ingegneria sismica
International Journal of Earthquake Engineering
Anno XLIII - Num. 3 - 2026

Research on the architecture design of intelligent management system for grassroots Party organization construction driven by cloud computing platform

Ying Chen[1,*], *Han Zheng*[1] *and Junyao Tang*[1]

[1] School of Political Science and Public Administration, Tianjin Normal University, Tianjin, 300074, China

SUMMARY: *The grassroots organization of the party is the foundation of all the party's work and fighting force. In this paper, the intelligent management system architecture driven by cloud computing platform is designed for the informatization needs of grassroots party organization construction. Methodologically, a theoretical model of intelligent party building containing intelligent perception, intelligent linkage, intelligent analysis and intelligent decision-making is constructed, the system framework is designed by adopting the cloud computing three-layer architecture and B/S architecture, the entropy weight method is applied to determine the weights of the evaluation indexes, and a fuzzy comprehensive judgment model is established to evaluate the system quality and efficiency. The results show that the application design has the highest weight of 31.65%, and the weights of the three indicators of management mechanism, operation and maintenance, and information management are 0.0976, 0.0838, and 0.0918, respectively; the comprehensive evaluation score of the system is 3.234, which is in the general to good level; compared with the big data platform, the CPU and memory utilization rate of the cloud computing platform is significantly reduced. The study shows that the system architecture is reasonable and effective, can meet the intelligent management needs of grassroots party organizations, and provides a feasible solution for the transformation of party building work informationization.*

KEYWORDS: *Cloud computing platform; grassroots party organizations; intelligent management system; entropy power method; fuzzy comprehensive judgment; intelligent party building*

1 Introduction

With the development of computer technology and network technology and the continuous advancement of reform and opening up, the towns and villages are undergoing unprecedented and profound changes, and the interest relationship and linkage between grass-roots party organizations and the residents are also undergoing profound changes, and grass-roots party building work is faced with a lot of new situations, new contradictions, and new problems that need to be studied and solved urgently [1-4]. This requires that the work tasks, organizational forms, activities and work methods of grassroots party organization construction must be adapted to the requirements of the times and development needs, so the application of intelligent management system of grassroots party organization construction is imperative [5-7].

Under the premise that the level of work informatization is constantly improving, the local

*cherrying1106@163.com
https://doi.org/10.65102/is20261157 Published: 10 June, 2026

party organization departments in China have actively responded to the state's call to implement informatization management [8, 9]. Local party departments have successively established their own intelligent management system for party organization construction, and up to now, most of the party organs in China have a relatively perfect management system network [10-12]. In this context, many grass-roots party organizations have set up their own websites, such as the Organization Department, the Propaganda Department, etc., and the organs and units also have a more convenient information intelligent management system for party officials, which plays a key role in publicizing the party's line and guidelines, implementing the internal informatization of the party organizations, and improving the efficiency of the grass-roots party organizations [13-16].

This study is based on the actual needs of grassroots party organization construction, and carries out research from multiple dimensions, such as system architecture design, function implementation, performance optimization and so on. Firstly, the theoretical model of intelligent party building is constructed to clarify the theoretical basis of system construction; secondly, the system framework based on cloud computing platform and B/S architecture is designed to realize the core functions of party organization management and party member management; thirdly, the quality and efficiency assessment index system is established, and entropy weight method and fuzzy comprehensive judgment method are applied to assess the system scientifically; and lastly, the practicability and high efficiency of the system is verified through performance testing. Through the research path of theoretical modeling, architectural design, and evaluation and verification, we strive to provide a complete set of intelligent solutions for the construction of grassroots party organizations.

2 Intelligent management system for grass-roots party organizations

With the rapid development of network information technology, cloud computing technology, big data technology and artificial intelligence, intelligent party building has become an important embodiment of the advancement of grass-roots party organization building work with the times. From the viewpoint of composition, the intelligent management system of grass-roots party organization construction contains both hardware construction and software development, as well as the organic integration of information technology and party building work. From the viewpoint of work content, the intelligent management system of grass-roots party organization construction contains both the extensive collection of various types of party building data and the value mining of party building data. Therefore, to build an intelligent management system for the construction of grass-roots party organizations, it is necessary to deal with the relationship between the complexity of the intelligent system and the integration of the overall functions, the extensive collection of information and the high efficiency of value mining, the openness of the network environment and the security of the information, to follow the general rules of grass-roots party building, and to improve the intelligent level of the work of grass-roots party building.

2.1 Theoretical Model Construction of Intelligent Party Building

2.1.1 Grass-roots party organization

The Internet is the most dynamic area of development in our time. The Internet has changed people's way of thinking and values, in a certain sense, the Internet determines the direction of the development of human society. In the era of mobile Internet, the way people receive

information and carriers have quietly changed, the past “duck” and “indoctrination” party education is difficult to adapt to the fast-paced modern society, difficult to meet the grass-roots party organizations and party members of each other's expectations. Therefore, the Internet + grass-roots party building has become an inevitable choice to comply with the trend of the times and meet the needs of reality.

Internet + grass-roots party building can break the time and space limitations, with the network party building platform of the new way for grass-roots party organizations to provide a new place of education. The network party building platform can realize the full coverage of education, management and service for all party members through mobile terminals such as cell phones, tablet PCs and laptops in the form of WeChat, QQ, grassroots websites and APP. At the same time, the convenience and embeddedness of network learning makes it possible to have a variety of forms of network learning, so grass-roots party organizations can, according to the characteristics of the party members' time fragmentation, make the learning content into micro-courses, small videos, and other short and concise learning materials, and push them to the party members in a targeted way, which is helpful to stimulate the party members' interest in learning and enhance the effect of education [17].

The management of party members by grassroots party organizations mainly relies on disciplinary constraints and individual self-discipline, but with the year-on-year increase of the mobile population, party members of grassroots party organizations present the characteristics of multiple identities, indeterminate locations, and declining self-discipline, and the traditional management mode can not cope with this change. “Internet+” provides a new mode for grassroots party organizations to manage party members. Grass-roots party organizations can widely collect all kinds of information on grass-roots party members, cadres and party workers by building party member information databases, and through specialized data analysis, grasp the laws therein, so as to provide a basis for strengthening the scientific management of party members by grass-roots party organizations. If you want to implement refined management, you can also rely on WeChat groups, QQ groups and other mobile Internet means, based on different criteria such as industry, community, etc., the network party branch is divided into different units of the grid, the implementation of grid management.

