AUCTORES
Globalize your Research

International Journal of Clinical Case Reports and Reviews

Yuzhong YANG *

Open Access

Research Article

Panoramic analysis of regional risks in Longgang City and research on high-frequency hidden dangers in industrial parks based on DeepSeek

Fei WANG [1,3], Yuzhong YANG [2,*], GuoXun JING [2], Liyun WU [2]

[1] Postdoctoral Research Station of Safety Science and Engineering at Henan Polytechnic University, Jiaozuo, 454000, Henan, China.

[2] Henan Polytechnic University, Jiaozuo, 454000, Henan, China.

[3] Bureau of Emergency Management of Longgang, Wenzhou, Zhejiang, China.

***Corresponding Author:** Yuzhong YANG, Henan Polytechnic University, Jiaozuo, 454000, Henan, China.

Received Date: July 31, 2025 | **Accepted Date:** August 15, 2025 | **Published Date:** August 29, 2025

Citation: Fei WANG, Yuzhong YANG, GuoXun JING, Liyun WU, (2025), Panoramic analysis of regional risks in Longgang City and research on high-frequency hidden dangers in industrial parks based on DeepSeek, *International Journal of Clinical Case Reports and Reviews*, 29(1); **DOI:**10.31579/2690-4861/924

Abstract:

In response to the three major challenges in the field of safety supervision in industrial parks: weak prevention, slow process response, and low efficiency of post review, this study analyzes the regional risk panorama of Longgang City and uses the "3030" hidden danger closed-loop mechanism in Longgang City as the research carrier to improve the efficiency of safety supervision and the accuracy of risk assessment in industrial parks through innovative methods. This article uses principal component analysis (PCA), analytic hierarchy process (AHP), and expert scoring method to determine the weights of seven types of risk factors in Longgang City, and constructs a regional risk panoramic analysis matrix model to evaluate the degree of regional risk in Longgang City. Introduce DeepSeek for intelligent risk analysis and construct a three in one model of "intelligent prediction, graded intervention, and dynamic optimization". By using deep learning methods to analyze 950 multi-level safety hazard inspection data at the provincial, municipal, and county levels from 2023 to 2025, a risk feature map with Longgang regional characteristics is constructed. This study identified 7 major categories of high-frequency hazards and 25 subcategories of high-frequency hazards in Longgang City, and revealed 9 composite risk overlay scenario threats; Strengthen supervision over high-frequency hidden dangers, promote the reduction of regional risk thresholds, and provide replicable basis for the next step of building an integrated regulatory paradigm of "intelligent center+institutional innovation".

Key words: regional risk; panoramic analysis matrix model; risk characteristic map; risk scenario; risk threshold

1. Introduction

1.1 Background

As a pilot area for China's new urbanization reform, Longgang City in Zhejiang Province has shown significant dual-core development in administrative management system reform and digital economy since it was upgraded from a town to a city in 2019. Geographically, it is situated at the strategic intersection of the Yangtze River Delta and the Haixi Economic Zone, where the 183.99km² administrative region supports the economic activities of 471,600 permanent residents. In 2024, the city's GDP reached 44.37 billion yuan, forming a unique industrial ecosystem centered around the printing and packaging industry. Longgang is one of the three major printing and packaging industry bases in China, with a comprehensive printing and packaging industry chain that covers materials, equipment, packaging printing, design, and cultural creativity. The city offers a wide range of printing services, including flatbed offset printing, gravure printing, letterpress printing, and digital printing. It is home to several national-level golden business cards, such as China Printing City, China Gift City, China Printing Materials Trading Center, and China Calendar Distribution Center. In terms of administrative management innovation, the city has implemented the 'city-managed community' flat governance model and reduced 60% of its institutions, creating the first county-level 'large department system' governance model in the country. However, in the field of production safety supervision, it faces common challenges such as an inverted ratio of government and enterprise supervision (few people handling many tasks), single supervision methods, slow response times, and insufficient information integration capabilities. Traditional methods of manual inspection and supervision have revealed three major structural issues in

safety oversight: First, the mismatch between the scale of enterprises and the capacity for regulatory supply, such as inspecting 140 enterprises per capita in industrial and mining sectors, which makes it difficult to achieve comprehensive coverage in the short term; Second, the technological gap in identifying potential hazards, where professional limitations hinder the accurate identification of risks, leading to technical monitoring blind spots; Third, the absence of a closed-loop governance mechanism, where frequent hidden dangers identified by provincial supervision reports often rebound after rectification, failing to meet the urgent needs of modern industrial park safety oversight.

