skills, 1.3 Motivational-valorational, 1.4 Knowledge, 1.5 Skills, 1.6 Skills, 1.7 Skills, 1.8 Skills, 1.9 Skills, 1.10 Skills Indicators

1.1.1.1 Knowledge on measuring the social impact of projects. 1.1.1.2 Knowledge on the use and construction of social impact indicators. 1.1.1.3 Knowledge on STS approach. 1.1.2.1. Previous professional development actions received. 1.1.2.2 Previous professional development actions received on the topics of social impact measurement, use and construction of social impact indicators, and STS approach. 1.1.2.3 Previous experience in: social impact measurement, use and construction of social impact indicators, and use of the STS approach.

1.1.2.4 Consultation of bibliography on social impact measurement, use and construction of indicators, and the STS approach.

1.2.1.1 Skills in the management of science, technology and innovation projects. 1.2.2.1 Skills in measuring social impact. 1.2.3.1 Skills in the construction of indicators of social impact. 1.2.3.2 Skills in the use of social impact indicators. 1.2.4.1 Skills in the use of the STS approach for constructing and measuring social impact indicators.

1.3.1.1 Commitment to achieving the social impact of STSCP projects. 1.3.1.2 Commitment to participate in professional development in the measurement of social impact using the STS approach. 1.3.2.1 Need to measure the social impact of STSCP projects. 1.3.2.2 Importance of professional development in social impact measurement, use and construction of impact indicators, and STS approach. 1.3.3.1 Interest in receiving professional development in social impact measurement, construction and use of indicators and STS approach. 1.3.2.3 Willingness to participate in professional development activities in social impact measurement, use and construction of indicators, and STS approach. 1.3.2.4 Type of modality in which he/she is willing to join.

### **Category 2. Offers of professional development to PCTC project managers.**

#### **Dimensions.**

2.1 Institutional. 2.2 Improvement issues. 2.3 Incorporation. 2.4 Knowledge of the managers about the training offers. 2.5 Satisfaction with the professional development offerings.

#### **Indicators.**

2.1.1.1 Offers from the PCT. 2.1.1.2 Offers from Higher Education. 2.1.1.3 Offers from their workplace. 2.1.1.4 Other institutions. 2.2.1.1.1 Professional Superation Actions 2.3.1.1.1 Offers on measuring the social impact of projects. 2.3.1.2 Offers on the construction of social impact

indicators 2.3.1.3 Offers on the use of the STS approach in projects. 2.4.1.1.1 Incorporation into a professional development action. 2.4.1.2 Type of professional development action. 2.4.1.3 Incorporation into professional development actions on social impact measurement, use and construction of impact indicators, and the STS approach. 2.5.1.1 Knowledge about professional development offers in social impact measurement.

2.5.1.2 Knowledge of professional development offerings in the use and construction of social impact indicators. 2.5.1.3 Knowledge about professional development offerings in the use of the STS approach. 2.5.1.1 Status of satisfaction with professional development offers on social impact measurement, construction and use of social impact indicators.

### **Category 3. Demand for professional training in measuring the social impact of projects.**

#### **Dimensions**

3.1 Interest in the subject. 3.2 Demand for professional development

#### **Indicators.**

3.1.1 Importance. 3.1.2 Interest in the subject. 3.2.1 Modality for professional improvement. 3.2.2 Demand for knowledge Results.

When exposing the situation of the results of the initial diagnosis carried out, we base ourselves on the criterion that although there is evidence of a boom in the R&D&I projects developed by the Matanzas Scientific and Technological Park, there are weaknesses in the measurement of their social impact, due to the lack of mastery of the project managers regarding the elaboration of the methodology to measure social impact, the construction, execution and measurement of social impact indicators, contextualized to the Science and Technology Park of Matanzas.

From the triangulation of the information obtained in the application of the empirical methods

(analysis of documents, surveys and interviews to managers) it was evidenced that:

The previous training of project managers (undergraduate and graduate studies received on the topics does not include work with the topics related to social impact measurement, which contributes to the fact that their mastery and skills in the contents related to social impact measurement are deficient (see graphs 1.1, 1.2).



Graph 1.1 Previous knowledge received by MTCP project managers on the subject (source: own elaboration).

