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## Application of QR Code Technology in the Archive Management of University Student Party Members

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### Abstract

QR code technology, by virtue of its high-capacity information storage capability, can be applied to the management of university student party member archives, thereby substantially enhancing operational efficiency. This paper first analyzes the feasibility of applying QR code technology to such archive management, elaborates on its advantages, and finally investigates the associated risks and challenges along with corresponding countermeasures. The objective of this study is to promote the application of QR code technology in party member archive management in terms of security, precision, and efficiency.

### Full Text

## Application of QR Code Technology in the Archives Management of University Student Party Members

CHEN Peiqin, LI Caili

### Abstract

QR code technology, leveraging its high-capacity information storage capabilities, can be applied to the archives management of university student Party members, significantly improving work efficiency. This paper first analyzes the feasibility of applying QR code technology to university student Party member archives management, expounds on its advantages, and finally explores the associated risks, challenges, and solutions. The aim is to promote the application of QR code technology in Party member archives management with respect to safety, accuracy, and efficiency.

**Keywords:** QR code technology; archives management; Party member archives

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Party member archives for university students are highly political documents that serve as proof of student Party membership. These archives hold significant importance for ideological and political development, Party building, and talent selection in higher education institutions. QR codes consist of specific geometric patterns distributed in two-dimensional planes. The most widely used QR code today is the QR Code (Quick Response), whose primary advantages include massive information capacity, easy recognition, and low cost, leading to its widespread adoption in modern society. Based on new optoelectronic information technology and the concept of bit streams, QR codes arrange various data characters in black-and-white patterns along two dimensions [5]. In computer language, “1” and “0” represent black and white dots respectively, and the resulting patterns can be easily recognized by image recognition devices on users' mobile devices, enabling rapid information sharing. The QR Code adopted in Party member archives informatization is suitable for Chinese character encoding and can be directly recognized by smartphones. Party member archives management should fully utilize QR code technology to provide accurate, efficient, and secure services.

## 1 Feasibility Analysis of Introducing QR Code Technology into Party Member Archives Management

### 1.1 Favorable Network Environment

As of 2022, China's smartphone penetration rate has exceeded 66%, growing rapidly with the swift development of internet technology. The general public is already familiar with QR codes, using them for payments, adding friends, and reading information—QR code technology is now ubiquitous in society. QR code technology requires robust network support, and currently, 3G and 4G signals are fully 普及 in China, with 5G technology becoming mature. On university campuses, nearly everyone possesses mobile devices with high-speed network access, and virtually all universities have comprehensive network coverage. This provides excellent conditions for applying QR codes to university student Party member archives management.

### 1.2 Characteristics of QR Code Technology

First, the application of QR code technology in Party member archives management is not technically demanding. Compared to magnetic cards or IC cards, QR codes have lower technical and development complexity, making them more advantageous for archives management [8]. Second, QR codes possess enormous

information capacity, far exceeding that of one-dimensional barcodes. They can easily store textual information from Party member archives and can even embed anti-counterfeiting information to help verify authenticity. Finally, the development cost of QR code technology is extremely low. Similar radio frequency identification systems rely on reading devices but cannot replace QR codes as the mainstream solution due to high chip costs. Beyond low development difficulty, high information capacity, and low cost, QR codes also offer advantages of low error rates and wide encoding ranges [1]. The maturity and convenience of QR code technology significantly enhance its feasibility for application in Party member archives management.

### **1.3 Promoting Integration of Party Member Archives Information Resources**

QR codes can integrate archives information resources by systematically organizing all materials within each Party member's archive, transforming disordered documents into well-structured digital archives. Building upon this, QR code technology can compile abstracts and catalogs for archive information and establish corresponding retrieval indexes for easy access. When Party member archives information changes, staff can update the QR codes to integrate old and new information resources, effectively preventing information loss and distortion. The application of QR code technology effectively promotes the integration and management of university student Party member archives information [4].

### **1.4 Practical Application of Introducing QR Code Technology**

By introducing QR code technology, a QR code can be placed in the upper right corner of the Party membership application form cover, encoding all Party member material information and establishing corresponding entry catalogs. To develop a Party member QR code information system, Party member archives documents should first be input into a digital archives management platform to create a Party member information database, followed by the development of database QR codes [9]. The Party member information database should contain basic personal information, Party joining date, full membership date, examination records, transfer-in date, transfer-out date, Party member ID, affiliated Party branch, Party class training and examination status, etc. After creation, information can be retrieved based on catalog needs, and corresponding QR codes can be generated for mobile device scanning. When grassroots Party organizations manage university student Party member archives, they can access relevant archives information simply by scanning the QR code with a smartphone. Applying QR code technology in the practice of university student Party member archives management can ensure standardized dynamic management processes, promote the transformation from paper-based to electronic archives management, and further enhance the informatization of university student Party member archives management.

## 2 Advantages of QR Code Technology in Party Member Archives Management

### 2.1 Ensuring Authenticity of Material Sources

University student Party member archives have long formation periods and follow the principle of “files follow the person” after graduation. Transferring archives in and out is normal, but some individuals, constrained by employment or further education requirements, may resort to fraudulent means to falsify documents, hoping to pass inspection during circulation. This creates difficulties for Party organization verification. If QR code technology is proactively introduced into university student Party member archives management, all information from the Party member management system can be converted into QR codes placed in the upper right corner of the Party membership application form. Leveraging QR code technology, each Party member’s archive would have a unique QR code. When accessing or retrieving a specific Party member’s archives later, the target QR code can be quickly located through keywords to obtain complete archives content information.

