

University archives: the research road travelled and the one ahead

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Abstract

Purpose – University archives (UA) are the bridge between the past and the present and serve as a beacon for highlighting the contribution of academic institutions to society. Although the UA topic was introduced and formalized in the 1950s, the scientific research interest has increased significantly in the past two decades. This paper aims to provide insights into the UA research topic during the previous 15 years.

Design/methodology/approach – The combination of two well-established methods for performing literature review was deployed, aiming to identify, select and assess the research documents. Based on the selection criteria, 49 documents presenting research efforts around the UA topic were finally examined from the Scopus citation index. The selected studies have been classified into three main topics: strategic management of UA and the derived challenges, the educational contribution of UA and the strategic information systems for UA.

Findings – Some of the main findings are the lack of well-defined administrative policies, the low level of awareness and archival consciousness within the universities, the inadequacy of university archivists' educational and training background, the need to use UA for building relationships with alumni and society, and finally, the need for metadata standardization by the UA management systems.

Originality/value – As a literature review around UA has not been conducted before, the reader will gain insights into the methods and research designs that other scholars had already applied to designate useful findings and results.

Keywords Case-studies, Archives management, Education, Literature review, University archives, Archivists education, Archival information systems

Paper type Literature review

1. Introduction

Whilst digitalization is in full swing and growth, the way organizations manage their produced information signals the success or the failure of their daily operational goals. Academic institutions such as universities and colleges could not be an exception regarding managing information derived from their archives and records. The proper management of records and archives for a university constitutes a vital point for providing reliable, timeless and comprehensive information for more efficient and faster decision-making within its operational framework. Moreover, strategic records management can foster the preservation and utilization of university archives (UA), bridging the past with the present, thus highlighting the contribution of academic institutions to society (Kim and Han, 2015). UA refers to the historical records of various substrata and formats directly produced by the



university stakeholders, students, academic and administrative staff whilst engaging and enrolling in the learning process, scientific research and management (Ly and Shi, 2020).

Universities have historically made a significant contribution to the society they belong to and served as hubs for preserving and using archives for educational, research and cultural purposes (Fritz, 2018). Without a doubt, academic institutions, through daily operational activities, produce large volumes of archival material. This fact leads to established policies by archival departments within academic libraries or even independent Archives inside universities that aim to manage UA in an organized and effective way. Over the years, UA foster students' relationships with the institution, improve administration, collect, classify and use the produced material for academic research and cultural purposes. Globally, during the mid-twentieth century and increasingly during the 50s and 60s, universities and professional associations of archivists turned towards the preservation, management and utilization of UA (Saffady, 1974; Maher, 1992). In the same year of Maher's (1992) grounded theoretical contributions, the International Council on Archives (ICA) established the Section for University and Research Institution Archives. This initiative -derived from ICA- works as a compass to embrace UA as a novel research field within archival science. More recently, in 2020, *comma* on issues 1-2 focused on the work and impact of archivists and archives in university and research institutes, highlighting at an international level the importance and benefits of managing UA.

In this respect, UA's importance for administrative operations and research purposes creates an imperative need for institutions to provide processes for managing, refining and preserving both current and archival material. This also demands well-documented and scientifically valid archiving policies (Legg *et al.*, 2020). Up to the current research efforts, most of the studies unfold the benefits of managing UA aptly. Among the significant benefits are the following:

- Documentation, indexing and management of information that is produced herein by the universities, which allows faster and well-informed decision-making.
- Provision of information at the lowest possible cost.
- Provision of extensive and optimized academic services for the involved stakeholders.
- Deletion of documents that are no longer needed, thus reducing unnecessary information overloading symptoms for every operational department in the university.
- Rescue, preserve and use historical archives for various purposes, introducing the university's history to the forthcoming interest parties.

Another benefit is to reduce the possible loss of information and knowledge that records produce during university daily operations and activities whilst at the same time reinforcing the organization and preserving the historical archive (Li, 2019a). Nevertheless, UA management suffers from fragmentation for several reasons: lack of administrative frameworks, inadequate capabilities of the information systems to manage UA, absence of archival consciousness and unclear policies for record cycle handling (e.g. transition of inactive records to the archive). The complexity is raised significantly as the digital era proposes several e-services that should be chosen to use as opportunities for improving the management of UA (Marciano *et al.*, 2018). UA optimized management would reinforce university archival practice further, allowing more accessible archival material, protect integrity, authenticity and consistency and contribute positively to policy-making and

systematic decision-making. Also, through a well-established management process, it becomes easier to evaluate the university's development.

Against this background, in this paper, we conduct a literature review to discover the state-of-the-art practices, well-informed suggestions, proposed methods and research designs, empirical findings and challenges to the UA research topic.

The results of our work will expand the knowledge of related researchers and university archivists for building and examining novel practices in terms of UA management within the digital era and increasing the awareness of such entities for their contribution to the university culture, educational and societal background of the involved stakeholders.

We first justify our motivation to conduct this study, the raised challenges and the literature review's scope. Therefore, the materials and methods are described regarding the sequential stages of a literature review. The literature classification follows three main categories:

- (1) Studies that are related to the development of management policies for UA, whilst highlighting the derived challenges through case studies.
- (2) Studies related to the educational and cultural contribution of UA to society.
- (3) Studies related to the development and optimization of UA management systems from a technical perspective.

Hereupon, before the methodology (Chapter 3), the results (Chapter 4) and the discussion of the findings (Chapter 5), it was necessary to provide details about the research scope, justification and trends (Chapter 2).

2. Research scope, justification and trends

2.1 Research scope and topic justification

It is common knowledge that information communication and technologies (ICTs) have matured and as UA management changes rapidly in several ways, the need to establish a well-informed framework becomes urgent. This framework will indicate the state-of-the-art approaches and help to improve the management, preservation and access to the university archival holdings. Among the changes in UA management, some stand ahead:

- *Changes concerning users' expectations:* As information-seeking behaviour changes over time due to the plurality of available information, very fast in its production, users seek ease-of-use and reliable information provided to them at the best possible time. UA topic is not an exception. In this case, there are multiple categories of UA users such as the staff itself, university faculty, external scholars, students and the general public. All of them need to seek and extract information from the archives for individual processing tasks such as operational, educational and/or researching activities. The increasing need for seeking information pushes the limits to UA entities to establish management policies, providing efficient access and findability of records to the stakeholders.
- *The rapid expansion of the available sources that produce documents:* The ICT advancement and their utilization for creating, sharing and managing records constitute a mechanism producing voluminous documents from various resources with high velocity (e.g. thousands of emails are sent daily). At the same time, administrative acts need to be organized, classified and indexed for possible retrieval and usage by the university staff. Other operations such as students' grades and application submissions are automatically processed, producing additional information that needs to be organized.