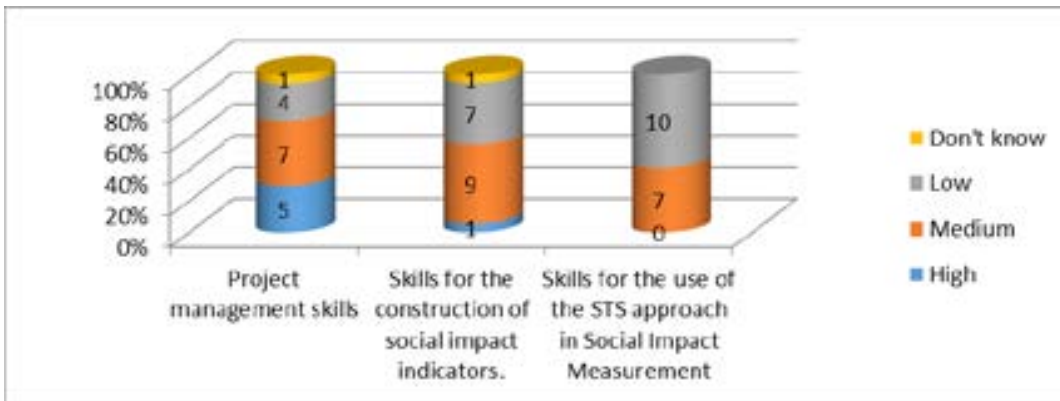


Figure 1.2 Mastery of skills of MSTP project managers (source: own elaboration).

Regarding the level of knowledge of the topics related to measuring social impact with an STS approach, it can be considered that the level of knowledge of project managers is between medium and low, although in the case of STS knowledge there is a higher level of knowledge compared to the rest of the topics, taking into account the percentage of managers who rate themselves as having high/medium knowledge of these topics (64.7%). The topics with the least

knowledge are the measurement of the social impact of MTCP projects and the construction of indicators for such measurement. Low knowledge is shown by 76.4% on impact measurement and 58.8% on the construction of indicators.

The diagnosis carried out through the questionnaire in terms of the demands and needs for professional development showed that 17 professors (100%) of those surveyed

consider that professional development in this area is important for their performance in project management; 15 (88.2%) consider themselves very interested in participating in the training, while 2 (12.8%) consider themselves not very interested in taking this type of professional development.

Regarding the modality of postgraduate education, 11 managers (64.7%) prefer the Hybrid modality, due to the benefits it offers, 4 managers (23%) request the more traditional option, face-to-face; while 2 managers (12.3%) prefer the virtual modality.

The tabulation of the questionnaires showed that 17 managers (100%) chose to request some of the proposed topics; and there were no additional topics other than those proposed. Among the most requested topics were: Construction of indicators, 16 managers (94%); E-Government Indicators 14 managers (82%), 12 managers (71%) selected the topics referring to technological results indicators and Digital City indicators; 11 managers (65%) selected the work with methodologies for measuring social impact and 9 (53%) opted to include the contents of work with indicator manuals and economic impact indicators.

As a result of the triangulation, it was found that there are no offers within the University's Graduate Plan related to social impact measurement for MTCP project managers. Likewise, the PCTM as an institution does not offer professional improvement options in the subject of social impact measurement of the projects they execute. It was evidenced that the wording of the projects does not specify how the social impact will be measured (they do not propose a battery of indicators contextualized to the transformation needs of the MTCP projects). Similarly, the importance of using the STS approach for the design, planning, execution and evaluation of MTCP projects was highlighted,

as well as for the construction of social impact indicators.

As a result of the diagnosis, the importance of measuring the social impact of the projects by their managers and the insufficient supply of professional training on these topics was confirmed. It was possible to systematize that there are several skills in the measurement of social impact in which these project managers should be trained. It also provides the demands for the knowledge system, which should include the contents referred to measure and construct indicators with an STS approach, with emphasis on those that are considered to have a low level. Likewise, the results obtained suggest the need to strengthen with training the values that guarantee the necessary rigor from the theoretical and practical point of view to develop all the procedures to build indicators and measure the social impact of specific projects.

### **Conclusions.**

The Cuban socialist social development model is enhanced by the proliferation of projects carried out from the Scientific and Technological Parks, most of which contribute to the development and transformation of Cuban society. One way to evaluate this transformation, and at the suggestion of the country's leadership, is through the measurement of their social impact.

The diagnosis of PCTM projects and their managers revealed weaknesses in the development of skills and capacities for measuring the social impact of the projects they manage.

In order to solve these weaknesses, it is proposed to conduct training on social impact measurement with an STS approach that contributes to the postgraduate training process of project managers who belong to the pool of MTCP professionals; and enables them to



develop skills and capacities to deal with the measurement of the social impact of the projects they manage in the present or future.

The contents to be included in the knowledge system must be contextualized to the Cuban Science and Technology Parks, as they are the result of the work of the social impact measurement team working in the PCTM, which is in charge of monitoring this topic in all phases of the projects managed.

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