

Discussion on the Construction Method of Networked Supervision Technology System for Safety Production in Shenzhen

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Abstract: In response to the implementation of networked supervision of safety production in Shenzhen, this study conducts a statistical analysis of basic information and application effectiveness of various districts, streets, grid personnel, and grid-managed enterprises in the city. It summarizes the existing shortcomings and deficiencies affecting the implementation of networked supervision technology for safety production. The study emphasizes six aspects of countermeasures: strengthening team construction, enhancing professional capabilities, reinforcing daily management, improving incentive mechanisms, standardizing supporting documents, and enhancing inspection guidelines.

Keywords: Safety production; Networked supervision; Hazard rectification

1. Introduction

Through on-site grassroots investigations, written surveys, and information system research, this study deeply understands the status of grassroots networked supervision work. It collects experiential materials related to networked supervision of safety production from various districts and systematically analyzes basic data, as well as dynamic regulatory data on safety inspections and hazard rectification for districts, streets, grid personnel, and grid-managed enterprises throughout the city. By the end of 2022, Shenzhen had designated 885 safety production grids, with 111,154 enterprises under management through the system platform, including 5,332 high-risk enterprises, 101,071 general production and operation units, 1,533 small-scale venues, and 2,893 purely office spaces. According to the grading guidelines, enterprises under grid management in each district are divided into four levels: red, orange, yellow, and blue[1]. There are 3,556 enterprises in the red level, accounting for 3.21% of the total under grid management; 21,101 enterprises in the orange level, accounting for 19.04%; 68,921 enterprises in the yellow level, accounting for 62.19%; 15,607 enterprises in the blue level, accounting for 14.08%; and 1,644 enterprises not classified, accounting for 1.48%[2-4]. Inspection frequencies for grid-managed enterprises are linked to their levels: red-level enterprises are inspected monthly, orange-level enterprises quarterly, yellow-level enterprises semi-annually, and blue-level enterprises annually[2-4]. Among the identified hazards discovered through inspection guidelines, 44.59% are identified through prescribed criteria, while 55.41% are identified through customized inspection items. The three most prominent categories of identified hazards are "Basic Management - Fire Safety," "On-Site Management - Premises Environment," and "Basic Management - Electrical Safety"[5-7]. As is shown in Figure 1 and Figure 2.

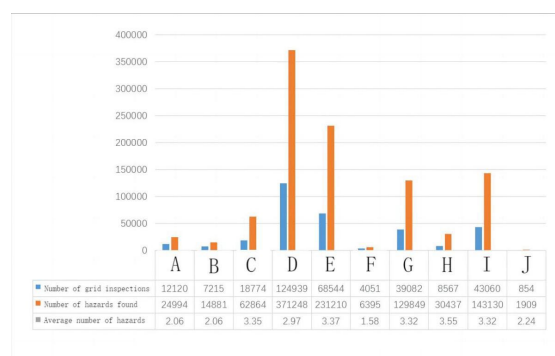


Figure 1: Inspection situation map of various districts in Shenzhen.

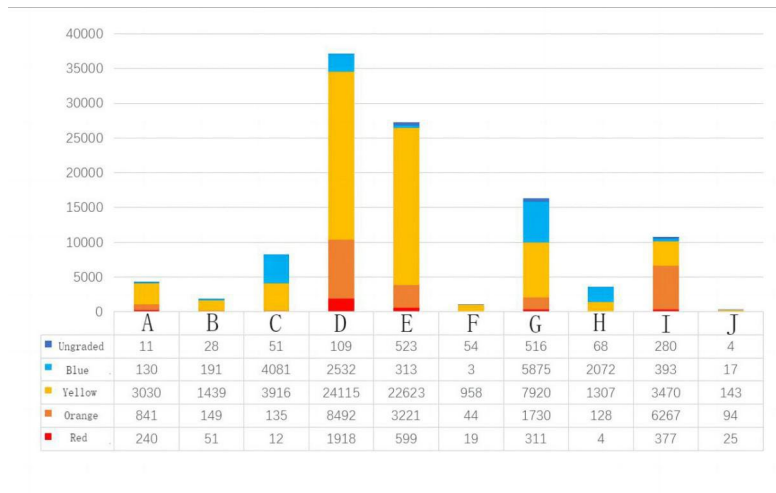


Figure 2: Enterprise classification map of various districts in Shenzhen.

