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Study of the Construction of Operational Management of Meteorological Archives in Qinghai Province

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Abstract

Meteorological archives are historical records formed in the activities of meteorological operational technology and scientific research. They represent a valuable asset for meteorological departments and constitute an important scientific and technological archive resource at the national level. As a crucial conduit for recording meteorological data and facilitating meteorological research and forecasting, the management of meteorological archives is confronted with a unique set of opportunities. The ongoing advancement of information technology is presenting new challenges and opportunities for the development of meteorological archive business management practices. As a significant component of the Qinghai-Tibetan Plateau, the development of meteorological archive business management holds particular importance and value. This paper examines the current status of meteorological archive business management in Qinghai Province, and offers guidance for advancing the modernisation, digitisation and intelligent development of meteorological archive business management in the context of big data.

Keywords

Meteorological Archives; Digital Information; Intensive and Efficient.

1. Introduction

Meteorological archives are constituted by meteorological departments in the context of meteorological operations, scientific research, management and service activities. They represent historical records in different forms, such as text, charts, sound and video, and electronics, with a value of preservation. Meteorological archives are characterised by a high degree of professionalism, timeliness and confidentiality[1]. Meteorological archives serve not only to document the evolution and accomplishments of meteorological departments, but also to furnish crucial data for meteorological forecasting, climate research, and disaster prevention and control[2].

The Qinghai Provincial Meteorological Archives comprises four paper archive storage rooms, one electronic archive storage room and one off-site archive room. The archives comprise a variety of collections, including those pertaining to meteorological career management, meteorological observation records, meteorological operational technology, meteorological scientific research, meteorological instruments and equipment, audio-visual materials, electronic archives, and other miscellaneous archives, collectively amounting to over 110,000 volumes. In recent years, the Qinghai Provincial Meteorological Information Centre has adopted a strategy that aligns with the actual situation of the region. This strategy prioritises the digitisation of meteorological data, with the management and utilisation of meteorological archives serving as the entry point. The construction of a meteorological digital archive information digitisation project has been initiated, with the initial establishment of business operations focused on metadata archiving and paper archive extraction. Furthermore, the

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material linkage and dynamic ring monitoring system have been enhanced, thereby facilitating the standardised management of digitised meteorological archive data. The Qinghai Provincial Meteorological Data project has also led to an improvement in the management capacity of meteorological data in Qinghai.

2. The Current Situation of Meteorological Archives Business Management in Qinghai Province

In recent years, the Qinghai Provincial Meteorological Archives has undergone a transformation from a system reliant on manual transcription and raw data service to one that is information-based, offering data service and deep-processing service. This transition has been enabled by enhancements in the Archives' capacity and the advancement of science and technology. Presently, the Qinghai Provincial Meteorological Archives has established a comprehensive archive management system comprising a range of integrated systems and methodologies for archive management, learning and training, post management, and other key functions. Additionally, the Archives has implemented advanced information technology systems, including the Meteorological Archives Business System, with the objective of enhancing the efficiency and quality of meteorological data and archive management. The Meteorological Archive Business System has been implemented in Qinghai, comprising business modules for archive collection, archive organisation, archive storage, archive utilisation, statistical evaluation, system management, and other functions. This system supports the full range of processes involved in the management and utilisation of meteorological archives. In addition to the collection and collation of routine observation data, Qinghai Province has established a preliminary workflow for the collation and entry of metadata of meteorological archives files, thereby facilitating the efficient retrieval and archiving of paper meteorological archives.

Despite the initial digitisation efforts of the Qinghai Provincial Meteorological Archives, a considerable volume of original, paper-based information remains undigitised. The data collected from agricultural and animal husbandry meteorological observations are still stored in manual paper reports, with a low utilisation rate, and thus fail to play their due role. It is imperative that investment in the digitisation of archives be increased and that the remaining original and paper materials be digitised as soon as possible. Furthermore, the digitisation of agricultural and animal husbandry meteorological observation materials must be strengthened, and their utilisation rate and service capacity improved[3]. A robust archive information security management system and comprehensive protective measures have been implemented to guarantee the security and integrity of archive information. Furthermore, it is essential to enhance the monitoring and maintenance of the archive information system, and to identify and address potential information security risks in a prompt manner. The promotion of archive resource sharing services, the establishment of a more comprehensive meteorological data network sharing service system, and the provision of convenient meteorological scientific data sharing services for a larger user base are also crucial.