- *Continues changes in the organizational structures of the university:* Universities are subject to change as the scientific and educational fields evolve. Updates to curriculum and courses, merging of departments or even whole universities, can also cause the restructure of records and archives.
- *Consistently reduced financial flexibility and digitization:* The reduced financial flexibility is often among academic institutions for the past 10 years. Priorities and budget allocation for improving university services are changing over time, which does not ensure the UA development and implementation. The digitization of printed records and archives becomes a priority that faces challenges during the implementation. However, without proper documentation and metadata, the advantages that digitization offers could quickly be eliminated. The more digitized holdings are without appropriate documentation, the harder it is for end-user to locate and retrieve relevant documents.

Along with the changes described, there is a clear need to focus on systematic management of university records and archives, independently their age, type and substrate (analog or digital). This assumption is based on archival science's theoretical and applied management models, namely, the life cycle of records (active/current, semi-current or non-current/historical) and, even more, the uninterrupted continuity (continuum) model introducing an integrated operational approach (recordkeeping) for UA. Considering the emerging challenges among UA's management, we conduct a literature review on this topic, highlighting the existing scientific knowledge and methodologies to reflect and tackle these challenges.

A literature review reflects the selection of available studies on a specific topic. It also summarizes the main findings from a particular perspective and the most important suggestions to improve the research topic (Hart, 2018 p. 39). In addition, a literature review can be used for other purposes by a researcher such as introducing relevant terminology and understanding key terms, making comprehensible the available methodologies that prior scholars have developed to extract findings, gaining insights regarding the existing research gaps on the topic and highlight new research dialogues and agendas (Kitchenham *et al.*, 2009). In this study, we conduct a literature review for three reasons:

- (1) Firstly, for searching and identifying relative research efforts within the topic of UA (e.g. identify, the individual research disciplines and the research activity over the years around the topic).
- (2) The second reason is related to the effort to gain insights about the methods and research designs that other scholars had already applied to designate useful findings and results. The methodologies understanding will reinforce the potential practical efforts of university archivists and will highlight the related community's efforts to draw novel research avenues and agendas.
- (3) The third reason is depicting the finding and results that are probably capable of enhancing the contribution of UA to the society they belong to.

In the next section, we provide an overview regarding the increased research activity around the UA topic over the years.

2.2 Research trends in university archives topic

Whilst the UA topic was introduced and formalized in the 50s with fundamental theoretical efforts -mostly in *American Archivist*-, the scientific interest has been increased significantly

in the past decade (manifested mainly by the number of published documents). A bibliometric analysis proves this statement. More specifically, by searching Scopus, the results indicate only 50 published works from 1950 to 2004, compared to the 78 documents from 2000 to 2020. Additionally, a search in Web of Science, from 2000 to 2010, returned 84 results. In the upcoming figure (Figure 1), a more detailed overview is presented regarding the number of publications per citation index database.

As it can be seen, the findings indicate that during the past decade (2010–2020) the research activity is more intense. For example, Scopus counts 58 documents between 2010 and 2020, outperforming the previous decade (2000–2010), where only 20 publications were created (190% increase). Complementary, Web of Science articulated up to 14 documents between 2000 and 2010, whilst up to 70 documents are indexed within the database between 2010 and 2020.

Moreover, in the following figure (Figure 2), the document types are presented just as they have been extracted from Scopus. Most of the published works are articles in journals (82 documents), whilst reviews and conference papers follow up (13 and 14 documents, respectively). It is noted that most of the documents have been published in related journals with the archival science topic such as the *American Archivist* (29 documents), the *Journal of Archival Organization* (6 documents), the *Comma* (4 documents) and the *Journal of the Society of Archivists* (2 documents).

Finally, regarding the research activity around the topic of UA, in Figure 3, a world map and a bar chart are depicted. This figure illustrates the global research activity based on the authors' affiliation origin (country). In total, 96 out of the 116 related documents retrieved from Scopus contained affiliation origin information. As can be seen in the bar chart, most documents originated from the USA (50 documents), whilst China follows with 17 documents.

3. Materials and methods

This paper provides up-to-date knowledge and ongoing insights into UA management, allowing university archivists and researchers to have a clear view of the topic's nature and

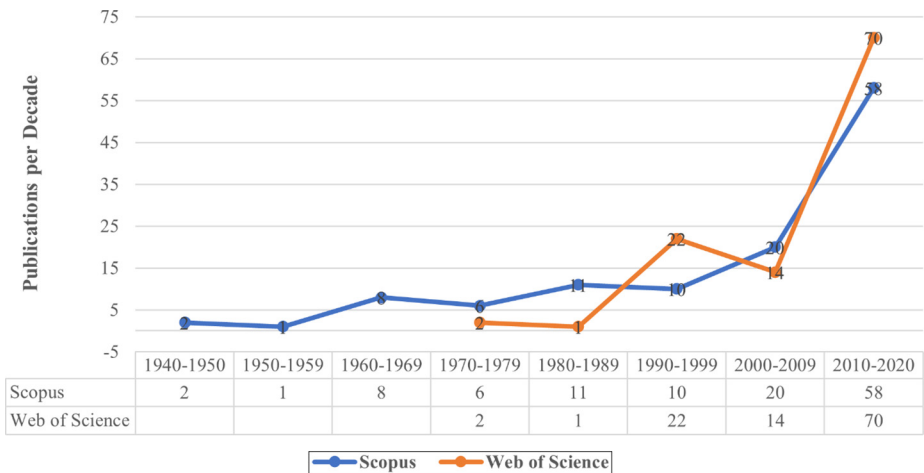


Figure 1. Publication activity per citation index database over the decades into the research topic of university archives

Source: Scopus and Web of Science

prior relevant research efforts results (Hart, 2018 p. 127). To achieve this goal, we deployed the Kitchenham (2004) methodology. This methodology involves four sequential steps: the identification of related studies, the studies selection, the studies quality assessment and the data extraction and data synthesis, including a comprehensive UA topics classification framework.

3.1 Identification of studies

The first step articulates the identification of related studies into the research realm of UA. To identify as many relevant documents as possible around the research topic under investigation, we used only the Scopus database. We justify this choice based on comparing the results from Scopus and Web of Science. In more detail, we examined the titles of the retrieved documents and noticed that the results from the Scopus database indicate greater relevance to the UA topic compared to the Web of Science results. In addition, the Scopus database was selected as it provides more reliable source links to the indexed databases for content retrieval.

