

Implementation of ISO 21001: 2018 in postgraduate academic programs

Implementación de la ISO 21001:2018 en programas de posgrado académico

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Abstract— The International Organization for Standardization published the ISO 21001 Standard in 2018, outlining the Management System for Educational Organizations. This work focuses on implementing the ISO 21001 requirements within a collaborative Chair offering postgraduate academic training services at Havana University in the areas of standardization, metrology, and integrated management systems. The implemented educational organization management system encompasses all necessary processes, personnel, and actions to deliver quality postgraduate training services and educational products, evaluated based on the satisfaction of students and other beneficiaries.

Index Terms— academic postgraduate program, educational organization management system, ISO 21001.

Resumen— La Organización Internacional de Normalización publicó en 2018 la Norma ISO 21001, Sistema de Gestión de Organizaciones Educativas. El objetivo de este trabajo fue la implementación de los requisitos de la norma ISO 21001 en una Cátedra colaborativa que brinda servicios de formación académica de posgrado en el campo de la normalización, la metrología y los sistemas integrados de gestión en la Universidad de La Habana. El sistema de gestión de la organización educativa implementado incluye todos los procesos, personas y formas de acción necesarias para lograr servicios de formación de posgrado y productos educativos de calidad, basados en la evaluación del grado en que se satisfacen los requisitos de los estudiantes y otros beneficiarios.

Palabras claves— ISO 21001, programa de posgrado académico, sistema de gestión de organizaciones educativas.

INTRODUCTION

THE Chair on Quality, Metrology and Normalization of the Havana University is an educational organization created in October 2003 to contribute to enhance the cultural awareness of the need to develop functions and services related

to the National Quality Infrastructure. The Chair is a collaborative educational project which groups professor, researcher and specialists from the Havana University, the National Office for Standardization, the National Institute of Metrology, and other research institutions. To comply with its objectives the Chair carries out scientific activities, such as publications, meetings and conferences, and also provides academic postgraduate training services in three Programs: Master Degree Program on Quality and Environmental Management, Master Degree Program on Metrology and the Specialization in Standardization.

The training services offered by the Chair on Quality, Metrology and Normalization are open to graduates of any disciplines, working in any sector. However, the pharmaceutical and biotechnology sector represents the most important source of students due to the great significance of this sector for the economic development of the country.

The Master Degree Program on Quality and Environmental Management was initiated in January 2006. It has eight completed editions and one is ongoing, graduating 152 masters up to May/2021. This Program was Accredited as Excellence by the National Accreditation Board in 2016. Two other Programs are in their second edition, and for this reason are not submitted to external evaluation for accreditation yet.

The Programs are carried out in a partial time schedule, in presence and semi-presence modes and with the implementation of virtual activities in the last year due to the Covid-19 epidemic. Research activities in the programs are considered to solve the organizational problems of the students related to their fields of studies [1].

The postgraduate training service is on the scope of the quality management system certified to NC-ISO 9001:2015 standard [2]. With the approval of the ISO 21001 in 2018 [3], the first attempt was done to evaluate how the requisites of the new standard are fulfilled within the existing quality

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management system [4].

The National Normalization Office of Cuba, which includes the National Certification Organ, is organizing the NC-ISO 21001:2019 certification scheme. Taking into account the experience and knowledge available, the Board of Directors of the Chair decided to implement the new standard. The objective of this work is to highlight how the management system for educational organization (EOMS) was implemented in the Chair on Quality, Metrology and Normalization at Havana University.

Until now few papers are available related the implementation of EOMS ISO 21001, due to the relatively recent publication of the standard, and also there still exists some resistance to the implementation of standardized systems in educational institutions. Nevertheless, some institutions that incorporated the generic ISO 9001 quality management systems are moving to ISO 21001 [5], or are developing methodologies for ISO 21001 implementation and diagnosis [6], [7]. Despite the fact that the ISO 21001 standard does not yet have a wide implementation, consulted papers evidence the benefits that the standardized management systems could bring to the educational organizations [8] - [11].

THEORETICAL FRAMEWORK

Educational services are provided through diverse organizations, which must have common principles of action and similar basic requirements; hence the importance of having a management system for all types of educational institutions. Efforts to elaborate an international normative document guiding the management of educational organizations had a new booming in 2014, when the Technical Committee of the International Organization for Standardization ISO/PC 288 began to develop an ISO standard aimed at implementing specific management systems for educational organizations [12] - [14].

The International Organization for Standardization states that the development of the standard ISO 21001 contributes to the achievement of the 2030 Agenda for Sustainable Development [15], specifically in relation with the following objectives:

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Goal 10. Reduce inequality within and among countries.

