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Los vínculos ciencia- tecnología para la conservación de la documentación histórica universitaria

Camacho Domínguez, Adriam; Pérez García, Yulianela; Villavicencio Santillan, Washington Rolando

Adriam Camacho Domínguez
acamachod@ulvr.edu.ec
Universidad Laica Vicente Rocafuerte de Guayaquil, Ecuador
Yulianela Pérez García
yulianela.perez@uartes.edu.ec
Universidad de las Artes, Ecuador
Washington Rolando Villavicencio Santillan
wvillavicencios@ulvr.edu.ec
Universidad Laica Vicente Rocafuerte de Guayaquil, Ecuador

Abstract: This article focuses on a series of problems that threaten the preservation and use of university heritage, especially documentary heritage. Various aspects such as the non-compliance with legislation, the absence of an efficient institutional policy, damages caused by lack of knowledge and personnel, the high cost of technologies and materials necessary for conservation and restoration, and the evident impact of age affect its preservation. Taking these precedents into account, the different uses derived from the management of university documentary heritage in its links with science and technology are analyzed. From the methodological point of view, an analysis was carried out with a qualitative approach based on the method of bibliographic review and the selection of information through criteria of inclusion and exclusion of primary and secondary sources in which a perspective of studies on science-technology and society prevailed. The main results allow identifying the necessary introduction of technology to facilitate preventive conservation, cataloging and dissemination of documentary heritage and all that derives from it in terms of research. Likewise, the implementation of a responsible management of documentary heritage requires the involvement of various social actors and institutions to promote scientific research based on the management and dissemination of knowledge as a significant resource.

Keywords: Documentary heritage, management, university, document preservation, scientific dissemination.

Resumen: El presente artículo se centra en una serie de problemas que atentan contra la preservación y uso del patrimonio universitario, en especial el documental. Diversas aristas como la inobservancia de la legislación, la ausencia de una eficiente política institucional, afectaciones provocadas por falta de conocimiento y personal, el alto costo de las tecnologías y materiales necesarios para conservación y restauración y el evidente impacto de la antigüedad afectan su conservación. Tomando en cuenta estos precedentes, se analiza los diferentes usos que se derivan de la gestión del patrimonio documental universitario en sus vínculos con la ciencia y la tecnología. Desde el ámbito metodológico se realizó un análisis con un enfoque cualitativo basado en el método de revisión bibliográfica y la selección de la información mediante criterios de inclusión y exclusión de fuentes primarias y

secundarias en el que primó una perspectiva de los estudios sobre la ciencia-tecnología y sociedad. Los principales resultados permiten identificar la necesaria introducción de la tecnología para facilitar la conservación preventiva, la catalogación y divulgación del patrimonio documental y todo lo que de el se deriva en materia investigativa. Igualmente de la implementación de una responsable gestión del patrimonio documental se hace necesario involucrar a varios actores sociales e instituciones para promover investigaciones científicas a partir de la gestión y divulgación del conocimiento como recurso significativo.

Palabras clave: Patrimonio documental, gestión, universidad, conservación de documentos, divulgación científica.

Introduction

Currently, one of the fundamental problems of universities is related to the protection, conservation, restoration and dissemination of their valuable documentary-historical heritage. In this complex management process, it is necessary to overcome the reduced visions that relate university heritage more to those tangible expressions that are usually restored and preserved. The documentation that every university campus generates throughout its history often suffers from neglect without taking into account that multiple scientific and social uses can be obtained within the framework of a responsible and holistic cultural policy that promotes an adequate management of these cultural riches.

The social, cultural, economic and political contextualization of heritage knowledge is fundamental, based on a deep knowledge of its diverse expressions with benefits for institutions and society in general. This cannot be divorced from the technological and scientific development that characterizes modern societies, organizing a management that enhances links with various branches of knowledge and reaches different social sectors.

There are also a series of problems that threaten the preservation and use of university heritage, especially documentary heritage, which touch on different aspects such as: non-compliance with current legislation in several countries, the absence of an efficient institutional policy, damages caused by lack of knowledge and personnel, the high cost of the technologies and materials necessary for conservation and restoration, and the evident impact of age, humidity and dust that affect heritage documentation.