2.1.2 Theoretical Model of Intelligent Party Building

Party construction is of great importance and affects the whole situation, including not only party work, but also party political construction, ideological construction, organizational construction, discipline construction, style construction, system construction and so on. Intelligent party building as a new form of party building work with the times, the essence is the effective use of information technology to promote the wisdom of party building work, with accurate data, intelligent sensing to achieve the party building resources sharing, learning and education personalized, organizational decision-making scientifically, standardized management of party members, ideological propaganda normalization, institutionalization of the organization's life. On the basis of analyzing and summarizing the theory and practice of party building informatization, the constructive model of intelligent party building is built as shown in Figure 1. This paper argues that the wisdom of intelligent party building is mainly embodied in the intelligent perception of party building information, the intelligent linkage of party building work, the intelligent analysis of party building data and the intelligent decision-making of party building issues.

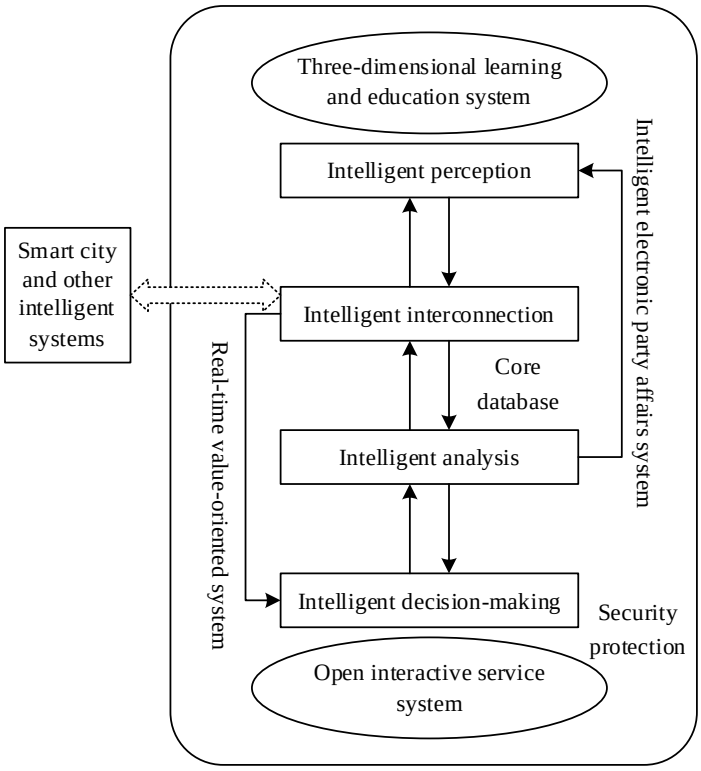


Figure 1: Theoretical model of intelligent Party building

The intelligence of intelligent party building is mainly realized by the joint collaboration of five major links: intelligent perception, intelligent linkage, intelligent analysis, intelligent decision-making, and security, in which security is carried out throughout the entire process to guarantee the privacy of personal information in all links and at all levels, the security of confidential information, and the effectiveness of system operation. First of all, the system passively or actively senses the individual party members' thought dynamics, organization and party members' activities and other information through sensors. The so-called active perception refers to the party organization and party members actively report their thoughts, learning and other aspects of information to the system, and passive perception refers to the system through the information interconnection of the party organization and party members of the activities of real-time tracking, presenting relevant information. When the system perceives the relevant information, it is transmitted to the “nerve center” of the intelligent party building (the link between intelligent linkage and intelligent analysis) through the stable and efficient wireless network and other technologies to form the core database of the party building work. In this process, the linkage of information is two-way and three-dimensional, mainly reflected in the interoperability of information between the upper and lower level party organizations, party organizations at the same level and party members, and to be developed to a relatively mature stage, it can also be realized with the smart city, smart campus and other intelligent systems of interoperability. Subsequently, the “nerve center” calls the relevant data in the core database for intelligent and efficient calculation and analysis according to the needs of party organizations and members, and presents the personalized and comprehensive results in the form of execution instructions and analysis reports. When the party organizations and members perceive the execution instructions and analysis reports, they complete the relevant activities in accordance with the requirements, and at the same time provide scientific references for the next decision-making.

2.2 Intelligent management system for grass-roots party organizations

2.2.1 Cloud computing platform framework

Cloud computing is a computing model based on a shared pool of resources and their flexible accessibility. Cloud computing provides services that enable users to obtain all types of resources they need, including but not limited to network, computing resources, storage resources, and corresponding software services, from its customizable shared pool of resources anytime, anywhere, and as needed. With the support of cloud computing, resources can be quickly provisioned and delivered to users. Compared with the traditional way of resource provisioning, cloud computing has higher flexibility, greatly improves the efficiency of resource utilization and enhances the quality of services.

Figure 2 shows the architecture of the cloud computing platform, including the infrastructure layer, system service layer and application layer. Among them, the infrastructure layer is based on virtualization technology, forming hardware facilities composed of physical facilities and virtualized resources generated by virtualization technology. In the infrastructure layer, basic computing and storage devices such as servers and memory, as well as other infrastructures are connected through network facilities to form large-scale interconnected basic hardware resources. The underlying hardware resources are not provided directly to the users, but the resources are virtualized through virtualization technology. Virtualization technology is the key to achieve resource sharing in cloud computing environment. With the support of virtualization technology, the actual hardware resources are encapsulated into virtualized resources such as computing resource pools, storage resource pools, network resource pools, and other resource pools, and these virtualized resources provide resource services to the upper layer. The system service layer provides system-level core services and service management in the cloud computing environment, which mainly includes resource management, security management, load balancing, database, middleware, and other service management, and provides computing resources, storage resources, network resources, and other resources in this layer. Through various types of services and service management, services with both efficiency, security and reliability are provided to the upper layer. In the application layer, various services are provided directly to users, and in addition to the directly available services, users can customize their own services on demand.

