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Practice and Optimization Path of Digital Empowerment in Managing Micro-corruption of Village-level Powers in Y City

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Abstract: Utilizing digital technology to supervise micro-powers is currently a primary means expected by the government to improve grassroots oversight. However, as the application of this technology has just emerged, there are not many related literatures and studies. In this regard, this paper takes the "Village Affairs Integrity Dingban" digital supervision application platform in Y City as an example to explore the internal mechanisms, specific achievements, and potential issues and risks in the process of empowering the supervision of village-level micro-powers through digital means. Further research is conducted to propose targeted optimization paths.

1. Introduction

Village-level micro-powers are closely related to the lives of grassroots citizens. However, under traditional oversight mechanisms, there exist numerous risky and vulnerable areas, which can easily lead to the erosion of village-level micro-powers affecting the collective interests of the village and even the personal interests of villagers. Studying practical cases of grassroots discipline inspection and supervision organizations applying digital technology to empower the management of corruption in village-level micro-powers aligns with the continuous development of democratic autonomy system construction towards modernization of the governance system and governance capabilities. Additionally, through researching their work paths, it helps to refine and summarize innovative experiences in this direction, providing methods and ideas for grassroots supervision work.

2. A Brief Review of Existing Research and the Introduction of This Study

With the advent of the information age, there are currently studies available on the use of digital technology to enhance supervisory efficiency. Jiang Shenghui believes that the application of digital technology by government departments can achieve precise supervision[1]. Huang Qisong and Qiu Longyun point out that the internal logic of its function lies in the integration of data, followed by comparison and analysis to implement supervision[2]. Tan Haibo finds that data investigation can promote precise supervision, integrity early warning can enhance efficient supervision, and the

implementation of responsibilities can facilitate seamless supervision[3]. Li Hui notes that digital technology reduces information asymmetry and breaks down information barriers between departments[4]. Zhang Jun and Ni Xing also argue that the degree of completeness in e-government construction is correlated with the frequency of corruption[5]. However, Xiao Bin contends that since government information cannot be fully and effectively disclosed, its effect on inhibiting corruption is limited[6]. Focusing on the practices and explorations of citizens leveraging digital supervisory platforms, Zheng Yongnian believes that digital technology empowers the public and enhances their political participation[7]. Nevertheless, most current literature remains at the surface description of related mechanisms, lacking deep thinking and exploration in terms of mechanisms. In this regard, this paper will take the "Village Affairs Integrity Nail Office" in City Y as an entry point to delve into the specific mechanisms and optimization paths of digital empowerment in managing corruption involving minor powers at the village level. The research findings will have significant practical implications for guiding practical work.

3. Case Presentation

3.1. The Development Situation

This paper takes Y City's "Village Affairs Integrity DingBan" as an example to explore the advanced nature and potential risks of digital technology in the supervision of village-level micro-powers, and attempts to propose targeted optimization paths through analysis.

"Village Affairs Integrity DingBan" is an initiative by Yiwu City to explore and promote innovation based on modern concepts. This platform systematically organizes and integrates 24 high-frequency village affairs such as seal usage, employment and labor, and village-level project management, reconstructs their approval and operation processes, and forms a closed-loop mechanism of "application - approval - copying - implementation - feedback - evaluation". It establishes a source-based and embedded grassroots supervision system, realizing "palm-based supervision, palm-based disclosure, and palm-based governance" of village affairs. Since its launch at the end of 2019, the platform has been promoted in all 537 villages and communities in Y City

3.2. Specific achievements

Strengthening supervision and accountability, and standardizing the supervision process. The supervision platform sets a clear path for supervision work through backend operating rules, and utilizes data collection, comparison, analysis, and cross-checking to monitor the exercise of power, thereby addressing issues of weak or ineffective supervision at the grassroots village level. At the same time, it also records key information such as business entities and processing flows in detail. Municipal discipline inspection and supervision organizations can query the supervision platform to obtain real-time progress information and operational details of supervision tasks, facilitating the traceability and verification of grassroots supervision responsibilities and enhancing the standardization of grassroots supervision.