For this reason, cultural heritage increasingly requires the introduction and incorporation into its scientific and technological processes of an analysis that interrelates science-technology and society. It is necessary to incorporate society and social actors in the elaboration of projects for the study, conservation, use and visualization of the heritage created by them. This change towards a more integral or holistic perspective of heritage must incorporate the scientific-technological in the cultural, abandoning reductionist disciplinary treatments that hinder the systemic treatment of it, forgetting the social character of science, relating culture and scientific dissemination and advocating an integration of social and experimental sciences, interpreting it as the need to humanize the sciences and impregnate a more scientific look to the humanities. (Fonseca et. al, 2020, p.24).

Based on this situation, the purpose of this paper is to analyze the links between science and technology and the management of university documentary heritage. The objectives are to determine the different uses derived from the management of university documentary heritage in its links with science and technology, to explain its conceptualization and integration, to identify the different problems that exist in its management and dissemination process, and to evaluate the different scientific and social uses that can be obtained from its management in its links with science and technology.

Materials and Methods

From the methodological point of view, a qualitative analysis was carried out based on the method of bibliographic review and the selection of information through inclusion and exclusion criteria of primary and secondary sources in which a perspective of studies on science-technology and society prevailed.

The science-technology and society approach focuses on the search for relevant and important information about the sciences and technologies of modern life, the analysis and evaluation of these combined with reflections on the values involved and decision making at the institutional or nation level.

The structure of the study used the contributions of the theoretical methods of analysis-synthesis, induction-deduction and historical logic to address variables and indicators related to documentary heritage and universities, university management and governance, and Science-Technology-Conservation of University Documentary Heritage.

Results

Universities with historical heritage have had processes not exempt of problems and particularities in the conformation of their diverse expressions. On many occasions we witness the in situ assessment of restorations of imposing facades or monuments that are only small reflections of the University Cultural Heritage (hereinafter PCU), in which movable and immovable assets such as architecture, archaeological sites, works of art, manuscripts, books and other objects of artistic, historical or archaeological interest are mixed, as well as scientific collections of all kinds, assets of ethnological value, technical documentary or of any other cultural nature regardless of their origin or owner. (Diaz, 2012, p.125)

The PCU is not exhausted in the purely historical, artistic or material, also its intangible heritage has been the result of the creative activities of the university community, cultural traditions, sports, religious and today are preserved with the responsible use of the historical memory that houses the university in every corner. Within this intangible heritage, the documentary support constitutes a legacy for humanity, and its protection, dissemination and enrichment depends on everyone. (Dorado & Hernández, 2015)

Universities as model centers of education through their libraries or information centers have the unavoidable mission of sensitizing and raising awareness among the university community and the rest of society about the protection of their cultural heritage. However, at present, the functions of

university libraries need to be updated in accordance with the trends and needs that contemporary heritage demands, so that they can develop sensitive experiences, communication strategies and educational alliances that empower the communities and the surrounding population.

In the midst of all these expressions of heritage, one aspect is vital today, we refer to the preservation of historical documentation in the university environment, mostly reduced to remain in their archival institutions, libraries and offices. This heritage is complex, and its degrees of conservation vary according to the management implemented by the higher education institutions, the knowledge of the personnel designated for these functions, the investment in technology or materials for these purposes and the will of preservation existing in the authorities.

Foster (1995) goes deeper into these issues by proposing the composition of the documentary heritage in those informative elements and documents that are carriers of transcendental data for the current development of the academic, pedagogical and research purposes of the university; as well as those that contemplate in their content some transcendental fact; describe a proven, authentic and reliable relationship that is part of those events that have had a direct impact on the development of the university, and have a relevant influence on the process of its social development (academic publications, prints, audiocassettes, videocassettes, tapes, CD's, DVD's, maps, cartographic references, etc.).).

Although this conceptualization includes more contemporary expressions, a large part of these documentary treasures are related to collections that may date back centuries based on documents that include university council minutes, rector's resolutions, academic records, photographic collections, pamphlets or rare and valuable books. In many cases, it has been observed that some institutions have lost important collections due to mismanagement, infrastructure problems or dangers caused by humidity and neglect.