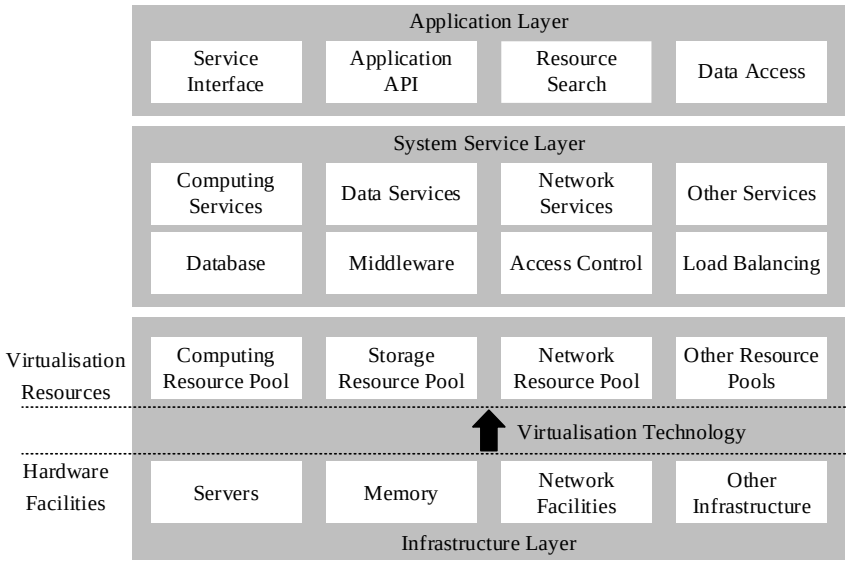


Figure 2: The architecture of the cloud computing platform

2.2.2 B/S three-tier system model

B/S structure is a change or evolution of the C/S client/server structure, i.e., the browser-server form, is a three-tier system.B/S structure through the placement of the code to the server, the client through the access to the browser to realize the query to the server, through the translation of the query statement, so that it is converted to the server recognizable code and then the query The query statement is translated and converted into a code that the server recognizes, and then the query is performed.

According to the data processing function, the three structures are divided into the first layer (top layer) is the client, i.e., the user interface, to realize the direct interaction between the system and the user access. The second layer (middle layer) is the business logic layer, often called the logic layer or component layer, which is mainly responsible for the operation of the system's business functions. The third layer (bottom layer) is the data management layer, the main function is to data information related operations, including storage, change and query.

B/S three-tier structure is a kind of technical system based on TCP/IP communication protocol, HTTP transmission protocol, using the browser to complete the query and operation of the Web server, and at the same time with the database to establish a connection. In the realization, just need to access the browser to enter the system interface, so as to complete further operations. The mode, most of the things logic to catch are Server side of the realization, and only a small part of the transaction logic to be completed in the Browser side, this way really reduces the Browser end of the load, but also reduces the workload in the future, through this can put the method, the customer's consumption level will also be reduced.

2.2.3 Intelligent management system framework

The overall goal of the intelligent management management system for grass-roots party organization construction is to build an easy-to-use, high-speed, easy-to-manage, safe and reliable intelligent management management system by adopting the current advanced information technology and network communication technology. Through the design of the system, it provides modern information means for the work of grass-roots party organizations, and provides timely, accurate and scientific and effective decision-making conditions for the party management work.

Based on the cloud computing platform and B/S framework, this paper designs the intelligent management system for grassroots party organization construction as shown in Figure 3. It mainly realizes the basic functions of party organization management, party member management, party applicant management, report statistics management, user management and system management.

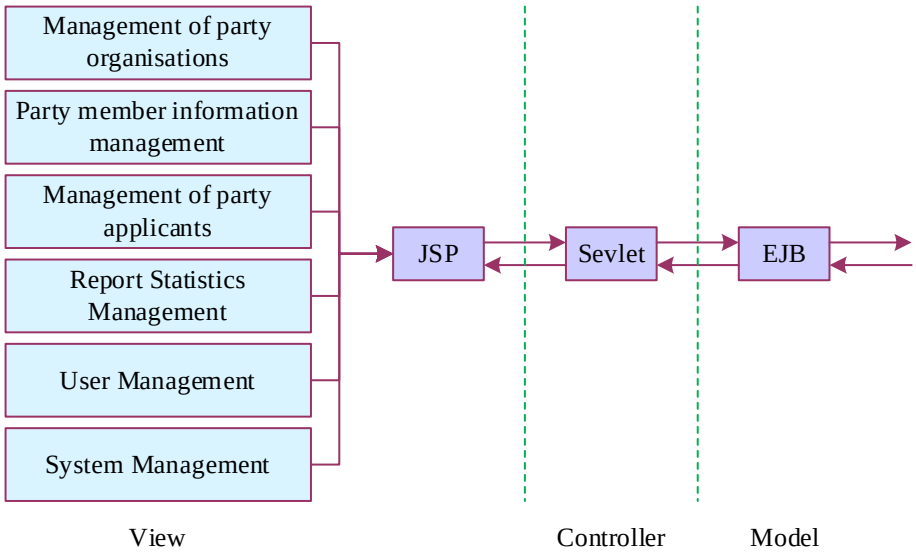


Figure 3: Intelligent management system framework

Database design is in a very important position in system development and design, we analyze and design the database of this system according to the requirement analysis. Define the database named Party, this database consists of data tables such as organization information table, organization session table, personnel basic information table, recognition table, party discipline table, party service information table, party fee information table and so on. The quality of service of the database should firstly be reflected in the quality of the data provided, therefore the contemporary database proposes the concept of database integrity, which means that the data in the database should always be kept in the correct state, preventing the wrong data inputs that do not conform to the semantics as well as the wrong results caused by invalid operations.

3 Quality-effectiveness assessment model for the intelligent management system of grass-roots party organizations

Chinese society has entered the network information age. The arrival of the information age means a greater span of social change and the opening of a new era of network politics, which will profoundly change our social form, cultural traditions, living habits, organizational and behavioral styles, and will also deeply affect the party construction. Therefore, the study of the development of the intelligent management system for the construction of grass-roots party organizations under the Internet environment in the new era has both very important theoretical value and extremely urgent practical significance.