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

In the works of ISO/PC 288 participate 86 specialists from 39 countries, culminating in May 2018 with the publication of the ISO 21001 standard "Educational organizations. Management systems for educational organizations. Requirements with guidance for use" [3]. This is the first international standard for overall educational sector, including both regulated education at any of its levels and non-regulated education (adult education, special education, continuing training, languages, etc.), in any modality. It is taught, either in person, remotely, online or mixed. Such a management model can help reduce the proliferation of potentially contradictory or incompatible national, regional or sectoral regulations, and facilitate a common language of collaboration between

different educational organizations, public or private [13], [16].

Before the approval of ISO 21001, there was the IWA-2:2007 [17] as result of an international workshop agreement (IWA). This document offered a guide for the implementation of quality management systems in educational organizations, according to the ISO 9001:2000 standard, and reduced ambiguity in terminologies when using the generic standard in educational organizations [13]. The IWA-2 should be updated considering the new structure of the ISO management standards, based on the ISO/IEC Directives approved in 2012, and was finally withdrawn in 2013.

The ISO 21001 standard is aligned with ISO 9001:2015, and takes into consideration other international standards related to educational services such as ISO 29993 [18]. The document maintains the high-level common structure that ISO has established for all its management system standards, applying the Plan-Do-Check-Act (PDCA) cycle and process approach, with an overall focus on risk-based thinking.

The document specifies the requirements for a management system (OEMS) when an educational organization [3]:

a) needs to demonstrate its ability to support the acquisition and development of competence through teaching, learning or research;

b) aims to enhance satisfaction of learners, other beneficiaries and staff through the effective application of its EOMS, including processes for improvement of the system and assurance of conformity to the requirements of learners and other beneficiaries.

With the implementation of the ISO 21001 standard, it is intended that educational organizations offer a better service, based on evaluating the degree to which they satisfy the needs and expectations of students, their families, teachers, the labor market and society in general.

Some concepts are provided in the ISO 21001 standard. Educational organizations are those whose main activity is the provision of educational products and services. The educational service constitutes the process that supports the acquisition and development of students' competences through teaching, learning or research, while the educational product (also called a learning resource) is a tangible or intangible product (physical or digital) used in the pedagogical support of an educational service.

A student is considered to be a beneficiary of the educational service, who acquires and develops her skills through the educational service. In general, the beneficiaries are the people or groups of people who benefit from educational products and services and whom the educational organization is obliged to serve by virtue of its mission, including families and guardians, the labor market and the government.

In addition to contextualizing the seven quality management principles included in the ISO 9000 standard [19] to the educational service, ISO 21001 adds four more:

- a) focus on learners and other beneficiaries;
- b) visionary leadership;
- c) engagement of people;
- d) process approach;
- e) improvement;

- f) evidence-based decisions;
- g) relationship management;
- h) social responsibility;
- i) accessibility and equity;
- j) ethical conduct in education;
- k) data security and protection.

While ISO 9001:2015 focus on customer satisfaction, ISO 21001:2018 focus on satisfaction of learners and other beneficiaries (government, labor market, parents and guardians).

All the processes that are established in the ISO 21001 standard are important so that the educational organization can function properly, fulfill its mission and objectives, and achieve its vision.

The ISO 21001 standard lists the potential benefits to an educational organization of implementing EOMS, they are in brief [3]:

- better alignment of activities with strategy;
- consistent processes and evaluation tools to demonstrate and increase effectiveness and efficiency;
- more personalized and effective response to all learners;
- increased credibility of the organization;
- greater social responsibility;
- widened participation of interested parties;
- stimulation of excellence and innovation.

METHODOLOGY

The results presented in this work are based on the participation in the diagnosis, design and implementation of the EOMS in the Chair on Quality, Metrology and Normalization of the Havana University, based on the analysis of the normative, legal and operative documents that support the educational service provided, specifically academic postgraduate programs on Master Degree and Specialization.

In the diagnostic stage, those aspects that were focused on the compliance with the ISO 9001 standard, but did not bring sufficient evidence of the requirements of the ISO 21001 standard were identified. Based on the results of the diagnosis, the design of EOMS deepened on those aspects that previously had not been sufficiently developed. At the same time, the new documents were implemented, taking care not to affect the educational service, for which an effective change control process was conducted.

RESULTS AND DISCUSSION

The system implemented is described in the EOMS Manual, using the structure of the ISO 21001 standard. This article offers the description of the EOMS of the Chair of Quality, Metrology and Standardization of the Havana University as established in its Manual.

A. Context of the organization

1) Understanding the organization and its context

The Chair of Quality, Metrology and Standardization undertakes the external and internal issues that are pertinent to

its purpose using the SWOT Analysis (Strengths, Weaknesses, Opportunities and Threats). In May 2021, the Strategic Projection 2021-2025 elaborated by the Board of Directors was circulated to the members of the Academic Committees. Once the pertinent recommendations had been analyzed and included, the document was circulated to all professors and tutors. Annually, the information on the organization and its context will be monitored and reviewed within the framework of the Management Review or when there are changes in the context that require a review of the Chair's strategic planning.

