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Bibliometric Analysis Of Virtual Reality Applications In Neurorehabilitation And Its Impact On Scientific Literature

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ABSTRACT

Since the 90s, virtual reality has been applied in the health field to treat phobias and mental disorders. It is currently used for neurorehabilitation, as it is capable of tricking the brain and extrapolating the user to a virtual world. Given the growing interest in the topic, this work aims to analyze the scientific production in the Web of Science and Scopus on virtual reality applied to neurorehabilitation during the last 10 years. For this, a methodology typical of bibliometric studies has been used based on the establishment of a series of keywords verified in databases and used by different authors in their publications. 8 variables were analyzed following the line of previous studies: total number of documents, production by year, typology of archives, titles of sources, institutions, countries, authors and most cited articles. Among the results, the growing interest in the topic since 2013 and the rise in production in 2016 stands out, as well as the involvement of the main world powers in research and publication on virtual reality for rehabilitation. The analysis of the metadata shows an emerging panorama in publications on virtual reality in



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the field of health, where the United States stands out as the country with the greatest scientific production.

Keywords: virtual reality; neurorehabilitation; bibliometric study; medicine.

INTRODUCTION

The advancement of Information and Communication Technologies (ICT) has brought about great changes in society, especially in the field of health where technological improvements have contributed to the updating of clinical methods. In this sense, with the help of technology, there has been progress in the knowledge and well-being of the patient, since the methods of disease detection, treatment and surgery are no longer as invasive on the human body as in the past. In this way, rehabilitation refers to the medical specialty that is responsible for facilitating functional improvements in patients, with the aim of returning a certain degree of independence.¹ In this area of specialization, there are different areas of action depending on the pathology to be treated (physical, neurological, vascular, communicative, among others).

In this situation, virtual reality (VR) is found as an emerging method with great demonstrated benefits^{2,3} for the neurological rehabilitation of patients (neurorehabilitation), since it is capable of deceiving the brain and extrapolating the person to certain scenarios. fictitious ones where he feels empowered to be able to walk, deal with phobias, among other applicability. In consideration, virtual reality is defined as "that technology that enables the user, through the use of a VR viewer, to immerse themselves in three-dimensional scenarios in the first person and in 360 degrees."⁴



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Although virtual reality technology is a new concept, it has already been used since the 90s in early studies on the treatment of flying phobia.⁵ However, the systems used did not have current guarantees and caused discomfort and dizziness in users. Current virtual reality is divided into three typologies: non-immersive virtual reality, characterized by interaction with virtual elements through a screen using a computer mouse or keyboard; semi-immersive virtual reality, which consists of several screens located around the user and the interaction occurs with a VR viewer; and immersive virtual reality, which is the most used in neurological rehabilitation⁶ and is distinguished by the total interaction of the user with the virtual elements, from electronic gloves, suits, audio systems, VR viewer, among others.⁷

If we look at specific experiences of using virtual reality in the health field, different studies stand out: *Peñasco et al. (2010)*⁶ focus on investigating the application of virtual reality for neurorehabilitation, and highlight its use in patients with *stroke*, spinal cord injury, multiple sclerosis and Parkinson's. Specifically, in the line of neurorehabilitation, some studies^{1,3} focus on the use of virtual reality to improve the motor function of *stroke* patients. Similarly, in other works² virtual reality is used in patients with Parkinson's disease. Likewise, all of them are placed in the context of neurovirtuality, in order to trick the brain into carrying out actions that in themselves are complicated in the real world.

Considering technological advances and their application in 21st century society, the growing interest in the topic of the introduction of emerging technologies such as virtual reality and the influence it is having in the field of health is



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evident. Knowing this reality enables new scenarios that improve the patient's well-being and, above all, represents an important advance in knowledge in the health sciences. Therefore, by analyzing the metadata of scientific literature published in prestigious international databases, relevant information can be obtained about the countries that produce the most documents, pioneering authors in these studies, as well as the most cited works. Consequently, this bibliometric study has different theoretical applications from the point of view of knowledge and study on the subject, and on the other hand, practical applications in line with being able to contact the authors and reference institutions to learn first-hand about their work. or apply the same methods they are implementing. The objective of this work is to analyze the scientific production in the Web of Science (WoS) and Scopus on virtual reality applied to neurorehabilitation during the last 10 years (2007-2017).

METHODS

For the analysis of the metadata of scientific production, a methodology typical of bibliometric studies has been used, with the purpose of quantitatively describing the information obtained.⁸ A systematic strategy has been followed that has consisted in the first instance of establishing the search descriptors: virtual reality, rehabilitation and neurorehabilitation. The choice of these descriptors responds mainly to their ability to bring together the subject matter under study, taking into account that virtual reality and rehabilitation are the central axes on which this bibliometric work is based. However, to ensure the standardized use of the descriptors by the scientific community, the considerations



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of Vitor , Duarte and Mascarenhas (2018) have been followed.⁹ It was verified that some of the key words are included in the thesaurus of Descriptors in Health Sciences of the Virtual Health Library (DeCS/BVS). Likewise, rehabilitation and virtual reality are used in the studies on virtual reality in medical rehabilitation by Peñasco et al. (2010)⁶ and Viñas and Sobrido (2016),³ and in more recent works neurorehabilitation is used together with virtual reality.¹ In consideration, with the objective of covering all scientific production and collecting emerging descriptors, the following search equation was used: VIRTUAL REALITY AND (REHABILITATION OR NEUROREHABILITATION). The use of the Boolean operator "AND" and "OR" provides rigor and precision to the review process.¹⁰

Regarding the databases, we have chosen to carry out the search in WoS and Scopus, since they bring together the scientific production with greater recognition and impact, and are the subject of review in other previous bibliometric studies.^{11,12} Both databases present their own impact index, WoS - Journal Citation Reports (JCR) and Scopus - Scimago Journal & Country Rank (SJR). Data collection took place in February 2018. Regarding the metadata obtained, these have been extracted from the information of the variables considered in this study and in line with those analyzed in other works:^{12,13}

- a) Total number of documents published between the years 2007-2017 (V1).
- b) Number of records in scientific production from the years 2007 to 2017 (V2).
- c) Number of records by type of published documents (V3).
- d) Number of records by titles of the sources from which the scientific literature comes (V4).
- e) Number of records by institutions (V5).



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- f) Number of registrations by country (V6).
- g) Number of records by authors (V7).
- h) Number of citations per article (V8).

RESULTS

Taking into account the different variables and crossing the search equation in the two databases, the metadata of the scientific production published in each of them has been obtained. In relation to the total number of documents published between the years 2007-2017 (V1), in WoS the number is higher (n= 4,525) than that hosted in Scopus (n= 3,023). However, below is the number of records in scientific production from 2007 to 2017 (V2), in both databases (Fig.), where we can observe the upward trend and uniform growth of the literature that WoS houses. , and which reaches its peak production in 2016 with 683 documents (15% of the total production between 2007-2017). On the other hand, in Scopus the trend has been variable in the first years, with peaks of rise and fall, since 2013 it has followed a stable line with minimal and increasing variability. Thus, it reached its maximum peak in 2017 with 404 documents (14%).



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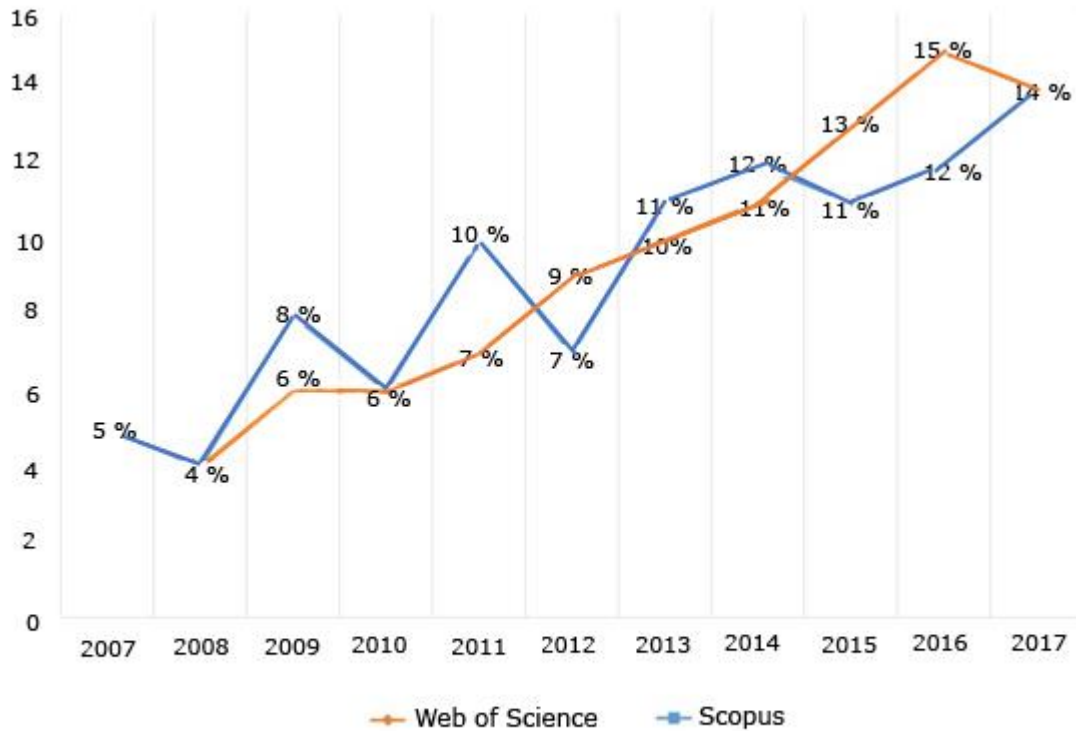


Fig. Producción científica por años en WoS y Scopus.

Regarding the amount of records around the typology of published documents (V3), the majority of the production is grouped around articles, conference proceedings, reviews, conference summaries, book chapters and editorial material. There are 2,815 journal articles hosted in WoS (62% of the total scientific production). It is the typology that presents the most documents, followed by the 966 writings of conference proceedings (21%), 475 reviews (10%), 191 conference summaries (4%), 153 book chapters (3%) and 109 relative documents to editorial material (2%). On the other hand, in Scopus the largest number of works are collected in conference proceedings with 1,323 files (44%), while articles occupy second place with 1,189 documents (40%), followed by 219 reviews (8%), 91 book chapters (4%), 79 conference abstracts (3%) and 33 editorial material (1%).



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If we look at the main titles of the sources from which the scientific literature comes (V4), the 10 titles that contain the most references represent 20% of the total production in WoS and Scopus. Among them, the *Journal of Neuroengineering and Rehabilitation* stands out with 156 references in WoS (3.44%) and 79 in Scopus (2.61%) and common in these two databases is also the journal *Studies In Health Technology And Informatics* with 63 references in WoS (1.39%) and 57 in Scopus (1.88%). The second title with the most documents in WoS is the journal *Neurorehabilitation* with 131 files (2.89%), followed by 106 in *Brain Injury* (2.34%), 91 in *Neurorehabilitation and Neural Repair* (2%), 81 in proceedings of *IEE Engineering in Medicine and Biology society conference proceedings* (1.79%), 78 in *Archives of Physical Medicine and Rehabilitation* (1.72%), 76 in *IEEE Transactions on Neural systems and Rehabilitation engineering* (1.67%), 66 in the journal *Frontiers in Human Neuroscience* (1.45%) and 57 in the *European Journal of Physical and Rehabilitation Medicine* (1.25%).

In Scopus, where most of the publications come from conference proceedings, *Lecture Notes In Artificial Intelligence And Lecture Notes In Bioinformatics* stands out with 115 documents (3.80%), 97 in *International Conference On Virtual Rehabilitation- ICVR* (3.20%), 52nd in *ACM International Conference Proceeding Series* (1.72%), 41st in *Virtual Rehabilitation International Conference VR 2009* (1.35%), 38th in *International Conference On Virtual Rehabilitation ICVR 2011* (1.25%), 38th also in *Annual Review Of Cybertherapy And Telemedicine* (1.25%), 37 in the *International Conference On*



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Virtual Rehabilitation Icvr 2013 (1.22%) and, finally, 37 again in the *Journal of Cyber Therapy And Rehabilitation* (1.22 %).

Regarding the main institutions that produce the most scientific literature (V5), we find in WoS the University of California, which presents 105 references (2.32% of the total), followed by the 92 of the ETH Zurich (2%). , 90 the University of London (1.98%), 84 the University of Toronto (1.85%) and 78 the University of Zurich (1.72%). In Scopus, the institutions vary although the second most productive one coincides with the WoS database, in this case the ETH Zurich with 66 documents (2.18%), surpassed by the McGill University of Canada which has 78 works (2.58%). The third institution is the New Jersey Institute of Technology and the University of Southern California with 50 references each (1.65%) and, finally, among the top 5, the University of Haifa in Israel with 47 (1.55%).

