

Original article

## Procedure for incorporating environmental responsibility in the managers of university institutions



### Procedimiento para incorporar la responsabilidad ambiental en directivos de instituciones universitarias

### Algoritmo para acionar a responsabilidade ambiental na gestão das instituições universitárias

Miladys Garrido Cervera<sup>1</sup>  0000-0001-5732-7512  [miladys@upr.edu.cu](mailto:miladys@upr.edu.cu)

Ainelis Duarte Barroso<sup>1</sup>  0000-0002-1596-4705  [ainelisduartebarroso@gmail.com](mailto:ainelisduartebarroso@gmail.com)

William Acosta Díaz<sup>1</sup>  0000-0001-9230-069X  [wad1975@nauta.cu](mailto:wad1975@nauta.cu)

Arielys Martínez Hernández<sup>1</sup>  0000-0001-9127-9200  [syleira@upr.edu.cu](mailto:syleira@upr.edu.cu)

<sup>1</sup> University of Pinar del Río "Hermandad Saíz Montes de Oca". Pinar del Río, Cuba.

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## ABSTRACT

Higher Education Institutions play a fundamental role in the integral formation of professionals, in the environmental awareness and education of the university community, by developing and implementing actions that allow them to increase the knowledge they have about the environment, train them in decision making, develop skills and behavioral changes that contribute to promote environmental awareness and the solution of environmental problems. The objective of this research is to design a procedure for the incorporation of the environmental dimension in the decision-making process by the managers of university institutions. For its implementation, the theoretical references of the community environmental education management process were taken into account, as well as the characterization of the environmental situation at the University of Pinar del Rio. As a result, it was possible to design a procedure to incorporate the environmental dimension, which consists of 4 stages and 14 steps that consider the key strategic and support processes that are managed,

contributing to enhance the analysis of environmental issues in order to improve the decision-making process and the solution of environmental problems at the University of Pinar del Rio.

**Keywords:** procedure; environment; decision making; university.

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## RESUMEN

Las Instituciones de Educación Superior desempeñan un papel fundamental en la formación integral de profesionales y llevan a cabo un importante rol en la toma de conciencia y educación ambiental de la comunidad universitaria, al desarrollar e implementar acciones que permiten elevar el conocimiento que se tiene sobre el medioambiente, los capacite en la toma de decisiones, desarrolle habilidades y cambios de conducta que tributen a fomentar la conciencia ambiental y la solución de los problemas ambientales. La presente investigación tiene como objetivo: Diseñar un procedimiento para la incorporación de la dimensión ambiental en el proceso de toma de decisiones por los directivos de instituciones universitarias. Para su implementación, se tuvo en cuenta los referentes teóricos del proceso de gestión de la educación ambiental comunitaria, así como la caracterización de la situación ambiental en la Universidad de Pinar del Rio. Como resultado se pudo diseñar un procedimiento para incorporar la dimensión ambiental el cual consta de 4 etapas y 14 pasos que consideran los procesos estratégicos claves y de apoyo que se gestionan, contribuyendo a potenciar el análisis de la temática ambiental en función de perfeccionar el proceso de toma de decisiones y a la solución de los problemas ambientales presentes en la Universidad de Pinar del Rio.

**Palabras clave:** procedimiento; medioambiente; toma de decisiones; universidad.

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## RESUMO

As Instituições de Ensino Superior exercem um papel fundamental na formação integral dos profissionais e preenchem uma função extraordinária na conscientização e educação ambiental da comunidade universitária, desenvolvendo e implementando se ações que lhes permitem abranger o conhecimento que possuem sobre o meio ambiente, treiná-los na tomada de decisões, desenvolver habilidades e mudanças de comportamento que contribuem para promover a conscientização ambiental e a solução de problemas ambientais. O objetivo desta pesquisa é projetar um algoritmo para a incorporação da dimensão ambiental no processo de tomada de decisões por parte dos

dirigentes das instituições universitárias. Para sua implementação, foram levadas em conta as referências teóricas do processo de gestão da educação ambiental comunitária, bem como a caracterização da situação ambiental na Universidade de Pinar del Rio. Como resultado, foi possível conceber um algoritmo para incorporar a dimensão ambiental, que versa em 4 etapas e 14 passos que ponderam os principais processos estratégicos e de apoio que são gerenciados, contribuindo para melhorar a análise das questões ambientais, a fim de melhorar o processo de tomada de decisão e a solução dos problemas ambientais na Universidade de Pinar del Rio.