Longgang urgently needs to develop a regulatory system that leverages digital technology, particularly by introducing AI to build an intelligent early warning system. This system will enable dynamic monitoring and efficient handling of potential hazards. By using deep learning algorithms, the system can accurately identify risk characteristics and construct a risk situation analysis model to pinpoint the core safety risks in enterprises (locations). For the 3030 hidden dangers identified at the provincial（Within 30 days, investigate and deal with 30 major hidden dangers in various industries, and complete the rectification loop within 30 days）, municipal, and county levels, the system can precisely identify high-frequency risks and optimize the regulatory process through the PDCA cycle to ensure timely hazard elimination and effective preventive measures. This approach forms a new safety supervision model centered on data-driven intelligence, encompassing 'intelligent risk early warning, thorough hazard clearance, and full-process closed-loop management.' The system uses AI to create a 'risk circuit breaker threshold matrix,' which accurately identifies and dynamically quantifies core risks in industries such as mining and fire safety, forming a risk map for each sector. Based on regulatory trace data, the system creates enterprise safety profiles to promote precise and targeted governance. The introduction of AI not only enhances the efficiency of hazard identification but also achieves multi-dimensional risk warnings through data integration, optimizing resource allocation and ensuring precise and efficient regulation. This supports Longgang City in building a modern safety supervision system, providing theoretical breakthroughs and practical references for the modernization of county governance.

1.2. Security status

Since 2021, Longgang has experienced 30 production safety incidents, resulting in 27 fatalities. By industry, 13 incidents occurred in the industrial and mining sector, leading to 10 deaths; 7 incidents in construction, resulting in 7 deaths; 5 incidents in road traffic, resulting in 5 deaths; 2 incidents involving maritime and fishing activities, resulting in 2 deaths; and 3 incidents in other categories, resulting in 3 deaths. As an industrial city, Longgang has a higher incidence of industrial and mining accidents, construction accidents, and road traffic accidents. The mortality rate per billion yuan of GDP has been relatively low, at 0.024 in 2022,0.01465 in 2023, and 0.01352 in 2024, maintaining a low level. The majority of accidents are classified as general incidents, with no incidents resulting in 2 or more deaths. The main causes of accidents are falls from heights and object strikes, with a few cases involving collapses, mechanical injuries, electric shocks, and fires. For more details on the accident situation since 2021, see Figure 1.

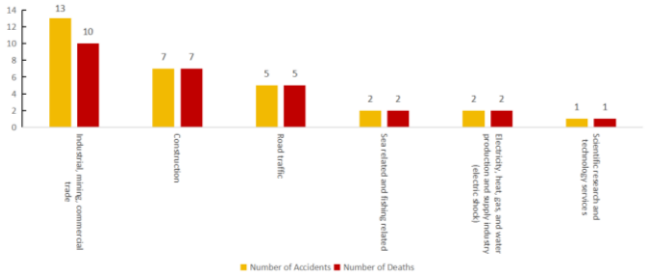

Figure 1: Statistics of Safety Accidents in Longgang City (2021-2024).

In terms of industry supervision and law enforcement, the EMD is responsible for the supervision of four major industries:Non-coal mines, Metallurgical industry and Trade, Hazardous Chemicals, and Fireworks. In terms of comprehensive supervision, comprehensive supervision and law enforcement has not yet been truly implemented, mainly focusing on guidance, coordination, supervision and inspection, notification, and interviews.

2. Panoramic analysis of regional risks

2.1 Industrial structural risks

By the end of 2024, the economic entities of Longgang city show the following characteristics:

1) Large market volume. There are 121,700 registered business entities, one business entity for every four people.

