

An overview of the research undertakings of the development of China's archives informatization from 1997 to 2007

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Abstract This paper makes a comprehensive statistical analysis of the papers published in recent years on the development of China's archives informatization from the aspects of the quantity, research focuses and approaches and thematic contents. In addition, it summarizes the current research situation in this field in general.

Keywords Development of archives informatization, Development of archives resources

Since 1979, a few Chinese institutions such as Archives of the Chinese People's Liberation Army, and the State Archives Administration of the People's Republic of China, have successively procured advanced computers to carry out essential researches related to subjects of automated archives management. In 2002, the *National Guidelines for the Development of the Archives informatization* (Quanguo Dang'an Xinxu Hua Jianshe Shishi Gangyao)^[1] was promulgated, marking the beginning of the development of China's archives informatization on a national scale. Thereafter, the development of archives informatization has been quickened and many noticeable results have been achieved. The author makes a statistical analysis of the previous published papers, based on their date of publication, their quantity and their topic themes, to present a general sketch about the current research situation in this subject field.

1 Quantitative analysis

1.1 A chronological and statistical analysis of the distribution of the publications related to archives informatization

Using the "title" as the keyword search and the "Development of Archives Informatization" and the "Development of Archives Resources" as the search



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wordings, we have conducted a retrieval of the papers related to this subject indexed in China Academic Journals Full-text Database, China Doctoral Dissertation Full-text Database, and China Selected Master Thesis Full-text Database. Learning that the first published paper on the development of archives informatization appeared in 1997, we chose the time period from 1997 to 2007 for our information retrieval and statistical analysis. We aimed to conduct a historic review of the research done as of date on the development of China's archives informatization. As a result, a total of 576 papers were retrieved. Among them, 518 papers were selected for analysis after other irrelevant papers had been discarded. The annual production of such scholarly papers during this 10-year period is shown in Table 1.

Table 1 Chronological and statistical analysis of the published papers related to archives informatization

Year	Number of the published papers
1997	1
1998	1
1999-2000	0
2001	6
2002	22
2003	68
2004	82
2005	86
2006	110
2007	142

It can be seen from Table 1 that the first domestic paper on the development of archives informatization appeared in 1997 and that the number of the papers in this field has shown a sharply upward stride since 2003. The year 2007 once again saw another rapid growth, albeit only a little slower than that in 2003. Based upon this fact, the domestic research in this field can be divided into three stages at present time; namely, 1) Being in the budding stage during the 1997-2002 periods; 2) experiencing a rapid growth period from 2003 to 2006; and 3) showing a fast-growing trend again in 2007.

1.2 An analysis of the thematic focuses and treatment

After having categorized and sorted out 518 papers, we learned that these research papers focused mainly on two aspects: theory and practice. Among them, the papers on theoretical research accounted for 21.53% of the total. These papers aimed mainly to give a general introduction of the basic knowledge, present status and the developmental trend of archives informatization. And the papers on practical research accounted for 48.93%. These papers mainly aimed to give an in-depth analysis of the present application situation of informatization, such as technical



means adopted and concrete solutions applied to the problems confronted in a given institution. In addition, the informational development of business archives and university archives have also become a hot issue for both theoretical and practical research, which accounted for 16.25% and 15.26 respectively. The papers on digitization and E-government affairs and human resources organization and management in archive development are small in number, accounting for only 9.59% and 3.13% respectively (Notes: as some papers involve several subjects, the total statistics number is more than 518).

This fact shows that the research work on the possible combination of E-government affairs and the development of archives informatization on the one hand and of human resources organization and management on the other hand should be further explored in the future.

2 The main coverage of the research contents on the development of archives informatization from 1997 to 2007

As the development of archives informatization has been carried out in accordance with the *National Guidelines for the Development of the Archives* informatization (Quanguo Dang'an Xinxi Hua Jianshe Shishi Gangyao) (hereinafter referred to as "the Guideline") and academic or business research implemented under its guidance, this paper summarizes the main contents from seven aspects in *the Guideline*.

2.1 The infrastructural development of archives informatization

The traditional manual management mode is gradually replaced by the electronic office mode with the application of the computer technology and online networking. Notable achievements have been made in modernizing archives management. The degree of informatization has been gradually improved and profound changes have taken place in the archives management work in each and every locality and administrative department. Moreover, the archives information resources are being greatly tapped and developed.