**Palavras-chave:** algoritmo; meio ambiente; tomada de decisões; universidade.

## INTRODUCTION

The 21st century has become a period marked by environmental and social uncertainties due, among other causes, to increasing anthropic pressures on natural resources, which have generated accelerated environmental changes, some of them of global scope, and the impossibility of continuing to maintain development styles that have historically been based on the exploitation of the environment is already evident, so they must be solved by all countries, although not all contribute equally nor have the same conditions and possibilities to solve the environmental problems that affect them.

In order to develop processes that truly lead to the improvement of relations between man, society and nature, as a condition for reorienting economic, social and cultural processes towards true sustainable development, it is necessary that governments adopt decisions that contribute to reorienting their development model towards sustainability and respect for the environment, for which community environmental education constitutes an effective instrument capable of generating actions that transform thinking in favor of promoting knowledge and skills for the solution of current problems.

Torres and Verdecia (2021) express that one of the essential elements in the historical analysis of evolution is man's attitude towards nature, historically shaped, which has taken place in the midst of a growing contradiction between new social ideals and the increasing possibilities available to society to influence both the natural and the built environment.

The theoretical references on which this research is based are related to the environment and sustainable development, where all agree on:

- It is a complex and dynamic system that integrates nature, society and economy
- They show the relationship between human beings and their environment as a social process in a specific historical moment
- They take into account the influence of the different components on current development models
- Consider the socio-cultural relationships present in each locality
- They emphasize the necessary dialectical and evolutionary interrelationship between all the elements

The research assumes the concepts presented by Jaula Botet (2008) because it considers that the environment not only identifies, as environmental problems, problems related to pollution, solid waste treatment, among other aspects, but also those linked to social and economic issues related to the development model.

The aforementioned concepts highlight the importance, timeliness and need to face reality from a different perspective from what was seen until recently and show a close relationship with sustainable development.

In order to develop processes that truly lead to the improvement of relations between man, society and nature, as a condition for reorienting economic, social and cultural processes towards true sustainable development, it is necessary that governments adopt decisions that contribute to reorienting their development model towards sustainability and respect for the environment, for which community environmental education constitutes an effective instrument capable of generating actions that transform thinking in favor of promoting knowledge and skills for the solution of current problems.

It is not perceived that the environmental management process is developed exclusively by the State and the Government, but by all individuals in each locality to promote change in the way of thinking and acting. The process of Environmental Management is a continuous and permanent process, which constitutes a dimension of the integral education of all citizens, oriented to the acquisition of knowledge, development of habits, skills and abilities and attitudes and the formation of values, to

harmonize relations among human beings and between them and the rest of society and nature, to promote the orientation of economic, social and cultural processes towards sustainable development.

This definition was included in the National Environmental Strategy and of the Ministry of Higher Education for the period 2021/2025, which states that "The Cuban State, in the exercise of its sovereign rights over the environment and natural resources, plans the country's environmental policy and management, which is executed through government bodies and controlled in its implementation by the Ministry of Science, Technology and Environment. Other authors who have worked on this subject are: Iglesias, Betancourt and Jiménez (2020); Llanes, Hechavarría and León (2021); García, Ramos, and Ramírez (2021) and a Collective of authors (2017).

The evolution of the concept has been modified as the concept of environment has been refined, incorporating technological, sociocultural, political and economic dimensions as a basis for establishing the relationship between humanity and its environment.

The definitions of environmental education cannot enclose all the distinctive features of the object because they only express essential features and its location in the context of current pedagogy is not simple. Today it is understood by some authors as a positive process in terms of collective prosperity, based on the need for improvement, protection and conservation of the environment, the basis of sustenance of human society and it is defined, lately, as a theoretical, methodological and practical model, which transcends the traditional educational system and reaches the conception of environment and development (Collective of authors, 2017).

This concept implies the consideration of the existence of three interdependent processes that in reality are integrated: the environmental educational process, they are instruction, training and education. Instruction is related to the construction and production of knowledge for the process of formation of habits and skills; what distinguishes training is related to the development of habits and skills that translate into competences in individuals and social groups that allow them to participate effectively in all processes, and what distinguishes education is given by the formation of environmental values, which are based on critical thinking and the development of individual and collective responsibility to give adequate response to the consequences of decisions/actions, as well as the duty to participate in the solution of environmental problems.