3.1 Construction of a systematic quality-effectiveness assessment indicator system

3.1.1 Principles for the construction of the assessment system

The evaluation of the intelligent management system of grass-roots party organizations is first of all to establish a set of practical evaluation index system, and the following principles should be followed when constructing the evaluation index system:

(1) The principle of scientificity. The selection of evaluation indexes should be based on

science, and the principle of science is the first principle of building the evaluation index system.

(2) The principle of comprehensiveness. Evaluation indicators should not only evaluate the information content level, but also evaluate the information content expression, and also examine the technical aspects of the intelligent management system.

(3) Guiding principle. The evaluation indicators and survey results can play a positive and correct guiding role in the development of the intelligent management system for grassroots party organization construction.

(4) Principle of objectivity. The survey indicators are mainly objective indicators, which can objectively react to the important attributes of the system through data analysis.

(5) Principle of operability. Try to make the indicators simple and easy to understand, objective scoring, easy to count the data, easy and quick to calculate.

(6) Expandability principle. With the different stages of development of the intelligent management system of grass-roots party organizations, the survey indicator system must be adapted at the right time.

3.1.2 Content of the assessment indicator system

Based on the comprehensive analysis of existing relevant studies, this paper constructs a quality and effectiveness evaluation index system for the intelligent management system of grassroots party organization construction, the specific content of which is shown in Table 1. It mainly includes four dimensions, namely, system architecture, application design, operation efficiency and application effect, with 14 evaluation indicators. Among them, the dynamics of quality and effectiveness assessment is mainly reflected in the application design and operational efficiency, which is greatly affected by the actual experience of users, so the selection of indicators should focus on the user experience, and should most directly reflect the user's participation, satisfaction and other factors, and through the assessment of these two factors, the most targeted measures can be put forward for the improvement of the grass-roots party organization construction intelligent management system.

Table 1: Quality evaluation index system

Primary index	Secondary index	Code
System architecture	Framework result	SA1
	Content resources	SA2
	Basic element	SA3
Application design	Interface design	AD1
	Software implements	AD2
	Security protection	AD3
	Characteristic application	AD4
Operating efficiency	Management mechanism	OE1
	Operation and maintenance	OE2
	Information management	OE3
Application effect	User stickiness	AE1
	User experience	AE2
	Interactive communication	AE3
	Learning transformation	AE4

3.2 Intelligent system quality and efficiency assessment model construction

3.2.1 Determination of evaluation indicator weights

Entropy Weight Method (EWM) is an important information weighting model that has been widely researched and practiced, mainly used in comprehensive evaluation and decision analysis. The core idea of entropy weight method is to evaluate by measuring the degree of differentiation between the values, the higher the degree of dispersion of the indicator values means that the higher the degree of differentiation of the indicator, the more information can be obtained, and this indicator should be given a higher weight, and vice versa. Specifically, entropy weight method is to determine the weight of the indicator by calculating the entropy value of each indicator, the larger the entropy value is, the higher the degree of discretization of the indicator is reflected, and the greater its influence on the comprehensive evaluation results, so its weight is also higher.

The execution steps of the entropy weight method are as follows:

Step1 Collection and organization of raw data. Assume that the evaluation system includes n indicators and consists of m samples, forming the initial matrix of the evaluation system, and x_{ij} denotes the value of the j evaluation indicator in the i sample. Then:

$$X = \begin{pmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{pmatrix} \tag{1}$$

Step2 Non-negativity of the resulting data. The entropy weight method is calculated using the ratio of an indicator in each scenario to the sum of that indicator, and the data samples are to be non-negative processed. For larger and larger indicators, the processing is as follows:

$$X_{vj}^{*} = \frac{x_{vj} - \min\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right)}{\max\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right) - \min\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right)} \tag{2}$$

where $i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, m$.

And for smaller and smaller indicators, the treatment is as follows:

$$X_{ij}^{*} = \frac{\max\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right) - x_{ij}}{\max\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right) - \min\left(x_{1j}, x_{2j}, \ldots, x_{nj}\right)} \tag{3}$$

where $i = 1, 2, \ldots, n$; $j = 1, 2, \ldots, m$. For convenience, the non-negativized processed data is still noted as x_{ij}.

Step3 Calculate the weight of the ith program under the jth indicator for that indicator. Then:

$$P_{ij} = \frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}} (j = 1, 2, \ldots, m) \tag{4}$$

Step4 Calculate the entropy value of the jst indicator. Then:

$$e_j = -k\sum_{i=1}^{n} P_{ij}\log\left(P_{ij}\right) \tag{5}$$

The constant k in the formula is related to the sample size m, generally make $k = \frac{1}{\ln m}$.

Step5 Calculate the coefficient of variation of the j th indicator, g, the larger the indicator the more important. Then:

$$g_j = 1 - e_j \tag{6}$$

Step6 Find the weights, according to the following formula to find the weight W_j of each indicator, that is:

$$W_j = \frac{g_j}{\sum_{j=1}^{m} g_j}, (j = 1, 2, \ldots, n) \tag{7}$$

where j denotes the j th indicator in the number of n indicators, and i denotes the i th sample in the number of m samples.

In summary, it can be seen that the advantage of entropy weighting method is that it can avoid the influence of subjective factors on the weights of the indicators, reflect the differences in the entropy value of the information of the indicators well, effectively consider the characteristics of each variable comprehensively, and ensure the objectivity of the comprehensive evaluation results.

3.2.2 Fuzzy composite judgment models

(1) Evaluation object set

$$U = \{B_1, B_2, \cdots, B_n\} \tag{8}$$

where U is the evaluation target, $B_1, B_2, \cdots, B_n$ are the evaluation objects that can consider the evaluation target from various aspects.