In Table 1, the applied search terms are articulated. Scopus-specific field codes were used to minimize false positives results such as Doc Title, Abstract and Keyword (TITLE-ABS-KEY). We did not involve other search field codes that limit studies geographically or by subject, as this literature review aimed to investigate all the topics around UA on a global scale. Moreover, aiming to ensure that the study includes up-to-date information, the papers' inclusion period was limited to the past 15 years; from 2006 up to 2020. Initially, without applying year limitation, the searching process within the Scopus database resulted in 116

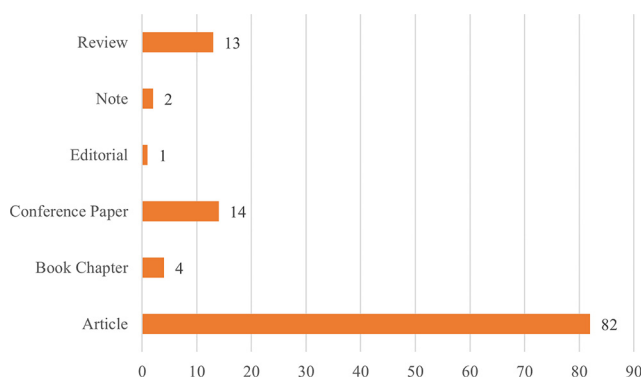


Figure 2.
Document types
extracted after
conducting a
bibliometric analysis
in Scopus

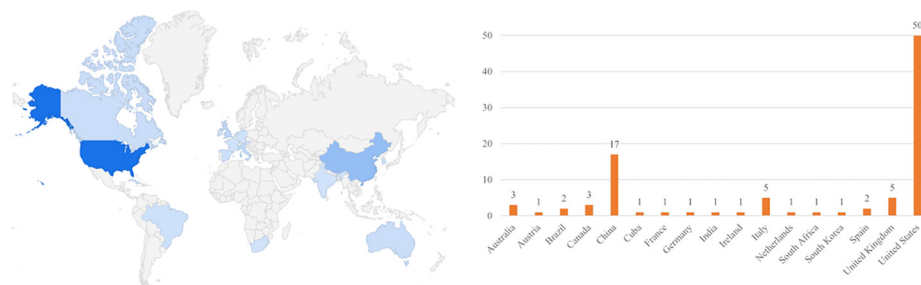


Figure 3.
World map and bar
chart depicting
publication activity
based on the authors'
affiliation origin
(country) on the topic
of University
Archives

documents, whilst 65 were published in the past 15 years (12 documents from 2006 up to 2010 and 53 documents from 2011 up to 2020).

3.2 *Studies selection*

For each of the 65 published works identified in the past 15 years, their content was examined in two steps to ensure their selection’s relevance to UA’s research topic. More specifically, at the first step, their metadata such as title, abstract and keywords were examined to understand if there is relevance with the UA topic. At the second step, the content of each document was examined to ensure furtherly relevance with the UA research field. Among the pool of the extracted documents, 5 of them were excluded. Moreover, within the sample of the retrieved documents, 4 appeared to be descriptions of workshops, short book presentations or calls for papers’ submission. These documents were also removed as they did not contain research work. Finally, 1 document was excluded as it was not accessible. Finally, 60 documents remained to be examined for their research contribution to the UA topic.

3.3 *Studies quality assessment*

Over the years, what determines a literature review weaker in its quality than others, resulting in receiving criticism about its subjectivity, is the methodology for selecting the sources (Dixon-Woods *et al.*, 2006). In this context, the third step is challenging and different quality evaluations could lead to different results. In this respect, we adopted various approaches to reduce the bias and define the documents to be excluded. We followed and combined Batini *et al.*’s (2009) and Bano and Zowghi’s (2015) methodological approaches to evaluate the quality of the selected documents, just like other efforts previously attempted to (Zuiderwijk *et al.*, 2020). The Batini *et al.* (2009) approach states four criteria within the quality assessment, namely, timeliness, completeness, accuracy and consistency of a study. The Bano and Zowghi (2015) approach proceed into the explanation of each one of these criteria. To make more comprehensible to the readers how these two methodological approaches were combined, the following table (Table 2) is introduced.

After applying the quality assessment method described above, 11 documents were excluded as they did not meet the criteria. More specifically, 9 studies provided insufficient information regarding the accuracy and completeness criteria, namely, the study’s primary goal, how the research design was developed and how the empirical data was collected. Besides, 2 studies were excluded, as, after the in-depth reading phase, they appeared to be a shorter version of journal papers already included. After all these sequential steps, 49 documents composed our literature review sample (Figure 4).

Table 1.
Search terms used during the initial step of the identification of related studies

Construct	Combinations of search terms and Boolean operators used to search documents in the university archives topic
Management	(“university archives”) OR (“institutional archives”) OR (“academic archives”) OR (“college archives”) AND (management) OR (administration) OR (policies) OR (principles)
Systems	(“university archives”) OR (“institutional archives”) OR (“academic archives”) OR (“college archives”) AND (systems) OR (information systems)
Challenges	(“university archives”) OR (“institutional archives”) OR (“academic archives”) OR (“college archives”) AND (challenges) OR (problems)
Education	(“university archives”) OR (“institutional archives”) OR (“academic archives”) OR (“college archives”) AND (education) OR (cultural education) OR (students)

Table 2.
Sample quality
assessment

Qualitative Criteria based on Batini et al. (2009)	Explanation based on Bano and Zowghi (2015)
<p>Timeliness: <i>the study should contain other studies and research studies as references that have been published relatively recently</i></p> <p>Completeness: <i>the study's methodological research approach is described in a detailed manner</i></p>	<p>The study included within the sample was published in the past 16 years, from 2005 to 2020</p> <p><i>For survey development studies:</i> the authors clearly define the sample size, justify the reason behind each assessment variable and present the results straightforwardly</p> <p><i>For experiments:</i> the variables that are involved have been measured for their adequacy and information about prior related experiments takes place</p> <p><i>For case studies:</i> the case study context is clearly described and defined from the initial stages of observations until the conclusions and suggestions to practitioners</p>
<p>Accuracy: <i>the aims/objectives of the study should be clearly stated and the materials and methods should be described with clarity</i></p>	<p>The study that is included within the sample states clearly the aims/objectives. The data collection methods are described clearly and citations from prior research efforts support important statements within the paper</p>
<p>Consistency: <i>the proposed research design is capable of answering the defined research questions</i></p>	<p>The study that is included within the sample develops an appropriate research design, whilst the research questions are answered in a transparent manner</p>
<p>Notes: On the left side, the criteria are taking place. On the right side, the explanation of them is unfolded</p>	

3.4 Data extraction and synthesis

In the fourth step, a spreadsheet was created to keep track of the selected studies' core metadata. These metadata include the *title of the study*, the *year of publication*, the *document type* (*journal, conference paper or book chapter, etc.*), the *URL link* where the study could be found, the *full citation at APA style* and finally, the *abstract*. For replication purposes and further research expansion of our work, the spreadsheet as a text data set can be found at Zenodo [1] and Kaggle [2]. The spreadsheet also contains the retrieved documents from both Scopus and Web of Science.

Based on the extracted metadata analysis, further information was gathered regarding UA's research topic activity. More specifically, as can be seen in [Figure 5](#), most of the selected studies have been published in scientific journals (38 papers – 77.55%), whilst only 10 works were published in conference proceedings (20.40%).

Subsequently, the following figure ([Figure 6](#)) depicts the distribution of the 48 research documents per year of publication. For example, in 2006, 2 out of the 49 selected documents have been published. It is noted that most of the selected research documents have been published between 2015 and 2020 (31 papers of 49 or 63.26%). Both the findings presented in [Figures 1](#) and [6](#) (the Scopus and Web of Science databases' findings) support the fact that there is an increasing research activity over the past years on the UA topic.

