

APPLICATION OF INTEGRATED DIRECTION FOR PROJECTS FOR SYSTEMIC MANAGEMENT OF UNIVERSITY PROCESSES

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Abstract

The work had as study object the management of university processes, they are important to achieve the social relevancy that the society demands to the universities; however, this object presents theoretical, methodological and practical limitations, which causes that these institutions obtain insufficient results in their indicators, what implies its improvement. The objective of investigation was to propose a theoretical and methodological conception on the application of Integrated Direction by Projects for systemic management of university processes. The main existent theoretical methods were used, as well as other methods, technical and instruments for the gathering, prosecution, analysis and interpretation of data and a study of unique case was developed. The main result of investigation was a methodology for systemic management of university processes sustained in the Integrated Direction by Projects, for that it was assumed as process bases the formation and as support the evaluation, and concepts as application scenarios, integration levels and management structure are introduced for the conception of project. Several novel contributions are revealed in the notions of link among the processes: formation, investigation and extension (linking with the society), with a systemic vision that generates own shades for conception of direction in the university context. The employment of this method allowed optimizing resources, to make more efficient the processes, to achieve the relevancy in the context of local development and to form competent professionals. This methodology constitutes a theoretical-practical contribution to the conception process and organization of university management and an important methodological and organizational instrument. The application of methodology in a Cuban university corroborated its effectiveness through the significant improvement of results in the evaluated indicators.

Keywords: Systemic management, university processes, Integrated Management for Projects, formation, investigation, extension.

1. INTRODUCTION

The appropriation of knowledge and its application for the benefit of society is an inexorable principle of the new university. The conceptual models of knowledge production, understanding for them the theoretical and

ideological basis that marks the course of a given school, or management orientation of science and innovation in general, is a current phenomenon that the university has transposed and incorporated into its theoretical conceptual system (Egetzkowitz and Leydesdorft 2000, Gibbons, Limoges, Nowotny, Scharzman and Trow, 1994; Souza, 2002; Núñez, Montalvo y Pérez, 2006), trying to explain its links to society through the processes it manages.

Thus, there are six models of knowledge production that have been used to "interpret the university's techno-scientific path" (Castro, 2007) and have evolved since the linear model of innovation to the central-context, through national innovation systems (SNIs), mode 1 and mode 2 knowledge production and triple helix. Its study showed that they are general theoretical models, conceptual which describe the processes of knowledge production, but do not explain a duly structured and systematized system of knowledge that analyze and explain theoretically the university system, and allow a greater theoretical, methodological and practical flexibility of management.

In relation to the management method, several published experiences of different universities were studied (Argote, 2009; Belloso, Barboza, Salazar and Guerra, 2011; European University, 2009, Fernández, 2008; Valdez (sic), Orozco y León; Zúñiga, 2011), whose analysis concludes that:

- For the management in the universities the general methods of management science were used, and no specific methodological tools were found scientifically supported in this field.

- The published experiences consider and highlight some components of the system to the detriment of others, which limits the conclusions, the absence of certain interactions and relations of their own, so they do not consistently use the principles of systems theory.

Due to the above, the application of novel methods in the management of substantive processes, in order to optimize resources, make university management sustainable and relevant, is an urgent need in university management.

Nevertheless, with the independence of the advances experienced in some universities, it is not still reached the coherence and required integrity, as consequence of that the educational strategies are not always formulated in the most precise and comprehensive way, neither an appropriate balance of the different dimensions of this work is achieved.

Inadequacies are appreciated in the precision of the objectives and of the actions foreseen in the educational projects. These aspects impact negatively in the effectiveness of the application of the integral approach during the development of the substantive processes, limiting their results. Of all the aspects mentioned above is derived that the necessity of negotiating the substantive processes exists in an integral and harmonic way from the career.

2. MATERIALS AND METHODS

The quantitative and qualitative paradigms have been used as a general methodology for this research, although with predominance of the first one. The main theoretical methods of investigation, that are: historical-logical, analysis and synthesis, inductive-deductive, hypothetical-deductive and modeling have been applied to understand the object of study in its development, its history and its logic, to discover the essential relations and general characteristics of it, to determine generalizations and to confirm theoretical formulations and to make its reproduction structural and functional simplified.