(2) Evaluation factor set

Under each evaluation object there are several different indicators to measure this evaluation object, these indicators are also known as evaluation factors, the evaluation factor set is a collection of evaluation factors, which can be divided into several groups, namely:

$$U = \cup U_i (U_i \cap U_j = \varnothing, i \neq j) \tag{9}$$

sub-factor set $U_i = (u_{i1}, u_{i2}, \cdots, u_{in})$, each of which does not contain the same number of factors. Thus the evaluation factor set can also be expressed as:

$$U = (u_{11}, u_{12}, \cdots, u_{1n}; u_{21}, u_{22}, \cdots, u_{2n}; u_{p1}, u_{p2}, \cdots, u_{pn}) \tag{10}$$

(3) Collection of Comments

$$V=\{v_1,v_2,\cdots,v_n\} \tag{11}$$

That is, the set of possible evaluation results made by the evaluator for each factor selected is a division of the scope of change of the object to be evaluated. Where V_i denotes the ith evaluation result, and n is the number of evaluation results.

The construction steps of the fuzzy comprehensive evaluation model are as follows:

Step1 Single-factor judgment. Analyze each factor in the factor set and determine the affiliation function, from which the affiliation of each factor to the evaluation set is obtained, and finally the fuzzy relationship matrix is obtained:

$$\begin{gathered} f:U\to F(U\times V) \\ f\left(u_i\right)=\left(r_{i1},r_{i2},\ldots,r_{in}\right)\in F(V) \end{gathered} \tag{12}$$

A fuzzy relation $R_f\in F(U\times V)$ can be induced from f, where $R_f\left(u_i,u_j\right)=f\left(u_i\right)\left(v_j\right)=r_{ij}$, and from R_f a construct the fuzzy matrix as:

$$R=\begin{bmatrix} r_{11} & r_{12} & \ldots & r_{1n} \\ r_{21} & r_{22} & \ldots & r_{2n} \\ \ldots & \ldots & & \ldots \\ r_{m1} & r_{m2} & \ldots & r_{mn} \end{bmatrix} \tag{13}$$

Step2 Weight assignment vector of indicators. Establish the weight assignment vector of the m evaluation indicators A, and the weight of each factor layer on the evaluation objective U constitutes the weight set as:

$$W=\left\{\omega_1,\omega_2,\ldots,\omega_n\right\} \tag{14}$$

where ω_k denotes the weight of indicator B_k on U, $k=1,2,\ldots,m$, and $\sum_{k=1}^{m}\omega_k=1$

There are C layers n sets of sub-factor layer indicators under the B_k layer, $C_1,C_2,\ldots,C_i,\ldots,C_n$ with respect to the B_k layer $(k=1,2,\ldots,m)$, denoted as $C_1^{(k)},C_2^{(k)},\ldots,C_n^{(k)}$, and the set of single weights can be written as:

$$C^{(k)}=\left(C_1^{(k)},C_2^{(k)},\ldots,C_a^{(k)}\right),k=1,2,\ldots,m \tag{15}$$

where $C_i^{(\mathrm{k})}$ denotes the weight of C_i in B_k, $(i=1,2,\ldots,n)$, and $\sum_{i=1}^{m}c_i^k=1.$

Thereby, the weight assignment vector of n evaluation factors is established A.

Step3 The fuzzy synthesized operational formula, i.e:

$$B=\omega*R \tag{16}$$

where ω is the indicator weights and R is the fuzzy matrix.

4 Assessment and performance of the intelligent management system for grass-roots party organizations

In the face of the development of the world's information networks, almost no one, no country and no political party has been able to escape its influence. In the field of political party building, the impact of the development of information network technology is multifaceted and far-reaching. In terms of technology application, it is highlighted by the establishment of political party websites, the implementation of e-party affairs, and the extensive use of information network technology to carry out party building work in order to realize the informatization of political parties. Informatization of political parties means that political parties have adapted to the requirements of the age of information technology development, extensively used information technology and network technology to carry out party building, and updated the mode, mode and method of party building, so as to improve the efficiency of party building, enhance the attraction and infectious force to the public, and promote the survival and development of political parties.

4.1 Analysis of Intelligent Management System Quality and Effectiveness Assessment

4.1.1 Weighting of QCA indicators

Based on the index system of quality effect assessment of the intelligent management system for grassroots party organization construction, this study designs corresponding questionnaires and selects 20 experts in the field related to the construction of grassroots party organizations to carry out the survey and research. Based on the data collected from the survey questionnaire, combined with the steps of calculating the weights of indicators by entropy weighting method given in the previous section, the distribution of the weights of indicators of the quality-effectiveness assessment of the intelligent management system for grass-roots party organization construction is obtained as shown in Table 2.

Among the first-level indicators of the indicator system, the highest weight is the application design, and its indicator weight percentage reaches 31.65%. The intelligent management system of grass-roots party organization construction should give full play to its core role and provide a solid guarantee for the healthy development of grass-roots party organization construction based on effective application design. The weights of operation efficiency, application effect and system architecture are 27.32%, 22.27% and 18.76% respectively, showing an overall focus on operation and application to provide reliable support for the high-quality development of grassroots party organization construction. The top three indicators in the secondary indicators are management mechanism, operation and maintenance, and information management, whose weight values are 0.0976, 0.0838, and 0.0918 respectively. This fully demonstrates that the intelligent management system of grass-roots party organization construction will give full consideration to the situation of its management mechanism, promote the efficiency of grass-roots party organization construction through effective information management, and thus provide technical support to meet the innovation and reform of grass-roots party organization construction information.