### 2.2 Enhancing Standardization of Process Management

Traditional Party member archives inspection involves cumbersome procedures. Each archives folder contains multiple thought reports (quarterly, annual, etc.), probationary Party member examination forms, and full membership application materials. In daily work, grassroots Party organizations generally prohibit inspection of probationary Party member archives materials except under special circumstances to prevent document loss or damage. When new graduate students enroll, probationary Party members’ archives are transferred to their institutions along with personnel files. However, different schools have different Party member cultivation processes and timelines for confirming probationary status. After transfer to new cultivation units, grassroots Party organizations must expend substantial time collecting, managing, and reviewing archives materials [6]. Applying QR code technology to dynamic management of university student Party member archives allows information access via mobile device scanning, avoiding repeated verification of original documents and effectively improving dynamic management efficiency [10]. Standardized management ensures orderly archives storage and use, significantly reducing risks of original document damage or loss. Embedding QR codes on Party membership application form covers provides each archives with a unique “ID card.” During subsequent review processes, reviewers can obtain information by scanning QR codes, which can track and record the entire formation and management process of the archives, thereby ensuring standardized management procedures.

### 2.3 Ensuring Security of Party Member Archives Management

Applying QR code technology to university student Party member archives management can enhance work security. In daily archives management, Party mem-

ber archives contain complex and diverse content, creating difficulties during collection and organization. Loss of original documents occurs frequently, and grassroots Party organization staff find it challenging to ensure every Party member document remains intact. Applying QR code technology can fundamentally solve problems of repeated archives inspection and review, thereby protecting original archives security. To further ensure security, operation logging functionality can be added to the Party member archives information management system, ensuring traceability of archives borrowing and inspection, preventing loss of original materials, and adding a protective firewall for dynamic archives management.

## 2.4 Improving Convenience of Party Member Archives Utilization

Introducing QR code technology into Party member archives management involves entering archives information into QR codes. Scanning and reading content via mobile devices can significantly reduce document retrieval time, improve inspection efficiency, precisely locate needed information, and lower time costs. Current Party member archives management requires coding and classification of each archives material. Each Party member's archives contain various documents: Party membership applications, thought reports, personal honor certificates, and personal information. QR code technology can incorporate different types of information from a single archives into QR codes, facilitating both management and user query [3]. QR code technology can also identify query users during archives searches, recognizing who has accessed the archives through scanning, thereby streamlining workflows and benefiting archives query and utilization.

## 3 Risks, Challenges, and Solutions

### 3.1 Risks and Challenges

**3.1.1 Risk of QR Code Information Leakage** QR codes placed on Party membership application form covers contain all archives information. In archives utilization work, each QR code is an ordinary pattern with low distinguishability. Archives workers and users often lack understanding of QR code security risks. While enabling convenient management, this creates information security hazards. If these small QR codes are obtained by malicious actors through illicit means, entire archives information could be leaked, causing a series of adverse events. Therefore, applying QR code technology to Party member archives management presents challenges in finding a balance between efficiency and security. Preventing Party member information theft while maintaining convenient operations and ensuring secure integration between the archives management system and QR code system has become a major challenge.

**3.1.2 Deficiencies of QR Code Technology** Current deficiencies in using QR code technology for information storage mainly manifest in two aspects. First, QR codes can carry virus codes. While storing large amounts of archives information, QR codes can also contain viruses and malicious links that are difficult to identify from appearance in daily work. Second, risks exist in the one-way transmission process between archives and users. The information transmission method of QR code technology in university student Party member archives work is unidirectional. Exploiting this characteristic, malicious actors can hijack the transmission process between scanning devices and archives or between archives and management system backends [7] to covertly obtain information. This information hijacking security issue during transmission poses another major challenge.

## 3.2 Solutions and Countermeasures

**3.2.1 Implementing Watermarking Functionality** Adding QR code digital watermarking functionality to the Party member archives management system can display basic information of archives users and managers, as well as archives sources, when scanning QR codes. Real-time monitoring of user operation records, access times, and printing behaviors, along with permission settings for users and access procedures [2], enables complete traceability throughout the archives borrowing and utilization process. This adds a security 防线 for QR code application in Party member archives and can significantly improve the safety coefficient of university student Party member archives management.

**3.2.2 Strengthening QR Code Technology Security** First, during development of Party member archives QR codes, supervision of QR code production should be strengthened. Establish security monitoring and evaluation mechanisms for QR code development and the Party member archives management system backend, implement strict confidential review procedures, and regularly commission third-party QR code stability testing. Second, strengthen verification procedures for the archives management platform to ensure security during one-way information transmission. Allow only Party branch committee members with QR code recognition devices to access Party member archives, while others have no permission to inspect or access relevant information, thereby preventing third-party access. These two approaches address QR code technology deficiencies in practical application and improve security.

## Conclusion

Applying QR code technology to university student Party member archives management can greatly improve work efficiency, enhance management standardization, and ensure authenticity, integrity, and security. In future practical applications, relying on digital network technology, efforts should be intensified to solve challenges in applying QR code technology to university student Party member archives management, comprehensively promoting transformation and

upgrading of management to provide efficient and convenient services. While transitioning toward convenient and efficient archives work, preventive measures should be implemented to avoid technical vulnerabilities, improve relevant regulations, promote integration between new digital forms and traditional archives methods, and innovate to ensure Party member archives work progresses alongside the digital era, advancing steadily in social development to achieve greater development space for the archival undertaking.

*Note: Figure translations are in progress. See original paper for figures.*

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