In the literature consulted on environmental education, it could be seen that in Cuba, authors such as Iglesias, Betancourt and Jiménez (2020); Llanes, Hechavarría and León (2021); García, Ramos

and Ramírez (2021) and Colectivo de autores (2017) have conducted important research on this topic and all converge on the same point: the development of environmental awareness to promote change.

According to Gavilanes and Tipán (2021), environmental education at a global level has evolved as a key element to achieve the objectives set out in the 2030 Agenda for Sustainable Development and when the basic elements of environmental education are applied, the teaching-learning process is easily improved, deriving in new ways of interrelating with nature, leaving behind traditional pedagogical approaches.

Numerous environmental education programs have been generated in the country by different institutions and organizations, which have been mainly aimed at formal education, essentially in primary and secondary schools and, at the same time, have been developed in communities located within protected areas.

Therefore, the participatory methods with which environmental education is approached should include instruments and techniques that allow not only to achieve a greater and better environmental knowledge on the part of the population, but also an openness to critical thinking and a vision of the necessary changes, as well as an interdisciplinary and holistic perception of environmental situations, with a focus on the future.

Puerta, Rico and Ramírez (2020) consider that it represents a process of planning, organizing, leading, controlling and analyzing the efforts of the organization's members and the use of all other resources to achieve established organizational objectives. In each case, it is necessary to carry out a good analysis and creatively follow the steps of the process so that the different people involved can offer answers, according to their points of view, level of knowledge, experiences and involvement in the results of a given organization and under certain conditions.

For this reason, the management process implies a permanent process of decision making to materialize the different functions and decisions which characteristics go through the subjectivity of the people who make them; this, in turn, is determined by several factors such as: the level of knowledge of the leader, level of experience in the activity he/she manages, preparation in management, particularly in the methods, techniques and styles of management used, etc. This process will be efficient as long as it is directed towards the achievement of the mission, vision and

general objectives of the organization, which can only be achieved to the extent that the entire group is aware of them, identifies with them and feels involved in their realization.

In the consultation carried out, a conception on the terminology of Environmentally responsible decision making was not obtained, so based on the concepts exposed by Morán and Bianchi (2005); Rodríguez (2006) and Figueroa and García (2018) it can be defined as a process of identification of a problem or opportunity and selection of an alternative of action among several existing ones, to promote and reconcile the three major objectives conducive to sustainable development: economic growth, equity (social, economic and environmental) and environmental sustainability, which allow the development of habits, skills, behaviors and modes of action with respect for all forms of life, with the use of certain resources that promote change, favoring the strategies and objectives of the organization.

In correspondence with what has been said so far, and relating this process to environmental decision making, it should be pointed out that they must respond to the solution of an environmental problem, which is, undoubtedly, an aspect that is little worked on by decision makers.

Despite the efforts made by the scientific community, there are still environmental problems related to the negative behavior of individuals, entities and decision-makers, inefficient environmental culture, degradation of the social and economic environment, among others. Therefore, it is necessary to continue developing actions that allow understanding the phenomenon in all its dimensions and encourage the development of critical thinking and the solution of problems from the local level with global thinking.

According to Mendoza, Loayza and González (2019), University social responsibility is a highly relevant topic worldwide, which represents an aspect to be addressed in all Higher Education institutions as they are generators of knowledge, science and training of professionals.

Precisely, the university has become an important pillar to promote the care and protection of the environment, since it is responsible for training professionals who will drive the development of society, but, at the same time, it serves as an example to promote a correct environmental performance that is capable of transmitting to society the concern for the care and protection of the environment, as well as developing an environmental and sustainable conscience in the management of the resources in its charge, competent to face the world demands of a more balanced society and more demanding markets of innocuous standards to humanity.

García, Ramos and Ramírez (2021) point out that the university is the social institution which mission is to help transform society by maintaining a permanent attitude of change and transformation through the improvement of the quality and competitiveness of the final products of the teaching, extension and research processes, as this is an indispensable condition for the survival and sustainable development of these institutions.

For Contreras (2011), one of the factors that determine quality in higher education is related to the capacity, ability and skill of universities to know and recognize the context in which they are inserted and the coherence with which the institution articulates with the context.