By 2004, archives departments in China have possessed a total of more than 26,000 computers and 1,500 network servers^[2]. However, as a brand-new professional undertaking, the informatization development is a systematic engineering project. For the moment, there still exists, such a problem of being "easy said then done" as the scarcity of financial support for the development of an information infrastructure. Furthermore, electronic products are being superseded by new products very rapidly and their life cycle is too short to make it a proposition of a long-term investment of once for all time. Therefore, the high expenditure for subsequent maintenance, replacement and upgrades can all be easily imagined^[3]. From the perspective of infrastructure and economic development, a great disparity



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exists between the eastern part of China and the central and western parts of China in terms of information technology, network communications, data warehousing and financial support^[4]. Meanwhile, the irrationality of the distribution of information facilities and blind investment have also affected the development of the information infrastructure^[5]. Therefore, in his paper entitled *Current Development of Archives Informatization, Problems and Solutions* (Dang'an Xinxu Hua Jianshe Xiangzhuang, Wenti Yu Duice), Zhang Zhaoyu takes a view contrary to the popular view asserted by the overwhelming majority writers that inadequate financial investment is the "bottleneck" inhibiting the development of archives informatization. In his opinion, the problem does not lie in the inadequate amount of investment fund by the government. It is rather because we have not yet done enough to broaden the funding sources and reduce our wastefulness in expenditure so as to optimize the benefit of the investment fund on hand^[6].

2.2 The development of archives information resources

At present, both the quality and quantity of archives information resources have greatly improved. The archives collection at all levels has exceeded 210 million volumes. The development and utilization of archives information resources are showing the features of multiple channels and diversity. Meanwhile, a deficiency in finding ideas for the development of archives and a changed information needs of the public away from those documents in the main subject areas prompted their information demands for social archives taking in a richer, more comprehensive and varied way^[7]. However, during the formative stage of processing the archives resources, the principal and pivotal position of the archives in information resources management has not yet been fully reflected. The system regarding the combination of central and regional systems and the shallowness of the research concerning the structure of the archives' information resources have had a profound adverse impact on its information resources development^[8]. In addition, the problems of the archival legislation concerning the supervision of non-state-owned archives, classification of electronic files and offside legislation have also impeded the development of archives information resources^[9]. If these conditions are allowed to develop continuously, they will cause the government spend much more efforts yet get much less results in its informatization undertakings and also facing the possibility of losing a large amount of its manpower, material resources and financial resources. Moreover, various loopholes and deficiencies can hardly be prevented either^[10].

Based upon the above problems, most archivists believe that a new management mode suitable for managing archives' information resource should be established during the technologically transitional period. In his paper entitled *Discussing the Archives Management Mode during the Transformation Period* (Lun Zhuangxing Qi De Dang'an Xinxu Ziyuan Guanli Moshi), Ye Han introduces such concepts as



the socialized open management mode, archives information resources centralized management mode, marketing-oriented archives management mode and the networked archives management mode^[11]. Lü Yuanzhi introduces the concept of a dynamic and multifarious service mode on the basis of the traditional mode in his paper entitled *The Establishment of a Dynamic and Multifarious Archives Service Mode in Contemporary China* (Lun Xian Jieduan Woguo Dang'an Xinxi Ziyuan Fuhe Dongtai Fuwu Moshi Goujian)^[12]. Ni Lijuan points out in one of her papers that new management modes must be established on the basis of two aspects: a modern concept about the development of archives information resources; and establishing an effective system for the development of archives information resources^[5]. In relevant legislations, the following issues should be adequately addressed: 1) Problems concerning the information management system; 2) problems of mutual accommodation between various systems; 3) the framing of information-related policies; 4) problems of mutual reinforcements between information-related legislations and other legislations^[10].