2. Achievements Attained

The networked supervision model for safety production has facilitated the creation of a unified grid electronic map in Shenzhen. It has refined and clarified the responsibilities and workflow of grid personnel. Hardware configurations such as workplaces and equipment necessary for grid personnel's duties are largely in place. The networked supervision information system has been developed, deployed, and put into use. This has led to the initial formation of a city-wide grassroots safety production grid regulatory responsibility system, effectively bridging the gap in safety supervision's "last mile" implementation. Specific progress is outlined below.

2.1. Unified Division and Mapping of City-wide Grid Electronic Map

Following the principles of "territoriality-based, regulatory convenience, clear responsibilities, and distinct division of labor," a number of grids have been delineated within the jurisdiction of each street, considering factors such as historical reform, geographic location, grid area, number of regulated entities, and regulatory tasks. Each grid is responsible for supervising units directly managed by emergency departments at all levels, which are engaged in actual production and operation activities (up to 180 entities). In line with the requirements of grid management, a city-wide electronic map depicting the distribution of grids has been created. Various levels of emergency departments have coordinated to locate the regulated entities on the map, ensuring their proper positioning within the grid.

2.2. Initial Establishment of Guidelines and Regulations for Grid Regulatory Work

Most districts across the city are required to assign at least 2 grid personnel to each grid. These personnel are positioned as "Safety Production Supervision Inspectors," "Information Officers," and "Promotional Officers." Mechanisms for supervising and managing grid personnel, as well as mechanisms to ensure their performance, have been established. Work norm guidelines for grid personnel have been formulated, outlining the procedures for conducting inspections of enterprises within the grid, collecting information, and propagating safety production laws and regulations. Regular training sessions have been organized for grid personnel to enhance their proficiency in safety supervision inspection duties.

2.3. Promotion of the Establishment and Application of Networked Safety Production Supervision Information System

A unified city-wide safety production networked management information system has been developed. The grid-based supervision system has been deployed, mandating grid personnel to promptly remove, shut down, or relocate enterprises as necessary, incorporate new establishments, and collect basic enterprise information. Geographical positioning of enterprises is updated in a timely manner to prevent cases of loss of oversight.

2.4. Classification and Grading Assessment of Enterprise Safety Production Status within Grids

A grading assessment has been conducted for each grid-managed enterprise, categorizing them into red, orange, yellow, or blue levels. The application of the grading results has been explored, determining corresponding inspection frequencies and levels of detail for each enterprise category. This has realized a preliminary implementation of hierarchical classification-based supervision, enhancing the effectiveness and precision of supervision inspections. It ensures that each grid-managed enterprise is inspected at least once a year, achieving full coverage of supervision inspections. Additionally, specialized supervision for key entities is strengthened.

2.5. Exploration of Establishing City-wide Networked Supervision Enterprise WeChat Groups

A "pyramid" structure of WeChat groups for enterprises has been established, covering vertical levels including the municipal bureau, district bureaus, street-level emergency departments, and various grids. Each grid is required to create WeChat groups encompassing leaders and safety management personnel of all grid-managed enterprises. This further facilitates the smooth transmission of networked safety supervision information, enhances communication and interaction between different supervision levels, and fosters a positive interaction between regulatory authorities and enterprises. It aids in the prompt dissemination of crucial decisions and deployments related to safety production to grid personnel and grid-managed enterprises.

3. Challenges Faced

While urban grid-based supervision has achieved significant results, it has also revealed several challenges, as detailed below:

3.1. Lack of Coordinated Leadership in Grid Supervision Leads to Weakened Inspection Effectiveness

In some districts, emergency management departments lack adequate overall management and control of grid personnel. Shortcomings in personnel appointments, salaries, performance assessments, and incentives have resulted in grid personnel shouldering a substantial amount of work beyond safety supervision, including epidemic control, information collection, grassroots inspections, and event handling. This has diluted the strength and resources dedicated to grid-based safety supervision, thereby impacting the effectiveness of safety production regulation.