As a result of the strategic exercise carried out, the Mission and Vision of the Chair was established as follows:

The Mission: To provide professional and academic postgraduate training services on issues related to the National Quality Infrastructure, meeting the needs and expectations of students, other beneficiaries and stakeholders in general.

The Vision to 2025: The professional and academic postgraduate training services on issues related to the National Quality Infrastructure, provided by the Chair of Quality, Metrology and Standardization are a national benchmark by their excellence and social relevance - based on the competence of its professors and staff in general, the scientific-technical validity of the programs and their constant updating. This reflects changes in the context and the interests of beneficiaries and other interested parties.

2) Understanding the needs and expectations of interested parties

The Strategic Projection 2021-2025 document identifies the stakeholders relevant to the EOMS and their requirements. Interested parties include:

- students;
- other beneficiaries (Havana University, High Education Ministry, student employers);
- professors and tutors employed at the Havana University, volunteers from other institutions, and support staff of the Chair;
- other stakeholders (alumni, collaborating and competing educational organizations, external providers, the media and society).

Annually, the interested parties' information, their relevant requirements and the communication channels are monitored and reviewed.

3) Determining the scope of the management system for educational organizations

The scope of the EOMS covers the three postgraduate academic programs developed by the Chair, as well as postgraduate professional training activities that are requested.

The programs are:

- Master in Quality and Environmental Management.
- Postgraduate Specialization in Standardization.
- Master in Metrology.

In addition, all educational products used in the postgraduate training services in any of its modalities are included: face-to-face, blended and distance (virtual).

4) Management system for educational organization

The Chair has established, implements, maintains and continuously improves its EOMS, including the necessary

processes and their interactions, in accordance with the requirements of the NC-ISO 21001:2019 standard. Fig. 1 shows the process map of the EOMS, while Table 2 lists the activities of each process. The processes are described in the Manual, including their purpose, related documented information, inputs required and the outputs expected.

The EOMS encompasses a key macro-process (Provision of postgraduate training services) made up of three processes:

- Professional training.
- Master Programs.
- Postgraduate Specialization.

In addition, there is a managerial process (Strategic and operative management), and two support processes (Logistics and Educational Technology).

The Board of Directors of the Chair:

- a) maintains documented information to support the operation of its processes;
- b) keep documented information to have confidence that processes are performed as planned.

B. Leadership

1) Leadership and commitment

The Board of Directors demonstrates leadership and commitment with respect to the EOMS by:

- taking responsibility for its effectiveness and continuous improvement;
- establishing the policy and objectives of the Chair, compatible with its context and strategic direction;
- guaranteeing the sustainable implementation of the educational vision and concepts related to education;
- ensuring that students' educational requirements, including special needs, are identified and addressed;
- considering the principles of social responsibility.

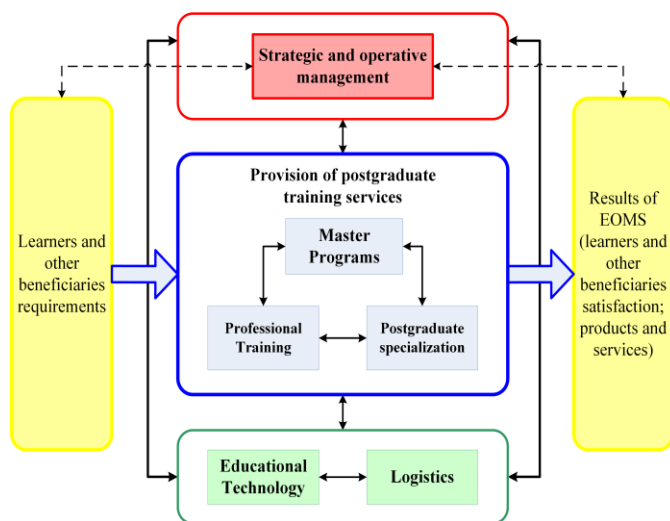


Fig. 1. Process map of the Chair' EOMS

TABLE I
PROCESSES, OWNERS, AND ACTIVITIES OF EOMS

Processes/Owners	Activities/ISO 21001 Requirements
1. Strategic and Operative Management/ President of the Chair	Diagnosis and strategic planning (4) Operational planning (5.6) Management of material and financial resources (7.1) Control of externally provided processes, products and services (8.4) Management of human resources (7.1.2, 7.1.6, 7.2, 7.3, 7.3) Control of documented information (7.5) Process monitoring (9.1) Internal audit (9.2) Management Review (9.3) Improvement (10)
2. Master Programs	Design of postgraduate training activities. Call, selection and enrollment of students. Provision of educational service.
3. Postgraduate Specialization	Guidance and tutoring for students. Management of updated educational materials. Evaluation of student satisfaction.
4. Professional training	Evaluation of the impact of training. Self-evaluation and improvement of programs. (8.1, 8.2, 8.3, 8.5, 8.6, 8.7)
5. Educational Technology (ET)/ Head of ET	Computerized systems support for the provision of educational services and knowledge management (7.1.3, 7.1.6, 8.5.1)
6. Logistics/ Specialist in Quality Management	Infrastructure management and student documentation (7.1.3, 7.1.4)