3. The Subsequent Phase of the Construction Plan

3.1. Enhance the Digital Construction of Meteorological Archive Resources

Presently, the state has issued a series of planning policies indicating that digital transformation is the objective of the '14th Five-Year Plan'. Furthermore, the relevant meteorological departments have issued guidelines and policies in sequence to reinforce digital capacity building. In accordance with the policy, the meteorological archive data should be given priority in order to establish a data classification and grading mechanism[4]. Furthermore, the complex

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meteorological data should be classified in a scientific manner according to the business attributes, with the aim of facilitating data storage and management. Secondly, improvements should be made to the data quality mechanism, with a view to strengthening the construction and management of data quality. In addition, the authenticity, accuracy and consistency of meteorological data should be enhanced, the processing of meteorological data facilitated and the processing efficiency improved. It is also recommended that the interconnection of meteorological operational data and archives be accelerated in order to achieve online archiving of operational systems to the archive management system via the archiving interface. This will result in the formation of meteorological electronic archives with reliable sources, compliant procedures and standardised elements. Finally, the data processing capability of the platform should be improved.The processing of meteorological data necessitates the utilisation of a multitude of modelling and formulaic calculations. Consequently, the enhancement of the computational performance of the data platform and the optimisation of the algorithmic capacity represent a pivotal criterion for digital construction. The digital archive platform serves not only the basic functions of collecting, storing and utilising meteorological archive data, but also the social functions of preserving meteorological cultural heritage, maintaining the veracity of meteorological history, facilitating scientific research, stimulating economic growth and propagating education. With the objective of establishing a digital meteorological archive platform, the construction of the archive storage room and library environment has been completed, and a scientific and efficient division of functional areas has been achieved.

3.2. Innovae and Optimise Traditional Records Management Models

It is of great significance to improve the efficiency of archive management, ensure archive security and promote the development and utilisation of archive resources that the traditional archive management mode be innovated and optimised. In order to fully realise the potential of big data technology, it is essential that a comprehensive data integration and sharing mechanism is established within the context of meteorological archive management. The establishment of this mechanism serves to enhance the efficiency of data resource utilisation, whilst simultaneously providing more accurate and comprehensive data support for meteorological forecasting, climate research and other fields. The construction of an archive information sharing platform will facilitate cross-departmental and cross-geographical sharing of archive information, thereby enhancing the efficiency of archive resource utilisation. The promotion of archival service innovation will entail the integration of user requirements, resulting in the delivery of a range of services, including archive compilation and research, archive exhibition and archive counselling, in order to meet the diverse needs of users.

The conventional approach to archive management is typically oriented towards the safeguarding and retrieval of archives, with relatively limited attention devoted to in-depth analysis and the utilisation of data. In the context of big data, meteorological archive management can shift its focus from the mere preservation of data to encompass data analysis, data mining, data services, and other forms of data utilisation. Furthermore, the introduction of artificial intelligence technology, utilising natural language processing, image recognition and other such technologies, can facilitate the automatic classification, automatic summary and intelligent retrieval of archives, thereby enhancing the efficiency of archive utilisation. The promotion of an intelligent archive management system, based on big data and cloud computing, will facilitate the automation of management processes and the provision of intelligent services for archives. The construction of a knowledge map of archives enables the correlation analysis and intelligent recommendation of archive information, thereby enhancing the development and utilisation of archive resources.

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3.3. The Objective is to Reinforce the Construction of Talent Teams and Accelerate the Transformation of Meteorological Archives into Digital Intelligence.

The necessity for immediate access to meteorological data results in the generation of a vast quantity of data, which in turn gives rise to significant maintenance costs. The background of ecological protection and national security is becoming increasingly important for personnel responsible for the management of meteorological data archives. In addition to professional expertise in archive management, these individuals must possess a comprehensive understanding of cross-disciplinary knowledge. First and foremost, it is imperative to disseminate information and raise awareness about national security. Meteorological archives, as a vital repository of data, must adhere to the highest standards of confidentiality. Regardless of whether the archives are stored physically or electronically, rigorous access controls must be in place to ensure the security of the archives and the confidentiality of the data they contain. Secondly, the construction of teams with expertise in data and artificial intelligence is essential to enhance the accessibility of electronic archives, provide dependable data sources for meteorological operations, and simultaneously implement intelligent management and intelligent recommendation systems to achieve optimal data management.

4. Conclusion

The meteorological archive management system in Qinghai Province is poised to benefit significantly from the advent of digitalisation. To fully realise this potential, it is essential to capitalise on the opportunities presented by this technological shift to drive modernisation, informatics and intelligence in meteorological archive management. The analysis of this paper revealed that, although meteorological archive management is still in its infancy, it is poised to benefit from a number of opportunities. In order to fully capitalise on these opportunities, this paper proposes a number of recommendations, including improvements to data integration, innovation and optimisation within the traditional archive management mode, strengthening of technical updates and talent reserves, and other measures. These recommendations are designed to facilitate the construction of meteorological archive business management in the context of bigdata, thereby achieving more efficient, accurate and sustainable development.

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