Along with these collections we cannot fail to mention that much of the documentation that is currently being generated constitutes in itself a new contribution to this documentary heritage, inevitably connecting universities with the future knowledge society that can be generated from academic, research or community outreach processes. (Takayanagui, 2014).

With the development of science and technology and the application of new technologies, there has been an explosion of documents and a diversification of the media containing information. As León (2006) explains, there has not been a proportional increase in the amount of space available for storage, which makes it necessary to seek formulas that do not require a large physical expansion.

Universities in developing countries have not been exempt from the evolutionary process of information supports, nor from the consequences derived from the contemporary scientific, technological and documentary explosion, but their efforts to alleviate this phenomenon are slow and complex due to the serious economic difficulties suffered by some nations. As a result of these conditions, documents with supports in different materials coexist in university libraries and archives, due to the historical juxtaposition of the carriers, which has caused documents of scientific, historical or artistic value created in the past to require efficient restoration. This is an excessively time-consuming activity

and requires a large amount of resources and highly qualified personnel. Given these circumstances, it is recommended to strive to create the ideal conditions for proper preventive conservation of documents, as well as to provide staff with the necessary knowledge for this arduous task and invest the few resources available in taking all appropriate measures to prevent the deterioration of the supports and the loss of the information they contain. (Palma, 2013)

In parallel, heritage conservation management cannot be divorced from social uses and the links imposed by science and technology today, which must stimulate a process that goes beyond the mere restoration of conserved goods. It is not only a problem of material and physical conservation but also of the involvement of those who preserve the memory and help to define the historical conscience of a society and the valuation of its own path.

This is connected with a trend that currently defends from the perspective of the librarian field the open access to the information heritage for its institutionalization within the legal frameworks of universities. This is based on an operational model that can be coordinated by university and specialized libraries that aims to sustain, manifest and regulate such access as a right of citizens and institutions, promote the use of the information heritage, encourage the autonomy of open access, disseminate the value and usefulness of open access to scientific and humanistic information for social benefits, among others (Palma, 2013).

Management of University Documentary Heritage: fundamental issues.

Cultural management is powerfully influenced by the changing and diverse contemporary environment. Among the characteristics of the times that influence the performance of management are: mercantile, financial and cultural globalization, the accelerated development of communications, computerization and transportation, the sharpening of economic, technological and social inequalities, the concentration of economic power outside the state, the increase in ethnic conflicts and migration processes, the deterioration of the environment and the acceleration of processes of cultural homogenization and the destruction of identities.

These characteristics, which imply uncertainty in management processes, are present in the complex realities of underdeveloped countries and pose a challenge for the preservation of our common heritage. The cultural management of heritage responds to a global coverage, where the fields of cultural administration (planning, coordination, direction and evaluation) and the dimensions of cultural activities (animation, creation, preservation, dissemination) are combined, ensuring an adequate and efficient development of policies both in macro social systems and in those related to the behavior of entities, programs or specific projects of the sector. (UNESCO, 2003)

The projections of heritage management cannot be disconnected from cultural policies, Garcia (1999) identifies the complexity of this process as a:

set of interventions carried out by the State, civil institutions and organized community groups in order to orient symbolic development, satisfy the cultural needs of the population, and obtain consensus for a type of order or social transformation. (p.18)

In this sense, cultural policies constitute the symbolic unity of a nation, the distinctions, divisions and links within it and with respect to other nations,

and heritage management constitutes a broad process that involves different networks, actors and interactions. Thus the conceptualization of management and conservation of the PCU is expressed as a conscious process, which establishes purposes and commitments of the subjects involved to promote learning and attitudes. (González et. al, 2018)

The management of the PCU must take into account these external conditions without losing sight of certain deficiencies that must be overcome internally, mainly associated with the management and preservation of its assets, which can be summarized in the following aspects:

Lack of knowledge and non-observance of current legislation on the protection of cultural heritage by those responsible for its preservation. The legal systems include a wide range of legal provisions that implement the political interest of the State to protect its heritage, but their regulation and implementation has different nuances within the public and private sectors.

Incomprehensions in the design of an institutional policy with respect to the management, handling and preservation of university heritage aimed at guaranteeing its identification, protection and dissemination, not only within the university community but also outside of it.