2) Policy

The Chair of Quality, Metrology and Standardization focuses its management policy on "guaranteeing the quality and continuous improvement of the EOMS, postgraduate training services and educational products, complying with the applicable regulations, taking into consideration educational developments, as well as relevant scientific and technical advances related to the National Quality Infrastructure. The work results of the Chair are reflected in the obtaining of higher accreditation categories of its programs, the satisfaction of its students, beneficiaries and other interested parties, as well as in an increase in the culture of quality in the context as part of its social responsibility".

The policy was approved in the strategic projection exercise carried out in May 2021, and was made known to the personnel to ensure its understanding and application. The policy is available to all interested parties, is kept as documented information and is analyzed annually in the management review to ensure its suitability.

3) Organizational roles, responsibilities and authorities

The Board of Directors has defined the roles and responsibilities of the staff for the maintenance of the EOMS processes.

The Chair President is in charge of ensuring that the EOMS complies with the requirements of the NC-ISO 21001:2019 standard. All personnel have the responsibility of collaborating in the implementation and maintenance of the effectiveness of the EOMS. In addition to these general responsibilities, the members of the Board of Directors, the Logistics Group, and the Academic Committees have specific responsibilities related to the functions they perform.

The Academic Committees functions comply with the

provisions of the Resolution No. 140/2019 Regulation of Postgraduate Education of the Republic of Cuba and Instruction No. 01/2020 Manual for postgraduate management established by the Higher Education Ministry.

C. Planning

1) Actions to address risks and opportunities

When planning the EOMS, the elements identified in the strategic diagnosis, the EOMS processes, as well as the needs and expectations of the interested parties were considered. For each process, the risks and opportunities that need to be addressed were identified, and documented in the Risk Prevention Plan, which also establishes the actions to address these risks and opportunities. The risk management actions are implemented in the EOMS processes and their effectiveness is evaluated annually, as part of the Management Review.

2) Educational organization objectives and planning to achieve them

Based on the strategic objectives and the EOMS policy, the EOMS objectives, deployed by each of the processes, their measurable indicators (measurement criteria) and the actions for their fulfillment, are established annually. These objectives are communicated to all personnel. Annually, the fulfillment of the objectives is evaluated in the Management Review. Both the planning and the evaluation of compliance are kept as documented information.

3) Planning for changes

When the need for changes in the EOMS is determined, these are carried out in a planned manner, considering: the purpose of the changes and their possible consequences, and the integrity of the EOMS.

D. Support

1) Resources

The Board of Directors determines the necessary resources for the establishment, implementation, maintenance and continuous improvement of the EOMS. The material and financial resources for the operation of the EOMS are provided by the Center for Biomaterials where the Chair is located. Taken in account that the Chair is a collaborative project, resources to improve staff skills are guaranteed in the institutions from which they come.

The Board of Directors determines and monitors what resources are provided by:

- a) the Center for Biomaterials and other dependencies of the University of Havana;
- b) institutions outside the University of Havana, which are members of the Chair;
- c) other external providers.

The organization ensures that reasonable adjustments are made to promote equitable access to postgraduate training for students with special needs.

The human resources available to the Chair include:

- a) personnel employed by the Center for Biomaterials and other dependencies of the University of Havana, according to the hiring procedures established in the national legislation;

- b) Professors, researchers and volunteer specialists from other institutions working with the Chair and contributing to the postgraduate training services coordinated by it.

One of the strengths of the Chair, which makes it *sui generis* and enhances its activity, is that it brings together, teachers and tutors from different institutions. They are specialized in issues related to the National Quality Infrastructure, both in technical aspects of a given economic sector, and in management tools.

The Board of Directors, with the support of the Head of Logistics, identifies and manages the infrastructure for carrying out the activities of the Chair. It includes: the built-up area, the equipment (hardware and software), the basic services, connectivity and the use of the Virtual Environment for Teaching-Learning (EVEA) of the University of Havana.

Another part of the teaching facilities is provided by other dependencies of the University of Havana and by external centers, which are part of the Chair, fundamentally the institutions of the National Office for Standardization System (Territorial Office for Standardization of Havana; Center for Management and Development of Quality; National Institute for Research in Metrology).

The implementation of knowledge is carried out, mostly, in the centers where the students come from. In addition, in the case of the Postgraduate Specialization in Standardization, the implementation of knowledge is carried out through the Technical Committees in which students carry out their professional work.

The Chair makes computer equipment and internet connectivity available to students who require it. However, most of the students use these facilities in their own work environments.