2.3 The development of an applicable automated management system for archives

Our research focused on the inspection and analysis of some samples involving institutions like archives, business firms, schools and hospitals. We analyzed the automated management system from the aspects of principles, characteristics, functions, structure and application. In 2005, there were a few researchers who had conducted a survey on the development of archives informatization in Hunan province and found that the ratio of using an automated management system was relatively high and also that they had an earlier start of operation in many archives and at various administrative levels in the province^[13]. As for the development of archives' websites, China has not yet established a nationally unified website portal or a large-scaled national archives database, and therefore cannot provide unified archives information services at present time^[14]. In terms of academic discussions about digital archives, most research work focused on the concept, service mode and the possible effect. At present, the computer-aided archives management has been popularized among various archives at almost all administrative levels in China. A wide variety of archives management software has been developed and found application in the day-to-day work of the archives. That is to say, a solid foundation for the development of digital archives has been established. However, China has very little practical experience in managing digital archives, except in having experimented them as a pilot scheme in only such a few pioneering cities as in Shenzhen and Qingdao. Owing to the general weakness and/or deficiencies in such areas as in the research of fundamental theories, digitized archives collections, staff talents and relevant laws and regulations, the process of the development of digital archives has been greatly impeded.



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As for these problems, the prevailing view of the archivists' circle is that the archives documentary resources must be integrated and then provided with open access to the whole society. From a broader perspective, we should pay special attention to such newly emerged management principle as pre-controlled knowledge-based and integrated management practice^[15]. In actual practice, we should strive to establish a computer-assisted and networked archives resources management system characterized by integrated management, digitized resources, and network supported services^[14]. Therefore, our major task at present is to establish essential organizations to guarantee the development of archives informatization on the basis of the development of E-government affairs. We should try every means possible to get financial support and place the development of archives resources into an integral part of the development plan of local E-government affairs so as to ensure information resources sharing possible. Lastly, we should also take the initiative in communicating with each other and in promoting a coordinated development via the platform of E-government affairs^[16].

2.4 The development of archives informatization standards

By 2007, China has promulgated a total of 45 relevant standards. Among them, there are 7 standards concerning archives informatization (2 national standards and 5 industrial standards). Only five of them are of modern informatization significance, accounting for 11% of the total, which is a far cry from the goal set in the *Guideline* of the Tenth Five-Year Plan. Meanwhile, the factors, such as the obsolescence and out-of-datedness of most standards, inconsistency in some relevant contents of these standards, tardiness in establishing new standards and inadequate legislative lobbying, have inhibited the development of archives informatization standards^[17].

As such being the case, our researchers held the belief that a unified principle in establishing standards should be adhered to^[18]. In terms of concrete operation, we should evaluate and revise the existing standards, improve the standard system concerning archives informatization and do a good job in the implementation of the standards^[17]. On the technical level, some scholars have introduced the concept of standard hierarchies to describe metadata and divide the description standard of data structure into three levels: the first is the standard for data contents; the second is the standard for data value; and the third is the standard for data structure. Thus, our archives staff engaging in archives description has corresponding metadata standards as the yardstick^[19].

2.5 The development of informatization staff talents for archives

There are a number of research papers on the professional quality of staff talents in academia and business enterprises. According to the former Ministry of Information



Industry, China's index number of informatization in 2003 was 38.46, while the index number of the staff resources of informatization was only 13.43 in that year. It can be seen from these two data that the development of China's information industry and the demand for talents are unbalanced.

Based upon this fact, some scholars have undertaken some researches on it. Zhang Zhaoyu points out that the major factors that have led to this imbalance include: 1) Low professional qualifications of archivists; 2) serious lack of technical talents; 3) lack of "versatile talents" (the so-called "versatile talents" refers to the talents with the knowledge of both management and technical skills; 4) policies regarding to staff recruitment and advancement need to be improved^[20]. In his paper entitled *Reflection on the Development of the Talents Squad of Archives Informatization* (Guanyu Dang'an Xinxu Hua Rencai Duiwu Jianshe De Fansi), Zheng Jinyue also put forward similar views and pointed out that IT talents do not necessarily mean informatization talents. Visionary strategists are of the highest, the most important ones and "talents of versatility" are a must in informatization development and concrete applications. He, furthermore, stressed that the lack of knowledgeable decision-makers is also a major contributing factor to the current sorry condition^[21].