2) There are many industrial parks (including small and micro parks), with nearly 5,000 industrial enterprises.

3) There are many small and micro enterprises. The total number of enterprises is over 29,000. In terms of enterprise composition: there are 505 large-scale enterprises (a decrease of 24 from 2023), accounting for only 1.74% of the total; small and micro enterprises account for 98.26% (including individual businesses). For example, in the printing and packaging industry, there are 40,085 market entities, employing nearly 130,000 people, with an average of just 3.2 employees per enterprise.

4) Dispersed industrial structure. The city's industrial structure is "low, small and scattered", mainly labor-intensive products, most of the enterprises are traditional printing industry, recycled cotton textile industry, etc., and the proportion of science and technology enterprises is less than that

5) The printing division is fine. The industry is mainly traditional packaging printing, and the output value of printing and packaging accounts for more than 60% of the total output value of Longgang. The industrial chain is complete and the professional division is fine.

6) Risk and hidden dangers are dense. There are many labor-intensive enterprises, front-line workers have high repetitive work, facilities and equipment are updated slowly, mechanical operation accidents or fire accidents are easy to occur.

2.2 Human resource risk

Fierce competition among peers. The competition among printing enterprises is fierce, the profit margin of enterprises is reduced, and the

human resource input of enterprises is insufficient.

High employee turnover. The company's salary and benefits are average, which makes it less attractive to young local workers aged 18-35, leading them to move into the service sector, start their own businesses, or relocate to cities like Hangzhou and Xiamen. Additionally, the workforce includes many migrant workers with a high proportion of those with a junior high school education or lower, resulting in high turnover. This situation reduces the company's willingness to invest in training and poses potential safety risks.

Imbalance of the number of people. There are 5,235 ABCDEF talents in the city, but there are less than 300 highly skilled talents (class E and above), and only 479 technical talents in R&D and industrial positions, accounting for only 9.15%. The shortage of high-end talents, high-end R&D personnel and technical workers is obvious, which hinders the upgrading of the printing industry.

2.3 Investment momentum risk

Investment structure data shows that in 2024, industrial investment accounted for 29.5% of the city's total investment, a 0.1% decrease from the beginning of the 14th Five-Year Plan period, indicating a decline in the proportion of industrial investment. In 2024, the share of manufacturing value added fell to 24%, placing it in the lower-middle range among the 13 counties and districts of Wenzhou. The R&D investment intensity was 1.49%, the lowest in Wenzhou, significantly below the national average (2.65%), Zhejiang Province (3.2%), and Wenzhou City (2.72%). Additionally, the R&D investment of large-scale industrial enterprises accounted for 2.85% of their revenue, also the lowest in Wenzhou. This situation raises several issues:

1) Insufficient investment leads to the extension of the fixed asset renewal cycle, which may exceed the average life period of the equipment (the growth of the equipment iteration cycle).
2) Investment in technological transformation decreased year-on-year.
3) Low penetration rate of smart devices.

2.4 Operation risks of the park

Longgang has four large incubator parks (core parks), including science and technology innovation industry center, specialized, refined and new incubation park, high-end mechanical manufacturing park and printing art town living room. There are the following prominent problems:

The core park is mainly engaged in site leasing business, and lacks professional operation institutions. The Park operation and safety management are not standardized and professional, which is not conducive to the growth of the park.

The entry threshold is not strict, the quality control of resident enterprises is effective, and the rate of high-tech enterprises in residence is low.

Insufficient investment in facilities maintenance, finance and material, and insufficient equipment integrity rate.