There is a repository for specialized literature at the server of the Center for Biomaterials, also there are books in digital and printed format and the final papers of the students of all the editions of the three programs. These are all available. There is also abundant scientific literature and normative documents, available to students, in the Center for Management and Development of Quality, in the National Institute for Research in Metrology and in the Center for Management Studies of the Havana University, institutions participating in the postgraduate training services of the Chair. Likewise, in each of the face-to-face courses and on the EVEA platform, the teachers avail the students with updated basic and complementary bibliography, related to the subject being taught.

The Chair determines, provides and maintains a suitable environment to promote the well-being of the relevant stakeholders, considering physical and psychosocial factors. Order and cleanliness are basic attributes of the teaching environment, together with the ethical conduct of teachers, students and staff in general.

The knowledge necessary for the operation of the processes of the Chair and to achieve the conformity of educational products and services, are determined. A Quality Workshop is held annually, in which students and teachers present their results in the subjects of study of the Chair.

The professors and tutors provide learning resources and

make them available where and when needed. The person in charge of Educational Technology supports the rest of the staff in the development of learning resources, which are made available to students on the EVEA platform.

2) *Competence*

The staff is competent to carry out postgraduate training services in the area of knowledge in which it works. The competence requirements of the professor and tutors are the following:

- Possess a high academic level and extensive professional experience in the area of knowledge of the program, endorsed by a scientific degree, the title of Master or Postgraduate Specialist; the teaching categories of Full Professor, Assistant Professor or the scientific categories of Senior Researcher or Assistant Researcher. Other professionals who have a high and recognized prestige in the area of knowledge of the program may also be part of the faculty.
- Maintain an active participation in research, innovation and professional practice in the area of knowledge of the program.

The evidence of competence is kept as documented information, through the updated Curriculum Vitae, copies of the professional title and academic degrees, certifications of teaching or research categories, publications and other relevant information.

The non-teaching staff may be also competent for their functions, based on their training, experience and on-the-job training.

The annual evaluation of the personnel is carried out in their institutions of origin and, when required, training actions are carried out to acquire the necessary updated competence, which is assessed.

The organization ensures that all educators and staff who have contact with students with special needs have specialized and appropriate training.

3) *Awareness*

The Board of Directors ensures that the people who carry out the work under the control of the Chair are aware of:

- a) The Policy, the Strategic Projection of the Chair, the Objectives and measurement criteria of the EOMS;
- b) their contribution to the effectiveness of the EOMS, including the benefits of an improvement in the performance of the Chair;
- c) the implications of non-compliance with the EOMS requirements.

4) *Communication*

The Board of Directors and the Academic Committees determine the internal and external communications pertinent to the EOMS, and establish effective methods for communicating with students and other stakeholders guaranteeing the necessary feedback.

Communication between the members of the Chair and the students is established, fundamentally, through email, meetings, workshops and the Chair's web page. In case of unresolved problems, students and other beneficiaries are informed that they should contact the Presidents of the

Academic Committees and, in an extreme case, the Graduate Directorate of the University of Havana. These aspects are reflected in the Communication Strategy of the Chair.

Annually, in the Management Review, the Board of Directors analyzes and improves the Communication Strategy based on the results obtained. Documented information of the communication process is retained.

5) *Documented information*

The EOMS of the Chair includes the documented information required by NC-ISO 21001:2019, and those determined as necessary for the effectiveness of the EOMS and the legal compliance.

Documented information can be in any form or type of medium, and includes:

- Records of the Programs;
- Records of Editions;
- Student records,
- Work instructions,
- Evidence of the management of the EOMS.

The documentation of the students and postgraduate programs is governed by Resolution No. 184/11 Manual of Norms and Procedures for the Work of the Secretariats in Higher Education Institutions, a normative document of official use for the work of the general, teaching and postgraduate secretariats, in all the attached to Higher Education Centers. Specifically, Chapter X is related to the postgraduate control process.

In the technical instruction IT 46 Control of documented information, it's established how the following activities are carried out:

- a) distribution, access, retrieval and use;
- b) protection and security, including redundancy;
- c) storage and preservation, including preservation of readability;
- d) change control;
- e) conservation and disposal;
- f) assurance of confidentiality;
- g) prevention of inadvertent use of outdated documented information.

Documented information of outside origin deemed necessary for the planning and effective operation of the EOMS, are organized and classified in all. An index of both internal and outside documents and their relevant updates are kept.

E. *Operation*

1) *Operational planning and control*

The Chair plans, implements and controls the processes necessary to meet the requirements for the provision of educational products and services, and to implement actions for risk management. The Board of Directors controls planned changes and reviews the consequences of unanticipated changes, taking actions to mitigate any adverse effects, as appropriate. Externally outsourced processes are controlled to the extent possible.

The Academic Committees of the Programs plan the design, development and expected results of educational services,

which include:

- a) learning outcomes;
- b) ensuring appropriate and accessible teaching methods and learning environments;
- c) define the criteria for the evaluation of learning;
- d) carry out the learning assessment;
- e) define and conduct improvement methods;
- f) provide support services.