By focusing attention on the countries with the greatest scientific production (V6), those countries that are among the top 10 in both databases have been collected (table 1). In both WoS and Scopus, the United States is in the lead with 1,209 and 714 documents respectively, which represent 26.7% of the total in WoS and 23.6% in Scopus, followed by Italy with 563 references in WoS (12, 4%) and 271 in Scopus (8.9%).



Tabla 1. Países con más producción científica en WoS y Scopus

País	WoS		Scopus	
	n	%	n	%
Alemania	364	8	85	2,8
Australia	193	4,2	106	3,5
Brasil	112	2,4	113	3,7
Canadá	312	6,8	245	8,1
China	169	3,7	153	5
España	331	7,3	223	7,3
Estados Unidos	1 209	26,7	714	23,6
Francia	133	2,9	127	4,2
Israel	101	2,2	114	3,7
Italia	563	12,4	271	8,9
Japón	160	3,5	125	4,1
Reino Unido	357	7,8	183	6
Suiza	204	4,5	106	3,5

In relation to the authors who have the greatest number of references (V7), the same strategy as the previous variable has been followed with the extraction of the 10 authors with the greatest number of documents in both databases ([table 2](#)). In WoS, *Riener* stands out , with 40 references (0.88% of the total literature); *Riva* , with 31 (0.68%) and *Paolucci*, with 29 (0.64%). While in Scopus, the first author is *Riva* , with 34 documents (1.12%); second *Qiu*, with 33 files (1.09%) and third *Riener*, with 32 (1.05%).



Tabla 2. Autores con mayor producción científica en WoS y Scopus

Autor	WoS		Scopus	
	n	%	n	%
Adamovich SV	20	0,44	31	1,02
Alcañiz M	18	0,39	24	0,79
Deutsch JE	25	0,55	24	0,79
Fung J	11	0,19	25	0,82
Levin MF	23	0,5	27	0,89
Paolucci S	29	0,64	10	0,33
Qiu Q	21	0,46	33	1,09
Riener R	40	0,88	32	1,05
Riva G	31	0,68	34	1,12
Verschure PFMJ	19	0,41	27	0,89
Weiss PL	28	0,61	16	0,52
Yeh SC	19	0,41	31	1,02

Finally, the most cited articles are shown (V8). Likewise, the 5 articles with the highest number of citations in each database have been selected ([table 3](#)). So in WoS the most cited article is " *Effects of robot-assisted therapy on upper limb recovery after stroke: A systematic review* ", from 2008, with 616 citations; while in Scopus it obtains 759. And in Scopus, " *Gesture recognition: A survey* " stands out, from 2007, with 920 citations and 591 in WoS.

DISCUSSION

In this work, a total of 8 variables have been analyzed based on the precepts established in previous bibliometric studies in WoS and Scopus.^{12,13} These variables have allowed us to extract metadata from scientific production on virtual reality applied to neurorehabilitation. So the total number of documents hosted in both databases is 7,548, which are concentrated in various years, although it is



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from 2013 onwards that a stable and continuously increasing production begins to be established, especially in 2016 where Some of its benefits are increasingly being demonstrated.³ According to *Price*'s law,¹⁴ it could be established that the scientific literature on virtual reality and rehabilitation is in a stage of exponential growth in which the literature continues to increase significantly each year.

Regarding the typology, we see that in WoS the majority corresponds to magazine articles (62%). Thus, production has materialized in a solid and consolidated body of scientific documents on the use of virtual reality for neurorehabilitation, unlike Scopus, where conference proceedings predominate (44%). However, the articles are almost at the same level (40%). Taking into account that news and trends begin initially at conferences, conferences and congresses, the great increase in articles demonstrates the consolidation of virtual reality as a method for neurorehabilitation.

On the other hand, among the titles that publish the most on the subject is the *Journal of Neuroengineering and Rehabilitation* and *Neurorehabilitation*, which are two of the media that present the most interest in the subject due to the high number of references on virtual reality and neurorehabilitation that they publish. . These journals are positioned in the Q1 and Q4 quartile respectively in 2016, which is why they are considered journals of interest, especially in the case of *Journal of Neuroengineering and Rehabilitation*, for researchers in health sciences.

If we look at the institutions, since the United States is the country with the most scientific production (1,923 documents in both databases), it is expected that among the first 5 there will be 3 American institutions (University of California,



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Institute of Technology New Jersey and University of Southern California). However, Italy coincides in WoS and Scopus as the second country that produces the most with a total of 834 files, so it can be deduced that Italian researchers publish mostly in journals with JCR impact factor, which are usually also indexed in Scopus. , while conversely, those with SJR impact factor, mostly Q3 and Q4 quartiles, are not usually included in WoS. Thus, the interest of major continents and world powers in virtual reality as a rehabilitation method is exemplified, where some countries in North America, South America, Europe, Asia and Oceania are among those that research and publish the most.

Regarding the authors, *Reiner* and *Riva* coincide among the top 3 in both databases with 72 and 65 references respectively. These authors have established themselves as references in this field, as they are pioneers in the methods of applying virtual reality for neurological rehabilitation, with a consolidated history of publications. The identification of reference authors is of interest to the scientific community, since the analysis of their works can elucidate key aspects in the implementation of VR.

Finally, the literature analyzed follows the line of application of virtual reality for neurorehabilitation. In this case, it coincides with the considerations of the review of the published literature about virtual reality in medical rehabilitation.⁶ Likewise, the number of citations of the most cited articles reflects the impact that this topic is having. The first 10 articles garner a total of 3,232 citations in WoS and 4,200 in Scopus.

Different implications related to the data collected are highlighted from this study: firstly, the total number of documents and their evolution by year shows the



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emerging trend of the topic worldwide, making it an incipient and interesting field of study. for the scientific community and for health sciences researchers. Secondly, the identification of the titles of the sources from which the literature comes exemplifies those magazines, conferences, books, among others, with the greatest number of references on virtual reality applied to neurorehabilitation, which show the titles of which They can extract significant ideas for subsequent theoretical or practical studies. Thirdly, the reference institutions in this field are listed, which exemplify those key centers with which researchers and health professionals can contact and establish professional networks of collaboration. Fourthly and finally, the record of the authors with the greatest number of references and most cited articles shows readers and those interested in the subject as references to begin or advance in the knowledge of virtual reality applied to neurorehabilitation.

This work highlights the rise and interest in virtual reality applied in neurological rehabilitation, which has immediate effects on the human brain. This casuistry is called neurovirtuality. The analysis of scientific production in the Web of Science (WoS) and Scopus during the period 2007-2017 shows data of interest to the scientific community with different theoretical and practical implications on the implementation of virtual reality in the field of health.

Conflict of interests

The authors declare that there is no conflict of interest in this article.

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The Involvement of the Cuban Association of Librarians in the Network of Medical Libraries in Sancti Spíritus

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ABSTRACT

The Cuban Association of Librarians is a non-governmental organization of voluntary affiliation. A number of medical sciences librarians from the province of Sancti Spiritus have been members of this organization ever since its base delegation was founded in the year 2004. The purpose of the study is to present the main activities conducted by the Association in the network of medical sciences of Sancti Spiritus in the period 2004-2017, with reference to the areas of training, research and publication in which affiliates have participated. Data were obtained via document analysis of the main work documents of the Association. Results show an increase in membership throughout the thirteen years analyzed. One executive has remained stable, which has favored both organizational discipline and the sustained development of training activities. Although research and publication activities are still limited, sustained participation is observed in scientific conferences and meetings.

Key words: medical libraries; library associations; Sancti Spiritus.



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INTRODUCTION

The Cuban Association of Librarians (ASCUBI) was officially founded on March 31, 1986, on Cuban Book Day. It is a legal entity, representative of librarians throughout the country. Its fundamental objectives are to promote the professional development of its associates and the services entrusted to them, and to work to achieve the maximum development of Librarianship by promoting the scientific and technological advancement of its associates through teaching and research, to favor the relationships of collaboration and solidarity with similar organizations, librarians and specialists from related branches in Cuba and other countries in the world, especially those in Latin America and the Caribbean.¹

The ASCUBI founded its provincial branch in Sancti Spíritus on February 2, 1989.² It was hosted from its beginnings by the "Rubén Martínez Villena" Provincial Library, and began to bring together base delegations from different library systems. The base delegation of Medical Sciences was founded in 2004. At that time the majority of the librarians of the Medical Library Network belonged to the Cuban Society of Scientific and Technical Information (SOCICT) and all of these associates moved to ASCUBI, which already in the province had a prestige gained by the results achieved in the information activity in Sancti Spiritus. Thirteen years have passed of a fruitful path of Medical Sciences information systems within ASCUBI.

This article aims to describe its main activities in the period 2004-2017. Documentary analysis of meeting minutes, balance reports, financial payment receipts and lists of members by year were used as methods. Interviews



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were also conducted with founders and other professionals to inquire about the organization, training, research and main activities developed by the association.

COMPOSITION AND OBJECTIVES OF THE CUBAN ASSOCIATION OF LIBRARIANS IN SANCTI SPÍRITUS

The ASCUBI Provincial Branch in Sancti Spíritus is currently made up of 340 professionals from different specialties, but united by a commitment: the library. There are 17 base delegations from public libraries, school libraries, specialized libraries and university libraries. In February 2017, the base delegation of Medical Sciences had 36 members, which represented 10.59% of the total members of the Branch ([table 1](#)).

Tabla 1. Asociados de diferentes sistemas de información miembros de la Asociación Cubana de Bibliotecarios

Sistemas de Información				
Biblioteca Pública	Biblioteca Escolar	Biblioteca especializada en Salud	Biblioteca Universitaria	Otros
159	124	36	17	4

Fuente: Informe de balance de ASCUBI, febrero 2017.

The base delegation of Medical Sciences in its beginnings had a membership of 22 members. During all these years membership has maintained an increasing trend, although it has been conditioned by variability of the workforce in the Medical Library network. The year with the highest membership was 2012. The incorporation of the majority of library staff to the ASCUBI is one of the fundamental objectives of the delegation. The Association's executive continues to encourage this incorporation through training courses and cultural activities aimed

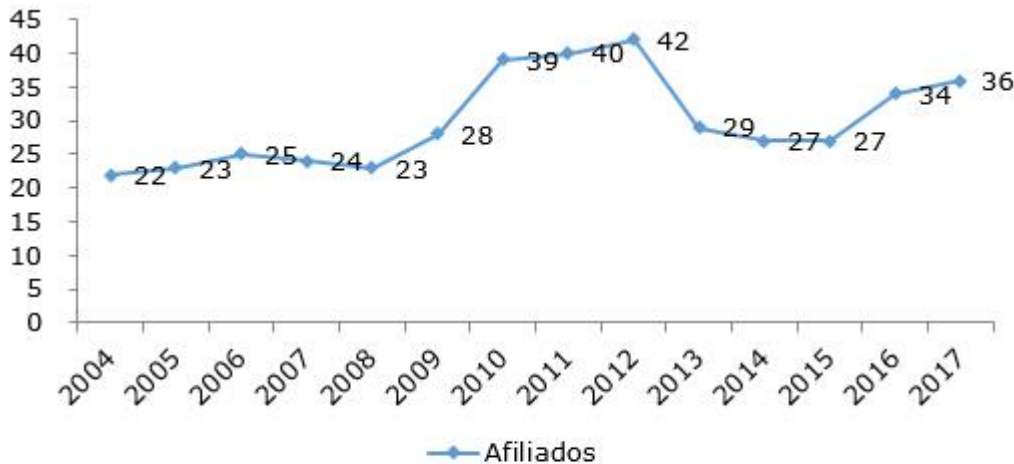


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at librarians who are new to the network and those who, for geographical reasons, have difficulties attending the activities (Fig. 1).



Fuente: Comprobantes de pago de los asociados.

Fig. 1. Comportamiento de la afiliación por años. Delegación de Ciencias Médicas. Sancti Spíritus 2004-2017.

Currently, the ASCUBI medical library delegation has 36 members spread throughout the province, which represents 40.9% membership. The municipality of Trinidad is the only one that is not represented in the association's membership ([table 2](#)).



Tabla 2. Comportamiento de la afiliación por municipios.
Delegación de Ciencias Médicas de Sancti Spíritus,
2004-2017

Municipios	Bibliotecarias	Afiliadas	%
Sancti Spíritus	48	24	50
Cabaiguán	5	3	60
Taguasco	4	2	50
Fomento	4	3	75
Jatibonico	4	1	25
Trinidad	9	0	0
Yaguajay	13	2	15,38
La Sierpe	1	1	100
Total	88	36	40,90

Fuente: Datos aportados en actas de la asociación.