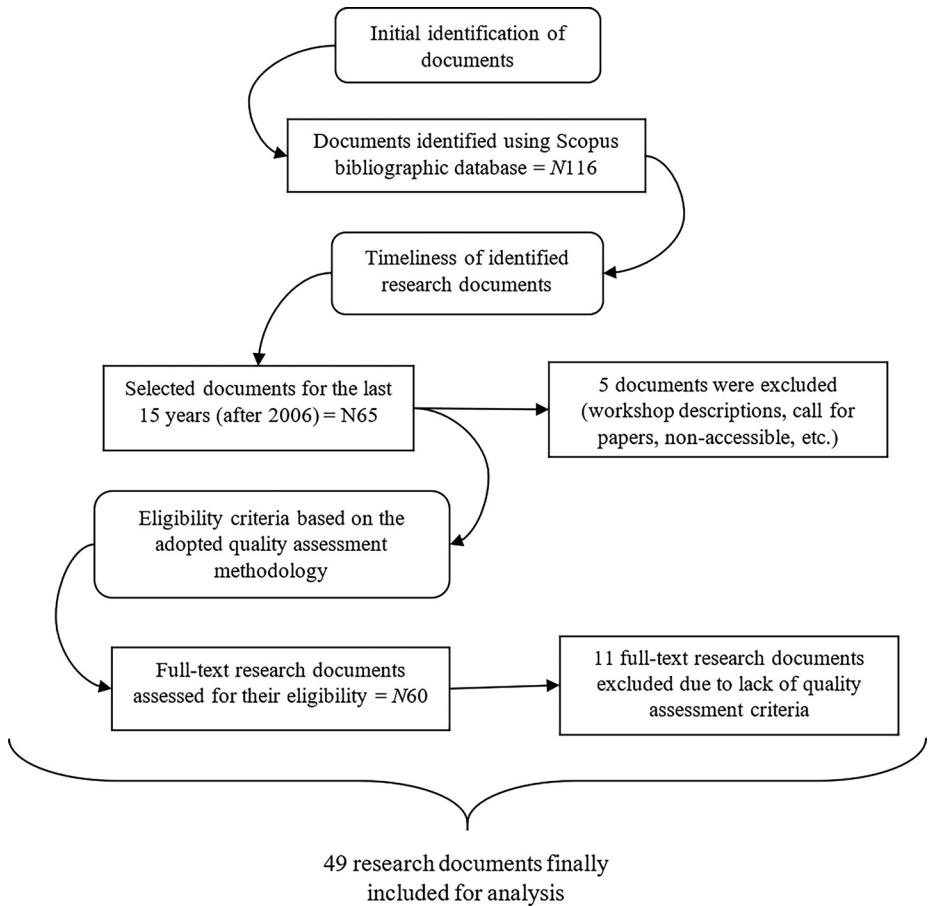


Figure 4.
Studies selection
process and
assessment

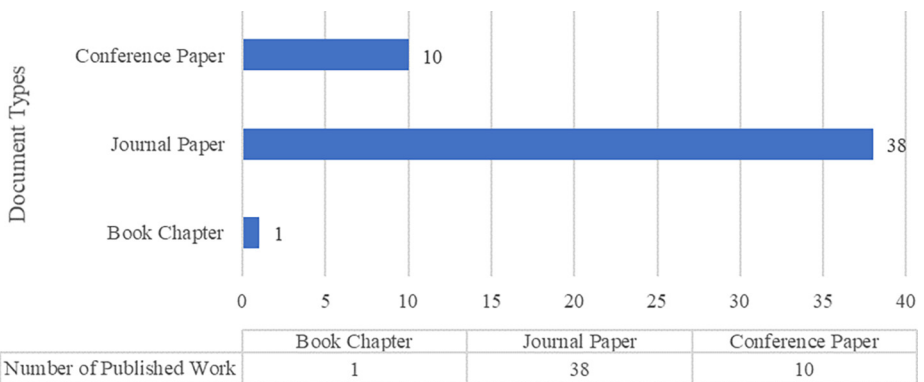


Figure 5.
Types of publications
in terms of the
selected 49 studies on
the university
archives research
topic

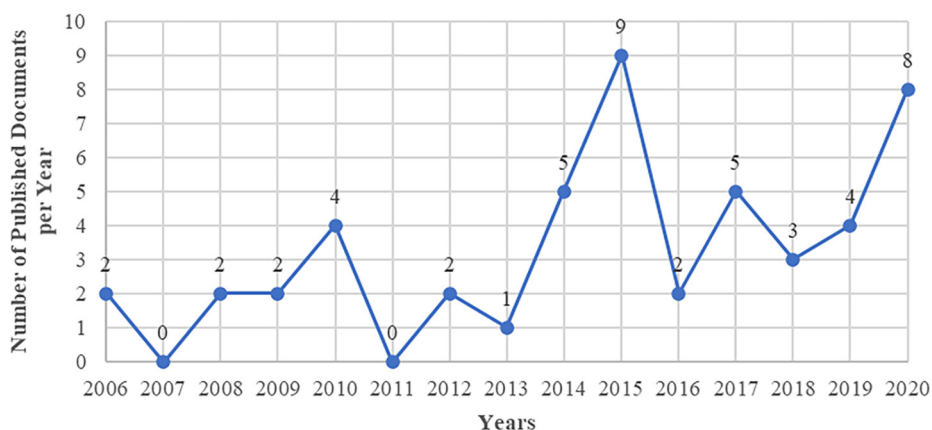


Figure 6.
The number of
published works each
year for the selected
49 documents

3.5 University archives topics classification framework based on the literature review

As part of the data extraction and synthesis, the 49 research documents were classified into three main topics.

- (1) *Strategic Management of UA and Derived Challenges (22 documents)*: The first topic is related to researchers' efforts to designate current strategic management and policies in UA. The topic includes methods and approaches for identifying management, access and maintenance policies for UA and understanding archivists' training requirements and professional background. Moreover, within this topic, challenges derived from particular case studies were also included. These case studies focus on archival issues such as encoding standards for the proper practical management, discoverability, accessibility and digital preservation issues (e.g. document prioritization for digitization) of university archival material. Besides, the case studies present comparison results from practices and policies implementation in different academic institutions.
- (2) *Educational contribution of UA (8 documents)*: The second topic relies on studies that highlight the contribution of UA for improving students' educational, research and cultural backgrounds. These studies' focus was on how UA as entities could enhance students' teaching experience, improve their critical thinking and understand the importance of UA in terms of university history.
- (3) *Strategic information systems for UA (19 documents)*: The third topic concentrates on the existing efforts to develop, evaluate and intelligently enhance UA information systems from a software engineering point of view. Several issues are unfolded regarding the UA information systems such as their compliance with metadata standards, their performance evaluation and their development by integrating existing software technologies. Moreover, the third topic expands readers' knowledge of machine learning approaches for intelligent UA management and how artificial intelligence enhances preservation issues and hardware energy-saving.