According to Iglesias, Betancourt and Jiménez (2020), the university, being an organization with many particularities, acquires a double responsibility: on the one hand, the responsibility to train professionals prepared to perform their work in an environmentally correct manner and, on the other hand, the responsibility to be an example for their social environment by the development of their activities, so as to generate the least possible impact on the environment.

Cardenas (2013) states that the University environmental policy should include environmental commitments to be fulfilled, either in the training of students, as the university as an institution of service to society and serving as an example in many respects, stating that the University should adopt an exemplary role that allows it to serve as a paradigm of proper environmental performance to promote concern for the environment, establish guidelines to follow for compliance in the areas of teaching, research, extension, management and university policy. It also proposes the establishment of a University environmental committee made up of university authorities, deans or department heads, professors, students, and even support personnel with the objective of implementing environmental practices in its management, developing environmental management systems, eco-efficiency programs, the use of clean energy, campus land use planning, monitoring or control of emissions produced by the University, treatment of wastewater produced by the University, monitoring of green areas on campus, management of solid waste produced at the University, among others, to serve as an example, achieving environmental and health conditions on campus that influence the quality of life of the people who study and work there. At the end, six steps are proposed to build an environmentally responsible university: Institutional Commitment, Environmental Policy, University Environmental Committee, Environmental Diagnosis, Work Plan, Evaluation and reporting of environmental performance.



From the above, it follows that the university trains students in good practices and transmits the necessary knowledge so that they can understand the impacts that the activities they will carry out as future professionals will have on the environment and be able to control them, but, at the same time, allows them to know the environmental aspects derived from their activities in order to set an example and guarantee the sustainability of higher education. For all of the above, it is necessary that the environmental issue be taken into consideration and allow decision makers, starting from the knowledge of their immediate reality and from a critical analysis, to achieve changes in awareness, attitudes and behaviors, and encourage their own responsibility and participation in the solution of environmental problems, decision makers and because of the importance that this requires, it is necessary to design a procedure for the incorporation of the environmental dimension in the decision making process by the directors of university institutions.

## **MATERIALS AND METHODS**

For the theoretical basis of the proposal, it is begun with the materialistic-dialectical method as a general method of scientific research. Secondary and primary sources of information were used; the secondary sources reviewed are the following: Strategic planning of the university, Annual plan of activities, University budget, Environmental strategy of the university, plan of topics for the preparation of tables, minutes of the boards of directors, chemical and hazardous waste management plan, research carried out around the topic and awards received, environmental inspections and visits from the National office of labor inspection, as well as from Hygiene and epidemiology. These provided important elements regarding the problem, and the documentary analysis technique was used for their consultation, taking into account the main aspects to be found in each of the documents and reports. To obtain primary information, a survey was designed and applied to a sample of 70 managers, using the questionnaire technique, with the objective of obtaining information on the knowledge, perception and consideration of environmental issues in the decisions made by the managers in their area of action.

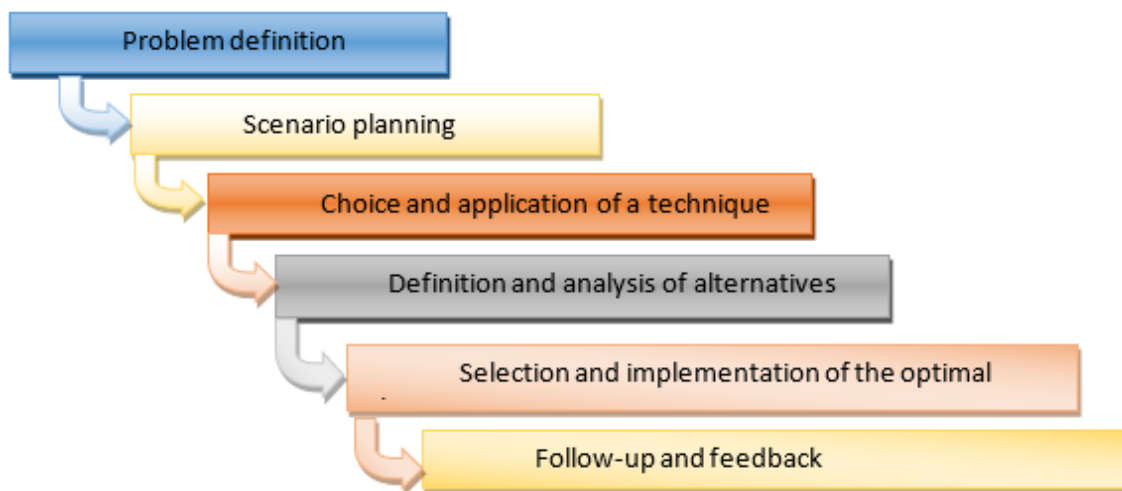
## **RESULTS AND DISCUSSION**

As a result of the application of the instruments and based on the analysis and synthesis of the previous documents, the following list of problems was drawn up:

1. Insufficient preparation of managers on environmental issues

2. Most managers are not aware of and, therefore, do not use the University's Environmental Strategy as a working tool
3. No preparedness action on environmental issues is planned in the preparedness plan for cadres
4. Low perception of what is considered to be an environmental problem on the part of managers
5. There is no intention to carry out research on the solution of environmental problems present at the University, "Hermanos Saíz" campus, and therefore very little research has been carried out
6. In the annual action plans, very few actions are planned for each area, aimed at solving the environmental problems present
7. There is little knowledge of the Environmental and landscape rehabilitation project, so it is not used as a basis for preparing action plans to solve environmental problems
8. Non-compliance with the purchase of protective equipment for workers
9. There is no recognition of the need for managers to improve environmental issue

When making decisions, it is important to carry out a set of actions that allow a correct decision to be made among the possible alternatives. In the literature consulted, authors such as Franklin (2011); Iglesias, Betancourt and Jiménez (2020); Llanes, Hechavarría and León (2021); García, Ramos, and Ramírez (2021) and a Collective of authors (2017) have shown similarities in the delimitation of the stages or steps to carry out the decision-making process in a general way. By way of conclusion, the following classification is assumed, which is shown in figure 1.

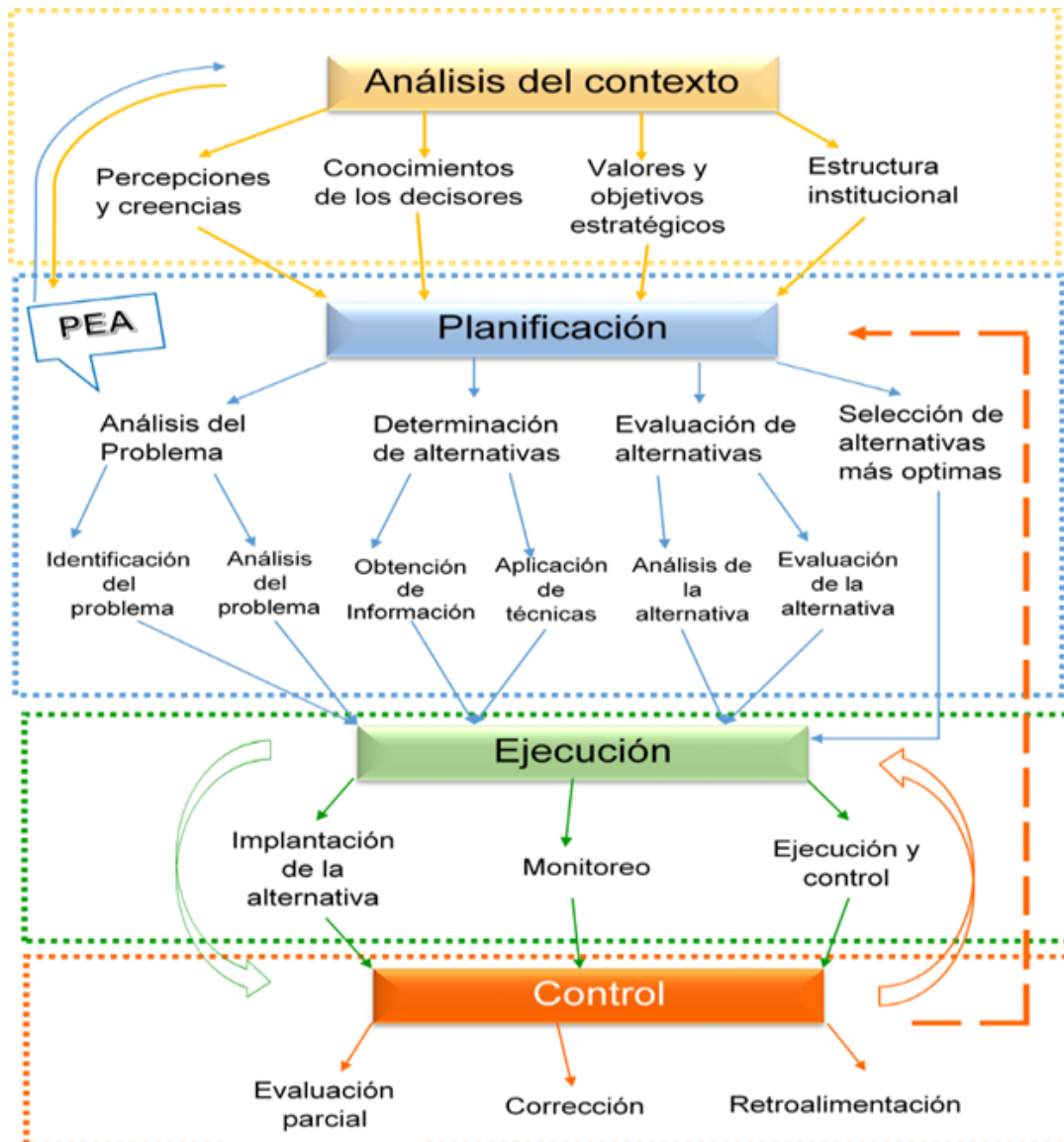


**Fig. 1** - Steps in the decision-making process

Source: Own elaboration

The use of the aforementioned steps in the decision making process is always conducive to approaching a more satisfactory solution, however, the presence of problems such as lack of information, incorrect choice of alternatives, thinking in the short term as opposed to the long term, lack of foresight and intuition are some of the obstacles that can derail this process.

In order to incorporate environmental issues into the decision-making process of university decision-makers, it is necessary to design a procedure that allows the incorporation of the environmental dimension into the decision-making process, as shown in figure 2.



**Fig. 2** - Procedure for environmentally responsible decision making

Source: Own elaboration

## **Step 1: Context analysis**

In this stage, it is necessary to start from the values and strategic objectives outlined by the institution in correspondence with the indications of the Ministry of Higher Education, as well as the constructive conditions in which the institutional structure is found, the perceptions and beliefs of the university community and the environmental knowledge of the decision makers related to the impact generated by their actions in the training of the professional and on the environment in which their processes are developed, which allow determining the external and internal risk factors that may affect the fulfillment of their objectives.