2.5 Departmental regulatory risks

The supervision of industrial parks involves multiple departments, including development and reform, economy and information technology, science and technology, commerce, culture, and tourism, as well as emergency management, fire rescue, natural resources and planning, comprehensive administrative law enforcement, market regulation, public security, and other industry regulatory bodies. It also includes local governments such as townships, sub-district offices (community joint party committees), and other entities. The responsibilities of these units are detailed in Table 1. Seven types of regulatory risks exist:

The risk of overlapping responsibilities in multi-party supervision. There is a risk of overlapping duties, particularly in emergency management and fire rescue, where the authorities have overlapping powers in safety production and fire inspections (for example, open flame operations are supervised by multiple departments). In the case of illegal stacking under photovoltaic installations, the development and reform department leads the safety inspection, the law enforcement department removes illegal enclosures, and the emergency department urges the removal of illegally stacked materials. The natural resources and planning and construction department and the comprehensive administrative law enforcement department may have gaps in the process of handling illegal buildings, and differences in cross-departmental joint inspection standards can confuse enterprises during rectification. The risk of regulatory vacuum exists due to the lack of timely coordination among departments, such as technology and commerce authorities focusing on market entry management, while emergency and fire departments concentrate on law enforcement inspections. Daily dynamic supervision mainly relies on townships and streets, which can result in a 'regulatory vacuum period' for newly established enterprises, such as when an enterprise changes its business project without updating its records in time, leading to regulatory lag.

The risk of inadequate local regulatory capacity. Due to insufficient professional skills, grid officers in townships and communities generally lack the expertise to inspect special equipment and hazardous chemicals. Routine inspections often overlook deeper issues, such as alterations to building load-bearing structures or unauthorized adjustments to fire compartments, leading to the failure to identify and address these hidden dangers. Additionally, there is a risk of lagging dynamic management, as frequent closures, mergers, and transformations of enterprises in the jurisdiction can lead to outdated information updates, resulting in a 'zombie enterprise' registry. This results in significant discrepancies between the enterprise information registered with the municipal market supervision department and that of the local jurisdiction.

The risk of the enterprise's primary responsibility being suspended. False compliance risks: although the signing rate of safety management agreements between lessors and lessees meets regulatory requirements, the content of these agreements is highly repetitive. Many companies fail to tailor their agreements to specific risk points, and safety management practices are not effectively implemented. Training effectiveness risks: safety training for all employees is typically conducted through online courses. However, inspections by provincial, municipal, and county authorities have found that frontline staff often struggle to fully articulate the' four understandings and four abilities '(a set of core competencies in safety management), and the' three sixes 'and' three tens' (key performance indicators) training outcomes are not significant. Particularly, the practical qualification rates for special positions, such as hot work operations, are low.

The risk of regulatory blind spots in emerging business models. Risks from the transformation of business models, such as converting warehouses and logistics facilities to hazardous chemical storage or repurposing idle factories for live streaming bases, often fail to comply with the required re-registration procedures. There is also a risk of uncontrolled facility renovations, particularly the unauthorized addition

of floors to steel structure factories, which has become a significant risk point.

Risks associated with technical support deficiencies. The risk of inadequate intelligent governance capabilities: most parks have not established intelligent supervision platforms, or if they have, the real-time monitoring coverage for hazardous chemical storage and special equipment operation is insufficient. The risk of inadequate detection equipment: the popularization rate of rapid detection devices in grassroots market supervision departments is low, making it difficult to identify hidden defects such as pressure vessel weld cracks. The risk of incomplete monitoring facilities: video surveillance, sprinklers, gas alarm devices, and other facilities are not maintained in a timely manner, leading to poor equipment conditions and the failure of monitoring and early warning functions to function effectively.

Bottleneck risks in emergency coordination. Risks related to the alignment of emergency plans, including insufficient compatibility between different departments 'emergency plans, inadequate coordination among fire, emergency, and public security departments' response plans, and poor communication in emergency coordination. Risks related to the effectiveness of drills, such as a tendency towards 'routine' joint exercises and a lack of frequent non-routine emergency drills during nights, holidays, or special events.

Illegal disposal of follow-up risks. Risks of rebounding rectification: if the "look back" is not timely after the rectification, problems will rebound; risks of non-standard law enforcement: flaws in the law enforcement process will lead to the loss of administrative law enforcement cases in litigation, which will affect the image of the government.

Table 1: Departmental regulatory responsibilities (industrial parks and enterprises).