In the upcoming section, the efforts, the findings and the suggestions from researchers around the three different topics are presented based on the literature review results.

4. Results

4.1 Strategic management of university archives and derived challenges

This chapter unfolds the studies related to researchers' efforts to understand UA's management and curation policies. Furthermore, the empirical findings and statements are presented regarding the challenges of applying archival principles to several UA case studies.

To begin with, apart from highlighting the operational and cultural importance of the produced archival information within universities, the study of [Cui and Ma \(2016\)](#) pointed out that UA's information management construction could be divided into three distinct levels. The archives network construction, the definition and construction of archives information resources and finally, the development and utilization of archives resources for administrative issues. Among others, the authors take as an example the Jilin Agricultural University and highlight the following major issues in managing UA. That is, the lack of appropriate supporting facilities concerning mainly hardware and software (e.g. inadequate or even non-existent file backup strategy), the lack of professional manpower with decent information technology skills and the lack of unified approach for electronic document archiving and management. By the same token, [Dole and Hill \(2015\)](#) go ahead with an in-depth examination to understand how UA management is elaborated in urban North American universities. Their quantitative survey results contribute to identifying documents that need to be collected whilst trying to understand the applied managerial strategies to UA material. Also, the authors highlight the impact of archivists on UA management and curation whilst pointing out challenges derived when preserving first and secondary archival resources.

Another aspect that attracts research attention is related to UA continually changing nature due to the significant role that ICTs play in changing management policies. [Kim and Lee \(2009\)](#) performed qualitative and quantitative research surveys in 51 cases of UA in the Korean region to understand the management practices and the level of using digital technologies. They found that although preservation and management functionalities are robust, there are no clear and established policies/principles for ICTs' proper integration in UA. Based on their findings, access to archival holdings is weak, as digital technologies had not been appropriately exploited. Furthermore, as [Cui and Ma \(2016\)](#) also did, the authors pointed out that university archivists' educational background does not include the specialization training required for UA management. In terms of accessibility level, another effort highlights the importance of the proper processing of documents within the archival management context ([Prom, 2010](#)). The author indicates that low searchability and findability levels are directly related to archival documents' inadequate description. The study also suggests strategies that university archivists should adopt to enhance findability through proper curation of the digital records descriptions.

Within the same line of ICTs and their impact on UA digital management, [Bantin and Agne \(2010\)](#) propose a broad-spectrum qualitative reference survey that helps archivists with the over-the-years standing query: "what to digitize and why". The survey allows archivists to identify the most common cases that end-users may need to access UA material and prioritize digitization. For example, these cases include information about students, faculty, former staff and administrators, administrative structural information, campus history information, etc. Such a research tool would help university archivists implement more efficient archival reference services to the interested parties whilst also expanding their knowledge and skills to provide well-informed support to the information-seeking researchers. The study of [Oliver et al. \(2017\)](#) is focused on discovering barriers that exist in the provision of reference services at UA. To do so, the authors developed a quantitative

survey. The results indicate several obstacles such as insufficient reference tools for adequate access to digitized archival material, unprocessed records or even financial institutional constraints.

Along the lines of the continuously changing nature of UA management within the ICTs era, [Huang and Gui \(2014\)](#) shed light on the vital role of standardizing the management processes and phases of the produced electronic university documents. The authors claim that developing a UA management strategic framework will positively impact the rest of the university services, including teaching and scientific activities. In another study, [Noonan and Chute \(2014\)](#) recognize the importance of the university archivists' involvement in the data curation process and contribution to the development of services, teaching and research activities. To examine this assertion, the researchers conducted a quantitative methodological survey in which 55 university archivists of the Association of Research Libraries participated. The survey results showed that up to 41% of respondents are not involved in university data curation processes, whilst only 33% are moderately involved or fully engaged, contradicting the authors' recommendations.

Regarding the impact of ICTs on university archival material preservation, [O'Flaherty \(2015\)](#) pointed out the necessity of proper storage conditions for the physical records and the digital preservation and authenticity mechanisms for the electronic records (digitized or born-digital records). Investigating his concerns within the Trinity College Archives, the author elucidates that there is a need for close cooperation between legal and IT professionals.

The research landscape around UA management seems to be still foggy in more recent efforts ([Lu, 2019](#)). More specifically, the author points out some drawbacks in management and curation such as the lack of professional archives managers in handling UA, the lack of archival consciousness of academic staff and the omission of standardization in management practices. Besides, concerning the ICTs, the author indicates archives offices' software and hardware inefficiencies for collecting, digitizing, preserving and providing access to UA collections. The study also emphasizes strengthening university archivists' training to improve the cognitive understanding regarding the importance of UA in shaping the academic and campus culture. This fact has been previously examined by [Wang and Zhang \(2014\)](#) as they suggested a framework on UA's contribution to the overall improvement of academic culture. In a similar vein about UA's contribution to academic culture formation, [Woodward's \(2015\)](#) research work emphasizes that building and sustaining relationships with the alumni should also include the university archivists' activities. The role of university archivists should not be confined to document management and preservation but also to explore the possibilities to use UA as a bridge to connect universities with alumni.

From another point of view, Harvey examined the value of UA for researchers and how they support research activities ([Harvey, 2006](#)). Harvey determined a set of important practical questions that archivists should consider within the ICTs context. More specifically, by examining the case of Dalhousie UA, several issues were discovered affecting the searchability of digital collections such as the appraisal, management and description of archival holdings. The discoverability of UA and how it affects the researchers' work was a core point of [Grimsley's \(2008\)](#) study. He proposed methods to enhance the discoverability and accessibility into rare collections in printed and digital formats at the Columbus State UA. The author also examined critical aspects related to the significance of the university community on archival holdings such as the cost for better discoverability and the potential benefit for university awareness expansion.

[Maher \(2009\)](#) highlighted aspects of the importance of university archivists' role in selecting and preserving documents for ensuring easy and long-term access. In addition,

Maier indicates the necessity of university archivists to design and create new records systems, ensuring UA accessibility and interoperability. The author suggests that strategic planning and selective attention in specific operations with a three to five-year timeline constitute another managerial responsibility that should archivists assume. Finally, Maier emphasizes the importance of the seven principles of archival work: authoritative establishment and administration of programmes, authentication of documents, appraisal, arrangement, description, preservation and use of UA.

Yakel *et al.*'s (2008) study also focus on archivists' managerial contribution to UA material. The authors highlight the archivists' role in providing their knowledge and expertise to digital preservation issues in the Census of Institutional Repositories in the USA. They created a qualitative methodological survey asking the institutional repositories' developers to state their opinion about archivists' role in managing and acquiring documents within repositories. The findings indicated that developers believe that archivists have a low-profile attitude; however, they are persistent in appraisal, managerial and preservation issues. Nevertheless, Li (2019b) pointed out that in China, archivists often lack professional knowledge, which has also been stated by other related studies within the same region (Zhang and Chen, 2017)

UA management challenges and advantages within a specific region are described, respectively, for Indian universities (Gautam, 2020). More specifically, the author examines three different universities in India and how their UA as entities reflect the history and the evolution of each institution. Specific challenges are extracted based on his investigation. That is physical accessibility issues of the UA archives and lack of connection between archival material and the university education opportunities. Gautam also pointed out that the university archival material's importance is not fully recognized as it is considered a sub-entity quartered within university libraries.