2) *Requirements for educational products and services*

The requirements for educational services are defined in the corresponding Programs, considering:

- a) those required by the Chair due to its policy and strategic plan;
- b) those resulting from the needs analysis carried out to determine the requirements (current and potential) of students and other beneficiaries, particularly those with special needs;
- c) those resulting from international demands and developments;
- d) those resulting from the labor market;
- e) the results of the investigation;

The special needs analysis involves a comprehensive assessment of students' learning skills, includes prior knowledge and skill requirements. When students do not meet these requirements, propaedeutic courses are planned. In the event that students do not show evidence of possessing the required knowledge, proficiency tests are carried out before approving enrollment.

The Chair complies with the statements about the educational services it offers. The requirements of the Programs are communicated to the students and other relevant stakeholders in the call for each edition, where the entry requirements, the study plan and the preliminary calendar are communicated. As the Program progresses, communications are established with students regarding the specific characteristics of each course, the dates of the activities to obtain research and professional credits, and other aspects of interest.

Academic Committees ensure that when requirements for educational services are changed, relevant documented information is amended, and that interested parties be aware of the changed requirements. For example, students and teachers are notified regarding calendar changes. The Postgraduate Directorate of the Havana University is notified about changes in the Programs prior to each edition and information on modifications and their approval is kept.

3) *Design and development of educational services*

The Chair has established, implemented and maintains a design and development process to ensure the subsequent provision of educational products and services. Instruction IT 40 Course Design establishes the input elements of the course design, the design stages, and the aspects to be included in the program and how the review, verification and validation of the course design are carried out. The results of these activities are reflected in the models: Certificate of Compliance with Requirements and Certificate of Validation. For the design of distance training, IT 50 Design of virtual courses and digital educational media has been established.

In Instruction IT 41 Design of Postgraduate Programs,

incorporates the input elements, the design stages, the aspects to be included in it and also how the review, verification and validation of the Program design are carried out. The design, delivery, evaluation and accreditation of Postgraduate Programs are regulated by the Directorate of Postgraduate Education of the Ministry of Higher Education, in Instruction No. 01/2020 Manual for postgraduate management.

The design and presentation of the Academic Postgraduate Programs are carried out by the designated Academic Committee with the participation of the teachers and under the direction of the Program Coordinator. The approval of the Program (verification of the design) is carried out by the University Postgraduate Commission (CUPOS) and the national Advisory Commission for Postgraduate Education (COPEP), which gives it the category of Authorized Program. The validation of the Program design is carried out in the self-evaluation that is performed at the end of each edition, taking into account the opinions of students and teachers, and using the instruction IT 45 Evaluation of the impact of Postgraduate training.

The Academic Committees take the necessary steps dealing with the problems identified by the reviews and with the verification and validation activities. Documented information is maintained on:

- a) the results of the review, verification and validation activities;
- b) any new requirements for educational products and services.

4) *Control of externally supplied processes, products and services*

The Chair ensures that externally provided processes, products and services are compliant and do not adversely affect the organization's ability to consistently deliver compliant products and services to its students and other beneficiaries. To do this, it applies the controls documented in IT 47, based on the criteria established for the evaluation, selection, performance monitoring and re-evaluation of external suppliers, based on their ability to provide processes or products and services in accordance with the requirements. Documented information of these activities and of any necessary actions arising from the evaluations is retained.

The Chair ensures the adequacy of the requirements before their communication to the external provider, and communicates its requirements for:

- a) the processes, products and services to be provided;
- b) approval of external supplies;
- d) the interactions of the external provider with the Chair;
- e) the control and monitoring of the performance of the external provider to be applied by the Chair;
- f) the verification or validation activities that the Chair, its students and other beneficiaries intend to carry out at the external provider's facilities.

5) *Production and provision of educational service*

The Chair implements the production and provision of the educational service under controlled conditions, in accordance with the ISO 21001 requirements and in compliance with the provisions of the Resolution No. 140/2019 Regulation of

Postgraduate Education of the Republic of Cuba and Instruction No. 01/2020 Manual for postgraduate management. To start each edition, authorization is requested from the Rector of the University of Havana, confirming compliance with the established educational process requirements and reporting any changes made to the approved programs.

The admission of students is carried out in compliance with IT 44, which regulates the processes of convocation, admission, enrollment, withdrawal and re-entry into the Programs. The pre-admission information and the admission conditions are communicated in the calls for each edition of the Programs and independent courses. Admission criteria and processes are guaranteed to be applied evenly for all students; The results and decisions about the admission process are kept as documented information and are available to anyone interested in consulting them; the traceability of each admission decision is ensured.

For the provision of educational products and services, processes for teaching, learning facilities and administrative support are established. IT 43 Evaluations and certifications in Postgraduate programs regulates the calls and deadlines for the evaluation of the courses, as well as the preparation of the Certification of Notes and the Dictum of the Academic Committee that certifies the fulfillment of all the qualification requirements demanded in the program. IT 42 regulates requirements for the writing and defense of the thesis and the written memory of the professional work.