Considering that the object of study is a complex social process with the existence of a large number of variables, many of them outside the control of the researcher, a social experiment was developed, based on a single case study. The following instruments were used for the data collection: participant and covert scientific observation, questionnaire, semi-standardized interview, measurement and experiment, based on the informed consent of the interviewed.

The statistical analysis was focused on descriptive statistics. A student's t test was used to verify that there were significant differences between the means of the indicators in the years 2012-2013, period where the proposed was applied, with respect to the years 2010-2011 and 2011-2012. The SPSS 19.1 (2013) was used for the use of these methods.

3. RESULTS

The integrated management of the substantive processes

In the universities three substantive processes are developed, namely training (undergraduate and

postgraduate), research and university extension (linkage with society).

According to Batista and Perez (2013), each substantive function of higher education encloses and contains the others, so a student investigating a certain problem develops skills and acquires knowledge-forms, engages with social actors, makes extension; but how can we manage the substantive processes systemically?

The experience accumulated by the authors in university management, materialized in studies as part of investigations of doctoral theses, master's and degree, and synthesized systematizations and contributions, have been conditioned by the need to satisfy the technological demands generated by the actors of the territory in the new conditions, which induced the search for efficient management methods to make the university relevant in its context.

The application of the Integrated Management by Projects (DIP) (De Heredia, 1995; Project Management Institute, 2002) was the method of management chosen by the authors to favor the achievement of the Integrated Management of Substantive Processes in university centers, since it allows to deepen in the main conceptions about the link between the universalized substantive processes and the contributions that have already been settled from this perspective in previous works as a result of this research.

A project of integrated management of university processes, has a duration of a school year, during the closing phase an analysis is made of the fulfillment of the outlined objectives and of the impact indicators; it reborns at the beginning of next course with new objectives, impact indicators and so on until delivering the final product that is a professional better prepared, with values, committed to the process carried out in the country.

The training process has been taken as the basis, since it is the main one. Within the training, the evaluation has been taken as the starting point (Fig. 1), which constitutes motivational support.

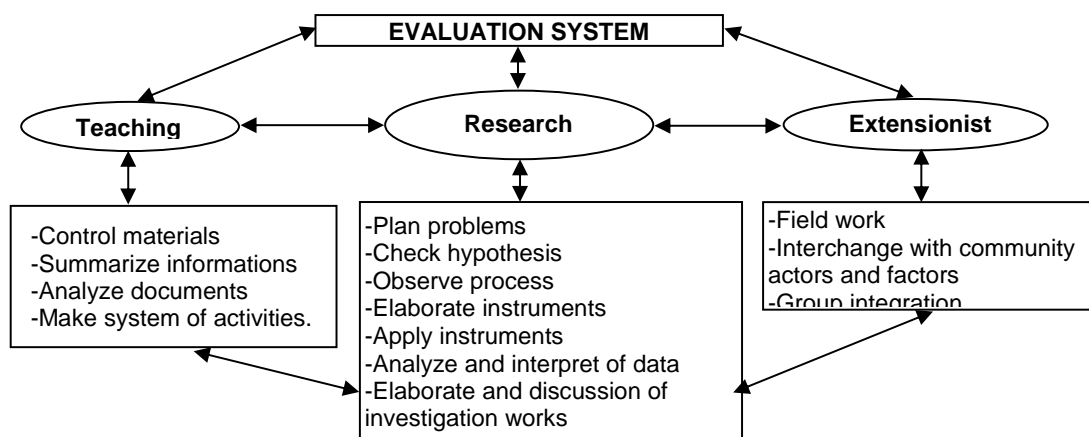


Fig. 1. The evaluation system in higher education.