The base delegation is governed by the regulatory documents issued by the national ASCUBI and are disclosed in meetings with members through a bulletin and through the Medical Sciences website (<http://www.ssp.sld.cu>). . The executive that has led the association during these years has remained stable, it meets officially twice a year and the majority of its members are made up of associates who work at the University of Medical Sciences of Sancti Spíritus.

MAIN ACTIVITIES OF THE CUBAN ASSOCIATION OF LIBRARIES IN SANCTI SPÍRITUS

TRAINING ACTIVITIES

Since its creation, ASCUBI has worked on training and improving its members through courses, seminars, workshops and technical debates, always selecting topics related to library trends and the information needs of its members. Participation in the activities planned by the directors of the Spiritus



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Library Chair "Segundo Marín García", of the provincial branch of the ASCUBI, contributes greatly to this improvement. An affiliate of the Medical Sciences library network is part of the faculty of this prestigious chair.

The Provincial Information Center for Medical Sciences (CPICM) of Sancti Spíritus has a methodological department that offers courses and training to the network of Medical Libraries. The base delegation has worked in alliance with this department and has offered training courses to associates with a prior diagnosis of their learning needs; Non-affiliated information workers are also invited to these activities.³

The main objectives taught have been to provide members with computer tools to enhance library work with information technologies, update topics on research methodology and pedagogy with their new guidelines in the development of learning and the expansion of library services and user satisfaction.

Another improvement activity that the grassroots association has promoted is the Literary Tea, where members meet twice a year to share their work experiences, and a reading promotion is carried out where a book belonging to the library's literary collection is proposed. of Medical Sciences. This is a space to also disseminate the newsletter Trazas y Trazos, a biannual publication prepared by the delegation. As a culmination of the activity, a topic of improvement is taught.

RESEARCH AND PUBLICATION ACTIVITIES

The Provincial Branch of ASCUBI develops the Scientific Library Event every year, in which it offers its members the possibility of sharing the research carried out in their institutions.⁴ The Medical Sciences delegation has had an active participation as a jury and as a speaker at the event, with 15 papers presented. In



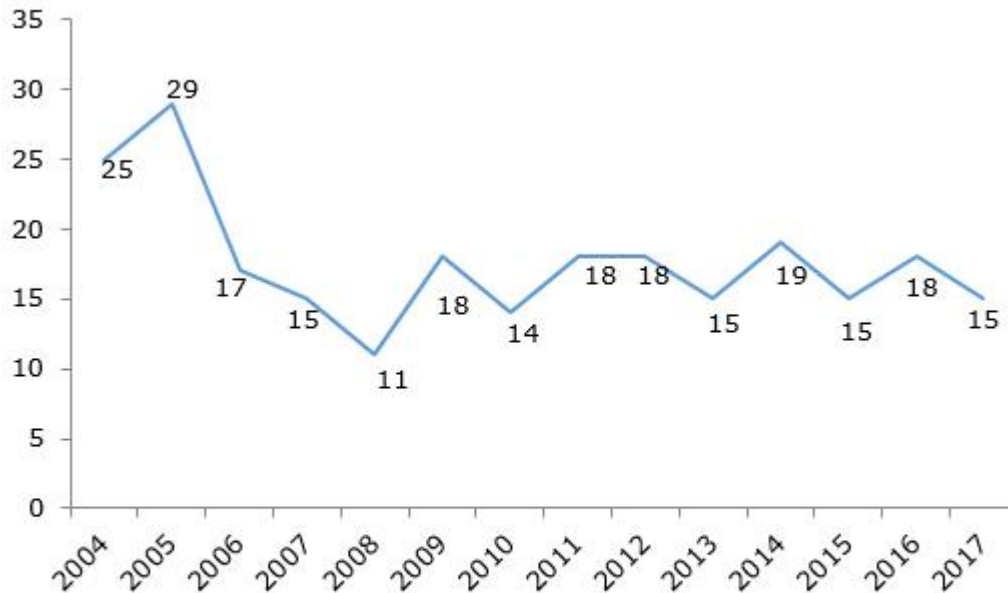
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this meeting, members fraternize with professionals from different sectors to learn about their experiences and projections. Since 2015, research from Medical Sciences has been selected to be presented at the National Library Scientific Event. The Reading Promotion Workshop, organized by the ASCUBI Branch, is held every two years at the "Rubén Martínez Villena" Provincial Library, in the province of Sancti Spíritus. The Medical Sciences delegation has participated with seven presentations and three of its members participate as a jury. The socialization of experiences in the promotion of reading and its foundations in the value-added products that are made in the health sector has been the most recurring theme in the research presented.

The Medical Libraries Conference was held for the first time on December 28, 1985 with the objective of evaluating the results of the scientific information activity in the Provincial Network of Medical Libraries.⁵ Consecutively, through various modalities of presenting works that showed the work of librarians between 1985 and 2017, 17 provincial conferences have been held, always in the month of June, to celebrate Librarian's Day. Information workers from Medical Sciences, whether affiliated or not with ASCUBI, and other information systems interested in sharing and socializing their research participated in this activity. Starting with the fourth Library Conference, the base delegation of Medical Sciences becomes the sponsor of the event (Fig. 2).

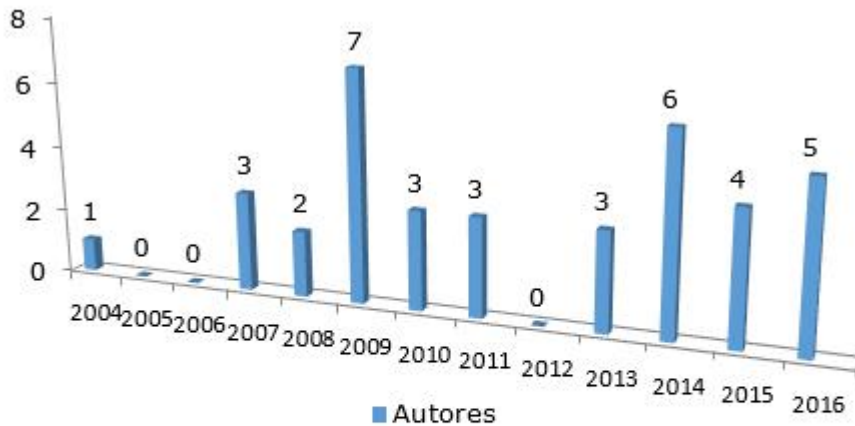


Fuente: Relatorías de las Jornadas Provincial de Bibliotecología Médica.

Fig. 2. Ponencias presentadas en las Jornadas de Bibliotecología Médica. Delegación de Ciencias Médicas. Sancti Spiritus, 2004-2017.

La Jornada receives an average of 17 investigations per year; Most of them provide outlets for institutional projects and are exposed partially or totally. Representatives of all the municipalities in the territory attend, and the best works are encouraged, which are given three places and a mention when the research requires it. ³

The publication of scientific articles is of vital importance for the completion of an investigation. The Medical Sciences delegation has three librarians with research status. The affiliates have published some of their research (annex), and although the percentage of publication is still very low, work has been done, through scientific writing courses, so that the works presented at the Provincial Conference on Medical Librarianship are published. (Fig. 3).



Fuente: Datos obtenidos del registro de producción científica de los afiliados.

Fig. 3. Producción científica de los afiliados de la delegación de base de Ciencias Médicas. Sancti Spíritus, 2004-2017.

AWARDS AND DISTINCTIONS

In 1995, ASCUBI awarded for the first time the Antonio Bachiller y Morales Commemorative Seal, which constitutes the highest distinction granted by this association jointly with the Cuban Society of Scientific and Technical Information (SOCICT). Additionally, in 2004, the creation of seven national awards was approved to recognize the work of its affiliated professionals. It was decided that these would be named after outstanding figures in Cuban librarianship, to fulfill a double purpose: to honor outstanding librarians and pay tribute to the pillars of Cuban Librarianship.⁴ Several of the associates of the Medical Sciences delegation have been distinguished with these awards: five have obtained the Antonio Bachiller y Morales Seal in the years 2009, 2010, 2011, 2014 and 2016, respectively. In 2009 he was awarded the Gilberto Sotolongo Aguiar National Prize; in 2013 the Domingo Figarola Caneda National Award and in 2016 the Dolores Vizcaya Orden II National Award.



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At the Scientific Library Event corresponding to the year 2014, the Annual Library Research Award was awarded to a health associate, for her research "The service of selective dissemination of information and information literacy in the network of medical libraries." Due to the work sustained during all these years, the Medical Sciences delegation has been outstanding from 2009 to 2017, in which it has received recognition from the Provincial Branch.

The associates have had a presence in the mass media through interviews for the Sancti Spíritus telecenter, in which they have made known the activity of ASCUBI within the Medical Sciences and the role of the university libraries within the association. Relations with other information institutions have been developed periodically. Several affiliates of the Medical Sciences have participated as judges of events at the "Rubén Martínez Villena" provincial library and at the "José Martí" University of Sancti Spíritus.

For the dissemination of the activities carried out by the delegation and as a means of consultation, a section called ASCUBI was enabled on the CPICM website (<http://www.ssp.sld.cu/>), with different categories: About ASCUBI, Code of Ethics, Distinctions, Statutes, Activity Plan and ASCUBI Mail.

CONCLUSIONS

The base delegation of Medical Sciences actively participates in the activities organized by the ASCUBI. There is evidence of membership growth during the thirteen years analyzed. The executive has remained stable, which has allowed organizational discipline. The workshops and improvement courses have contributed to the preparation and professional growth of members of the library



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systems. Due to the results obtained in the fulfillment of the activities planned by the Subsidiary, the Medical Sciences delegation has obtained the outstanding category from 2009 to 2017. Although the research and publication activities are still limited, there is also observed participation sustained in scientific events and conferences.

Authors' contribution

Emelina Amiris Llano Gil, Carmen F. Sánchez Sánchez and Felicia Pérez Moya designed the study, analyzed the data and wrote the first version of the manuscript. Claudia Yoana Maro García was involved in the collection, processing and analysis of the data. All authors reviewed the writing of the manuscript and approved the version finally submitted.

Conflict of interests

The authors declare that there is no conflict of interest in this article.

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Integrating Document Management and Risk Management Approaches for Treating Information as Evidence of Organizational Acts and Transactions

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ABSTRACT

This article explores the relationship between document management and risk management. For this, it is analyzed how document management has evolved in recent decades to focus on the processes of capturing and maintaining evidence of business acts and transactions. It shows how specialized literature explored this relationship and identified that documents are both sources of information for risk identification and objects of risk in themselves. It is concluded that document management systems help organizations manage uncertainty in relation to failure in the creation and control of quality documents, due to the negative impact this has on the organization's ability to achieve its objectives. In this sense, a document management system is considered to be a risk management system, in which the determination of document management requirements is essential for the identification and mitigation of organizational risks derived from information, such as evidence of acts and business transactions.

Keywords: document management; Risk management; Quality of the information; internal control.



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INTRODUCTION

The international literature that has examined the between documents and risks, as well as their respective management processes, dates back to the last decade of the 20th century. In a pioneering article from 1998 in which the Australian *McKemmish*¹ explored the relationship between document management (DG) and accountability, it was already stated that the failure of document management systems brought with it organizational and social risks. In 2010, *Victoria Lemieux* applied the methodology of visual analysis to 248 articles in the field of GD published in seven mainstream journals, and identified that until then the specialized literature had explored the relationship between documents and risks from the following points of view:

- Use of documents to explore organizational risks.
- Document risks.
- Documents as causes of risks.
- Changes in documents that may mean risks for the profession.
- Risks associated with traditional archival systems.
- Document Management as a technique for risk mitigation.
- Application of risk management processes.

This made it possible to ensure that a large group of authors such as *Akotia*,² *Gilliland-Swetland*,³ *Palmer*,⁴ *Lemieux*,⁵⁻
⁷ *Clifford*,⁸ *Fraser and Henry*,⁹ *Dietel*,¹⁰ *Mat*



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Isa ,¹¹ Reed ,¹² Ebaid ,¹³ and Ngoepe ,¹⁴ among others; Since the end of the 20th century, they have explored the relationship between organizational failures and poor or non-existent document management. This article examines a good part of this literature with the purpose of determining how this relationship has been addressed to understand the role of documents and their management in the identification and mitigation of organizational risks.

