Modeling of Member Behavior Data and Evaluation System of Organizational Capability in the Smart Organization Construction Platform

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Keywords: Smart Organization Construction; Member Behavior Data; Data Modeling; Organizational Capability; Index System

Abstract: With the widespread deployment of smart organization construction platform, the behavior data generated by members in the platform is increasingly rich. This paper focuses on the modeling method of member behavior data and the construction of evaluation system of grass-roots organizational strength, and explores the governance path of organization construction driven by data. By combing the multi-source behavior data in the platform of smart organization construction, the key characteristics such as activity, participation, persistence and interaction are extracted, and a member behavior classification model based on cluster analysis is constructed. On this basis, combined with the theoretical connotation of organizational capability, an evaluation index system covering four dimensions: political leadership, organizational execution, mass cohesion and innovative service power is designed. The purpose of the study is to promote the transformation of organizational construction evaluation from empirical and qualitative to data and structure, and to improve the scientific and forward-looking management of grass-roots organizations. The model and system can provide theoretical reference for the functional optimization and decision support of the platform for building smart organizations, and help improve the quality and efficiency of organizational construction in the new era.

1. Introduction

Digitalization and intelligence are profoundly reshaping all fields of social governance, and the construction of organizations has gradually entered the era of "smart organization construction". In recent years, organizations at all levels have actively promoted the informatization construction of organizational construction, and built a smart organization construction system that covers the functions of member management, learning and education, organizational life, and open organizational work [1]. This kind of platform not only improves the efficiency of organizational construction and management, but also enhances the convenience of members' participation, and at the same time, it continues to accumulate a huge amount of member behavior data [2]. These data are no longer simple operation logs, but important information resources that reflect the performance of individual members and the running state of grass-roots organizations.

For a long time, the evaluation of members' performance and organizational effectiveness mostly depends on annual appraisal, organizational appraisal or subjective judgment of leaders [3]. There are some problems in the evaluation process, such as long cycle, fuzzy standards and lagging feedback, which make it difficult to achieve dynamic and refined management. Especially in the background of widely distributed members and enhanced mobility, the traditional management model increasingly shows the shortcomings of asymmetric information and untimely response [4]. The popularity of the platform for the construction of smart organizations provides a technical possibility for solving this dilemma. By systematically collecting and analyzing members' behavior

  DOI: 10.25236/icceme.2025.038

tracks in the platform, members' participation status, sense of responsibility and pioneering role can be described more objectively, and then data support can be provided for organizational evaluation [5].

By combing the data sources and characteristic types of members' behaviors, this study designs a behavior modeling method suitable for organizational construction scenarios, and strives to reveal the inherent laws of members' participation. On this basis, combined with the theoretical connotation of organizational strength, an evaluation system with clear hierarchy and measurable indicators is constructed, covering political guidance, organizational execution, mass contact, innovative service and other dimensions, and a dynamically renewable organizational strength evaluation model is formed. Through the systematic modeling of member behavior data and the innovative design of organizational strength evaluation system, it is expected to promote the transformation of organizational construction from passive response to active early warning, from extensive management to precise policy.

2. Smart Organization Construction Platform and Member Behavior Data Base

The platform of smart organization construction is the product of the deep integration of information technology and organization construction, and its essence is to reconstruct the operation mechanism and management mode of organization construction by means of information technology. This kind of platform is usually based on Web or mobile applications, and integrates many functions such as member management, online learning, organizing life records, voluntary service registration, democratic appraisal and so on. These systems not only improve work efficiency and expand coverage, but also quietly change the form of members participating in organizational life. More and more organizational work activities are "online", and every time you log in, study, sign in and leave a message, you will leave a traceable behavior trace in the background of the system.

Member behavior data is not a single type of information collection, but a multi-source, heterogeneous and procedural composite data system [6]. From the source point of view, it mainly includes platform operation log, learning record, participation information of organization activities, interactive communication content and so on. These data not only have structured fields (such as time, place and operation type), but also contain semi-structured or even unstructured content (such as comments and comments), showing typical characteristics of "small data and great significance".

In specific applications, the value of member behavior data lies not only in "recording", but also in its potential to be analyzed and interpreted. By combing and integrating these data, the track of members' political participation in a certain period can be preliminarily restored. These judgments are difficult to find only by manual observation, but they may be identified by data modeling [7]. For this reason, behavioral data is essentially a "digital mapping" of members' political life status, and it is a supplement and extension to the traditional way of organization inspection.