## **Stage 2: Planning**

The first step consists of analyzing the problem, identifying those environmental situations that may hinder the harmonious development of its activities, in a reliable and timely manner, taking into account that the problem should not be confused with the cause or effect, then for its analysis it is necessary to have a complete view of all the factors that influence the problem.

The second step is related to the determination of alternatives; to do so, it is necessary to obtain all possible information regarding the present and future in relation to the problem, such as: restrictions, possible effects, costs, objectives to be achieved, target population, among others. Depending on the importance and type of decision, the information available and the resources of various kinds (monetary, material, technological), the most appropriate qualitative and quantitative techniques are chosen and applied to solve the problem. The qualitative techniques are based on the criteria, experience and skills of the decision makers, among them are: brainstorming, problem analysis, Delphi expert evaluation methods, matrix of strengths, opportunities, weaknesses and threats, analysis of the environment, among others, and quantitative techniques are related to the application of mathematical, statistical and economic engineering methods such as operations research, simulation, statistical methods and economic engineering.

The third step is the evaluation of the alternative based on the analysis of possible solutions, using the cost-benefit criterion as a criterion of choice, which in this case is related to the environmental dimension, the results of which must be evaluated in relation to the expected effects.

In order to select the most optimal alternative, it is necessary to plan and program all the activities required to implement it, minimizing risks, but at the same time establishing alternative solutions in the event that those chosen are not consistent with the expected results.

### **Stage 3: Execution**

Once the most optimal alternative has been chosen, all the activities necessary for its implementation must be planned and programmed. These activities must be coordinated in such a way that they allow the formation of values, supported by an efficient communication and information process, and contribute to the development of an environmental conscience that will result in the solution of environmental problems, which must be expressed in each and every one of the identified processes.

During monitoring, changes in the external and internal environment of the university community should be observed, as well as the capture, processing and transmission of information related to the different facts, events, activities and conditions that give rise to the different transformations that occur as a result of the implementation of the selected alternative.