Unit	Unit positioning	The target of regulation	Division of responsibilities
Development and reform, economy and information technology, science and technology, commerce, culture and tourism departments	Park competent department	Industrial Park	(1) Responsible for guiding and urging the park to implement the main responsibility of safety, and clarify the safety management organization and safety management personnel; (2) Urge the lessor to sign a safety management agreement with the lessee, and implement unified coordination and management of safety; (3) Guide and urge towns and villages and industrial parks to formulate conditions for entering the park, and eliminate units that do not meet the safety production conditions in time; (4) Lead the organization of inspection and disposal of "four-no" enterprises in the park.
Emergency management department	Trade supervision department	Enterprise	(1) Carry out safety supervision and inspection of production and operation units in the park according to law, investigate and punish illegal acts such as failure to sign safety management agreements or fail to implement unified coordination and management of safety production, illegal leasing of sites for the production and operation of hazardous chemicals, and special operation personnel working without certificates. (2) Supervise the hidden danger investigation and management and production safety education and training of production and operation units in the park; guide and urge the emergency rescue linkage work of production safety accidents in the park.
Fire and rescue services	Industry regulators	Industrial Park enterprise	(1) Fire control supervision and inspection of production and business operation units in the park shall be carried out according to law, and illegal use of open flame, insufficient or seriously blocked evacuation passages and safety exits, destruction, unauthorized demolition or shutdown of fire control facilities, failure to meet fire control requirements for fire compartments and fire separation distances, "three-in-one" sites and other fire safety violations shall be investigated and dealt with according to law. (2) Supervise the production and operation units in the park to carry out fire safety publicity, education and training and targeted emergency evacuation drills. Guide and supervise the park's fire accident emergency rescue linkage work.
Department of natural resources, planning and construction	Trade supervision department	Industrial Park enterprises	(1) Responsible for guiding and supervising the disposal of illegal buildings in the park, establishing a daily inspection system for illegal buildings and illegal construction in the park, and implementing the inspection responsibility. (2) The construction department shall investigate and punish illegal acts such as violating the fire control management of construction projects, changing the main body and load-bearing structure of a building without authorization, changing the use nature and function of a building without authorization, and failing to obtain approval or filing for fire inspection in the park.
Comprehensive administrative law enforcement department	Trade supervision department	Industrial Park enterprises	Illegal buildings in the park shall be demolished according to law

Market regulatory authorities	trade supervision department	enterprise	To supervise and inspect, according to law, the use of special equipment by production and operation units in the park and the certification of operators of special equipment, and investigate and punish illegal activities such as unlicensed operation of relevant units.
public security organization	trade supervision department	industrial park enterprise	To guide police stations to carry out daily fire supervision and inspection and fire publicity and education in accordance with the law, and investigate and punish illegal acts such as using open flame operations or ordering or forcing others to take risks in violation of fire safety regulations in industrial parks.
Township government subdistrict office (Community Joint Party Committee)	Territorial management	industrial park enterprise	(1) Supervise the grid workers to do a good job in the publicity of production safety and fire safety policies, information collection, inspection, hidden danger reporting and other work. Guide the grid workers to strengthen the inspection of fire safety measures, safety education and training, electric welding operations and other situations in the park, and timely report accident hidden dangers and illegal behaviors. (2) Conduct a comprehensive investigation of the parks within the jurisdiction, find out the basic information, master the number of lessors and lessees, rental area, number of employees, enterprise scale, leasing purpose, risk points, etc., establish an information ledger, and implement dynamic management. (3) Organize the responsible persons of the lessor and lessee and on-site staff to carry out targeted safety education and training, and urge the park to fully implement the safety training for all staff with the focus on "four understandings and four skills". (4) Carry out regular investigation and management of hidden dangers in the park, focusing on checking whether the landlord of the park has performed unified coordination and management duties, and whether there are hidden dangers of major accidents. For problems and hidden dangers found in the inspection, reported by grid workers and assigned by superiors, urge rectification and close the loop. (5) Strengthen the safety law enforcement inspection in the park, investigate and punish all kinds of illegal activities according to law. If the scope of duties exceeds, it shall be transferred to relevant departments in time. (6) Urge the lessor to clear out the enterprises with major hidden dangers and refuse to rectify in time, and dismantle all kinds of illegal buildings (structures) affecting fire safety in the park according to law. (7) Guide the construction of volunteer fire brigade and other fire organizations in the park, strengthen joint operation and linkage, carry out regular emergency drills, and improve the ability to deal with accidents