Lack of knowledge of the totality of the heritage assets of the universities, specifically those of a documentary nature such as reports, offices, memorandums, books, articles, journals, book chapters, papers, theses, among others: it is presumed that some of these are not identified, which implies a lack of knowledge of their characteristics, state of conservation and historical-heritage value and hinders the execution of concrete actions with respect to their safeguarding.

Problems with the state of conservation of cultural heritage: due to factors such as climate, age, dust and partial or total damage, deficient training of those responsible, among others. There are a large number of assets that are in a poor state of conservation, which is detrimental to their durability. In the specific case of heritage documentation, these require conservation conditions that are sometimes very costly -such as air conditioning-, qualified personnel for handling and maintenance, the necessary equipment for image and/or sound reproduction, conservation units and adequate furniture for special materials, just to mention some of the shortcomings.

Within all these requirements, documentary heritage constitutes a fundamental nucleus. The documentary wealth contains material not only related to the universities that preserve them, but to the history of each country, it must be organized in such a functional way that it helps us to understand more about our past, this process of revaluation of effective strategies must take into account the uses of science and technology where an ethical and social responsibility of the scientists responsible for them prevails. (Morte & Esteban, 2019)

The relationship Science-Technology-Conservation of University Documentary Heritage.

PCU management must evolve in correspondence with the archival reality worldwide. This situation leads us to the application of the so-called hybrid systems, which means producing, storing and maintaining documents on paper and other media that technology offers us, such as microfilm or electronic

media, so that at this point of convergence to ensure the preservation of archival documents for as long as they are needed. Hybrid systems are used as a way of guaranteeing the preservation of information, so as not to have problems in the attention of citizens and the legal order in general that public documents support (León, 2006).

The universities are destined to adopt a system for the management of their documentary heritage in which the preservation and integrity of all electronic records and traditional archival documents are complemented in an efficient way and with the transparency of their free access.

Management, seen in a multifunctional sense, should connect the university documentary heritage with knowledge, rather it should be treated, for the sake of accuracy, as a management of internal and external organizational information for the generation of new collections that will influence the development of products and services with high added value, because knowledge can only be managed converted into information, gathered, processed, organized, stored and disseminated through databases, shared information networks, virtual communities, among other contemporary means of data and information transfer.

In the new university educational models, information, documentation and knowledge management is emerging as a strategic component of the first magnitude. The traditional orientation of the tactical nature of information or documentation management projects changes when it is considered a true component of the educational strategy. The sustained growth in the training of professionals in these areas of knowledge has been of great importance in this regard, although unfortunately there are great differences between countries.

We must not lose sight of the necessary links that must exist between documentary heritage and the social function of knowledge, as Bernal (1939) announced:

To ensure the knowledge base that will allow the construction on rational bases of a national project based on the traditions, values, interests and expectations of the people.

To extend and turn into a collective patrimony the capacity of thought that allows us to confront dogmatism, mysticism, irrationality, the uncritical acceptance of interpretations and projects that are not supported by practical experience and lack scientific and cultural foundations that are duly argued.

Strengthen national self-awareness through the in-depth study of national history and culture, where the care of the documentary base itself, contained in archives and databases, is fundamental.

Ability to develop, based on knowledge, public deliberation of the issues that most interest the nation and its citizens. The discussion and evaluation of public policies, the exercise of social criticism, are constituent elements of a truly participatory democracy that encourages the exercise of a committed citizenship.

Education in general and the technical preparation of workers allow for a reasonable technological learning capacity that makes possible the functioning and development of the productive sector. Productivity has cultural roots and labor performance is not indifferent to educational and technical capacity. Any strategy implemented in universities for the protection of their documentary

heritage lacks the basic support if they do not have the right people to deal with the technologies and their scientific backing.

Maintain a receptive and at the same time critical and selective attitude towards the cultural, scientific and technological production that circulates in the global world today. In a world where a truly overwhelming volume of information circulates, there is a great deal of knowledge available. A good part of the problems that affect society require technical resources that it will not be necessary to create. It may seem a simple task, but the mere ability to search, find, select and adapt is actually a complex and highly creative task.