Enhancing the convenience of information acquisition and emphasizing the timeliness of supervision. With the real-time collection and updating of the supervision database through the digital supervision platform, grassroots discipline inspection and supervision personnel can comprehensively grasp the supervision information of the supervised entities, significantly improving the efficiency of querying supervision information and conducting supervision work. Furthermore, by analyzing and cross-checking supervision data based on algorithmic rules, problematic data that does not conform to logical operations can be identified and flagged for early warning, reinforcing the timeliness of supervision.

Lowering the threshold for participation and increasing public willingness to supervise. Influenced by relevant assessment mechanisms, the supervision platform ensures that public opinions and suggestions are responded to or fed back within a specified time frame, resulting in high response rates and short feedback times. This has increased the recognition and usage intention of grassroots residents towards the "Village Affairs Integrity DingBan," attracting more of them to participate in the supervision of village affairs. As a result, the strength of democratic supervision has been further enhanced.

4. Implementation Path

4.1. The normalization and embedding of power operation rules

By sorting through 24 high-frequency village-level matters such as village projects, official seal management, labor employment, and collective assets and resources, business modules have been established within the system according to the requirements of standardization and simplification, enabling the entire process of these matters to be handled online. Currently, the platform has established 93 sub-modules, 24 approval processes, set 3,757 minimum fields, and reformed 21 operational mechanisms. Additionally, supervision rules and algorithmic models have been constructed. Based on the risks and patterns of village-level micro-power operation, 23 dimensions of supervision rules and algorithmic models have been developed to provide intelligent warnings on work efficiency, suspected issues, and other matters, and to push these to the responsible units for handling.

4.2. Optimization and clarification of supervision entities' responsibilities

Through the construction and use of the digital supervision platform, the departmental division system for the three-level vertical supervision of "city-town-village" has been further streamlined. According to the division of labor, the Y City Discipline Inspection and Supervision Commission is responsible for the construction and management of the digital supervision platform. The town and street discipline inspection commissions are responsible for using the platform to conduct daily supervision within their jurisdictions and respond to risk warnings from higher-level authorities. The village-level supervision work liaison stations are responsible for using the platform to conduct village-level supervision and report issues. The clear division of responsibilities among the discipline inspection and supervision organizations at all levels not only enhances their overall coherence and coordination but also promotes the improvement of supervision synergy.

4.3. Citizen-oriented data construction and management

Following the "citizen-oriented" government performance evaluation model, it is required that the interests of villagers (residents) serve as the starting and ending points for village-level affairs. The "Village Affairs Integrity Nail Office" digital supervision platform, centered around the aspirations of the masses, integrates a series of core functions such as government affairs supervision, basic management of village and community affairs, and public services, while implementing differentiated designs in the supervision module. The platform persists in "exposing" the livelihood issues of high concern to villagers and major matters of village and community collectives, achieving full-process and round-the-clock disclosure of these matters, thereby comprehensively receiving and addressing feedback and suggestions from the masses.

5. Facing Risks and Challenges

5.1. Risk of absence of supervision entities

Digital technology inherently has a usage threshold, which excludes a portion of the population from the target group for digital supervision. To address this, a total of 190 questionnaires were distributed to villagers (residents) through a survey method, conducting detailed investigations on aspects such as their experience with the platform and the rationality of its design, in order to gain a deep understanding of the information relevant to this paper. Based on the data collected from the initial questionnaires, this section analyzes the relationship between gender, age, education level, and the willingness to adopt digital supervision, and identifies which segments of the supervision entities may be at risk of absence.