At present, the shortage of information professionals consists of the following four categories; namely, research-oriented scholars in archives informatization, management talents, practical operational professionals and legal experts. Some scholars suggest that we should resolve this acute personnel shortage problem from the following three approaches: 1) Recognizing the urgent need of high-caliber personnel for the development of archives informatization; 2) handling the relations properly between high-tech applications and the cultivation of high-caliber personnel; 3) cultivating a high-caliber team of professionals^[22]. There are also some other scholars who believe that high-caliber talents for the archives documents management can be trained through institutions of higher learning or through a continuing educational program, or through other mechanisms such as establishing more academic seminars and rational career advancement policies, etc^[20,23].

2.6 The development of security system for archives

At present, the research on the archives security system issue is rather scattered and not in-depth, nor systematic and comprehensive enough. The major problems include: poor awareness on the security issue of archives; the lack of both a unified and effective management apparatus and an archives documents security management system; the potential security hazard of the document archiving system^[24], issues concerning intellectual property rights; and the instability of the archived documents^[25].



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From the legal perspective, regulations regarding to the archives security guarantee system have not yet been established in a systematic way at the present time. Therefore, it is difficult to deal with such archives security issues effectively. The ineffective enforcement of administrative law and the lack of legal experts in the field of archives security matters have also inhibited the development of archives informatization to a certain extent^[26]. From a technical perspective, Xiao Jinsheng and Li Chengyao brought up the issues of virus infection, loopholes in operating systems and application software and external attacks on the LAN of the archives in the paper entitled *Network Security Technology of Archives Information System* (Dang'an Xinxu Hua Xitong De Wangluo Anquan Jishu Yanjiu)^[27].

At present, the major measures that have been taken to address the archives information security include the following four areas.

- Firstly, it is assumed essential to design an information security model. There are many kinds of information security models at home and abroad, such as the multi-level security model, multilateral security mode, the international security architecture (ISO/IEC7498—2) and the information security management model in accordance with Standard BS7799 (BS7799 Code of Practice for Information Security), and the Common Criteria (CC) standards for information technology security evaluation. These models and standards have their own unique characteristics. They are applied in different situations and in different areas, which can serve as a reference and/or as examples for the establishment of the archives information security guarantee system^[28].
- Secondly, in establishing various security protection systems, we should pay special attention to the establishment of the network security protection system, data security protection system, computer system safety protection system, virus protection system, and the security protection and management system. Meanwhile, during the course of this security system development, it is advisable that a thorough job on the security system evaluation should be performed simultaneously so as to insure that one's own current overall level of informatization achievement is at a satisfactory level. This will lay a good foundation for the future development of informatization in the future^[29].
- Thirdly, we should resort to effective means to address those technical problems. For instance, Cheng Youe advanced a DRM technology (Data Rights Management), which can protect the security of electronic files and can technically guarantee the rational utilization of digital contents in their life cycle. Users must be authorized to operate the digital contents, thus safeguarding the security and controllability of electronic files in the process of their distribution and utilization^[30].
- Fourthly, we need to improve and perfect the legal system for the protection of the security of the information contents of the archives. China can establish



relevant laws and regulations according to China's national sentiment so as to safeguard the informatization development of archives. In addition, the government should revise out-of-date provisions and amend and promulgate them in a timely manner, and also strengthen the innovation-oriented research on network security protection rules and technologies^[24]. Meanwhile, in order to cultivate high-caliber, versatile talents for the archives information security guarantee work, we must strengthen the development of the body of law enforcement for archives, devote more efforts in propagating the laws concerning archives security, and pay attention to the development of a highly trained team of archival law experts and enforcers. Lastly, we should also work closely with the archives departments, law departments and other relevant departments at home and abroad^[26].

2.7 The developing trend of archives informatization

With the constant acceleration of the development of archives informatization, the archival collection mode will be characterized by a mixture of physical collections and collections of digitized archival materials. Documentary delivery service will be handled both physically and through networked online service. The nature of archives management will be an organic combination of physical file management and knowledge-based management for the purpose of documents organization and retrieval. Archivists' professional role is changing from managing the physical archives to navigating the intellectual contents of the documents both within and without a given archives^[31].

Some scholars have made an in-depth analysis of the change of the archive management work and its main trend in development from such perspectives as internal adjustment, external reorganization and horizontal union^[32-33]. The development of digital archives, being one of the long-term goals for the development of archives informatization, some scholars have also made an analysis of its developing trend. In their view, with the constant development and innovative applications of the combined use of computers and networking technologies, archives departments will gradually find the right direction for the development of their digital archives and find out relevant experience and mature theories along the evolution of this process.