This material is the first of two articles that aim to explore the relationship between document management and risk management, with the intention of determining the role of the former in internal control processes. Consequently, this first article aims to explore the , identified by international literature, between these areas, and explain the essential role of the former in the identification and mitigation of risks derived from the management of information as evidence of acts. and transactions of organizations. These two articles are based on the following aspects:

- a) The emphasis placed by the conceptualization of the Cuban economic and social model of socialist development and the national plan for economic and social development until 2030, on the need to modernize both the Public Administration and the business sector.
- b) The accelerated introduction of electronic information management systems in Cuban administrations, as a consequence of the computerization process of society.
- c) The strong imbalance that the Cuban regulatory framework shows in relation to the needs of efficient and effective administrative management, and the imprecise document management approaches present in it.



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d) The magnitude of organizational risks identified by international literature as a consequence of poor or non-existent document management.

e) The evaluation of the results of the XI national verification of internal control, published in the Granma newspaper on January 31, 2017, in which the Comptroller General of the Republic stated that "during the execution of this process, 26 incidents were presented in 13 entities, where some of the specific objectives that had been projected for the control actions could not be met. In general, these incidents are associated with the lack of reliability of the primary documentation or the non-existence of the same", ¹⁵ which represented a loss of 90 million 9,070 pesos in national currency and 51 million 505,792 convertible pesos.

Classic documentary analysis was used as a method, based on specialized literature on document management and risk management, which allowed us to examine the between these areas and which have been identified by renowned authors in the international context.

DOCUMENTARY MANAGEMENT

The management of the documents in which organizational acts and transactions are recorded is as old as society itself, since it needs to record its actions in lasting media that can be trusted, as a way to "maintain, protect and perpetuate itself." herself". ¹⁶ As *Mena states*, ¹⁷ this need for registration and trust lies at the center of a social consensus that implies the unavoidable execution of certain actions through the generation of documents that serve as evidence or proof of these, which by their very nature , need to be properly managed.



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The advent of the modern era with its rationalizing imprint, based on predictability, deduction and control, led to the emergence of a form of organizational functioning: the rational legal bureaucratic model described by *Max Weber*,¹⁸ in which all organizational communications are carried out through written documents, through normalized routines, standards and regulations that define procedures to guarantee verification, appropriate documentation and compliance with organizational tasks and objectives. This model was complemented by forms of document management that were based on the submission of documents to their conservation in archives. In this way, it was sought that the communications were interpreted in a uniform manner, while at the same time trust was guaranteed in the information recorded in the documents in which they were recorded.

However, the diversification of the forms of information registration, and especially the enormous documentary explosion in the mid-20th century as a result of the complexity of the administrations of the time, led to the need for the establishment of a new form of data management. documents that, inspired by management approaches, was initially concerned with the economy and efficiency of handling administrative documents. This new form appeared in the United States between the 40s and 50s under the name of *Records Management* and was endorsed in the *Federal Records Act* of the North American Congress in 1950, as the method of managing federal administration documents. , with the aim of "ensuring adequate documentation, avoiding non-essentials, simplifying systems for creating and using paperwork, improving the way documents are organized and retrieved, providing proper care and low-cost storage of documents documents in the archives, and to ensure the proper arrangement of documents that are not long



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needed in the conduct of the affairs of the moment.¹⁹ These document management processes and their tools spread rapidly throughout the world, given their benefits for managing large volumes of documents, and maintained their evidence values.

Document management was then defined as the "area of administration that is responsible for guaranteeing economy and efficiency in the creation, maintenance, use and disposition of documents (*records*) throughout their life cycle."²⁰ If for the first moments document management was associated with purposes of efficiency, effectiveness and low costs in the management of documents, by the 90s of the 20th century its functionalities were directly linked to the defense of organizations against phenomena of fraud and corruption, in which their determining role in the creation of organizational capacities for transparent and responsible accountability was argued.

This evolution in the purposes of document management is closely related to the risks of maintaining the evidence value (proof) of the new forms of information production, as a result of the accelerated assimilation of information and communications technologies (ICTs).) by contemporary organizations.

According to *Mat Isa* ,¹¹ Starting in the last decades of the 20th century, many organizations were encouraged to introduce different types of information management systems, such as *Electronic Document Management* , *Knowledge Management* , *Integrated Document Management* , *Content Management* and *Enterprise Content Management Systems*, given the facilities they offered for information management. However, these systems lacked information management functionalities such as evidence of organizational acts and transactions that made it



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possible for decision-making and accountability to be carried out with quality information. Despite this, *Stephens* asserts ,²¹ many corporate executives were inclined to view document management as a discretionary effort, unrelated to organizational success and, therefore, unworthy of serious management attention.

However, the major corruption scandals of major corporations such as *Enron*, *Arthur Andersen* , *Tyco International* , *WorldCom* and *Peregrine Systems* , among others, and their bankruptcies due to manipulation of internal accounting controls, their inadequate practices of destruction of financial documentation and non-compliance with regulations relating to the disposition and retention of documents, revealed the occurrence of a deep crisis in the capacity for transparent and responsible accountability on the part of organizations, which had already been warned since the 1990s by the prominent archivist American *David Bearman* .²²

Taking into account that a key factor in the crisis was the fraudulent manipulation of financial information recorded in internal controls, given the facilities that ICTs offered for such manipulation, this had significant consequences for document management, both in the legislative and regulatory spheres. .

In the legislative sphere, the *Public Company Accounting Reform and Investor Protection Act* , enacted in 2002 by the United States Congress (better known as the *Sarbanes-Oxley Act* or (SOX)], is well known, which, although it legislated for companies and public accounting firms and their subsidiaries, reflected the main concerns of the entire world due to the corruption scandals of the aforementioned corporations. According to *Mat Isa*,¹¹ SOX defends the need for good corporate governance and transparent accountability and responsible, through the need for the integrity of the financial and accounting systems of public organizations. Thus,



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sections 302 and 404 (Title IV. Improvement of Financial Statements) of the law have important implications for the policies of Document management of North American public organizations and their auditing firms.

This is especially important in relation to the availability of information in cases of audits, government investigations, or other legal purposes, as SOX established important rules related to the retention of documents, including electronic documents (including mail), the preservation of relevant evidence and the prohibition of its destruction, aimed at ensuring that information on the financial status of organizations remains available for as long as necessary. Likewise, SOX considered the accidental destruction of information as evidence as criminal conduct.

Since the endorsement of SOX, the fraudulent handling of information on the financial status of organizations, and consequently non-compliance with the retention of these documents, became legal infractions punishable by penalties of up to twenty years in prison. Regulations similar to SOX were applied throughout the world from that point on. The one endorsed by Japan, known as JSOX, stood out.

With respect to the regulatory environment, the crisis favored the emergence of numerous national and international standards and good practices. Among them, of special interest for the purposes of this article are the updates to the internal control framework carried out by the aforementioned *Committee of Sponsoring Organizations of the Treadway Commission* (COSO).

Said Committee, encouraged by the dire consequences of the transparency crisis and especially by the need to comply with SOX, only updated—two years after its



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promulgation—its 1994 internal control framework and did so by explicitly integrating it into risk management. This update from 2004 under the suggestive title of Enterprise Risk Management - Integrated Framework (*Enterprise Risk Management (ERM) - Integrated Framework*) or *COSO ERM* , did not replace the internal control framework, but rather incorporated it into a risk management approach. risks, which particularly highlighted the risks associated with the manipulation of the information recorded in financial reports and consequently the need for controls to guarantee confidence in them. Thus, the new framework established, within the categories of organizations' objectives, the reliability of financial reporting and compliance with legal rules and regulations.²³ This approach, based on the principles of risk management, was intended to provide reasonable assurance to achieve the objectives of reliability, integrity and accuracy of accounting information, safeguard it from fraudulent manipulation and promote confidence in documents, as well as timely production. of accounting reports and information on the management of organizations. However, it should be noted that this framework had a limited focus on the qualities of evidential information.

The need for a new update of the COSO in 2012 was based, according to its own authors, on the identification of a significant number of problems worldwide, such as the increase in the complexity and versatility of business, the expectations surveillance for governance; increasing attention to risks and risk-based approaches; the growing megatrend of globalization of markets and their operations; the growth of business complexity and organizational structures, including outsourcing and strategic suppliers; the increase in the number and complexity of laws, poor or non-existent transparency, increase in regulations and



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standards; the international financial crisis, as well as the bankruptcy scandals have already been mentioned, and the dramatic evolution of technologies, which allow the use of sophisticated electronic information systems that produce enormous amounts of data that are very complex to manage, especially in terms of its veracity. .²⁴

Consequently, the approach to information risks was significantly strengthened by clearer views on combating fraud, considering its potential causes as a separate principle from internal control and, perhaps most salient for For the purposes of this article, we extended the focus on reliability, integrity and accuracy of information to non-financial documents. For this, he introduced the concept of information quality, and defined it as a necessary element for the effectiveness of the internal control system, since it was recognized that inaccurate and incomplete data and the information derived from them could potentially generate decisions, estimates or judgments. erroneous, which are a permanent source of risks.²⁵

As can be seen, both SOX and the different updates to the internal control framework recognize the centrality of information manipulation processes in the occurrence of the transparency and accountability crisis; Consequently, they pay special attention to the risks derived from their fraudulent manipulation and establish a set of requirements for their management. However, achieving these information quality requirements is difficult to achieve without the implementation of a robust document management system that maintains and supports compliance with regulations, such as SOX, and internal control.

In this scenario, and under the influence of the transparency and accountability crisis already mentioned, Subcommittee 11 of the Technical Committee ISO/TC 46



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Information and documentation of the International Organization for Standardization (ISO), published more than a dozen standards that deal with the different processes of document management, among which the well-known ISO 15489 (parts 1 and 2) of 2001 and the ISO 30300 Management System family of 2011 stand out. The latter defines the object of management documentary as "information created, received and maintained as evidence and information by an organization or person under its legal obligations or in the course of its transactions and business activities", where evidence is the "documentation of a transaction"; that is, it is "...evidence of completion of a business transaction that can demonstrate that it has been created in the normal course of business transaction and that it is intact and complete. It is not limited to the legal meaning of the term";²⁶ information that is recorded in documents that are "... generated or received in the course of organizational activities and transactions as their instruments or by-products, these records of documentary information are the primary evidence (proof) for assumptions or conclusions related to said activities and the situations that they contribute to create, eliminate, maintain or modify. From this evidence, intentions, actions, transactions and facts can be corroborated, compared, analyzed and evaluated."²⁷

Consequently, maintaining the unalterable evidentiary character of this type of information needs to be properly managed. In this sense, the role par excellence of document management today is the creation and maintenance of quality information on business activities and transactions, to guarantee that decision making, accountability, audit processes, risk identification and organizational and social memory, take place in a reasonable security scenario. On the other hand,



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document management is seen today as a management system that creates capabilities for organizations to make decisions and be accountable in a transparent and responsible manner, with information that can be considered quality.

Such a statement insists on two aspects that are sometimes forgotten by organizations: it is not enough to record organizational actions and transactions in documents to trust their veracity, nor is it enough to show these documents for the purposes of audits, legal claims, decision making or accountability; but it is necessary that they be managed in such a way that said information can be trusted, that is, that it is possible to guarantee its value as evidence or true proof of said activities.

In this sense, the ISO 15489 standard, under the examination of the causes of the crisis, redefines document management as the "area or field of organizational management responsible for the effective and systematic control of the creation, reception, maintenance, use , disposition and preservation of documents (*Records*), in which the processes of capture and maintenance of evidence and information on the transactions and business activities of the organization are decisive",²⁸ and the documents object of its management are defined as "information created, received and maintained as evidence and/or asset by an organization or person, in the course of its legal obligations, its acts and business transactions, or for such purposes, regardless of its form, format or medium." twenty-

one

Reasonably, a document management system allows the systematic management of documents as information about the business activities of organizations, since



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such documents support both the decisions made and subsequent activities and ensure accountability to present and future stakeholders.⁸

Consequently, it can be stated that document management offers the necessary infrastructure, based on normative, operational and evaluative tools, to create organizational capabilities that allow generating and providing truthful information about its actions, in such a way that it is possible to corroborate, compare, analyze and evaluate any administrative exercise with confidence, avoiding possible acts of manipulation of information and consequently the occurrence of fraud and corruption.

As can be seen, the objective of document management is aligned with the information quality requirements established by regulations such as SOX and internal control, since said system establishes information custody policies and procedures, to satisfy legal requirements. and operational aspects of organizations, as well as for the recovery and distribution of quality information that is necessary for the achievement of business activities and includes the provision of documents for audits that evaluate compliance with the regulatory framework.²⁹ This statement is crucial to understanding the relationship between document management and risk management.