3.2. Overall Low Qualifications of Grid Personnel, Limited Enthusiasm, and Stability

A majority of personnel hired in some jurisdictions hold positions as Level-III full-time safety officers, with a relatively low percentage holding bachelor's degrees or higher. The demanding nature of grid-based supervision inspections necessitates higher individual qualifications. However, the development of business capabilities among most grid personnel is slow due to inadequate, less targeted, and infrequent training. Training programs lack a strong theoretical-practical combination, and experienced grid personnel often experience high mobility, which limits the depth of training content enhancement. The remuneration of grid personnel does not match their workload and requirements, with an incomplete incentive mechanism and limited promotion opportunities. The significant discrepancy between job pressures, workloads, and compensation significantly affects the enthusiasm and morale of grid personnel.

3.3. Inadequate Grid Assessment Metrics and Insufficient Supervision and Assessment Efforts

Currently, grid assessments mainly focus on indicators such as the compliance rate of managed enterprises, the rate of basic information collection, and the rating assessment rate. However, clear assessment standards and comprehensive assessment dimensions for aspects such as classification and grading of grid-managed enterprises and inspection of hidden dangers within the grid have not been established. Some districts and streets have incomplete performance assessment schemes for grid personnel. The assessment results for grid personnel and the implementation of grid-based supervision at the street level lack quantification, and the linkage between assessment results and rewards or penalties is weak. Some emergency departments in districts have not established regular supervision and inspection mechanisms for grid personnel, leading to inadequate and incomplete monitoring of their daily inspection duties, work discipline, complaint handling, and ethical conduct. This hinders the timely supervision and

guidance of typical case warnings, reminders, and the strengthening of grid personnel team building and management.

3.4. Singular Criteria for Grid Division and Disparity in Supervisory Workloads

Current city-wide grid division only considers the number of managed enterprises, resulting in relatively single standards. Each grid is required to manage no more than 180 entities. The allocation of grid personnel and the matching of grid-managed enterprises are severely imbalanced in some areas. Considering the varying nature and scale of enterprises within the grid, grid personnel may experience situations of "underutilization" or "overburden."

3.5. Inadequate Grid Inspection Guidelines and Room for Improvement in Information Technology Support

The continuous updates of safety production laws, regulations, safety standards, and normative documents, as well as the emergence of new industries, new sectors, and new business formats, impose higher demands on the scientific, effective, and professional aspects of safety supervision inspection guidelines. However, grid personnel are still using outdated versions of hidden danger inspection guidelines with relatively outdated parameter bases. There is an urgent need for improvements and updates based on the latest regulations, standards, and practical supervision. During the operation of the grid-based information system, issues like oversight and omission still exist. Modules for risk control, hazard investigation, and other aspects have not been fully integrated, and the system's level of automation remains low, unable to facilitate task assignments, supervision, and follow-up.

4. Recommendations

To address the current issues in the implementation of grid-based supervision, it is recommended that municipal and district-level emergency management departments comprehensively strengthen the construction of grid personnel teams. This can be achieved by establishing a management model that integrates recruitment, training, supervision, and support for grid personnel. The goal is to effectively stimulate the vitality of the grid personnel teams, enhance their sense of professional honor, belonging, and identity. The specific recommendations are as follows:

4.1. Strengthen Coordinated Leadership of Teams to Enhance Grid Supervision Effectiveness

Municipal and district-level emergency management departments should incorporate the supervision and management of lower-level emergency departments' implementation of grid-based measures, utilization of personnel, grid personnel discipline, and integrity into routine work tasks. It is essential to firmly prevent the arbitrary deployment of grid personnel at the grassroots level for tasks unrelated to safety supervision inspections. This ensures that grid-based safety supervision inspections continue with consistent intensity. It is necessary to establish a multi-channel way to report complaints and strengthen social supervision over the performance of the grid staff. It is also necessary to establish a verification and filing mechanism for full-time safety officers related to reporting complaints, and timely grasp the problems of discipline and law violations of grid officers accepted and investigated and dealt with by grid officers in all districts and streets. This ensures that the actions of grid personnel teams are standardized and lawful.