It can be predicated that in the future era of digital archives, all the archives on earth will be joined together into a huge documentary archives network through which archived documents and information are transferred, retrieved and utilized. The archives is no longer an institution that only stores archival files, but an documentary information center or a central information system that monitors the information resources of each member archives of a consortium and provides open access service not only to the member archives but also to the general reading public



of the society. As electronic files can hardly reflect the physical image/condition of the archived “genuine copies” of the archives, scholars think that the digital archives cannot completely replace the traditional archives^[34].

3 The review of the recent research on the development of China’s archives informatization

In summary, the research work on the development of China’s archives informatization has some of its own unique characteristics. However, there are also a few areas of deficiencies.

3.1 The coming to maturity of the research work on the development of archives informatization

Since 2002, the number of the papers published every year has shown an upward trend. With the publications of some relevant new regulations and policies regarding to archives informatization and the enforcement of such practice, the research on archives informatization has shown a diversified trend of development. After a sharp increase in the research publications in 2003, another period of rapid growth again surfaced beginning in 2007, which was only next in scale to that of 2003. It can be reasonably predicted that this subject matter will continuously be a hot issue of research activities in the years to come.

3.2 Balanced development of both theoretical research and practical research work

Firstly, the number of published theoretical research papers on the development of archives informatization has been ranked in the top place among all published research papers in the archives informatization subject area over the past few years. In addition, the theoretical research work as reflected in these papers is getting more extended as evidenced by the fact that scholars began also paying attention to some derivative issues. For instance, they have paid attention to the ethical issues related to the application of some methods and/or of technologies during the process of development of archives informatization^[35]. Secondly, based on the result of our search on target papers, we found that most scholars of different occupational fields have, based on their own changed working conditions due to the impact of informatization development in their own unique sphere of business operation, revealed their changed practice in order to keep them on top of a new competitive situation. This situation is particularly true in business enterprises and academia, which may indicate the degree of informatization is being gradually intensified in their work environment and so is their resulting deepened dependence on the management studies of the archives informatization^[36].



3.3 The comprehensiveness in thematic coverage and the sustainable development characteristic of the archives informatization research work

Firstly, in terms of the thematic coverage of the various research projects about archives informatization, scholars have recently increased their research studies on concrete strategies and also on tangible technical means while focusing on their basic theoretical research. Secondly, in terms of the subject training background of these researchers, there are library and information professionals, military personnel, scientific workers and so on in addition to a large contingent of archivist themselves, who all took part in the research in the various aspects of archives informatization. This can be evidenced by those articles about archives informatization published in such academic journals as in the fields of energy and hydraulics, etc. Those articles while firmly grounded in their own various professional fields intersect with archival science, and provide the latter with impetus of new ideas and new understandings stemming from the changing times for its further disciplinary development and professional practice.

3.4 Current problems of research work

There are relatively few published articles, which have delved deeply into the development of archives informatization in foreign countries or otherwise showed only a passing interest. Moreover, researchers in this field in China are unevenly distributed geographically. At present, theoretical researchers in universities and colleges represent the bulk part of the research undertakings in this field. These researchers are mostly likely to live in the developed regions. There is fewer number of research work done in the western, eastern and northern parts of China where the economy is less developed. Some people attribute this phenomenon to inadequate funding support in the less-developed regions, which usually results a lack of necessary equipments and a lack of basic facilities for professional practice. Therefore, governments in less-developed regions should strengthen their funding support for both researches on the development of archives informatization and their operation. Besides, they should find a way to do it in a more cost-effective way.

3.5 The future development

Based upon the above analysis, we believe that we should further strengthen our understanding and research work about the development of archives informatization in foreign countries in the days to come. At the same time, we should devote more efforts to study such hot issues at home as the classification of electronic files and the management of archives resources, etc. We should also constantly expand our research team and broaden our research vision, and, thus be able to facilitate the



development of archives informatization in a more comprehensive and systematic way and also from holistic perspectives for its thematic brilliance, cutting-edge technologies and professional practicability.

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