The strategies for the fulfillment of this series of objectives in the documentary heritage management process must be based on the profound technological revolution we are living through, and as part of it, the introduction and appropriate use of both computers and various computer products. The new information technologies have definitely brought about a profound change in the working methods of any type of professional and in any work carried out in the so-called information society. It is a fact, unanimously accepted, that a social and cultural transformation has taken place that is giving rise to a new industrial environment and new cultural forms of relationship and personal and group intercommunication.

The aforementioned transformation continues to affect all professional fields and their fields of application: commerce, finance, services, entertainment, training, social media, editing-publishing... and, obviously, the field of archives, libraries and university information and documentation centers and services.

Consequently, communicators, information professionals in general and documentalists have a new role to play in the era of electronic information, characterized by digitization, integration and globalization, as an immense universal data network or World Wide Web. The network of networks, the Internet (and its derivations, Intranet/Extranet), is therefore presented as a new means of communication, as the current instrument par excellence for the reception, consultation, production and dissemination of information of all kinds. (Serrano, 2020)

We are in a digital era, at a time when the available technologies of image and sound digitization, robotics and management of large databases and networks allow any professional in different fields of work to consult all kinds of information, produce their own content, digitize their material and integrate it into a complex system of remote access and dissemination. (Leija et. al, 2020)

Nowadays, with the development of science and technology and the application of new information and communication technologies (NICT), there has been an explosion of documents and a diversification of the media that contain information.

As Bustelo(2019) refers:

In this context, when organizations begin the process of digital transformation that inevitably implies that paper documents cease to exist, we are forced to make explicit new conventions that allow us to understand and define what an "electronic document" is and, with this change, new spaces are opened to establish new good practices to manage them. (p. 4)

In addition, various duplication techniques have been developed, such as facsimile reproduction, photocopying, microfilming, photography and

digitization, among others, which facilitate the preservation of original documents by limiting access by users. With gradual work based on these experiences, a preservationist culture can be generated among users. (Cascón-Katchadourian et. al, 2018).

NICTs should constitute a fundamental support for the management of the PCU; they have improved the search, storage, retrieval and dissemination of information, streamlining and improving access and service to users. However, there has not been a proportional increase in storage space, which makes it necessary to seek formulas that do not require a large physical expansion.

Digital technology promises to be one of the possible solutions to this problem because of the advantages it offers, but the process of digitization of collections is a complex and costly process that requires strategic decisions by the institutional management. Although digitization offers the possibility of storing, managing and disseminating a large volume of information, rapid retrieval of accurate information and online access, it is a relatively new technology and some aspects remain to be resolved, which are still controversial and, rather than disadvantages, constitute challenges that will have to be solved in the near future (León, 2006).

Among these challenges are the high initial investment, the longevity of the media used is short compared to that of quality paper, the technology used for storage and retrieval of information becomes obsolete relatively quickly and backward compatibility is often limited, the necessary refreshment or migration of stored data to a new medium and the renewal of technology in relatively short periods, the need for renewal of the technologies used the digitization project is expensive and the invulnerability to certain deterioration factors is not fully demonstrated. Fungi species are known to affect compact discs.

Many other advantages and disadvantages could be mentioned in the use of this technology, but the main thing is that it is a tool, not an end in itself, and the success of digitization programs lies in knowing how to use it to achieve the proposed objectives.

Attention should also be paid to the importance of using technology not only for the digitization of documentary and bibliographic collections, but also for the creation of databases, the use of the Internet and repositories for the dissemination of the university's documentary heritage, all this in close connection with the training and specialization of specialized personnel. It is essential to take into account the strategies of communication, dissemination and training of the public and the students that interact in the university with the use of blogs, web pages, brochures and the intervention in radio and TV to promote values in different social sectors. Likewise, a necessary bridge is built with the outside world in the search for agreements and resources to acquire technology to facilitate preventive conservation, cataloging and dissemination of documentary heritage and all that derives from it in terms of research. (Macías & Bujardón, 2010; Quirós & Polo, 2018).

For this type of situation, awareness-raising (understanding by awareness-raising the work of dissemination and extension of scientific knowledge by the university community that carries out research in the territory comprising the heritage to the local community, with the advice of personnel qualified in such tasks) is considered as a way of counteracting the negative effect of the exercise

of ignorance about the potential for scientific and economic development of the heritage. In this sense, complementary actions are needed, for example: the aforementioned work of dissemination and extension of the acquired knowledge.