A noteworthy case is related to Bradley-Sanders' study regarding the detailed description of processes and actions for receiving and managing a grant that is destined for implementing a UA project (Bradley-Sanders, 2017). The study describes in a detailed manner all the points for an effective administration of a grant based on the Young Women's Christian Association of Brooklyn Archival Collection case. Garaba (2018) focused extensively on losing university records due to a lack of acquisition policies. By examining KwaZulu-Natal University's archives, the author has developed qualitative and quantitative research methods to capture the deployed managerial approaches. Findings indicate that there was much frustration among participants about the current management approaches on UA. Consequently, there is an urgent need for university archivists to revise their practices when acquiring documents related to university heritage.

Under the prism of a transparent governmental landscape in Spain, Pacios *et al.* (2019) investigated UA units and their intention to release information through their publicly accessed websites. The authors mentioned that broad access to archival information constitutes an initiative to enhance university visibility, credibility and overall reputation. Through their examination, the authors found that although best practices are followed up, important information is missing such as the organizational objectives and accountability-related reports, negatively affecting transparency.

Finally, the recent study of Bauer and Bunde (2020) presented the examination and comparison between two UA, the New York and its campus in Abu Dhabi. In this way, they demonstrated the challenges derived through examining the material and the managerial issues and the evolution of archival appraisal theory into an overall practical context. It is noted that the authors emphasized the appraisal challenges that archivists face in both universities in terms of identifying, locating, acquiring and describing university records.

Table 3.
Key research
findings in strategic
management of UA

Key research findings	Sources (18/22)
Identification of documents that need to be collected and digitized through quantitative surveys and understanding of the applied managerial practices to UA material	Bauer and Bunde, (2020); Cui and Ma, (2016); Dole and Hill, 2015; Bantin and Agne, (2010); Kim and Lee, (2009)
Understanding university archivists' involvement and contribution to data curation and digital preservation issues through quantitative and qualitative methods	O'Flaherty, (2015); Noonan and Chute, (2014); Yakel <i>et al.</i> , (2008)
Identification of applied managerial practices in reference services and understanding the reasons for losing university archival material through quantitative and qualitative research methods	Garaba, (2018); Oliver <i>et al.</i> , (2017)
Exploring and understanding accessibility and discoverability issues of UA material	Prom, (2010); Maher, 2009; Grimsley, (2008); Harvey, 2006; Huang and Gui, (2014)
Understanding university archivists background and setting frameworks for training and improving their skills	Lu, 2019; Kim and Lee, (2009); Li, 2019b

In the following table (Table 3), five key research findings of the strategic management of UA and the most related sources are presented, helping university archivists and researchers to focus on certain managerial aspects for further investigation.

4.2 Educational contribution of university archives

In this section, efforts that demonstrate the UA contribution to enhance students' educational, research and cultural background are examined. One of the initial research approaches within this context has been designed by Senf (2005). Senf used university archival holdings to enrich and enhance students' exploration skills and mindset for performing genuine primary research within a living-lab approach. The author unfolds a specific educational methodology to improve students' appreciation for the research process, reinforced by UA's existence and their educational and cultural contribution to society.

Furthermore, Wagner and Smith (2012) consider more important students' perceptions regarding the types of materials found in archives rather than integrating archival theories into the studies curriculum. In a more practical approach, the authors develop a quantitative survey to measure Adelphi University students' awareness and perception regarding the existence of UA and the provided services. After that, they explore methods for encouraging students to share their academic life material as a potential part of the university archival holdings. The study results highlight the need for establishing a strategic plan that improves knowledge and awareness of students regarding the existence of UA and develops an *as-easy-as-possible framework* for encouraging them to "donate their academic life" material to the UA.

Furthermore, another effort to improve UA's educational and cultural contribution to students relies on Dominguez de Almeida and Medeiros's (2017) study. At the initial stage, the authors examined 11 universities in the Brazilian region, revealing the low awareness among the academic community around UA. Subsequently, the study highlighted the insufficient integration of practices and methods to provide access to the UA. Against these empirical findings, the authors suggest establishing archival science courses that could be provided to students, improving the awareness and utilization of UA. Likewise, Colonna and

Lawrimore (2019) created an academic course through which students learn about university history by using its archival services. The results indicated that the time that students spent studying UA, contributed directly to their learning outcomes and knowledge about the university history and its evolution over the years.

Legg *et al.* (2020) examined the Good University Teaching programme at Swansea University through a broader perspective. The authors highlighted UA’s involvement among teaching principles, giving at the same time practical examples for their integration. They also argued that UA plays a crucial role in teaching experience as it enhances students’ ability for critical thinking and improved research capabilities. In a similar context, an interesting approach is presented by Clifford and Sweetmore (2015) as they examine the relationships among the local and public records offices and the UA and how this relationship impacts research activities. More specifically, the case examines the North Yorkshire Country Record Office and how the produced archival material affected how research is performed in educational institutes by historians over the years.

Two more noteworthy studies highlight UA’s contribution both on the cultural, educational and societal levels. Firstly, Gosselar’s (2020) work introduces the utilization of UA for societal justice and documents the identification of past racist actions that negatively memorialize unfair social discriminations. Gosselar’s work also highlights university archivists’ stance on advancing social justice by collecting and promoting “old” records to uncover inequalities. Moreover, the recent study of Wiles (2020) embraces the impact of political actions and decisions over the past four years in the USA. The author points out that recent political choices, directly and indirectly, impact the UA culture, practical management and their assigned value to Higher Education. At the same time, the author refers that democratic values, historical accountability and the university’s support for learning are undermined.

In the following table (Table 4), three key research findings on using UA for educational and research purposes and the most related sources are presented, helping educators and archivists establish novel teaching activities (or optimize the existing) to improve students’ awareness and consideration about the university history.

4.3 Strategic information systems for university archives

The third topic of the literature review concerns the research efforts that contribute to optimizing UA management systems from a software engineering point of view (e.g. compliance with metadata standards, performance evaluation, integrating existing software) and by adopting machine learning and artificial intelligence approaches.

Table 4.
Key research findings in using university archives for educational and research purposes

Key research findings	Sources (6/8)
Cultivating students’ motivation in performing research whilst appreciating the contribution of university archives to this initiative	Legg <i>et al.</i> (2020); Senf, (2005); Clifford and Sweetmore (2015)
Development of a quantitative survey to understand students awareness about university archives	Wagner and Smith (2012)
Establishing archival courses to enhance students awareness about the university archives	Colonna and Lawrimore (2019); Dominguez de Almeida and Medeiros (2017)

Sanz-Caballero and Faba-Perez (2010) focused on identifying factors for improving the visibility of UA websites in search engines in an early research effort. Using two different search engines (Google and Altavista), the authors identified the proper content curation and specific metadata aspects as factors affecting UA ranking in search engines. Their preliminary assumptions were confirmed in a more sophisticated way by a series of recent research efforts (Drivas *et al.*, 2021; Vázquez and Ventura, 2020; Alhuay-Quispe, 2017).