THE LINK BETWEEN DOCUMENT MANAGEMENT AND RISK MANAGEMENT

Since the 1990s, as a result of the crisis of transparency and accountability, considerable literature began to appear—both in the field of document management and risk management—that analyzed the interrelationships between



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both processes. . Initially, it was identified that many difficulties in the financial management of organizations came from the absence of document management methods for the treatment of documents generated by accounting systems.^{2,4} However, by the first decade of the 21st century, the inseparable nature of document management and risk management processes was recognized when it was considered that document management programs should constitute an integral part of the risk management of organizations. . At the same time, the idea that document management had to be assumed as a tool for risk identification and evaluation was accepted, as recognized by authors such as *Fraser and Henry* ;⁹ *Ebaid*¹³ and *Ngoepe* .¹⁴

However, *Ngoepe*¹⁴ assures that the interrelationships between document management and risk management are not always clearly articulated, since managers identify and relate risks more to audits, legal processes and problems with technologies, despite the fact that many of the risks are due to problems with documents and their management. In this sense, the aforementioned author summarizes as follows the dimensions in which documents and their management are related to organizational risks: documents as sources of information to identify organizational risks, and documents as a source of organizational risks. Both aspects are determined by the evidence nature of the documents, since these allow corroboration, verification, analysis and evaluation of all organizational actions, which consequently constitute a source of essential information for the identification of risks, since they are the record. information on all business transactions; that is, the only byproduct, footprint, trace or recorded testimony of these. It is through this information that it is possible to know how, when, why, for



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what, where, by whom, an activity or business transaction was carried out and reasonably consulting it allows us to identify organizational risks, since this constitutes an informational “footprint” of the decisions made, by recording the information on how these were made.

On the other hand, the documents themselves are sources of risk if the quality of the information they contain about business activities is poor or non-existent and if their integrity cannot be demonstrated, since all the judgments, reflections, calculations, Estimates or other organizational management decisions could be completely wrong, even those related to the identification of organizational risks themselves.

Mat Isa assures in this regard that "...the decisions or actions taken must be based on empirical evidence to avoid exposing the organization to unexpected risks as a consequence of the inaccuracy of the information used to evaluate the risks." ¹¹ Consequently, risk management may not achieve its objectives and may not be successful if the documentary sources for the identification of organizational risks are not managed in such a way that the integrity of the information recorded about acts and transactions or business activities is not can be demonstrated to a high degree; That is, the information contained in the documents that record the activities and transactions of the organization is not true evidence, a record of reliable, authentic, complete and accessible information.

In this sense, document management has the function of creating organizational capabilities for risk identification, since it is through its processes and tools that the creation and maintenance of quality information is possible. That is why the ISO 15489-1 and 30300 standards identify information as a valuable resource and an



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important asset for organizations, since its proper management helps to capitalize its value and protect organizations from financial losses, fraud, corruption and even fraud. total failure and consequent disappearance as *Lemeaux* asserts .⁶

*Clifford*⁸ identifies the types of risks that organizations could face as a result of poor or non-existent document management and consequently the dubious quality of the information in their business processes. These are:

- *Legal risks*: Litigation or non-compliance with laws or regulations, regulations, etc. may be faced. Also known as compliance risks.
- *Financial risks*: Financial losses or threats to the organization's financial position may be faced.
- *Reputation risks*: Damage to the public image, trust and reputation of the organization may be faced.
- *Environmental risks*: Impossibility of documenting safe environmental practices.

Added to these are operational or transaction risks, identified by *Ambira* and *Kemoni*²⁹, which make it impossible for organizations to effectively complete business transactions. These are those that result from fraud, error or the inability to deliver products and services, maintain competitive position and manage information. These can also be strategic risks, as they result in wrong decisions.

*Mat Isa*¹¹ proposes the integration of document management and risk management processes in organizations through the formation of work groups that integrate the functioning of audit committees, archivists and document managers, as well as



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management teams. of risks, since document management reinforces risk management and ensures the availability of high quality information for its purposes.

INFORMATION QUALITY AND ORGANIZATIONAL RISKS

Taking into account what has been explained so far, the concept of quality of information on organizational acts and transactions is essential for the effectiveness of risk identification, mitigation and management, as it allows decisions to be made with reasonable certainty regarding the sources of information for such risks. trials or sentences. Consequently, this concept has become central both in the field of document management and in that of risk management. Table 1 shows some of these approaches; However, note how the qualities provided by the document management approach (ISO 15489 and 30300 standards), such as reliability, authenticity, integrity and accessibility, all associated with trust in the recorded information, are recurrent in each of them. .



Cuadro 1. Diferentes enfoques sobre la calidad de la Información

Información de calidad	ISO 15489 (1-2) ²⁸	Dietel J. Edwin ¹⁰	ISO 30300 ²⁶	COSO ²⁵
	Fiable	Exacta	Fiabes	Accesible
	Auténtica	Completa	Auténticos	Correcta
	Íntegra	Precisa	Íntegros	Actualizada
	Accesible	Oportuna Apropiada	Accesible	Protegida
		Pertinente	-	Retenida
		Comprensiva	-	Suficiente
		Adecuada	-	Oportuna
		Creíble	-	Validada
		Confiable	-	Verificable
		Capacidad para ser compartida	-	-
		Accesible	-	
		Valiosa	-	
		Reutilizable	-	
	Asequible	-		
	Comunicable	-		



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As can be seen, document management defines the quality of information from the quality of veracity of the documents; That is to say, that they can be considered reliable, authentic, complete and that they are available, in other words, based on the value of the veracity of the documentary sources of information.

According to *MacNeil*, truthfulness is defined as the quality of documents to constitute "an accurate statement and genuine manifestation"³⁰ of the acts and transactions they record, meaning that they have not been manipulated or altered, deliberately or not. Veracity, also translated as credibility, is made up of two other qualities, reliability and authenticity. The first, according to ISO 15489-1, refers to those documents "the content of which can be considered a complete and accurate representation of the operations, activities or facts to which it bears witness, and which can be used in the course of subsequent operations or activities"²⁸ It is related to the moment of creation of the documents.

On the other hand, an authentic document "is one that can be proven to be what it claims to be; that it has been created or sent by the person who is claimed to have created or sent it; and that it has been created or sent in the moment that is affirmed".²⁸ This is the guarantee that the document has not been manipulated or corrupted since its creation, that is, that it maintains its integrity as a record of information. In other words, authenticity is the maintenance of the reliability of the document in time and space.

Two other aspects are considered essential from a document management approach regarding the quality of information, integrity and accessibility of documents. Integrity refers to the complete and unaltered character of these and the



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accessibility or availability to the need for them to be located, retrieved, presented and interpreted, over time.²⁸ Therefore, achieving reasonable security in relation to the risks derived from the quality of the information implies the creation and maintenance of documents in which the existence of qualities such as veracity, reliability, integrity and accessibility can be verified.

DOCUMENTARY MANAGEMENT REQUIREMENTS FOR THE IDENTIFICATION AND MITIGATION OF ORGANIZATIONAL RISKS DERIVED FROM INFORMATION AS EVIDENCE OF ORGANIZATIONAL ACTS AND TRANSACTIONS

According to the ISO 30300 standard²⁶, one of the objectives of document management processes is to create and control documents in a systematic and verifiable way to contribute to the management of risks associated with the existence or not of evidence of organizational activities or transactions. Likewise, the standard ensures that the implementation of document management systems helps organizations meet risk management objectives, and ensures that true and reliable information is created, managed and made accessible for as long as true and reliable information is needed. , as evidence of the activities carried out under the management system.

In this sense, the ISO/TR 18128 standard of 2014,³¹ on risk assessment in document management processes and systems, considers that these risks are identified based on their potential to undermine the qualities of veracity, reliability, authenticity, integrity and accessibility. of the documents, which allows the purposes for which they were created to not be satisfied; that is, for the registration of organizational acts and transactions.



Consequently, the standard establishes that the identification of document management risks must be structured in accordance with the categories of context, systems and processes of document creation and control. Table 2 shows the areas of uncertainties that the standard identifies in relation to these three categories of document management risks.

Cuadro 2. Categorías y áreas de incertidumbre de gestión documental según la norma ISO/TR 18128 de 2014

Contexto (factores externos)	Áreas de incertidumbre
	Cambios en el contexto político-social
	Entorno macroeconómico y tecnológico
	Entorno físico e infraestructura
	Amenazas de seguridad externas
Contexto: (factores internos)	Áreas de incertidumbre
	Cambios en la organización
	Cambio tecnológico
	Recursos - Personas y competencias
	Recursos - Económicos y materiales
Sistemas de gestión documental	Áreas de incertidumbre
	Diseño del sistema
	Mantenimiento
	Sostenibilidad y continuidad
	Interoperabilidad
	Seguridad
Procesos de gestión documental	Diseño de los documentos
	Creación de documentos e implementación de sistemas de gestión documental
	Metadatos
	Uso de los documentos y de los sistemas de gestión de documental
	Mantenimiento de la usabilidad
	Disposición de documentos



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Taking into account that the ISO/TR18128 standard of 2014 does not directly address the mitigation of document management risks and given the centrality of the processes and controls in said purpose, it will be briefly addressed with the aim of exposing its general particularities for any type. the organisation. This approach will be carried out taking into account the proposal of the ISO 30301 standard.

The document management processes identified by the ISO 30301 standard are those of document creation and control. Consequently, Annex A of this standard establishes the controls that will be necessary to guarantee the creation of truthful, reliable, authentic documents, complete and accessible and their control. In this sense, the creation process must:

- Determine what documents, when and how they should be created and captured in each business process.
- Determine the information about content, context and control (metadata) that should be included in the documents.
- Decide in what form and structure the documents should be created and captured.
- Determine appropriate technologies to create and capture documents.

In relation to the document control process, Annex A itself defines that:

- Determine what control information (metadata) should be created in document management processes and how it will be linked to documents and managed over time.
- Establish the rules and conditions for the use of documents over time.



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- Maintain the usability of documents over time.
- Establish the authorized disposal/disposal of documents.
- Establish the administration and maintenance conditions of document management applications.

As can be seen, these standards offer useful tools for the design and implementation of document management systems, which offer guarantees to achieve reasonable security in relation to the organizational risks derived from the registration and management of information as evidence of the acts and business transactions.

CONCLUSIONS

The definitions of document management evolved in their purpose and objectives of contributing to effectiveness, efficiency and low costs in the management of documents of organizations in the 50s of the 20th century, and to be identified from the first decades of the 21st century with processes for capturing and maintaining evidence of business acts and transactions, for the creation of organizational capabilities for accountability, transparency, responsibility, decision making and risk identification with quality information. This was determined, among other aspects, by the deep crisis in accountability capacity since 2000, which showed the close relationship between fraud and bankruptcy of important companies with the capacity that electronic information systems offered for access and manipulation of information.



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The specialized literature that explored the relationship between document management and risk management since that time identified that documents (information, evidence or proof of acts and business transactions) are both sources of information for the identification of risks, and a source of risks themselves. themselves, since maintaining their quality is essential for the necessary guarantee of trust in the information with which organizations make decisions, are accountable and transparent.

Consequently, it is recognized today that the risks associated with the lack of quality of information for organizations are legal, financial, reputational, environmental and operational or transactional. That is why it is considered that the establishment of document management systems helps organizations manage the effect of uncertainty in relation to the failure in the creation and control of quality documents, due to the negative impact that this has on the capacity of the organization to achieve its objectives of decision making, transparency, accountability, improvement of business processes, effectiveness and efficiency in costs, and even in relationships with interested parties.

It is in this sense that a document management system is considered to be a risk management system, in which the determination of document management requirements for the identification and mitigation of organizational risks derived from information as evidence of acts and transactions is essential. of business. Some of these requirements have been provided by ISO document management standards and focus on document creation and control processes, starting from the identification of areas of uncertainty in relation to the context, systems and document management processes.



Conflict of interests

The authors declare that there is no conflict of interest.

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Challenges Of Open Access Of Scientific Journals Of Urban Planning, Architecture, Design And Art In Chile

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ABSTRACT

This research analyzes the challenges of open access to scientific journals of urban planning, architecture, design and art in Chile. Based on an analysis of the content of the magazines' web pages and the application of surveys to their editors, the access and publication formats, the use of editorial management platforms, the use of *Creative Commons* licenses , the copyright transfer policies, the use of anti-plagiarism programs and financing models. The results show that all academic journals in the field of urban planning, architecture, design and art in Chile are published by non-profit universities and declare themselves open access. Their articles are freely available through their websites, institutional repositories and/or SciELO, Latindex and RedALyC. Likewise, most journals use *Creative Commons* licenses and recently the *Open Journal System* . However, more than half of the journals continue to use restrictive authorship rights or do not have explicit editorial policies in this regard, which limits open access to their manuscripts. Other problems detected for open access are the lack of "sustainable financing models" and the preference of Latin American authors to publish in high-impact international journals in English, usually edited by commercial publishers without open access. These problems constitute important challenges that require



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new strategies to ensure that high-quality Latin American research is available in an open format for the community.