The processes of heritage interpretation and management are currently a new discipline in the development of heritage enterprises, in order to resolve a major dilemma: to enhance the value of heritage and its conservation, while at the same time allowing a deep understanding of its various expressions with benefits for the communities that carry it.

Within the framework of the implementation of a responsible management of documentary heritage, it is necessary to involve various social actors and institutions to promote scientific research based on the management and dissemination of knowledge as a significant resource. In this process that arises from the use of university documentary heritage, academic exchanges with scientists and specialists from other universities can be stimulated to break any kind of cultural obstacle in function of a responsible and modern management of documentary heritage linked to technology and science. (Garcia et. al, 2018).

In the spirit of cultivating social responsibility to protect and disseminate the university documentary heritage, another series of actions can be taken into account, such as arranged and guided visits to show the different collections within the archives or libraries, determining in advance the type of people to be visited, their academic level, age and purpose, among others. Each group will be made aware of the importance of the university's documentary heritage for them and for society in general and how they can use it for educational, personal or research purposes.

Another type of activity is that of pedagogical services that consist of the interaction that should exist between the university and educational centers (schools, universities), promoting the educational dimension that archives and libraries can fulfill, based on the use of their collections for didactic purposes. In this way, it will be possible to stimulate reflection and critical thinking among students by bringing them closer to their immediate reality through documents in workshops or information literacy courses.

Conclusions

The links between culture and science in the field of UCP studies should lead to encourage ethical values and social responsibility in the academic community. Within heritage studies, it is urgent to pay attention to the University Documentary Heritage, seen as a reformulated heritage that considers its social uses, not from a mere defensive attitude, of simple rescue, but with a more complex vision of how society appropriates its history and can involve new sectors. It does not have to be reduced to a matter for specialists in the past: it is of interest to officials and professionals engaged in building the present and to all sectors whose identity is often disrupted by the hegemonic uses of culture. The external and internal problems that hinder the rescue, study and promotion of heritage cannot prevent the consolidation of the nation, but no longer as something abstract, but as what unites and unites in a solidary historical project the social groups concerned with the way they inhabit their space and conquer their quality of life.

The conceptualization and integration of the University Documentary Heritage is presented as an indispensable argument to seek solutions from the STS perspective for its rescue and contribution to the knowledge and culture of the nation, taking into account the characteristics of the documentation, both digital and paper.

A proper management of these heritage values from a correct appropriation of the tools provided by the STS perspective will contribute to achieve results at three fundamental levels:

Scientific value of heritage per se and the techniques of its preservation and dissemination.

Preparation of technicians and professionals who will interact with this value in correspondence with the reduction of the risks that affect it.

Greater social impact of this tangible and intangible heritage with the interaction between society and history.

In order to direct, execute and supervise the mechanisms inherent to the implementation of an institutional strategy in relation to the protection of the University Cultural Heritage, the creation of a Department for the Management and Preservation of Cultural Heritage in the universities is required.

The diversity of problems mentioned above constitutes a challenge and a starting point for a work that will gradually have to be carried out:

Execute actions aimed at identifying and registering the assets comprising the PCU.

Develop and coordinate with the pertinent institutions the technical activities aimed at the conservation and restoration of the PCU.

To guide and control the university areas that own or have custody of patrimonial goods regarding their treatment, procedure and management in accordance with their nature, characteristics, location and state of conservation.

Coordinate activities aimed at the promotion and dissemination of University Cultural Heritage.

To promote research projects, whether through undergraduate, postgraduate or other works, aimed at obtaining scientifically based information regarding the identification, treatment, use, main problems and possible solutions associated with the assets that are part of the University's Cultural Heritage.

Coordinate , manage and execute the necessary resources to finance the activities to be developed by the Department.

To elaborate information products, such as multimedia, printed or digital publications and others, aimed at the dissemination of the assets that make up the University Cultural Heritage, which may be susceptible to commercialization.

Digitize historical documentation and minimize the use of paper and physical materials.

Invest in materials, platforms and repositories that become digital archives for the enjoyment of the present and future university community.

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