Through its documented practices the Chair guarantees traceability of grades, so that an objective connection can be identified between the student's work submitted and the grade assigned; retains documented evaluation information as evidence of assigned ratings for five years; and students have the opportunity to request rectification of the results of the assessment activity and the grade.

For each Academic Postgraduate Program, a file is kept with the following documentation:

- Printed copy of the original program design and its modifications, as well as the following improved versions approved by the Havana University and the Higher Education Ministry.
- Copy of the Ministerial Resolution that approves the original program and the Dictums of the Academic Committee and designated institutional levels that approve new versions and changes introduced.
- Results of the self-evaluations, external evaluations and other evaluations (inspections, administrative controls, etc.) carried out on the Program.
- Results of the National Accreditation Processes (Dictum of the National Accreditation Board).

For each edition of the Programs a file is kept with the following documentation:

- Authorization from the Rector to open the edition.
- Copy of the call.
- Official enrollment list (IT 44).
- Academic calendar of the edition.
- Documented information of the assessment as evidence of the grades assigned.

- Dictums of the Academic Committee on withdrawals, enrollment by exception, recognitions, proficiency tests, assignment of external tutors and others.
- Approving documents from thesis or final professional work committee issued by the Academic Committee and approved by the Director of the Biomaterials Center.
- Official, updated list of the graduates of the Edition.
- Act of closing the Edition.
- Results of the self-evaluation corresponding to the edition and program improvement plan.

The proposal for conferment of the Master's Degree or Postgraduate Specialist is presented to the Postgraduate Secretariat of the University of Havana, supported by the following documentation:

1. Dictum of the Academic Committee (IT 43).
2. Certification of academic activities and other approved qualification requirements.
3. Conclusions of the Committee for the Defense of Thesis or Final Professional Work (IT 42).

The management, conservation and custody of all this documentation is the responsibility of the Chair, student records will be kept in the Chair's file until they are transferred to the Postgraduate Secretariat of the Havana University, where documentation will be archived indefinitely.

A copy of the written report of the Thesis or Final Professional Work defended is filed in a place accessible to students who wish to consult them in paper or digital form.

The Chair's leadership, teaching, and support staff identify steps to improve the accessibility of educational services, applying reasonable judgment about what is possible over a specific time frame (e.g.: consideration of conditions such as pregnancy and maternity period, prolonged illness). To this end, individualized measures are applied flexibly, as appropriate, which may include modifying the curriculum (timing and mode of delivery) and promoting autonomy and independence. The credit system favors the flexibility of the curriculum and the different forms of teaching-learning.

The Chair guarantees identification and traceability with respect to:

- a) the student's progress through the educational process;
- b) follow-up of graduates, whenever possible;
- c) the results of the work of the staff.

Also, the organization takes care of the property belonging to any interested party while it is under its control or is being used by it. The property of an interested party may include materials, components, tools and equipment, beneficiary facilities, intellectual property and personal information, certificates, diplomas and other relevant documents.

In addition, consent is obtained when the property is incorporated into educational products and services. When a stakeholder's property is lost, damaged, or otherwise deemed unsuitable for use, the Board of Directors informs the relevant stakeholder, takes appropriate corrective action, and retains documented information about what happened.

The Chair preserves outputs during production and service provision, to the extent necessary to ensure compliance with

requirements. The Quality Management Specialist, acting as the teaching secretary, guards the documented information referring to the students' data, filed by editions. In virtual programs, student data is stored on the EVEA platform and the technological protection measures are validated. Students and other interested parties have controlled access to their data for review and update.

The Chair reviews and controls changes for production or service provision, to the extent necessary to continuously ensure compliance with requirements. The changes in the programs are approved at the corresponding institutional level, as established in Article 49, of the Instruction No. 01/2020. The documented information that describes the results of the review of the changes, the persons authorizing the change, and any necessary actions arising from the review is retained.

6) *Release of educational products and services*

The release of products and services to students and other beneficiaries does not take place until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, where applicable, by the student and other beneficiaries. Postgraduate academic programs are approved by the Academic Committees, the Scientific Council of the Center for Biomaterials, CUPOS and COPEP.

The Chair maintains documented information on the release of products and services, which includes:

- a) evidence of compliance with the acceptance criteria;
- b) traceability to the people who authorize the release.

The Academic Committees and the Postgraduate Secretariat of the University of Havana carry out the review of the Student Records, to verify the adequacy and legality of the information contained, prior to the Defense of the final work and before the granting of the corresponding title.

7) *Control of the educational nonconforming outputs*

Outputs that do not conform to specified requirements are identified and controlled to prevent unintended use or delivery. Appropriate actions are taken based on the nature of the nonconformity and its effect on the conformity of educational products and services. This also applies to non-conforming educational products and services detected after the delivery of the product, during or after the provision of the services.