The evaluation in the different levels of systematicity: the systematic (in each class), the culmination of the subject and the culmination of studies. The three levels complement each other, since the teaching task of the class must be in line with the investigative actions of the course work as a culmination of the subject, and of the titling work as a form of culmination of studies. (Fig. 2)

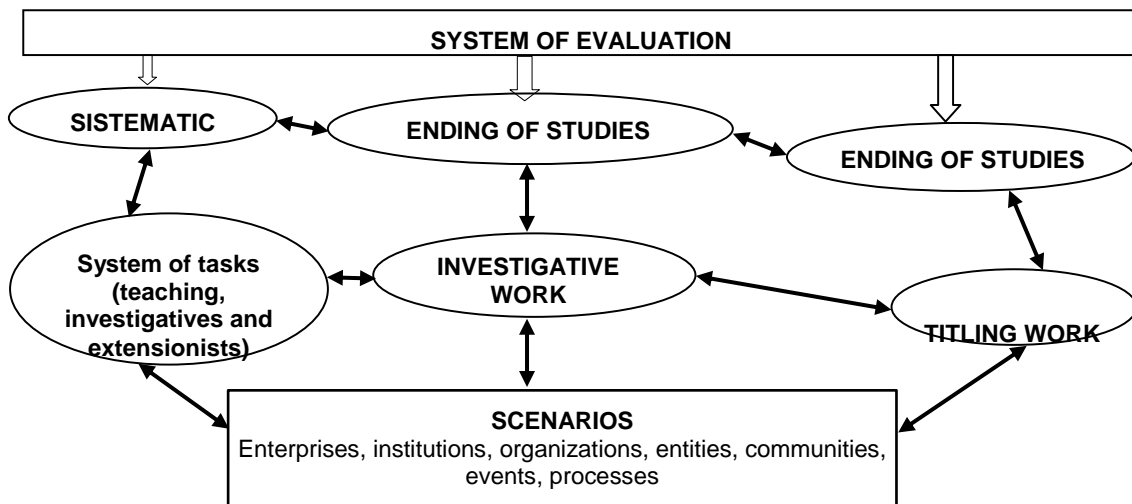


Fig. 2. Levels of systematizing of evaluation in higher education.

Three key dimensions have been identified: levels of integration, implementation scenarios and management structure. (Fig. 3).

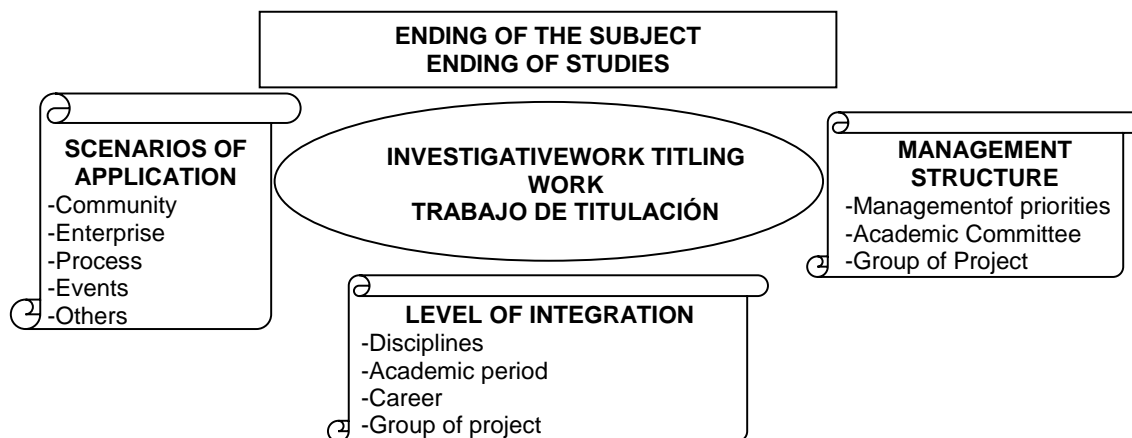


Fig. 3. Dimensions of the evaluation system in higher education.

The first dimension, the level of integration is referred to the inside of the career and expresses the vertical relationship of knowledge and skills in the development of different academic periods and the ending of each of the subjects organized in the disciplines. It expresses, in addition, the horizontal relationship with the other subjects of the academic period, and appears in this conception, a new element that transcends the career, integrates new knowledges that are incorporated with the participation of students of the same or different semesters; but of different careers, so this level of integration brings together students from several careers. This dimension expresses the formation process in a higher way.

The second dimension, the application scenario is referred to the interface, and denotes the biunivocal university-context relationship, theoretical knowledge-practical knowledge, tacit knowledge-explicit knowledge. It also expresses, to a high degree, the fusion of the three substantive processes, and it synthesizes the will of the territorial authorities when defining which contexts: enterprises, organizations, institutions, communities, processes, events or problematic, are the highest priority and entrust the ES to contribute in solving what has been identified as technological demands.