4.2. Enhance Recruitment and Training Mechanisms to Elevate Professional Competence

The entry threshold for enrollment of grid staff should be raised appropriately, and grid staff should be filled by those who have obtained relevant professional degrees, so as to improve the professional quality of grid staff from the source. It is also necessary to strengthen the training of grid staff, organize targeted and diversified training and study on a regular basis, and combine theory-practice-assessment. In addition, professional knowledge and business training should be carried out by means of expert lectures, ability competitions, demonstration and observation, so as to enhance the grid staff's ability to find hidden dangers and supervise rectification and reform, and constantly improve the professional level of the grid staff.

4.3. Improve Supervision and Assessment Mechanisms to Effectively Strengthen Daily Management

It is necessary to improve the assessment indicators and detailed rules, focusing on the norms of grid personnel's inspection work, and the indicators of quantity and quality of inspection. It is also necessary to strengthen the daily management and performance supervision and assessment of grid staff, establish a regular supervision and inspection mechanism for grid staff, and focus on the inspection and supervision of grid staff's daily inspection, work discipline, reporting complaints and clean government style. In addition, it is important to promptly notify the problems found by supervision and inspection, urge the relevant streets to organize rectification in a timely manner, and make every effort to consolidate the grass-roots foundation of production safety supervision.

4.4. Improve Incentive and Promotion Mechanisms to Fully Motivate Grid Personnel

It is necessary to appropriately improve the salary of grid staff, establish a dynamic salary adjustment mechanism, and employ grid staff of different levels according to different salaries. It is also necessary to use objective indicators and standardized processes to strongly associate the assessment results with performance incentives. Those who have excellent performance in their work and are rewarded and commended should be rewarded. Those who fail in the assessment, violate work discipline and are seriously irresponsible can be punished by criticizing education, warning, withholding performance pay, dismissal and other provisions. It is necessary to establish a post promotion mechanism, open up the rising channel, fully mobilize the enthusiasm of grid staff, and strengthen the stability of the team.

4.5. Improve Supporting Grid Documents to Further Standardize Implementation Principles

Based on the varying difficulty levels of regulating enterprises of different natures and scales, a calculation model for grid-regulated enterprises should be constructed. It's important to assign values to different enterprises and calculate the estimated values for grid-managed enterprises. Moreover, it's necessary to adjust grid boundaries based on these estimated values, achieving a balance between the number of grid personnel and the number of grid-managed enterprises. It's also important to refine documents related to grid personnel inspection guidelines, grid personnel management methods, and enterprise rating assessment guidelines. Requirements related to regulatory processes, personnel appointments, work discipline, etc. should be detailed. This ensures that grid-based supervision is supported by established guidelines.

4.6. Revise Grid Inspection Guidelines to Strengthen Regulatory Oversight

It is necessary to pay close attention to the key links and key places where accidents are prone to occur, as well as new industries, new business type, and enterprises in new fields, further refine and formulate various safety inspection standards, provide clear guidelines for enterprise self-inspection and self-improvement, and grid personnel inspection and inspection, and promote the detailed implementation of grid inspection work. The relevant departments should improve the connection mechanism between safety inspection and law enforcement, clarify the specific circumstances and working procedures that need to be handed over to law enforcement, and ensure that the illegal activities in production safety and hidden dangers of major accidents found in the grid are investigated and dealt with effectively in a timely manner.

5. Conclusion

Through the statistical analysis of the implementation of the network supervision of production safety in Shenzhen, this paper summarizes the effectiveness and shortcomings of the grid supervision of production safety in Shenzhen, and puts forward a lot of targeted suggestions. The grid supervision of production safety is an important part of urban public safety, which is of great research value. This paper is of great reference significance to the research on the construction of grid supervision technology system of production safety. Although there are still many deficiencies pointed out, it provides a reference for further research on grid supervision of production safety.

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