It is worth noting that at present, the utilization of data by many platforms is still in the primary stage-mainly used for statistical report generation or superior inspection and evaluation, lacking in-depth excavation of the logic behind behavior. Some systems even have data islands, and the information between different modules can't be opened, which makes it difficult to form a complete portrait of members. In addition, the data quality is also uneven, and there are some phenomena such as missing records, time confusion and identity mislabeling, which bring some interference to the follow-up analysis.

From the perspective of organizational strength, the collection of individual behaviors of members is directly related to the function of grass-roots organizations. The cohesion, execution and appeal of an organization are often reflected in the overall participation level and synergistic effect of its members [8]. If most members are in a "silent state" for a long time, even if the platform technology is advanced, it is difficult to really activate the organizational vitality. Based on this reason, it is a key step to transform the scattered individual behavior data into the evaluation basis of organizational operation.

3. Member Behavior Data Modeling

The core goal of member behavior data modeling is to transform fragmented operation records into an analyzable, classifiable and early-warning behavior characteristic system. This process is not a simple technical application, but needs to combine the actual logic of organizational construction work to design an analysis framework that meets the needs of organizational management.

The first step of modeling is data preprocessing. There are many problems in the original data, such as repeated records, abnormal time stamps and missing identity information. For example, some members fail to complete online check-in due to equipment failure, and the system may mark them as "absent"; Or the behavior is confused due to account sharing. For this reason, it is necessary to clean and correct before modeling. For the missing values, the pre-and post-interpolation method is used to complete, so as to avoid the influence of individual data missing on the overall trend judgment. After cleaning, the data enters the feature extraction stage.

The extraction of behavioral characteristics needs to focus on the key dimensions of organizational construction. Referring to the common concerns of grass-roots organization management, this paper constructs feature vectors from four basic dimensions: activity, participation, persistence and interaction. Each dimension is quantified by specific indicators:

Activity reflects the overall usage frequency of members on the platform, which is defined as the weighted sum of the number of logins and the number of learning tasks completed per unit time.

$$A_i=\alpha\cdot\frac{L_i}{\bar{L}}+\beta\cdot\frac{C_i}{\bar{C}}(1)$$

Where A_i is the activity score of member i, L_i is its login times, C_i is the number of learning tasks completed, $\bar{L}$ and $\bar{C}$ are the group average, $\alpha+\beta=1$, and the weight can be adjusted according to the actual emphasis.

Participation is used to measure the actual investment of members in organizational activities, including the attendance rate of organizational life and the frequency of volunteer service participation.

$$P_i=\frac{N_{attended,i}}{N_{total}}(2)$$

That is, the ratio of the actual number of participants to the total number of participants.

Persistence is used to examine the stability of behavior and avoid "surprise" participation. The coefficient of variation (CV) is used to measure the fluctuation degree of the study or check-in time interval;

$$S_i=1-\frac{\sigma_t}{\mu_t}(3)$$

σ_t and μ_t are the standard deviation and mean value of the time interval, respectively. The closer the value is to 1, the more regular the behavior is.

Interactivity reflects the willingness of members to communicate and cooperate within the organization, such as the number of speeches in the discussion forum, the number of praises, and the frequency of responding to other people's comments.

After feature extraction, it enters the stage of behavior pattern recognition. In this paper, K-means clustering algorithm is used to classify members. Taking the standardized features of the above four dimensions as input vectors and setting the cluster number k=3, three typical behavior patterns are preliminarily divided into "active", "conventional" and "marginal". The clustering center is determined by iterative optimization, and the distance is measured by Euclidean distance:

$$d(x_i,c_j)=\sqrt{\sum_{d=1}^{4}(x_{i,d}-c_{j,d})^2}(4)$$

Where x_i is the feature vector of the i member and c_j is the j cluster center.

In actual operation, it is found that some members' behaviors change in stages, for example, a member's performance in the first two months is mediocre, and then suddenly becomes active.

Therefore, the sliding window mechanism is introduced, and the eigenvalues are calculated on a monthly basis to observe the category migration. If it changes from "marginal" to "active" for two consecutive periods, the system can be marked as "progressive individual" for the organization to focus on and motivate.

4. Construction of Organizational Strength Evaluation System

The construction of evaluation system needs to clarify the basic logic first: organizational strength is not a single ability, but a composite system composed of multiple sub-abilities. This paper divides organizational strength into four core dimensions: political leadership, organizational execution, mass cohesion and innovative service. Political leadership reflects the organization's ability to control ideological construction and political direction. Organizational execution pays attention to the implementation of the living system within the organization. The cohesion of the masses reflects the actual results of the organization in contacting and serving the masses. Innovative service ability measures the exploration and adaptability of grass-roots organizations in their working methods.