Table 2: Weight of quality and efficiency evaluation indicators

Primary index	Secondary index	Weight	Relative weight
System architecture (0.1876)	Framework result	0.3175	0.0596
	Content resources	0.3498	0.0656
	Basic element	0.3327	0.0624
Application design (0.3165)	Interface design	0.2368	0.0749
	Software implements	0.2539	0.0804
	Security protection	0.2681	0.0849
	Characteristic application	0.2412	0.0763
Operating efficiency (0.2732)	Management mechanism	0.3574	**0.0976**
	Operation and maintenance	0.3067	**0.0838**
	Information management	0.3359	**0.0918**
Application effect (0.2227)	User stickiness	0.2274	0.0506
	User experience	0.2638	0.0587
	Interactive communication	0.2491	0.0555
	Learning transformation	0.2597	0.0578

4.1.2 Fuzzy integrated evaluation of the system

In the process of comprehensively assessing the quality and effectiveness of the smart management system for building grass-roots party organizations, the first task was to establish a fuzzy relationship matrix. To ensure the comprehensiveness and accuracy of the assessment, 20 representatives of experts in the field of grassroots party organization construction who have used the platform were selected, including professionals responsible for the daily operation of the platform, technicians engaged in the early development of the platform, party affairs managers in the relevant aspects of intelligent party building who frequently browse through and use the platform, as well as ordinary party members who frequently use the platform, etc., who are more familiar with and understand the platform's various performance characteristics so that the scoring results are more referable. All of them are familiar with and understand the performance characteristics of the platform, which makes the scoring results more referable.

Based on the scoring results, the evaluation matrix is calculated by combining the steps of the fuzzy comprehensive evaluation model given in the previous section, and the second-level evaluation results are obtained by fuzzy transformation of the weight vector and the evaluation matrix. Then based on the second-level evaluation results, the first-level fuzzy comprehensive vector is carried out according to the relevant formula, i.e.:

$$R = \begin{bmatrix} 0.215 & 0.163 & 0.328 & 0.416 & 0.087 \\ 0.079 & 0.215 & 0.387 & 0.279 & 0.081 \\ 0.053 & 0.436 & 0.537 & 0.156 & 0.016 \\ 0.085 & 0.219 & 0.426 & 0.243 & 0.037 \end{bmatrix} \tag{17}$$

Then, combining the weight situation of the first-level indexes obtained in section 4.1.1 with the formula $B = w * R$ of the comprehensive evaluation result given in the previous section, the comprehensive evaluation result of the intelligent management system for building grassroots party organizations is obtained as:

$$
\begin{aligned}
B &= w * R \\
&= [0.1876, 0.3165, 0.2732, 0.2227] \\
&* \begin{bmatrix} 0.215 & 0.163 & 0.328 & 0.416 & 0.087 \\ 0.079 & 0.215 & 0.387 & 0.279 & 0.081 \\ 0.053 & 0.436 & 0.537 & 0.156 & 0.016 \\ 0.085 & 0.219 & 0.426 & 0.243 & 0.037 \end{bmatrix} \\
&= (0.09875, 0.26651, 0.42560, 0.26308, 0.05457)
\end{aligned} \tag{18}
$$

In this paper, the evaluation of the intelligent management system for building grassroots party organizations is divided into five grades (excellent, good, fair, poor and very poor), i.e., V1~V5, whose scores are 1~5, respectively. The formula is introduced to calculate the comprehensive evaluation score of the intelligent management system of grassroots party organization construction:

$$
\begin{aligned}
S = B * V &= (0.09875, 0.26651, 0.42560, 0.26308, 0.05457) * \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{bmatrix} \\
&= 3.234
\end{aligned} \tag{19}
$$

Based on the fuzzy comprehensive evaluation results, it can be seen that the comprehensive evaluation score of the intelligent management system for grass-roots party organization construction designed in this paper is 3.234, which is in the range of average to good grade. To a certain extent, it shows that the intelligent management system for grassroots party organization construction designed in this paper has good practicality, but it also needs to carry out relevant optimization and upgrading for the system architecture, so as to provide guarantee for further promoting the information development of grassroots party organization construction.

4.2 Performance Verification Analysis of Intelligent Management System

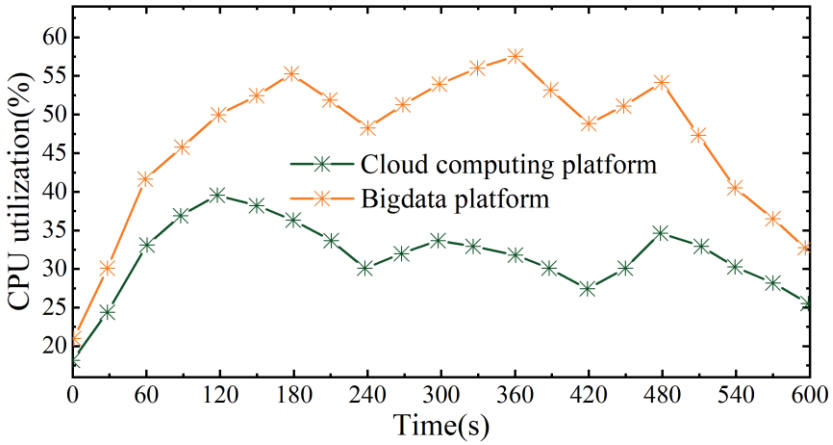
4.2.1 Utilization rate and response time

The efficiency of performance testing in cloud computing platforms regarding the intelligent management system for grassroots party organization building is usually related to the number of computing nodes in the cloud environment, and the higher the number of nodes, the more virtual machine instances can be created for the users to execute the corresponding performance testing scripts to achieve the purpose of improving the testing efficiency.

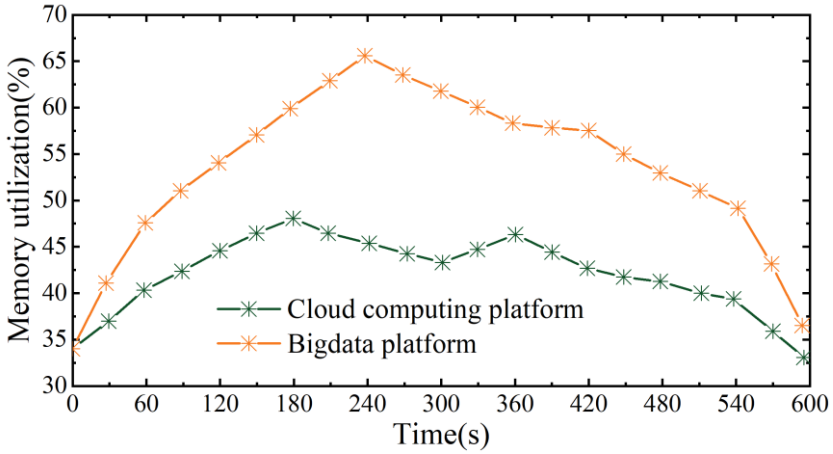
In this cloud performance testing platform, we use one physical machine as CloudStack management server node and two physical machines as compute server nodes. These three physical machines are configured with Intel® Core® i3 10300 3.6GHZ, 16G RAM, and Ubuntu Desktop as the operating system.On one CloudStack compute node server, three VM instances are created, and these three VMs are used as load machines. On another compute node server, create 1 VM instance and use this VM as a deployment machine.