On the scene, the students converge, who can be of several semesters of the career or several career of the same academic period. This group that acts on the stage is the so-called project group, which acts as a catalyst for the processes of knowledge production, technology transfer, and community intervention, among others.

This group, that acquires that denomination in the scenario, that participates in that unit of observation, as

part of the formation process, to execute certain investigative action product of a teaching task, that integrates abilities of several subjects of one or more disciplines of a career, it is in this stage guided by professors, and also has as participants and beneficiaries community leaders and the whole community with its people, institutions, organizations, in short, all actors.

This conception of the application scenario becomes a transformative idea, because not only the student is incorporated and does his teaching and research task to pass a certain subject, but that context becomes an object of transformation, for which it is necessary to many people, several forms of knowledge, therefore, the need for integration is useful, group formation. This dimension expresses to a greater degree the process of university extension as a substantive function.

The third dimension is the management structure. This includes the different levels of organization and decision: collective subject, discipline, academic career committee and university center, aligned with the policies, priorities and technological demands of the territory. From these demands the lines of research and main research topics are defined for the works of titling, thesis of masters, doctoral theses. From the approval of the themes, the integration of the groups, the selection of the participants, definition of the scope and projection of the impacts, the groups of projects emerge.

The integration of the groups is determined by the professors and students who carry out work of titling, investigative work of certain subjects or students belonging to the student scientific groups that perform certain research tasks. This dimension expresses the research process as a substantive function.

In short, the need to systematically manage the substantive processes in the context of the new university, in order to fulfill its social order nuanced by the demands of the territory, allowed to implement the DIP as a method of management, which was done with three levels of abstraction: A macro project for the university center-areas, a mesoproject for each substantive function or process, and a micro project for the careers.

4. Methodology for the application of the Integrated Direction for Projects as a method of management for the Systemic management of university processes

The methodology as a work tool that has emerged by the need to establish a set of phases and stages for the implementation of the DIP, to manage the universalized substantive processes systemically in the local context, is a result of this research and it constituted in its fundamental practical contribution.

The design of the methodology for the systemic management of the substantive processes through the DIP as a method of management in the universities is based on the management model developed by Batista and Pérez (2012a, 2012b). In addition, it was considered as general principles the scientific, ethical and eminently formative character and developer of the management process, the systemic and holistic approach of it, and the object of investigation.

The proposed methodology constitutes a source of information or knowledge, not only for the decision-making, but also as material for the creation of new capacities, so that the actors of the university centers should incorporate it into their daily work and turn it into a working document.

This methodology is characterized by being iterative; that is, the realization of each stage influences the whole and depends, at least, on one of the other stages, which helps to guide the course and allows going back to some stage that needs to be readjusted. The end of the cycle constitutes the beginning of a quantitatively and qualitatively superior stage; that is, to complete a complete cycle contributes to develop management capacities (cognitive, affective and volitional) in the actors.

In each of the stages of the methodology, the actors involved must make operational and (or) tactical decisions based on the fulfillment of the projected strategy and, for this purpose, must complete the phases of management at each stage (planning, Execution and control).

Based on the above, it is concluded that the greater the knowledge of the application environment of the methodology, and the better the contextualization of the methodology are, higher the results will be achieved. In Fig. 4, the methodology is represented in a simplified form, which consists of six phases, namely: i) conception, ii) environmental characterization, iii) planning, iv) organization, v) implementation, and vi) evaluation, Adjustment and improvement; Process that has a cyclical character (the cyclic succession of stages or phases in time), and iterative.

Between each of these phases, several steps or work steps must be performed, and at each phase, multiple management tools must be used. Now, the content of each phase and steps of it are explained:

1. General Concepción of the process: it is developed in three stages: preparation of the appropriate

atmosphere for the change, preparation of the conditions for the beginning of the process and the implied actors' training. The group agent is created (GA); the objectives are analyzed, the reach, the principles, the requirements and the restrictions that will govern the process; the material conditions, cognitives, volitional and organizational minimum necessary are specified and/or created; the members of the scientific advice are qualified (DC) and the management advice (CD) or similar structures; and they carried out disclose activities and training to key actors.