Using a qualitative methodological approach, Poltronieri *et al.* (2010) examined the management system used to archive the research outputs of the Italian Scientific Institutes for Research, Hospitalization and Health Care. Through interviews, the researchers explored the efficiency of the institutional repository and the adopted metadata formats for managing the produced archival documents. The results revealed the diversity in documentation practices and metadata formats impacting accessibility levels, thus raising the need for more standard procedures. The work of Moseley *et al.* (2020) emphasizes the creation of a strategic online presence through the integration of an open-source web-based archival system. The authors adopted the ArchivesSpace system to develop the institutional archive of the Southern Illinois University Medical Library. The study unfolds all the steps and the essential points that university archivists should focus on for an effective, simple and in some manner inexpensive development and promotion of a digital archival space for a university.

Faulder *et al.* (2015) proceed into a careful integration and deployment of the Encoded Archival Context – Corporate bodies, Persons and Families (EAC-CPF) metadata standard at the Digital Collections and Archives of Tufts University. The authors highlight three major key lessons after their case-study examination. Firstly, they realized the significant role of EAC-CPF for every institutional archive as a tool for organizing and finally achieving interoperable documentation. Secondly, the study pays attention to select a descriptive strategy for each UA that focuses either on the documentation of the narrative texts or linked intercorrelations among the documents. The third key lesson is related to the most appropriate methods of implementing the EAC-CPF. Specifically, they suggest avoiding the project-oriented approach within a finite timeline of progression and prefer the continuous production-level process. They also highlight that there are always limited resources as a de-facto issue that prevent high-cost descriptive strategies. Within the same line, Delgado *et al.* (2015) proposed on their study an integrated description framework for documenting the Medical Sciences University Archive of Havana in Cuba. The authors relied on four description standards, ISAD(G), ISAAR (CPF), ISDIAH and ISDF. Well-defined managerial steps followed up for initial document analysis to collect main categories of produced archival documents. After that, a graphic description was structured for visualizing the intercorrelations between the documents as objects.

Within the same year of research efforts, Kim and Han (2015) examined the Management System for Records Standard (ISO 30301) applicability within the Korean region's UA context. This case examination combined both quantitative and qualitative methods to collect data from archivists from 57 different UA. The authors suggest several points to improve the ISO 30301 integration within institutional archives based on their findings.

Crowe and Meagher (2015) suggest a framework that included best metadata practices for UA images for greater visibility, accessibility and management. The framework was implemented within the University of Denver Archives, including metadata fields such as title, description, dates, subject access and name authorities, cataloguing in this way more than 16,000 records.

One step further, a controlled vocabulary was developed by Moreira and colleagues for processing the documentation of UA at the São Paulo State University (Moreira *et al.*, 2016).

Through a waterfall approach, the researchers identified the different units and departments within university space that generate archival material. Sequentially, the authors examined the adequacy of the proposed vocabulary using terminology management software. The study highlighted the absence of a standard vocabulary that will holistically help metadata management and enable semantically linked data within UA systems.

Cui (2013) proposed designing and implementing a UA management system based on the .Net software framework. The author described the framework for developing such a system through a web-based application architecture to improve UA efficiency and security. Similarly, the study of Chen and Chen (2014) proposed another information system framework for archives following a web-based application architecture again. The authors combined C#, .Net, SQL server and MD5 technologies to articulate an archival management system that exhibits high levels of scalability, security and extensibility. Continuing with the applied software engineering approaches, Deng (2014) investigated several archives management systems in terms of the technologies used and their stability and operability. For example, the Java 2 Platform Enterprise Edition and the model-view-controller were combined to implement business models, operational control and classification tools for archival records within the university environment. The experiment results indicated that this framework exhibits sufficient stability and operability levels, enduring and maintaining 350 users simultaneously.

Ly and Shi's (2020) work, apart from specific UA management aspects (e.g. irrational organizational structures and cumbersome file collections), mainly focused on UA material display issues such as sorting, low openness and inadequate representation of the retrieved information. Another study indicates additional drawbacks such as who is responsible for administering the UA management systems, the dependency from the external software companies for updating their functionalities and the low open rate that several categories of documents exhibit (Zhang and Chen, 2017).

Based on the Lucene text search engine, Li and Wu (2020) proposed a full-text retrieval system for optimizing the findability of UA documents. The authors included in their experiments 627 UA records aiming to optimize the velocity of retrieving full-text documents, minimizing the memory usage by the system and improving the representation of the results for a better end-user experience. Yu *et al.* (2017) proposed an intelligent monitoring system based on ZigBee (wireless mesh network standard) for university archive room management. The authors describe all the requirements needed to develop a management system for monitoring temperature, humidity, brightness, flame and smog for the physical preservation of UA material.

The work of Xiao (2020) focuses on the deployment of data mining technologies for redesign the archival information service system within the university. The author determines four requirements for an efficient system that contains the archival information of the university. That is the high performance in storing and retrieving information, flexible resource sharing, safe access and easy maintenance of the system itself.

Pioneer efforts in adopting machine learning approaches in UA management were performed by Chen *et al.* (2012). The authors suggested a method to deploy clustering algorithms to improve UA's performance management appraisal objectively. Sequentially, the authors adopt the Apriori algorithm (a classical algorithm in data mining) to identify possible intercorrelations among the retrieved data set of documents. Another application of artificial intelligence in UA is presented in the study of Chen *et al.* (2015). They proposed an algorithm that, when deployed in archival storage systems, can reduce the computational resources needs for power consumption from 65% up to 80%. Another machine-learning-oriented research approach has been proposed by Han and Yu (2018). The authors

introduced a machine-learning framework based on intelligent data mining processes for automating UA management.

In the following table (Table 5), five key research findings on information systems structures from an engineering point of view and the most related sources are presented that could be practically useful for university archivists.

5. Discussion and future implications

5.1 Research implications

In this paper, an effort was given to dive into the until-recently scientific and empirical findings at the UA research topic. More specifically, this literature review was conducted to provide up-to-date knowledge about practices, methods, suggestions for improvements and developments and challenges from all over the world. Research activity around the topic of UA has shown that there is a notable increase in the number of publications over the past 10 years (Figures 1 and 6). This constitutes a very promising indicator for the expansion and evolution of the UA research topic in the future. Based on this assumption, this literature review could help the forthcoming researchers build further on the most recent publications to adopt and expand current methods and approaches.