(1) Comparative analysis of resource utilization. Comparatively analyze the CPU and memory utilization of the load virtual machines of the intelligent management system for

grassroots party organization construction based on cloud computing platform and big data platform through testing experiments. Expand the scale of the initial test case design and design a total of 600 test case data as the initial input domain of this system to be tested. Under the cloud test platform, the resource utilization of the VM instances is recorded every 2 minutes. In order to ensure the correctness and reliability of the experimental results, we conducted a total of 10 experiments under the same test conditions, and after taking the mean value of them, the results of their resource utilization comparison are shown in Fig. 4, where Fig. 4(a)~(b) shows the trends of CPU and memory utilization, respectively. The results show that the intelligent management system for grassroots party organization construction constructed based on the cloud computing platform shows a significant reduction in CPU and memory utilization compared with that based on the big data platform, which effectively improves the utilization efficiency of the corresponding resources.



(a) CPU utilization



(b) Memory utilization

Figure 4: Comparison results of resource utilization rate

(2) Comparative analysis of response time under different load conditions. Comparative analysis of the changes in response time corresponding to the execution of test tasks for users under different load conditions for the intelligent management system for grassroots party organization construction based on cloud computing platform and big data platform. We tested a total of 10 sets of data, and after taking the average value, we obtained the trend of response

time as shown in Figure 5. The results show that in the case of the performance test environment configuration are the same, due to the use of the cloud computing platform based on the grassroots party organization construction intelligent management platform performance test to improve the utilization efficiency of the resources of each load virtual machine. Therefore, under different load conditions, the time required to perform test tasks for users is shortened and the efficiency of performance testing is improved.

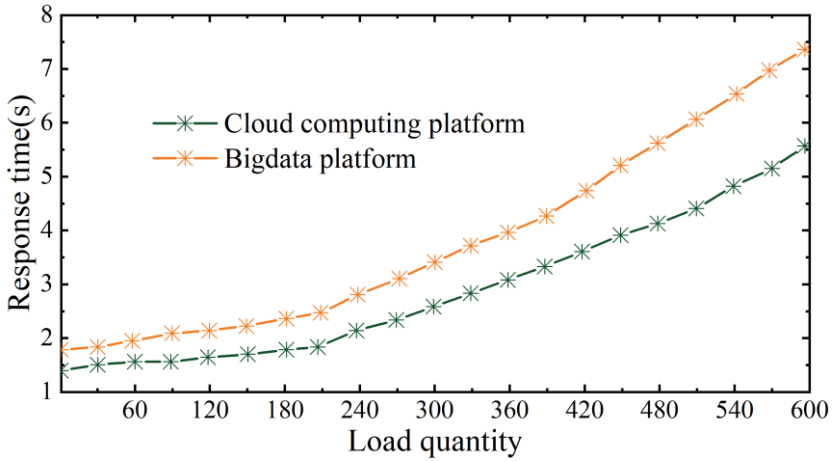


Figure 5: Comparative analysis of response time

4.2.2 Throughput and clicks per second

A standardized performance testing process can help the test discover potential performance problems and bottlenecks, and also ensure the repeatability and comparability of the performance test. In this LoadRunner-based performance test of the Intelligent Management System for Grassroots Party Organization Construction, the testing process is, in order, to familiarize with the system under test, formulate the performance test plan, design the test script, design and run the scenarios and analyze the test results. The component Analysis data analysis tool in LoadRunner is used to analyze the performance test results.

Hits per second is the number of HTTP requests a client makes to the server per second, and can also be used to measure the amount of load generated by a virtual client. Throughput is the amount of data a virtual client gets from the server per second and can be used to assess whether there is a bottleneck in the server's ability to handle the traffic. If the system is operating normally, the number of hits is proportional to the throughput, and vice versa, the system is operating abnormally. Figure 6 shows the trend of the number of clicks per second versus throughput at 100 users.

From the graph, it can be seen that as the number of clicks increases the throughput becomes larger, between 2 minutes 15 to 2 minutes 45 seconds there is a lag in the throughput data than the number of clicks per second, this is because the scenario simulation is to send a request to the server before responding to the throughput is the server response, so there will be a lag in the data. Overall, the curves of the two graphs are normal and basically the same, the server is able to respond to the client's request in time and return the results, which indicates that the server is in normal working condition when there are 100 users concurrently, and it is able to satisfy the demand for intelligent management of the grassroots party organization construction.