When non-conforming outputs are corrected, compliance with requirements is verified.

The Chair maintains documented information that:

- a) describe the delivery of the programs;
- b) describe any non-conforming output;
- c) describe the actions taken;
- d) describe all concessions obtained;
- e) identify the authority deciding the action regarding the nonconformity.

A student who fails a course or other activity in the curriculum has the possibility of being evaluated in a second examination session.

F. *Performance evaluation*

1) *Monitoring, measurement, analysis and evaluation*

The Chair monitors its processes and the EOMS, determines

the indicators and measurement criteria to evaluate their effectiveness. The annual evaluation of processes effectiveness is carried out, reported in the Management Review and kept as documented information.

In the meetings of the Academic Committees, compliance with the Calendar, the satisfaction of the students, the progress of the evaluations and other activities of the Programs are monitored. In addition, the completeness of the editions and students' files is periodically reviewed. At the end of each edition, a self-evaluation is carried out following the criteria established in the Master's Degree Evaluation and Accreditation System of the National Accreditation Board.

Documented information is kept as evidence of the monitoring, measurement, analysis, evaluation and its results.

Student satisfaction is monitored through surveys at the end of each course and upon graduation to evaluate the impact of the programs (IT 45 Evaluation of the impact of Postgraduate training). Teachers are surveyed annually to find out their perceptions of the degree to which their needs and expectations are met and of the quality of the programs. In the meetings of the Postgraduate Secretariat and in the supervisions that it carries out, feedback is obtained on the satisfaction of the established requirements. At the end of each edition, the self-evaluation report is sent to the Postgraduate Department of the University of Havana and feedback on it is obtained. IT 48 establishes the method for handling complaints and appeals and informs interested parties of its results. The Board analyzes the data, information that arise from monitoring, and the measures taken.

2) *Internal audits*

Internal audits are carried out according to the established Program to provide information on whether the EOMS:

- a) complies with the Chair's own necessities and with ISO 21001: 2019 standard requirements;
- b) is effectively implemented and maintained.

The IT 49 Internal Audits establishes the frequency, methods, responsibilities, planning requirements, the competence of the auditors and the preparation of the reports.

3) *Management review*

The Board of Directors reviews the EOMS, at least once a year, to ensure its suitability, adequacy, effectiveness and continuous alignment with its strategic direction.

The Management Review includes considerations on:

- a) the status of actions from prior management reviews;
- b) changes in external and internal matters that are pertinent to the EOMS;
- c) information on the performance and effectiveness of the EOMS;
- d) adequacy of resources;
- e) the effectiveness of actions taken to address risks and opportunities;
- f) opportunities for continuous improvement;
- g) feedback from staff related to activities to improve their competence.

The outputs of the Management Review include decisions and actions related to:

- a) opportunities for improvement;

- b) any need to change the EOMS;
- c) resource needs.

Documented information will be retained as evidence of the results of management reviews.

G. Improvement

1) Nonconformity and corrective actions

When nonconformity occurs, the staff of the Chair:

- a) reacts to the nonconformity and, when necessary, takes action to control, correct and deal with the consequences;
- b) assesses the need for corrective actions to eliminate the causes of the nonconformity, so that it does not occur again, nor does it occur in another part of the EOMS.

IT 50 establishes the treatment of non-conformities.

2) Continual improvement

The Chair continually improves the suitability, adequacy and effectiveness of its EOMS, taking into account relevant research and best practices. The results of the analysis and evaluation, and the outputs of the Management Review, are considered to determine if there are needs or opportunities that should be considered as part of continuous improvement.

3) Opportunities for improvement

The Chair determines and selects opportunities for improvement and implements any actions necessary to meet the requirements of the student and other beneficiaries and improve the satisfaction of students, other beneficiaries, staff and other relevant stakeholders, including external providers. These actions are documented in the Improvement Plan. Improvements can include correction, corrective action, continuous improvement, sudden change, innovation, and reorganization.

CONCLUSION

This article describes how the ISO 21001: 2018 Educational Organization Management System has been implemented in a university unit dedicated to providing postgraduate academic services in the areas of standardization, metrology and integrated management systems. Although the implementation of a standardized management system is a task for which the Havana University as a whole is not prepared yet and due to its size and complexity it would be a daunting task, the possibility of implementing this system in one of its dependencies is a valuable organizational innovation.

The work carried out shows the real possibility of implementing the requirements of ISO 21001 and gives an example to follow for other university areas. The fact that the Chair already had theoretical and practical experience in the implementation of standardized management systems, the vast capability available in postgraduate academic training, the competence of its staff and the effective leadership of its Board of Directors, has made possible the implementation of this system in a short time.

The work carried out places the educational organization in optimal conditions to request the certification of its management system, once the specific certification scheme is approved by the National Standardization Office, an accredited

body for the certification of management systems.

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