On the basis of index design, it is necessary to reasonably determine the weight of each index. In this paper, analytic hierarchy process (AHP) is used to determine the subjective weight, and then the objective weight is calculated by entropy weight method, and finally the comprehensive weight is obtained by linear combination.

The evaluation adopts linear weighted model to calculate the comprehensive score:

$$E=\sum_{i=1}^{n} w_i \cdot s_i \quad (5)$$

Table 1 Organizational Capacity Evaluation Index System

Primary Indicator	Secondary Indicator	Data Source	Calculation Method / Formula	Weight (Example)	Unit
Political Leadership	Theoretical Learning Completion Rate	Learning task records	Completed tasks / Assigned tasks	0.25	Unitless
	Learning Duration Compliance Rate	Learning logs	Number of compliant members / Total members	0.15	Unitless
Organizational Execution	Organizational Activity Attendance Rate	Check-in records	Actual attendance / Expected attendance	0.20	Unitless
	Timely Submission Rate of Meeting Materials	Document upload timestamps	Timely submissions / Total required submissions	0.10	Unitless
Mass Cohesion	Average Volunteer Participation per Member	Volunteer activity registration	Total participations / Number of party members	0.12	Times/person
	Public Satisfaction Score	Public opinion surveys	Weighted average score (1–5 scale)	0.08	Score
Innovation & Service	Monthly Platform Activity (per capita)	Login frequency logs	Average monthly logins / Total party members	0.06	Times/person
	Content Contribution Index	Number of submitted reports, reflections, cases	Standardized contribution (Z-score)	0.04	Unitless

Where E is the total score of organizational strength, w_i is the normalized weight of the i index, and s_i is the normalized score of this index (between 0 and 1). The final score is divided

into four grades: ≥0.8 is "strong", 0.6–0.8 is "strong", 0.4–0.6 is "average" and < 0.4 is "weak", which is convenient for intuitive judgment of organizational status. In order to show the evaluation architecture more clearly, Table 1 lists the main indicators and their technical descriptions.

5. Suggestions for Optimizing the Construction of Smart Organizations

At present, most systems only provide basic statistical reports, lacking automatic identification of behavior trends and abnormal early warning. It is suggested that the data analysis module should be integrated in the background to realize the dynamic display of the results of member behavior classification. For example, when the proportion of "marginal" members in a grass-roots organization exceeds 40% for two consecutive months, the system can automatically trigger a reminder to remind superior management units to pay attention to organizational vitality. Similarly, for members who have not logged in for a long time and whose learning tasks continue to lag behind, a hierarchical early warning mechanism can be set up, and the branch secretary can conduct directional communication to avoid management blind spots.

An "organizational dashboard" can be added to the platform to visually present the scores of each dimension in the form of radar charts and trend lines, so as to help organizational workers quickly grasp the operational status of the organization. At the same time, the evaluation results should not be simply ranked or publicly reported, but should be used as an internal diagnostic tool to guide resource allocation and work improvement.

At present, the organizational construction system is often isolated from platforms such as government affairs, personnel and trade unions, forming an information island. In the future, we can explore the realization of identity docking with the organization and personnel system and data sharing with the volunteer service system under the premise of ensuring security, so as to improve data integrity and application breadth.

With model iteration and data accumulation, we can try to introduce lightweight forecasting function, such as predicting the possible downward trend of participation of a certain type of organization or recommending suitable organizational life style. The application of technology should always serve the essential goal of organizational construction, and cannot replace traditional effective practices such as heart-to-heart talk and ideological guidance.

6. Conclusions

The platform of smart organization construction is the product of the deep integration of information technology and organization construction, and its essence is to reconstruct the operation mechanism and management mode of organization construction by means of information technology. Focusing on the utilization of members' behavior data in the smart organization construction platform, this study puts forward a set of systematic ideas from individual behavior modeling to comprehensive evaluation of organizational strength. The evaluation system of organizational strength is not only clear in structure and operable in indicators, but also gives consideration to subjective experience and data objectivity in weight design, which enhances the rationality and adaptability of evaluation. In the future, with the deepening of data accumulation and the improvement of algorithm ability, the construction of smart organization is expected to move from "passive recording" to "active early warning" and even "intelligent assistant decision-making".

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