Table 1: Distribution of willingness to adopt digital supervision across different age groups

			Whether digital supervision will be adopted for village (community) affairs supervision		Total
			Yes	No	
Age	18-30 years old	Counting	12	4	16
		Percentage of age	75.0%	25.0%	100.0%
	31-40 years old	Counting	29	13	42
		Percentage of age	69.0%	31.0%	100.0%
	41-50 years old	Counting	52	21	73
		Percentage of age	71.2%	28.8%	100.0%
	51-60 years old	Counting	21	17	38
		Percentage of age	55.3%	44.7%	100.0%
	60 years old and above	Counting	10	11	21
		Percentage of age	47.6%	52.4%	100.0%
Total		Counting	124	66	190
		Percentage of age	65.3%	34.7%	100.0%

As can be seen from Table 1, the young respondent group aged 18-30 has a very high acceptance of digital supervision, reaching 75%; among respondents aged 31-40 and 41-50, 69% and 71.2% respectively indicated that they would adopt digital supervision; among respondents aged 51-60, although more than 55.3% still expressed their willingness to adopt digital supervision; the proportion of respondents aged 60 and above who are willing to adopt digital supervision further decreases to 47.6%. This change indicates that as age increases, respondents' acceptance of digital supervision gradually decreases, which is related to factors such as older adults' adaptability to new technologies, learning costs, and the digital divide.

According to Table 2, the distribution of willingness to adopt digital supervision methods for village (community) affairs supervision among groups with different educational backgrounds can be observed. Among respondents with an educational background of primary school or below, none expressed willingness to adopt digital supervision, accounting for 0%, indicating this group's complete lack of understanding or acceptance of digital supervision. As the educational level increases, the proportion of those willing to adopt digital supervision begins to rise significantly. Among respondents with a middle school education, 51.6% indicated they would adopt digital supervision; for those with a high school/technical secondary school education, the proportion willing to adopt digital supervision is 53.4%, suggesting that as education levels improve, people gradually recognize the convenience and efficiency of digital supervision. Among respondents with a college degree or above, the proportion willing to adopt digital supervision is as high as 77.8%,

far exceeding other educational groups. This result not only verifies the positive correlation between educational background and acceptance of digital supervision but also indicates that highly educated groups have an advantage in accepting and applying new technologies and methods.

Table 2: Distribution of willingness to adopt digital supervision across different education levels

			Will the method of digital supervision be adopted for the supervision of village (residential) affairs		Total
			Yes	No	
Education level	Primary school or below	Counting Percentage of educational attainment	0	2	2
			0.0%	100.0%	100.0%
	Junior high school	Counting	16	15	31
		Percentage of educational attainment	51.6%	48.4%	100.0%
	High School or VocationaHigh School	Counting	31	27	58
		Percentage of educational attainment	53.4%	46.6%	100.0%
	Associate degree or above	Counting	77	22	99
		Percentage of educational attainment	77.8%	22.2%	100.0%
Total		Counting	124	66	190
		Percentage of educational attainment	65.3%	34.7%	100.0%

5.2. Operational risk in monitoring information

The efficiency of digital supervision platforms is built upon the foundation of comprehensive and accurate databases. To meet the demand for providing true and precise data for in-depth analysis, digital supervision platforms must have the capability to collect, aggregate, and upload data in real time during their daily operation. However, in practical operation, this process faces multiple challenges. For instance, the staff responsible for entering relevant information are often not completely rational or neutral. They may be influenced by factors such as personal laziness, interpersonal considerations, and the surrounding environment, leading them to adopt measures such as simplifying procedures or tampering with data during the supervision information entry process to cope with inspections from superiors. This results in the loss of valuable supervision information and the emergence of information operational risks. The existence of this risk not only increases the cost of grassroots supervision but also requires supervisors to manually filter out a large amount of invalid data to select effective data, thereby increasing the labor and time costs of grassroots supervision. The reduction in supervision effectiveness further triggers resistance among platform users towards digital supervision methods.

5.3. Technical risks of the supervision system

The generation process of village affairs supervision data, including investigation, collection, entry, storage, and subsequent utilization, is crucial, and improper handling or lax management at any step may result in data breaches. Taking the "Village Integrity Nail Office" application platform as an example, the main causes of data security issues include the following: Firstly, the front end

collects residents' personal information through questionnaire forms, and negligence in this process can easily lead to information leakage, triggering public panic over personal privacy breaches. Secondly, as data continues to accumulate, old data is not deleted promptly, and new data, along with platform operation records, is constantly generated. When the data storage method fails to meet storage requirements, information redundancy occurs. If there are any omissions in platform operation scripts, necessary technical investments, and subsequent maintenance, the platform becomes vulnerable to security threats or inadequate maintenance, leading to its abandonment.