Keywords: access to information; open access; electronic magazines; Copyright; licenses; Chili.

INTRODUCTION

Information and communication technologies (ICT) have produced great changes in the publication and dissemination of scientific articles during the last twenty years throughout the world, including Latin America and the Caribbean. Among the most important changes in this region are the increase in electronic journals and the growing availability of open access scientific articles on *the Internet*.

Open access is defined as obtaining "a publication in digital format, online (internet), free of charge, and without most of the copyright and license restrictions that hinder its free circulation and dissemination."¹ Open access to scientific articles is based on the principle of "sharing and disseminating research results among members of the scientific community with the purpose of contributing to the development of science and the advancement of societies."² In this way, the open access model recognizes scientific production as a "global public good", and seeks to access research results without financial or copyright barriers.

Latin America and the Caribbean presents a great sociocultural advantage for the use of open access: it has the particularity of sharing "with the exception of Brazil" the same language, Spanish, which favors the dissemination of new scientific knowledge. However, Latin America has historically had a low presence in scientific production worldwide (although it has recently increased in some countries such as Brazil), since it has few researchers per capita, little investment



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in science and technology, as well as a low rate of publications in scientific journals worldwide (4-8%).³ In order to counteract this shortcoming and promote greater visibility of Latin American scientific production, the three most important open access scientific information systems in Latin America were created in the 1990s : Latindex (1995), SciELO (1997). and RedALyC (2003). It should be noted that these systems are based on a regional, cooperative and non-commercial model,³ and that other scientific journal platforms have subsequently been created under this same model.

A particularity of scientific journals in Latin America and the Caribbean is that they are mostly published non-commercially by universities and research centers, and financed through public funds³⁻⁵ This differentiates them significantly from European scientific publications. and North American, where large for-profit commercial publishers predominate. Another important characteristic of Latin American journals is that many publications are available on the Internet for free through the web pages of the journals themselves, the institutional repositories and/or the journal platforms of SciELO, Latindex and RedALyC.^{6,7}

In this aspect, open access is framed within a "favorable context" in Latin America. However, on the other hand, several studies show that many electronic journals have restrictive copyrights "that do not allow the free circulation of manuscripts, and thus limit their effective open access" and a lack of explicit editorial policies to promote open access. .^{5,8-10} Likewise, the little knowledge of editors and authors regarding the open access model stands out.⁵

In Chile, open access has been introduced with great force in scientific publications over the last twenty years. There is a growing number of free, online, electronic



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journals. In this context, this research analyzes the current state and challenges of open access of scientific journals of urban planning, architecture, design and art in Chile; that is, those magazines that publish research on the city and its systems, within which the built environment is emphasized. The questions that guide this research are: 1) Are the academic journals of urban planning, architecture, design and art in Chile open access?, 2) Are the editorial policies " *Creative Commons* licenses , authorship rights, use of management platforms editorial, etc." effectively promote open access? and 3) How are open access journals funded and can they be funded in the future?

METHODS

For the analysis of the current state and challenges of open access of scientific journals of urban planning, architecture, design and art in Chile, a combination of qualitative and quantitative methods was used, which included a bibliographic review, an analysis of the content of the sites website of all the scientific journals of urban planning, architecture, design and art in Chile and the application of surveys to their respective editors.

Regarding the survey, it included a total of 20 questions and was applied via email to the editors of all the indexed scientific journals of urban planning, architecture, design and art in Chile, and sought to collect data regarding: publishing body (public or private); total years of continuous publication of the magazine; publication frequency; publication format (electronic and/or printed); language(s) of publication; indexations; presence of DOI (*Digital Object Identifier*); use of an editorial management platform; self-declaration of open



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access; use of *Creative Commons* licenses ; use of anti-plagiarism program; membership of the *Committee on Publication Ethics (COPE)* ; mode of financing and percentage of national and international authors included in each publication issue.

For its part, the analysis of the websites included a review of the "Focus and scope", "Open access policy", "Instructions for authors" and "Copyright notice" pages of all Chilean scientific urban planning journals. , architecture, design and art indexed. The website of each journal was reviewed in detail in order to complement the information obtained through the survey regarding the following variables: open access policy, use of editorial management platforms, use of *Creative Commons* licenses (including the version used), policies transfer of copyright and use of anti-plagiarism programs.

As a sample, all Chilean scientific journals of urban planning, architecture, design and art indexed in ISI (currently Clarivate Analytics), Social Science, ISI (currently Clarivate Analytics), Arts & Humanities, Emerging Sources Citation Index (ESCI), Scopus, were selected. Latindex, SciELO Chile and/or RedALyC. These journals are: Revista 180, ARQ, AUS Magazine, INVI Magazine, Latin American Journal of Urban and Regional Studies EURE, Norte Grande Geography Magazine, Aisthesis, Urbanism Magazine, Urbano, Alpha Magazine, Arquitecturas del Sur, Bifurcaciones, Materia, and Architecture Magazine (in total 14 magazines).

RESULTS AND DISCUSSION



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The results of this research confirm several trends observed in similar studies carried out in other Latin American and Caribbean countries. Firstly, in the group "indexed scientific journals of urban planning, architecture, art and design", a predominance of the focus of the magazines in the area of urban planning and architecture stands out with 64% and, in contrast, a scarcity of magazines that They include art (29%) and design (14%) themes. Likewise, and as confirmed by the authors *Sánchez-Tarragó, Caballero-Rivero, Trzesniak, Deroy Domínguez, Santos, Fernández-Molina,* ⁵ *Cetto, Alonso-Gamboa, Packer, Aguado López* ³ and *Fuentes-Navarro,* ⁴ for the Latin American case, Indexed scientific journals on urban planning, architecture, art and design are published by non-commercial universities. Half of the publishing organizations correspond to state universities, and the other half to private non-profit universities (there is only one magazine that is co-edited by a state university in conjunction with a Civil Society).

Regarding the total number of years of continuous publication, the indexed journals in the area have a consolidated trajectory: 43% of the journals have between 10 and 20 years of continuous publication; 7% of them between 20 and 30 years old; 29% between 30 and 40 years old; 14% between 40 and 50 years and 7% more than 50 years of continuous publication ([table 1](#)). It is observed that the publication frequency is semiannual in two thirds of the cases, and quarterly in one third of them. It should be noted that the journals published quarterly correspond mostly to the most prestigious journals indexed in ISI (Clarivate Analytics) or Scopus and belonging to the Pontificia Universidad Católica de Chile (60%) and Universidad de Chile (20%).



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Tabla 1. Resultados de la encuesta a editores: años de publicación continua en revistas científicas indexadas en urbanismo, arquitectura, diseño y arte en Chile

Años de publicación continua	Porcentaje de revistas
10 - 20	43
20 - 30	7
30 - 40	29
40 - 50	14
más de 50 años	7

PUBLICATION FORMAT

In relation to the publication format, the growing presence of electronic journals in the area is confirmed. Thus, today all indexed Chilean magazines in the field of urban planning, architecture, art and design are electronic magazines (with their corresponding ISSN records). Of this group of journals, 57% are also published in print format, while 43% of them are published only in electronic format. Until two years ago, half of the magazines that today are only electronic magazines were also printed on paper. This clearly shows the trend of the transfer of printed journals to electronic journals, which responds to the great impact of information and communication technologies (ICT), but also due to the increasingly restricted financial resources of Chilean universities. It should be noted that only two magazines in the area incorporate video as a possible publication format.

LANGUAGE(S) OF PUBLICATION



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Likewise, the languages of publication are of interest. Only 21% of the indexed scientific journals of urban planning, architecture, art and design publish only in Spanish, while 79% of them publish in several languages, with English and Portuguese predominating ([table 2](#)). In greater detail, you can find a group of magazines that publish in Spanish and English (36%); Spanish, Portuguese and English (29%); Spanish and Portuguese (7%); and Spanish, Portuguese, English and German (7%). These figures show the interest of Chilean magazines in multilingualism and their openness to publications including Brazilian authors (in Portuguese) and the rest of the world (in English). Regarding the origin of the authors of the publications, on average, half of the authors come from Chile and the other half are of international origin.

Tabla 2. Resultados de la encuesta a editores: Idiomas de publicación en revistas científicas indexadas en urbanismo, arquitectura, diseño y arte en Chile

Idiomas de publicación	Porcentaje de revistas
Únicamente en español	21
Español e inglés	36
Español, portugués e inglés	29
Español y portugués	7
Español, portugués, inglés y alemán	7

INDEXATIONS

In relation to the indexing of Chilean journals in the field of urban planning, architecture, art and design, a clear predominance of the three most important open



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access scientific information systems in Latin America and the Caribbean is shown: 93% of the cases of study are indexed in Latindex, 50% in RedALyC and 43% in SciELO. On the other hand, 14% of these journals are indexed in ISI Social Science (currently Clarivate Analytics), 21% in ISI Arts & Humanities (currently Clarivate Analytics) and 57% in Scopus ([table 3](#)). Likewise, it is worth noting that 14% of these journals were indexed in 2016 in the Emerging Sources Citation Index (ESCI). Other indexations include ERIH Plus, Redib, Dialnet, DOAJ, Avery Index, HAPI, Gale, Clase, MLA, Qualis/Capes B2, Redib, Rebiun, Ebsco, Open Archives Initiative, Journal Tocs, Peridica and ARLA. Regarding the *Digital Object Identifier* (DOI), the majority of journals (79%) register their articles using DOI, either institutionally or through Scielo. In turn, 71% of the journals use an editorial management platform, which is in all cases the *Open Journal System* (OJS).



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Tabla 3. Resultados de la encuesta a editores: indexaciones de revistas científicas indexadas en urbanismo, arquitectura, diseño y arte en Chile

Indexaciones	Porcentaje de revistas
Latindex	93
RedALyC	50
SciELO	43
SCOPUS	57
ISI Social Science (actualmente Clarivate Analytics)	14
ISI Arts & Humanities (actualmente Clarivate Analytics)	21
Emerging Sources Citation Index (ESCI)	14

OPEN ACCESS POLICIES

All journals declare themselves as “open access journals” ([table 4](#)). In this context, an important characteristic of Latin America and the Caribbean is confirmed in this case, which is "the notion of scientific information as a common good, and the consequent free access to this information." ³



Tabla 4. Resultados de la encuesta a editores: acceso abierto en revistas científicas indexadas en urbanismo, arquitectura, diseño y arte en Chile

Preguntas realizadas en la encuesta	Lo desconoce (%)	No (%)	Sí (%)
¿La revista es de acceso abierto?	0	0	100
¿La revista usa una plataforma de gestión editorial?	0	29	71
¿La revista emplea licencias <i>Creative Commons</i> ?	0	14	86
¿La revista tiene una política explícita de cesión de derechos de autoría?	0	21	79
¿La revista usa un programa antiplagio?	0	93	7
¿La revista está adherida al <i>Committee on Publication Ethics (COPE)</i> ?	7	86	7
¿Los artículos de la revista tienen DOI (<i>Digital Object Identifier</i>)?	0	21	79
¿Los autores pagan una tarifa para publicar en su revista?	0	100	0

However, when asked on which platform the magazine is published openly on the Internet, the editors' responses show a certain degree of ignorance. Thus, 14% of the editors responded that "they do not know it", 7% indicated " *Open Access* " as their response and 7% indicated that it was the ARLA platform. On the other hand,



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some editors identified the OJS platform (29%), Scielo (21%), RedALyC (14%) and its institutional repository - SISIB Universidad de Chile - (14%) as an open access publication medium. Finally, 29% of the editors declared publishing openly through the website of their respective journal.

USE OF *CREATIVE COMMONS* LICENSES AND USE OF COPYRIGHT POLICIES

An observed contradiction was the use of *Creative Commons Licenses*, which promote open access, in conjunction with the use of restrictive copyright policies or lack of explicit policies in this regard, which limits open access and the free circulation of articles. . This phenomenon has already been observed, recorded and described by several Latin American studies.^{Thus} , a restrictive copyright implies that users require the explicit permission of the copyright holder "in this case the publishing organizations" to use the published information (for example, to republish or translate an article), which constitutes a major barrier to the open access movement.⁹

Also in the case of Chilean scientific journals on urban planning, architecture, art and design, on the one hand, the use of Creative Commons licenses (86%) and, on the other hand, the use of authorship rights (79%) are observed. , in several cases restrictive, and in other cases without explicit editorial policies. Review of the journals' "Open Access Policy" and "Copyright Notice" pages shows three important findings. First, that in 14% of the cases consulted "all rights are reserved"; second, that in 50% of them there is no information regarding copyright on the magazine portals; and finally, that in 29% of cases the standard policy of the Open Journal System is used (this journal provides immediate open access to



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its content, based on the principle that offering the public free access to research helps a greater global exchange of knowledge).