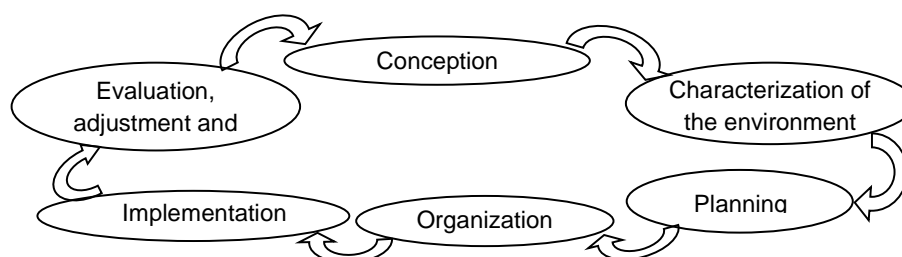


Fig. 4. Simplified methodology for the management of substantive processes through IPD in universities.
Source: Adapted from Batista and Perez (2013).

2. Characterization of the environment and precision of the internal capacity: it is carried out in five stages: precision of the internal and external demand, inventory of the available resources, diagnostic of the capacities of the actors, diagnostic of the structural and functional organs, and characterization of the atmosphere for the DIP.

The priority scenarios are selected, the sources of information and the key informants are identified in them and the actors of the university center that will participate in the diagnosis, the instruments are elaborated and the necessary material, organizational and human conditions are created, and the responsible professors are designated for its application.

The instruments are applied by those responsible for scenarios or projects, the technological demands are obtained: upgrading necessities, consultantships, projects, tutorships, etc., the necessities and internal potentialities are upgraded as for the administration of projects, application of computer tools, consultantship actions, teaching of courses and other scientific-technicians services that are demanded.

The material and technological recourses are related in the scenarios and in the university center that can objectively be used and the committed actors and with disposition to participate and to support the university administration.

The available physical resources are determined and the ones that can prepared by means of the cooperation (these are in the scenarios and dependences, which can be used for any training activity, consultantship, tutorship, community intervention, movement of resources and personal, etc.). The treats are elaborated and sign in agreements with the entities that cooperate.

The instruments are elaborated and will also be used by the GG then, they are approved by the CC, they are applied to the professors and other selected actors in correspondence with the interests of the university center, and the reports are elaborated by each careers and areas.

The GG elaborates the instruments that will be applied, they apply them and process the data, and it is determined if it is necessary the creation of some additional structural and functional level, and the functions of each established level are formulated and the functions are written of those created. The relationships of each level are defined with the other ones.

A survey is applied to the actors and from the gathered information, the general proposal settles down and the main elements that characterize the institutional atmosphere are defined for the application of the DIP. The characteristics of the atmosphere are listed for the DIP not presented and the plan of actions is elaborated to achieve them, it will be proposed by the GG and approved in the DC and CD.

3. Planning: it is carried out in four stages: definition of the performance scenarios, elaboration of the administration projects, elaboration of the plans of action of the administration structures and integration levels, and elaboration of the work plan yearly and monthly of the university center, careers and management structures.

The scenarios are defined in where those educational tasks will be executed and they are categorized in dependence of the quantity of actors that participate and the purpose of the intervention. The projects of

management of the careers and the areas are elaborated, and the objectives, the results and activities of Logical Marco's Womb (MML) of each one are integrated for the design of the project of the university center, the same that is presented to the actors implied with the presence of representatives of the scenarios and strategic allies. The project of the university center and those of the areas are approved by the DC first and later by the CD. Then the plans of action of each DC are made in the career levels and of the university center, starting from the activities contained in the MML of their management projects.

The work plan is elaborated yearly and monthly of the university center starting from the integration of the activities planned in its management project. Of this plan the areas, careers, management structures and each professor elaborate theirs, by means of the disintegration of the activities of the annual plan and the integration of the specific ones that have not been taken into account in that one by their detail level and singularity.

4. Organization: it is developed in two stages: design and creation of the structural and functional levels for the management, and definition of the hierarchical relationships among the structural and functional levels for the management. It is designed and created or it recaptures the system of mechanisms and management levels (investigation groups, dynamic structures and so on.) and its management is organized by means of projects.