6. Optimized Path

6.1. Emphasize the Full Participation of Supervision Entities

To overcome the obstacles posed by the "Village Integrity Nail Office" supervision platform to some villagers (residents), especially those with lower educational backgrounds, in promoting it at the grassroots level of villages and communities, and to ensure the effective achievement of democratic supervision goals, corresponding measures need to be taken. Firstly, government departments need to enhance the digital skills of villagers (residents). This can be achieved through platforms such as universities for the elderly and community classrooms to improve their skills in using computers and smart devices, thereby promoting the widespread use of smart tools. Secondly, government departments need to mobilize social organizations and volunteers to provide in-home guidance. This personalized guidance approach can precisely help villagers (residents) improve their skills in information retrieval and online submission of feedback. Thirdly, government departments need to organize collective activities for ideological popularization. By holding lectures, exchange meetings, and other forms, stimulate villagers' (residents') interest and participation in digital supervision. Fourthly, government departments need to simplify the interface and lower the usage threshold, continuously optimize the operation interface of the digital supervision platform, reduce unnecessary complexity, and make it more concise and user-friendly, so that even the elderly and those with lower educational backgrounds can easily participate in supervision, ensuring the breadth and effectiveness of democratic supervision.

6.2. Enhancing the Systematic Integration of Oversight Tools

The core effectiveness of the "Village Affairs Integrity Management on DingTalk" lies in the meticulous design and optimization of administrative processes, which involves scientifically and reasonably adjusting business processes within the flexible framework of the system, while ensuring that the process design strictly adheres to legal procedures. Firstly, it is necessary to improve the standards for collecting oversight data by establishing rigorous and standardized guidelines for data collection, clearly defining the scope, specific procedures, and core content of data collection to enhance its feasibility and practicality in actual operations. Secondly, the closed-loop management of oversight information should be enhanced by strictly implementing an online feedback handling mechanism and considering whether village affairs information forms a closed-loop management as an important performance indicator for village officials' duty fulfillment. Thirdly, the analytical and judgment capabilities of digital technology should be improved by collaborating with multiple parties, including the discipline inspection commission, organization department, politics and law committee, civil affairs department, and agricultural department, to jointly optimize the top-level design of the digital oversight platform, ensuring its practicality and efficiency. Additionally, the design of algorithmic formulas should be refined to enable precise analysis and judgment.

6.3. Operational risk in monitoring information

At the grassroots level, digital technology can be utilized to enhance the transparency of supervisory information, ensuring the effective and smooth operation of the democratic supervision system. Firstly, government departments need to improve the system of village affairs disclosure, increase the level of village affairs disclosure through digital supervision platforms to safeguard villagers' rights to information and supervision. Secondly, government departments need to rely on digital supervision platforms to integrate and optimize administrative resources, and improve the mechanism for handling, feeding back, and evaluating information such as public reports, complaints, suggestions, and inquiries, ensuring that every aspect of people's livelihood and public sentiment can receive a response. Thirdly, government departments need to improve the electronic data archiving mechanism and establish a well-defined registration and circulation system, including unifying the format of forms and standardizing key information such as record content, time, and processes.

7. Conclusion

Through the practical application of the "Village Affairs Integrity Nail Office" platform in City Y, this study believes that digital empowerment of village-level micro-power supervision has achieved remarkable results, effectively compensating for the current deficiencies in grassroots supervision and exhibiting vast application prospects. It can be said that digital supervision methods have brought revolutionary improvements to the management of village-level micro-power corruption. However, due to current technological limitations and variations in local customs and social conditions, its development still faces certain challenges, and the widespread application of digital means in village-level micro-power supervision will take time. Looking ahead, with the continuous optimization of algorithms and the enhancement of data processing capabilities, the development of digital supervision platforms will increasingly focus on improving the accuracy of supervision data acquisition and analysis. By then, the platforms will be able to more accurately identify potential risks and issues, providing stronger technical support for grassroots supervision.

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