In relation to the *Creative Commons licenses*, it is observed that the versions used are CC BY 4.0 (21%), CC-BY-NC-SA 4.0 (21%) and CC BY-NC-ND 3.0 (14%), which They allow authors to disseminate their published works through institutional repositories. On the other hand, it stands out that 29% of the editors declare that they use *Creative Commons licenses* , but do not know which version is used by the magazine. Furthermore, the review of the "Open Access Policy " and " Copyright Notice" pages of the journal portals shows that in a third of the cases the use of *Creative Commons is not explicitly indicated*. Finally, 14% of journals do not use *Creative Commons licenses*.

The above shows the lack of explicit policies and, therefore, of editorial training on these topics "of great importance for the correct use of *open access* ", a lack already observed by other Latin American studies.⁵ As *Deroy Domínguez and Sánchez-Tarragó* point out , "This situation shows a contradiction between the adoption of technologies that favor open access, and political, legal and cultural aspects that slow it down or do not promote it."⁹

Likewise, this research shows the lack of implementation of anti-plagiarism policies. Only one scientific journal in the area uses an anti-plagiarism program, and only one journal is a member of the *Committee on Publication Ethics (COPE)*.

FINANCING OF MAGAZINES

Finally, an important issue concerns the financing of journals. As previously noted, all journals in the area are edited and published by non-profit universities and in a context of increasing budget restrictions of Chilean universities. This research



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shows that 93% of magazines are financed solely through institutional subsidies, and only in one case is additional financing obtained through subscriptions and advertising from third parties; No magazine charges its authors a fee to publish in it. This situation contrasts with other Latin American countries, such as Brazil, where 10% of journals charge authors to publish, with a rate in USD of \$60 to \$500 per article.^{eleven}

CONCLUSIONS

Open access democratizes the obtaining of scientific information and eliminates restrictions (often financial and copyright) on scientific production generated with public funds. Considering that scientific information is a common good, it is essential that research results are available without barriers to researchers and teachers, as well as to students and the community in general.

Taking into account the central objective of this study—regarding the challenges of open access to scientific journals of urban planning, architecture, design and art in Chile—it can be concluded that, in general terms, this group of journals would be part of the open access that seeks to overcome financial and copyright barriers. All the publications consulted not only declare themselves open access, but are actually available in digital format, online (internet) and for free. Likewise, almost all magazines use *Creative Commons* licenses .

However, half of these journals have copyright restrictions or a lack of explicit policies on this matter, which hinders the free circulation and, therefore, the dissemination of articles. *Additionally, there is a lack of editorial training in Creative Commons* licensing and copyright transfer policies (many editors are full-



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time academics who hold this rank for only a few years). In this sense, in Chile, as well as in the rest of Latin America and the Caribbean, a definition of explicit copyright policies is required - at the international, national and institutional level - that favor both open access and the dissemination of articles in institutional repositories or personal web pages, such as reusing content and sending digital copies or photocopies to students for teaching purposes, among other strategies.

Another difficulty for open access is the preference of prominent Chilean and Latin American authors to publish in high-impact international journals in English, usually published by large publishers for commercial purposes and without open access (generally North American and European). The above constitutes a great problem for access to the results of Latin American research, both for academics and students. Unfortunately, a large part of high-quality Latin American scientific production is not published in Spanish and, even more restrictive, a high fee must be paid to large foreign publishing houses to access it. This constitutes an intrinsic contradiction, given that most regional research is financed with public funds originating in Latin America. In this sense, it is a priority that institutions and universities, as well as national ministries of science and technology, develop incentive policies for open access publications.

Finally, a big problem is the financing of open access scientific journals and the lack of "sustainable financing models." Almost all Chilean scientific journals are financed through institutional subsidies, in a context of strong budgetary restrictions, as mentioned. It should be noted that in Chile, to date, no scientific journal on urban planning, architecture, art and design charges a fee to authors for publishing in it. However, in some Latin American countries, as well as in other



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disciplines in Chile (for example, natural sciences), a practice (although incipient) of the payment of fees by authors called *Green Open Access* (with fees between 50 USD and 5,000 USD). The above leaves a question: What then could be a sustainable financing model for open access scientific journals in the field of social sciences, arts and humanities?

All the problems described in this work constitute important challenges that require new solutions and editorial strategies, in order to ensure that all high-quality research published in Latin America and the Caribbean is available and continues to be available openly and free of charge to the public. academic community and the interested community.

Thanks

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Author contribution statement

Both authors designed the research, collected and analyzed the data, and wrote the manuscript.

Conflict of interests

The authors declare that there is no conflict of interest in this article.

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Utilization of Social Networks within the Cuban National Health System

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ABSTRACT

The use of social networks in public health favors the flow of information, autonomous learning, teamwork, communication, access to related networks and contact between experts. The present work examines the use of social networks in the Cuban National Health System, exposes the strategy developed by the National Information Center for Medical Sciences on Facebook and Twitter and its main results. To identify the different actors in social networks, the participation spaces of the Infomed network were consulted and searches were carried out on Facebook and Twitter. The components of the strategy developed by the National Information Center for Medical Sciences were identified through consultation with specialists from the Web Portal and Communication Group of that institution. To examine its main results, specialized tools were used. 64 blogs, 363 mailing lists and 97 collaboration groups were identified in the Infomed network. 87 Cuban health institutions have profiles on Facebook and/or Twitter. With an upward trend, those of Infomed stand out with 7,245 and 1,814 followers, respectively. The analytics of the latter showed high reach, engaged audience and favorable impact on web statistics. The use of social networks in the Cuban health system is under development. The definition of institutional policies and strategies and the information literacy of managers and users constitute today the most important



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challenge for their integration into health information and knowledge management processes.

Keywords: social networks; information management; health; communication; Cuba.

INTRODUCTION

Nowadays, the term "social network" is constantly growing. This was coined mainly by the English anthropologists John Barnes and Elizabeth Bott, when they proposed that it was essential in human relationships to consider external ties with family members or other people belonging to various social groups.¹

The development of Information and Communications Technologies (ICTs) has allowed the rise of this type of grouping in virtual spaces. In this context, social networks (SR) constitute a group of Internet-based applications that are developed on the ideological and technological foundations of Web 2.0.² They have been defined as platforms with a double media and self-communicative perspective that form techno-social structures and generate a broad system of relationships.³ Its penetration in everything around the world is increasing: more than 3,000 million people, representing 42% of the world's population, use social networks with Facebook and YouTube at the top, according to the most recent statistics from the "2018 Global Digital" report.⁴ These are used by 98% of digital consumers, who on average spend 2 hours and 15 minutes a day on RS and messaging services, according to GlobalWebIndex.

In 2016, Cuba was the country in the world with the highest growth in the use of RS (368%).⁵ During 2017, RS users in Cuba reached 38% of the population⁴ and according to StatCounter GlobalStats, a tool for analyzing web traffic, they were



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predominantly found on Facebook: 88.66%, Pinterest: 5.47 %, Twitter: 2.85% and YouTube: 1.73%.⁶

One of the main trends foreseen regarding the use of the Internet is the increase in the use of RS in the field of information search, direct competition to the Google search engine.^{4,7} In this sense, social networks have become a topic with a growing presence in the research agenda on information management and specialized communication.⁸ Several studies have analyzed dimensions such as their use by certain groups,⁹ their adoption by cybermedia,¹⁰ and their use in the academic and teaching context.^{eleven}

Some works specifically point out its value for information exchange and communication in the health field.^{2,12,13-16} In this sense, what stands out is that they enable better interaction between health professionals, between patients and between professionals-patients, while at the same time they constitute tools of indisputable usefulness for the flow of information between the main actors. in a new scenario of the so-called e-Health.

Some research that has investigated the particularities of information management processes about certain diseases in certain groups has shown a preference for the Internet and social networks as communication channels, to the extent that they allow interactivity and dialogue.¹⁷ In the Cuban context, previous studies have identified as trends the predominance of the informative genre, the limited use of interactivity and hypertextual and multimedia resources, and the lack of a level of specialization in the treatment of health information.¹⁸ Others describe how the technological, message and cultural dimensions mediate the differences in the uses of interactive resources and social networks.¹⁰ On the other hand, analysis of



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specialized websites, such as those that make up the Infomed portal network, have described the process of transition towards web 2.0, with the incorporation of tools to collaborate and share, such as blogs and wikis, although recognizing the need to debate and move forward in this regard.¹⁹

In the case of public health, SR favors the publication of information, autonomous learning, teamwork, communication, feedback, access to other related networks and contact with different experts. In addition, they allow us to detect patterns and behaviors associated with the search and provision of health information. Its potential for surveillance, service planning, and the development of intervention and health promotion programs are visible.² In the Cuban context, characterized by the particular importance of the health issue in government public policies and, at the same time, , one of the lowest Internet penetration rates in region⁴ —40 users per 100 inhabitants in 2017— the use of SR in the health sector is a topic of particular relevance.

This work examines the use of social networks by professionals and institutions of the Cuban National Health System. As part of this, the components of the strategy developed by the National Information Center for Medical Sciences for the insertion of the web content of the Infomed network on Facebook and Twitter are presented, as well as the main results of its application to date.

METHODS

To identify the different professional and institutional profiles in the social participation spaces of Infomed²⁰ (blogs, mailing lists and collaboration groups), the corresponding web platforms were consulted.²¹⁻²³ In the case of Facebook and



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Twitter, the *fan pages* and users were located through searches in both RS, using the names of the Cuban health institutions, available in the directory of the Virtual Health Library of Cuba.²⁴

Additionally, the directors of the 16 Provincial Medical Sciences Information Centers, coordinators of the Infomed network in each territory, were requested to report on the existence of institutional profiles on Facebook and Twitter. The information search included the period January 2017-April 2018, with which the data offered in this work correspond.

The components of the strategy developed by the National Information Center for Medical Sciences (CNICM) for the insertion of Infomed web content on Facebook and Twitter were identified through consultation with specialists from the Web Portal and Communication Group of that institution. responsible for its design and implementation. Additionally, the corresponding documentation was reviewed, available in the files of the Department of Special Information Services of the CNICM.

For the analysis of the main results of the implementation of the strategy until April 2018, web analytics and RS tools were used, such as LikeAlyzer (<https://likealyzer.com>), Tweepsmat ([https://tweepsmat.com /es/Map/#](https://tweepsmat.com/es/Map/#)), Twitonomy (<https://www.twitonomy.com>) and Alexa (<http://www.alexa.com>); as well as the statistics available in the administration of Facebook and Twitter profiles.

The indicators considered were:



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- *Infomed fanpage* on Facebook: number of publications, number of followers, gender of followers, country of origin of followers, reach of publications, interaction with publications, ranking according to LikeAlyzer.
 - *Infomed users on Twitter*: number of Tweets, number of followers, number of favorite tweets, country of origin of followers, percentage of redistribution of tweets.
 - *Web analytics of the Infomed web portal*: ranking according to Alexa, pages per visitor, average visit time per visitor.

For better understanding, the information was supported by tables and figures, whenever relevant. The Microsoft Excel program, from the Office 2016 package, was used to prepare the graphs.

RESULTS AND DISCUSSION

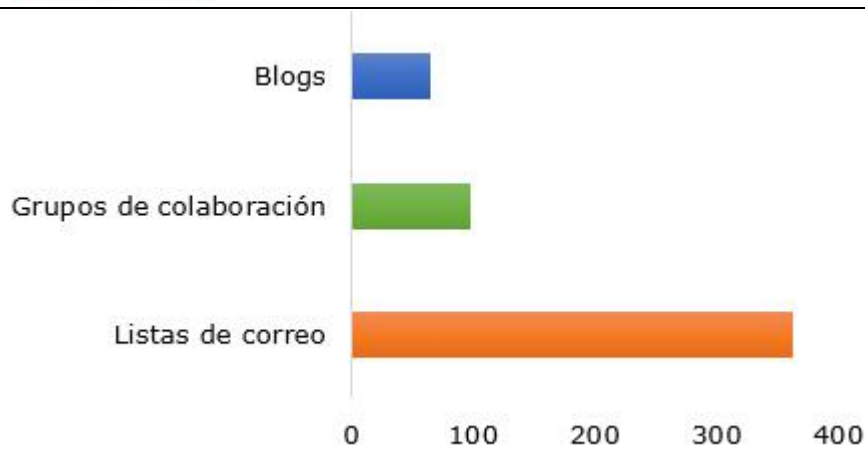
The Infomed blogosphere is made up of 64 blogs managed, essentially, by professionals from the National Health System and the National Health Sciences Information System, organized in the Health Blogs instance.¹ A total of 363 mailing lists on various topics² and 97 collaboration groups³ that deal essentially with specialized health topics, are added as institutional collaborative spaces.²⁰ (Fig. 1). The greatest growth in the last three years corresponds to mailing lists, which increased by 82.