The analysis and categorization of the 49 documents into three specific topics provided significant suggestions and indications and constituted one of the main novelties of this work. Through this categorization, the forthcoming researchers around UA could focus on specific research topics and how they have been shaped until now (management of UA, educational contribution provided by UA to university students and other interest parties and information systems). In addition, several documents -mostly within the management topic- have been proceeded to the construction of both qualitative and quantitative methodological tools such as questionnaires and interviews. This could help the forthcoming researchers to use these tools for:

- Understanding the management practices that have been developed and applied within a UA (Bauer and Bunde, 2020; Cui and Ma, 2016; Kim and Lee, 2009).
- Identifying documents that need to be digitized through the development of a prioritization strategy (Dole and Hill, 2015; Bantin and Agne, 2010).
- Understanding archivists' practices and their background whilst setting frameworks for their training (Lu, 2019; Kim and Lee, 2009).
- Identifying strategies in the appraisal process and reference services (Bauer and Bunde, 2020; Oliver *et al.*, 2017; Maher, 2009; Harvey, 2006).

Key research findings	Sources (17/19)
Proposed software frameworks on designing, implementing and evaluating university archives systems	Chen and Chen (2014); Deng (2014); Cui (2013); Sanz-Caballero and Faba-Perez (2010)
Evaluating web-based systems efficacy through qualitative and quantitative methods	Moseley <i>et al.</i> (2020); Poltronieri <i>et al.</i> (2010)
Suggested frameworks for improving metadata structures of university archives for improved documentation of the archival material	Faulder <i>et al.</i> (2015); Delgado <i>et al.</i> (2015); Kim and Han (2015); Crowe and Meagher (2015); Moreira <i>et al.</i> (2016)
Artificial intelligence and machine learning approaches – other pioneer technological approaches	Xiao (2020); Li and Wu (2020); Han and Yu (2018); Chen <i>et al.</i> (2015); Chen <i>et al.</i> (2012); Yu <i>et al.</i> (2017)

Table 5.
Key research
findings in strategic
information systems
for UA

In this respect, we encourage the forthcoming researchers to use and expand the already established tools for understanding management practices in other UA entities around the globe. Along this line, a remarkable contribution over the past 15 years has been made to the sub-topic of using UA for educational purposes. More specifically, prior efforts had already established curriculum programmes as methods for involving learners to understand UA's contribution to acquiring knowledge about university history (Colonna and Lawrimore, 2019; Dominguez de Almeida and Medeiros, 2017). Moreover, other efforts emphasized increasing students' motivation in doing research (Legg *et al.*, 2020; Senf, 2005) or creating the research context to measure students' awareness about UA (Wagner and Smith, 2012). Other researchers could further expand these methods by applying different teaching approaches and thereafter, measuring learners' knowledge, awareness and consideration about UA and how they contribute to their educational background.

In terms of strategic approaches in using information systems to enhance UA management, it is noted that there are important suggestions for developing such systems that are capable of managing more efficiently in terms of describing, searching and retrieving the digital archival material (Moreira *et al.*, 2016; Sanz-Caballero and Faba-Perez; Li and Wu, 2020). Other studies could further use these efforts to evaluate UA information systems acceptance levels by the end-users. In the bargain, whilst considering both the papers in the practical management of UA and the ones in information systems proposed structures, we argue that future research approaches should combine these two pillars in a blended way and not solely examine one or the other. Through this way, researchers will have a deeper understanding of a UA entity in terms of:

- Archivists' background, their involvement in records management policies of the university and their role within the information system.
- Discovering and defining the units that produce documents within the university whilst determining metadata structures and their effectiveness in terms of describing archival holdings for potential interoperability purposes.
- Technology acceptance and high usability levels of the information systems that manage archival material.

Besides, as ICTs involve progressively more and more UA as an indivisible part of the administration, researchers should focus even more on the born-digital records and their transition from inactive records to archival ones (O'Flaherty, 2015).

5.2 Practical implications

Considering the studies included in the literature review, the most oft-quoted issues in managing UA are related to the standardization of practices and access to the university archival material, both printed and digital.

In terms of standardization, two significant pillars are identified:

- (1) The first is related to the standardization of the daily management of UA and includes aspects such as improvement of reference services (Oliver *et al.*, 2017), appraisal process (Maher, 2009) and prioritization of specific material for digitization (Bantin and Agne, 2010). In this case, several studies indicate the lack of well-defined managerial policies (Lu, 2019; Cui and Ma, 2016; Huang and Gui, 2014; Kim and Lee, 2009).
- (2) The second pillar of standardization is related to the metadata policies that are followed for documenting the UA material. Not in a few cases, the need to establish standards in metadata practices has been quoted and concerns several related papers for achieving better documentation, description strategy, accessibility and

visibility levels (Moseley *et al.*, 2020; Faulder *et al.*, 2015; Poltronieri *et al.*, 2010; Sanz-Caballero and Faba-Perez, 2010).

Considering the first pillar of standardization, we argue that the multiversity of different types of material and how they are produced in each UA constitutes one of the most significant barriers in establishing standard managerial practices that the majority of archivists could adopt. As there are differences in material production in each UA, it will be difficult for researchers to establish standards in management at a macro-level capable of being adopted, accepted and applied by other university archivists. Controversially, understanding which university entities produce records should be included in the UA and after that, developing micro-level and flexible to adapt managerial standards could work more efficiently.

For the second pillar, meaning metadata standardization, we argue that the issue is related mainly to archivists' knowledge and foresight of what standard -or combination of standards- they choose to apply for the UA holdings documentation. This assumption could be furtherly reinforced by Noonan and Chute (2014) as they highlighted the crucial need to involve archivists in data curation policies within universities. The better the curation of the UA material metadata, the better will be the searchability, findability, and thus access (Prom, 2010; Maher, 2009). Therefore, we suggest to university archivists to be more involved in data curation policies as they understand in detail what records are produced daily within a university, they are the most appropriate staff to suggest the metadata schema that suits the UA holdings effectively and they have deeper knowledge in describing the needs and capabilities that UA information systems should have to manage more efficiently the produced UA material.

Another practical implication for university archivists is related to the research activity around UA's educational, research and cultural contribution to university students. Research activities around the topic highlighted the contribution of UA to foster students' knowledge for the university they belong to (Colonna and Lawrimore, 2019). UA's educational contribution to stimulate and foster critical thinking, learning outcomes and students' research capabilities is a research aspect that has been identified (Legg *et al.*, 2020; Dominguez de Almeida and Medeiros, 2017). These research efforts should be taken into consideration by university archivists to create such programmes that promote the practical utility of the UA as entities into the universities, increase the archival consciousness of the university community and improve the teaching and educational experience of students.

Finally, this literature review can work as a solid stepping-stone for related researchers and practitioners around the UA topic. It intends to identify the state-of-the-art activities over the past 15 years, proving in this way its timeliness. Research methods and findings have been identified to articulate the derived challenges and suggested frameworks to tackle the existing barriers in UA management (e.g. poor records descriptions, cumbersome file harvesting, low utilization levels of the available systems, the lack of professional knowledge, etc.). Only then the archival consciousness, appreciation and awareness among the members of the universities members will be improved significantly.

Notes

1. available at: <https://doi.org/10.5281/zenodo.5121487>
2. available at: www.kaggle.com/imr/ab/university-archives-literature-review-dataset/metadata

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Further reading

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