Then, the authorized organizations give it legal body at different levels and they put into operation the different mechanisms, by means of the emission of the creation resolutions with objectives and functions, appointment of the personnel in charge and local, logistical support, information and disclose to the interested parts.

It is defined each actor's responsibility in the general process in each phase and stage of the management, and the previous tasks that should be carry out to have the systematized information. It is defined how the actors communicate and cooperate in each project to consent to the information and the execution of certain action or activity.

Finally, the general chronogram is defined for the implementation of the DIP to the integrated management of the substantive processes in the university center.

5. Implementation: it is developed in a stage: Execution of the plans of activities in each level, structures and group. A monthly, detailed and analytic report is elaborated, reconcile of the carried out activity, its quality and the actors' participation, organs and structures in each levels, and a summary of the month in each level, starting from the evaluation of the acting of each one of the actors, its stimulation and the projection of the adjustments and pertinent improvements.

6. Evaluation, adjustment and improvement: it is carried out in two stages: evaluation of the results, and adjust of the objectives and established plans and proposal of the improvement. They are evaluated, in quantitative and qualitative form, the execution of the projects and the effectiveness of the area managements, careers and created structures, an analysis of the objectives is made, the deviations are detected and the pertinent corrections are made.

The objectives and the established action plans are adjusted in the annual planning for the following period starting from the results, by means of the employment of the same mechanisms that were used for its initial design.

The project of the university center, areas, careers and created structures are checked and the improvement plan is proposed. This activity is coordinated by the GG and it constitutes the beginning of the next cycle of the period (month, semester or course).

5. DISCUSSION

The proposed methodology was applied during the 2012-2013 academic year and the results of the last two courses were taken as references; That is, 2010-2011 and 2011-2012. From each process the most representative indicators were defined for the purposes of the research.

From the process of undergraduate and postgraduate training it can be seen that all the selected indicators underwent a promotion in the academic year 2012-2013.

The indicators: number of professors linked to postgraduate studies, postgraduate efficiency index and number of university graduates enrolled in these, show increases not achieved in previous periods with other forms of management, which indicates the effectiveness of the application of the methodology.

The research process evidenced to be the most consolidated and its indicators experienced significant

increases.

Referred to the university extension all the selected indicators, except for the number of chairs, experienced increases. The number of new agreements signed (21) and the scenarios attended are significant (17).

To verify the hypothesis we compared the means of the indicators of the courses 2010- 2011 and 2011-2012; in which the methodology was not applied, and 2012-2013; Where it was applied, for which the student's t-test was used (Table 1).

Table 1. Hypothesis test using Student's t-statistic.

	t	gl	Sig. (bilateral)	Difference of means	95% Interval of confidence	
					Lower	Higher
2010-2011/2011-2012	2,742	22	0,012	34,4117	8,3845	60,4390
2012-2013	3,097	22	0,005	51,5178	17,0226	86,0131

Source: SPSS 13.0 for Windows

The table shows that the significance level values are lower for the 2012-2013 academic year than the average for the 2010-2011 and 2011-2012 academic years and is lower than 0.05; It can be stated that there are significant differences between the means of the indicators for the academic year 2012-2013 compared to previous courses, so that, with a 95% confidence level, the applied methodology contributed to the improvement of the evaluated indicators, and with it to the management of the substantive processes in the university center selected.

6. CONCLUSIONS

1. Integrated Project Management (DIP) is an effective method for university management in general and the management of substantive processes in particular, since it helps to optimize human, material, technological, financial and information resources in order to improve quality and impact of the results of this management and, with it, the social relevance of the universities.
2. The theoretical and practical foundations are important references for the systematization of a methodology for the application of IPD, as a method of management in university centers for the systemic management of their substantive processes, which consists of six essential phases: conception, characterization of Environment, planning, organization, implementation and evaluation, adjustment and improvement; which require for the execution of 17 stages in series or in parallel, which is a guide for concrete practical work, according to the technical-organizational and functional characteristics and conditions of the university, which makes possible its applicability.
3. Through the application of the methodology proposed in a case study, the relevance of this tool was evidenced for the integrated management of the substantive processes in the universities, which shows the feasibility and convenience of its implementation, based on an adequate contextualization.

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