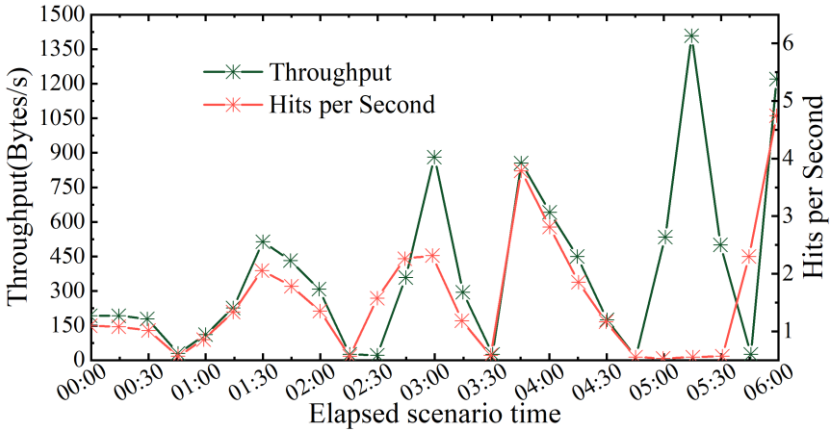


Figure 6: Throughput - Hits per Second

5 Conclusion

The construction of the intelligent management system for grassroots party organization construction provides an effective path for the transformation of party building work informatization. Through the organic combination of the three-layer architecture of the cloud computing platform and the B/S model, the networkization and intelligence of party management is realized. The results of system quality and efficiency assessment show that among the 14 secondary indicators, the weight value of management mechanism reaches 0.0976, which is in the first place, fully reflecting the core position of management in system construction; the weights of operation and maintenance and information management are 0.0838 and 0.0918 respectively, which ensures the stable operation of the system and the effective utilization of data. The performance test data show that the cloud computing platform has obvious advantages in resource utilization efficiency compared with the big data platform, with CPU and memory utilization reduced significantly and system response time shortened. The fuzzy comprehensive evaluation score of 3.234 indicates that the overall performance of the system is good, which basically meets the intelligent management needs of grassroots party organizations. The successful construction of the system not only improves the efficiency of party building work, but also provides referenceable experience for the informationization construction in other fields. In the future, it should continue to optimize the system architecture and improve the user experience, so as to promote the development of grassroots party building work to a higher level.

Funding

This work was supported by the National Social Science Foundation Youth Project "Construction of a Database of Overseas Returnees Around the Founding of New China and Research on Their Patriotic Spirit (1948–1956)" (Grant No. 24CKS118), the Tianjin Philosophy and Social Sciences Planning Key Project "Research on the Exemplary Role of Rural Party Members in Promoting Comprehensive Rural Revitalization" (Grant No. TJFHZYYJ24-10), and the Tianjin Normal University-level Research Project "Historical Process and Experience of Modernization Coordinating Material and Spiritual Civilizations" (Grant No. 52WT2237).

About the Authors

Ying Chen was born in Nanchang, Jiangxi, China, in 1987. She obtained a Master's degree from the Party School of the Central Committee of the Communist Party of China (Central Party School), and a Ph.D. in Law from Nankai University. She is currently a Lecturer and Master's Supervisor at the School of Political Science and Public Administration, Tianjin Normal University. Her research focuses on political governance theory and historical studies of the Chinese Communist Party, with particular emphasis on macro-level political management.

References

[1] Mittelstaedt, J. C. (2021). Rebuilding authority: the Party's relationship with its grassroots organizations. The China Quarterly, 248(S1), 244-264.

[2] Zhang, J. (2023, July). Design and implementation of grassroots party building work system based on micro service system. In 2023 2nd International Conference on Educational Innovation and Multimedia Technology (EIMT 2023) (pp. 421-427). Atlantis Press.

[3] Zhang, X. (2019, January). Development Power of Party Building Work at the Grassroots Level in Enterprises in the New Era. In 2018 6th International Education, Economics, Social Science, Arts, Sports and Management Engineering Conference (IEESASM 2018) (pp. 524-527). Atlantis Press.

[4] Halvorsen, S. (2023). The role of territory in grassroots party-building: insights from Argentina. Territory, Politics, Governance, 11(7), 1303-1323.

[5] Liu, Z., Ou, T., Chen, X., & Qin, H. (2019, October). Research on the Construction of School Village Party Against the Background of Big Data Taking Zhuhai College of Jilin University and Hetian Village as an Example. In 2nd International Conference on Contemporary Education, Social Sciences and Ecological Studies (CESSES 2019) (pp. 855-859). Atlantis Press.

[6] Rüdig, W., & Sajuria, J. (2020). Green party members and grass-roots democracy: A comparative analysis. Party politics, 26(1), 21-31.

[7] Miao, L. (2025). Exploration on Grassroots Party Building Innovation Driven by Big Data. Scalable Computing: Practice and Experience, 26(2), 964-972.

[8] Li, H., & Zhang, C. (2022). THE CONSTRUCTION AND INFLUENCE MECHANISM OF SOCIAL PSYCHOLOGY ON THE COHESION OF GRASS-ROOTS PARTY CONSTRUCTION ORGANIZATIONS IN COLLEGES AND UNIVERSITIES. Psychiatria Danubina, 34(suppl 2), 342-342.

[9] Lin, Y., & Bu, X. (2022). “Internet+ Party Building”: Research on the Integrated Management System of Grassroots Party Building at the Fingertips. Creative Education, 13(11), 3593-3601.

[10] Zhu, W. (2024). Practice and Exploration of the Construction of Rural Grass-roots Party Organizations in the New Era. Journal of Humanities, Arts and Social Science, 8(4).

[11] Hu, X. H. (2015). Challenges and coping methods for the grass-roots organization of our party strengthening social management—based on investigation and survey on GT village in central Henan Province of North China: Xiao He Hu. In Computing, Control, Information and Education Engineering (pp. 623-626). CRC Press.

[12] Wan, H., & Wang, Y. (2022, July). The Design of the Multimedia System for the Informationization of the Party Building Work in the Primary Party Organizations of Colleges in the New Era. In 2022 International Conference on Inventive Computation Technologies (ICICT) (pp. 1164-1167). IEEE.

[13] Deng, Q. (2023). Discussion on the Modernization of Grass Roots Social Governance Guided by Party Building in the New Era. Journal of Humanities, Arts and Social Science, 7, 155-159.

[14] Zhao, H. (2021, September). Analysis and design of government governance service platform based on internet of things application. In 2021 4th International Conference on Information Systems and Computer Aided Education (pp. 319-323).

[15] Gao, H. (2021, February). Study on the Gridding Public Management of the Community under the Background of Intelligent Society. In 2021 International Conference on Public Management and Intelligent Society (PMIS) (pp. 320-323). IEEE.

[16] Shang, L. (2018, May). A Dysfunction Analysis of Grass-roots Party Organizations in the New Field of Party Building??"??" Based on Internet Thinking. In 2018 4th International Conference on Humanities and Social Science Research (ICHSSR 2018) (pp. 408-413). Atlantis Press.

[17] Wenhua Zhu. (2024). Practice and Exploration of the Construction of Rural Grass-roots Party Organizations in the New Era. Journal of Humanities, Arts and Social Science,8(4).