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Eighty-seven Cuban health institutions have a *fanpage* on the social network Facebook or a user on Twitter, among which are teaching and healthcare institutions of high prestige at a national and international level, Provincial Health Directorates, Cuban medical journals, Provincial Health Information Centers. Medical Sciences and the CNICM.

The main difficulties observed in the profiles of health institutions include the low frequency of content updates, the limited use of hypermedia resources in the preparation of publications (posts or tweets), the use of low quality images - both due to its composition as well as its dimensions or content—, the little interaction with users and the absence of its own web content that supports publications in RS. Among the aforementioned institutions, the CNICM, coordinator of the Infomed network, stands out.²⁵ Its content insertion strategy in the RS Facebook and Twitter began in 2013 and is coordinated by the Web Portal and Communication Group, although the main functional areas of the center have been involved in its implementation. For its development, the following aspects were considered:

- Previous analysis: objectives of the Infomed network as part of the National Health Sciences Information System. What is Infomed and what does it



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do? Strengths, weaknesses, threats and opportunities for the implementation of the strategy.

- Strategic goals and objectives.
- Audience and target audience.
- Specific objectives and actions for each channel.
- Privacy settings, guidelines for the design of visual identity and formal elements.
- Content management and programming guidelines.
- Framework of interaction with the audience/community.
- Material resources, human and symbolic capital, technological and communication means.
- Evaluation and control method for the analysis of the results.

As a result of its implementation and to date, the CNICM has 6 *fanpages* on Facebook and 5 users on Twitter ([table](#)). The information disseminated on the Infomed network is primarily aimed at members of the health sector, which is why it is He defined that the contents had to meet the expectations of the essential segment to which it is intended: Cuban health personnel. Health personnel from other countries, as well as people interested in health information, were added as potential users.



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Cuadro. Perfiles de Infomed en Facebook y Twitter. Abril, 2018

Infomed Cuba	https://www.facebook.com/infomedcuba	@InfomedCuba
Biblioteca Virtual de Salud en Cuba	https://www.facebook.com/bvscuba	@bvscuba
Biblioteca Médica	https://www.facebook.com/bmn.infomed	@bmn_cuba
Universidad Virtual de Salud de Cuba	https://www.facebook.com/pages/Universidad-Virtual-de-Salud-de-Cuba/602478696441137	@UvsCuba
Cencomed-eventos de la salud en Cuba	https://www.facebook.com/pages/Cencomed-Eventos-de-la-Salud-en-Cuba/174051292651840	@CubaSalud
Editorial Ciencias Médicas	https://www.facebook.com/Ecimed	-

The main profile is the one that represents the Infomed Network in its entirety (Infomed Cuba) - both on Facebook and Twitter - and that, acting as an "umbrella" space, in relation to the others, but with a well-defined independence of The contents it promotes use the following as its main sources: Infomed web portal, specialized information services of the Cuban health network (AIDía news service, Cuban health anniversaries service), main information sources of the Infomed network. (network sites portals of health specialties and topics, Virtual Health Library of Cuba, Medical Library, Medical Sciences Publishing House (ECIMED), Virtual University of Health, Cencomed-Health Events in Cuba), press websites Cuban, other websites of international health organizations (Pan American Health Organization, World Health Organization), social network profiles of institutions of the Cuban National Health System, as well as the Cuban Medical Brigades that



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work in different places in the world and other channels for disseminating content on social networks with international impact directly related to health and related topics.

From April 3, 2014, the day the first *post* was published on the InfomedCuba *fanpage* on Facebook — created under the *Medicine & health* typology — until April 30, 2018, 6,859 *posts* were published , for a daily average of 12. The page has 7,245 followers, with an increasing trend (Fig. 2). Most of them come from visits to the page itself, as well as suggestions from other pages on Facebook. The predominance of the female sex stands out (57%), as well as that of the group made up of people who are between 25 and 34 years old (42%). The page has followers from 45 countries, among which those from Cuba (27.6%), the USA (8.6%), Mexico (8.2%), Brazil (7.1%), Bolivia (4.7), Venezuela (4.3) and Spain (3.9%). The statistics referring to the interaction behave in a similar way. The reach of the publications has increased over time. In the last month included in this study (April/2018), the maximum reach was 181,097 people and interactions amounted to 52,061. All the reach of the page is organic, that is, it is obtained without any type of intervention. payment.

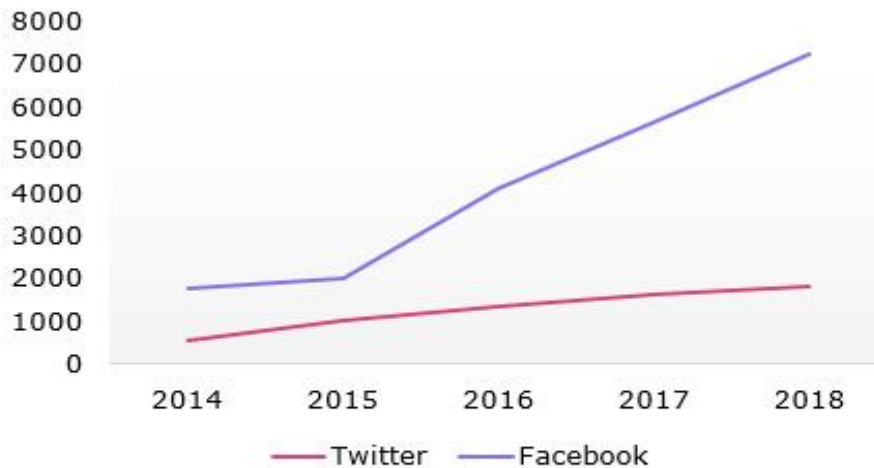
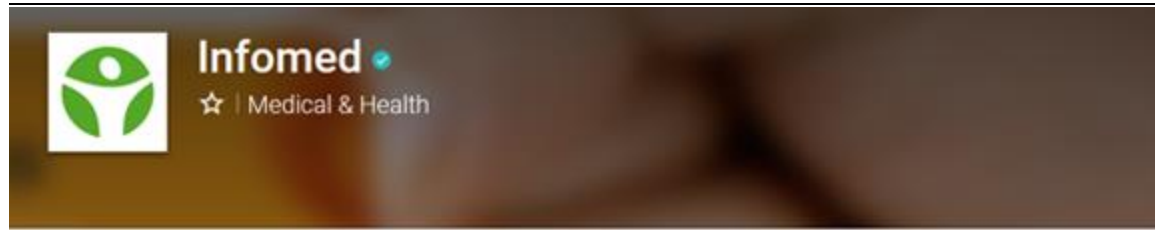


Fig. 2. Evolución de los seguidores de los perfiles de Infomed en Facebook y Twitter; 2014-abril, 2018.

According to LikeAlyzer, the Infomed page on this social network obtained a ranking of 73/100, higher than the average value for any type of page (53/100), for pages of the same type — *Medicine & health* — (51/100). 100) and even with respect to those of similar brands (70/100). Its audience is very committed, based on the daily, constant and diverse activity that the *fanpage* shows . The tool points out as its main deficiencies the little use of events and the fact that followers cannot publish content. It is worth noting that this last aspect derives from the privacy settings defined for the page, one of the elements that make up the CNICM's RS strategy ([Fig. 3](#)).



RESUMEN

Lo estás haciendo bien, pero todavía hay espacio para mejorar.

- Los seguidores no pueden publicar contenido. Esto obstruye la participación del usuario.
- No se están aprovechando los beneficios de Facebook Events (eventos de Facebook).
- Están publicando contenido nuevo a un ritmo excelente.
- Esta página valora la calidad sobre la cantidad en cuanto a la longitud de los mensajes. ¡También está recibiendo un nivel de participación excelente!



Fig. 3. Resultados del análisis de LikeAlyzer sobre la página de Infomed en Facebook. Abril 2018.

From April 21, 2014, the date on which the first tweet was published on the Infomed Twitter account, until April 30, 2018, the main results are: Followers: 1,814, Favorites: 1,355, Number of Tweets : 12,052. These indicators have also been improving over time ([Fig. 2](#)). In the last month included in the present study, the tweets reached approximately 71,500 impressions and the profile obtained 983 views. According to Twitonomy, 48 out of every 100 messages published were redistributed, indicating a high level of impact. The analysis carried out with Tweepsmat showed that most of the audience is concentrated in Cuba and other countries in the Americas, the United States, the United Kingdom and Spain ([Fig. 4](#)).



Fig. 4. Distribución de seguidores de @InfomedCuba en Twitter.

All this work on social networks contributes to making the Infomed portal, <http://www.sld.cu/>, popular on the web, according to the results of the Alexa analytics tool.²⁶ In the period studied, visitors spent about 5 minutes browsing and reviewed an average of 4 pages ^{per page}. In 2017, the Infomed portal reached a historical record in its placement in the Alexa ranking, placing itself in position 5,799 in June, the best in history^b This implied that it was also positioned as the Cuban web portal with the best positioning according to this web analytics tool. Throughout the period studied, it remained among the 6,000 most visited portals among all Internet sites and among the first 10 most visited Web sites in Cuba. At the end of 2017, it occupied the second position among those of national origin^c. From January 2015 to April 2018, the number of visits to the Infomed portal and the most important sites on the network, coming from the RS, has increased by 16%.²⁷

The previous results suggest that users place a high value on the information that flows through Infomed, on its website and on social media. In this sense, these authors consider that the CNICM strategy constitutes a good practice, since it



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integrates the content channels on Facebook and Twitter with the social participation spaces of the Infomed network (blogs, mailing lists, collaboration groups). to enhance the exchange and flow of information between the different professional and institutional actors, in the context of the Cuban health system.

In line with the above, it is valid to consider that SRs are a tool of great value for public health when they constitute timely channels of information and interaction. They allow you to intentionally promote and position digital resources, generate original and unique content and amplify the reach and impact of website content, facilitate and monitor user interaction and feedback, diversify communication channels with other networks. of health and among the target and potential users themselves, build scenarios for teaching and scientific exchange and strengthen the collective and transdisciplinary construction of knowledge, one of the challenges of the information society. However, they must be used strategically. Select and produce quality content, plan publications, carry out daily actions, intentionally generate trends, share information, use attractive multimedia resources, segment messages, influence certain users, provide the audience with the information that interests them and interact With it, they constitute some of the essential aspects to be considered by SR managers.

It is vital that information professionals understand the importance of the interactions that are generated in these spaces. Health has a large potential audience and dissemination is the key to building loyalty. SRs are a tool to facilitate this approach; However, there are still untapped opportunities regarding their use as tools for information and knowledge management in the context of the Cuban Health System.



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This is part of the challenge we have to use the possibility that technology offers to expand the horizons of the use of SR, which will be strengthened to the extent that we promote efficient use of these tools, institutional policies and strategies are defined with this purpose and information literacy actions are carried out aimed at managers and users of social networks.

CONCLUSIONS

The use of social networks in the Cuban health system is under development. In the context of the Infomed network, professional blogs, mailing lists and collaboration groups stand out, which maintain a growing trend over time.

There are still few health institutions in Cuba that have profiles on Facebook or Twitter. In this group, the National Information Center for Medical Sciences stands out, which for four years has implemented a strategy in both social networks, with satisfactory results according to the indicators used for its evaluation. This places it as a national reference in this field and points to the fact that, when used strategically, social networks are a tool of great value for health, in the current digital communicative environment.

The definition of policies and the development of institutional strategies for this purpose, together with the information literacy of managers, actors and users, constitute today the most important challenge for their integration into the information and knowledge management processes in the context. of the Cuban health system.

Authors' contribution



Patricia Alonso Galbán designed the study, performed the literature review, analyzed the data and wrote the first version of the manuscript; *Oneidys Hernández Vidal* was involved in the collection and processing of the data; *Ileana R. Alfonso Sánchez* participated in the review and editing of the manuscript. All authors reviewed the writing of the manuscript and approved the version finally submitted.

Conflict of interests

The authors declare that there is no conflict of interest.

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