For implementation and control, there must be a record of the events that led to the changes from a current situation to a desired one and its verification is manifested in the habits, attitudes, skills and modes of action of the entire university community during a before and after period.

### **Stage 4: Control**

The partial evaluation of the results makes it possible to detect possible atypical situations that may affect the institution's strategic objectives. Among the actions to be carried out are direct observation, weekly checks, safety inspections, among others. Performance indicators can be applied here to provide an overview of the proposed solution.

If there are undesirable situations that can be corrected over time, a plan of action is drawn up to resolve them in a timely manner.

Feedback is a process present throughout the procedure, as a result of the follow-up of the implemented alternative, discarding the negative aspects and taking the positive ones.

The implementation of this procedure allows the incorporation of the environmental dimension in the decision-making process by managers in university institutions, since it promotes the responsibility

of training professionals prepared to perform their work in an environmentally correct manner, contribute to understand and control the impacts that will have on the environment, the activities they will perform as future professionals and should be an example for their social environment through the development of their activities, so that these generate the least possible damage to the environment.

Garrido, González and Casas (2018) propose an environmental education program for the decision-making process in managers that details in seven steps and two subprograms, the fundamental aspects in which decision-makers should be prepared in order to train environmentally responsible professionals to ensure sustainable development and comply with the objectives of the 2030 development strategy.

In conclusion, the importance of including environmental issues in the decision-making process is emphasized, taking into account the responsibility of the university institutions, in such a way as to promote the acquisition of knowledge, practices and modes of action to obtain the most satisfactory solution and achieve the desired change in the solution of environmental problems.

In the literature consulted, authors such as Morán and Bianchi (2005) work on a model of governmental environmental decision-making in which they include four levels: Environmental and social context, Planning and evaluation, Decision-making mode and Decision actions. Similarities related to the analysis of the context are perceived, however, in the Planning and Evaluation stage, elements related to the determination of the alternatives to solve the selected problem are not appreciated, so difficulties could arise, dedicating time and resources to problems of difficult solution or scarcity of resources, of small impact or leaving out other variables that could indicate the selection of those problems that could affect the fulfillment of strategic objectives. Similarly, the possibility of correcting certain solutions that do not have the desired effect is not perceived.

Cárdenas (2013) makes an approach in tune with the new precepts that are currently being worked on the environment, incorporating a series of indicators to evaluate the degree of environmental commitment, if the university incorporates actions linked to environmental responsibility, but the possibility of carrying out actions for monitoring, reduction and/or mitigation of possible environmental problems is not perceived, nor the analysis of different problems with their viable solution paths in the economic, social and natural environment.

Chumaceiro, Hernández and Chirinos (2016) address this issue in a similar way, by promoting the development of its professionals as the fundamental pillar for sustainable development, enhancing the training of professionals with a focus on social development, projecting the university as an educator to integrate its daily actions of the environment, solving the present and projecting the future in relation to its past. In addition, promoting the development of capabilities in the training of its professionals for the understanding of the problems presented and their intervention in decision making for the resolution of the same, forming citizens from an environmental and even more humanistic culture, developing processes of sensitization of individuals who make up society. However, it only works in the formation of environmental values in students and participation in environmental programs and projects, so it also lacks the role that should have the decision makers in universities in the way of acting in harmony with their environment, in the development of critical and enriching thinking in different areas and processes that are gestated, with actions that allow the preservation and conservation of the environment, acting with proposals for action to raise awareness and respect for all forms of life, ensuring a cleaner and safer environment for future generations.

Revuelta and Vegas (2020) state that in Mexico, the activities carried out at the University should promote the improvement of social and economic conditions that lead to the equitable distribution of the nation's material and cultural goods and encourage the integration of innovation and tradition in productive harmony to achieve a solid and authentic cultural and technological independence. In Peru, they work to promote scientific and technological research in students to achieve greater economic development and better use of the country's natural resources, betting on the commitment to the generation of knowledge, research and the positive effects that these activities should have on society, however, it is not clear how the leaders act with the processes and how they can influence in terms of achieving change, in line with the precepts of sustainable development and its impact in favor of a sustainable society.

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### **Conflict of interest:**

Authors declare not to have any conflict of interest.

### **Authors' contribution:**

All the authors reviewed the writing of the manuscript and approve the version finally submitted.



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