2.6 Enterprise agglomeration risk

Taking Longgang New City as an example, the area is densely populated with enterprises, exhibiting a high spatial density. Located in the eastern coastal region of Longgang, the city covers 37 square kilometers and includes four provincially certified small and micro-enterprise parks: Longcheng Micro Park, Xincheng Entrepreneurship Park, Nengke Light Industry Park, and High-end Mechanical Intelligent Manufacturing Park, along with two village-level industrial clusters: Electric Carving and Electroplating Park and Textile Improvement Park. The park houses 625 enterprises, while there are 730 enterprises outside the park, including 226 large-scale enterprises. Traditional industries generally have an output value per mu (about 0.16 hectares) ranging from 1 million to 5 million yuan, whereas emerging high-end manufacturing reaches the ten-million-yuan level. The six parks cover a total area of 1215.77 mu (approximately 81.05 hectares), with an average of 1.92 mu per enterprise (an average plot ratio of 2.02). The high density of enterprises leads to significant issues such as insufficient space between factories and the frequent occupation of fire lanes. According to incomplete statistics, among the 1355 enterprises, only 49 are independent enterprises. In terms of factory-in-factory arrangements, 139 are landlords, 549 are tenants, and the rest are either factory-in-factory or park-in-park enterprises.

In the city's 24 industrial parks, the average land area per enterprise is 1.867 mu (approximately 1.15 acres), with a median of 0.895 mu. Among these 24 parks (the other 5 parks lack data), the land area of enterprises is mainly distributed in the range [0.4348,1.732] mu (19 parks), and more specifically, in the range [0.0.63,0.91] mu (11 parks). For more details, see Table 2, Table 3, and Figure 2. This' bar scatter plot + box plot + log-normal 'distribution graph shows that the main data is concentrated in a small area (density peak of 0.869 mu), with a long tail extending to 7.56 mu, including several outliers. The box plot indicates that the median (0.895 mu) is significantly lower than the mean (1.867 mu). The data reflects the polarization of park sizes, with most being small parks (<2 mu) and a few large parks significantly raising the overall average. This distribution is common in industrial clusters with size thresholds, possibly due to park positioning, industrial policies, or land supply methods. Policy implementation discrepancies reflect lax approval processes for new enterprises, which only have entry mechanisms but lack exit mechanisms. In some parks, a large number of enterprises enter, leading to small land areas per enterprise and insufficient production space, resulting in the occupation of fire lanes and the appearance of illegal buildings. Once a fire occurs, it obstructs the passage of fire vehicles, increasing the response time for fire linkage during peak periods, potentially causing fires to spread and result in' fire spreading.' At the same time, the number of enterprises per unit area increases, and the load of power distribution equipment increases. Overload may lead to electrical fire, and the risk of fire increases. The management object of managers increases, and the

management risk increases.

2.7 Risks of high-risk enterprises

Taking Longgang New City as an example, to address the concentration of enterprises and risks in the new city, 1,196 key enterprises, including 718 'factory-in-factory' and 'park-in-park' enterprises, 43 three-place and three-enterprise enterprises, 412 hazardous chemical users, 6 pearl cotton producers, and 17 hazardous chemical producers and storers, have been included in the list of key regulated enterprises. Additionally, six industrial parks (small and micro parks) and chemical clusters have also been included in the key regulatory scope.

Table 2: Statistics of the area occupied by enterprises in small and micro parks in the city.

Small and micro enterprise park	Longjin Avenue Yibang Industrial Park	Small and micro fashion park	Century Avenue Yibang Industrial Park	Rainbow Smart Entrepreneurship Park	Century Science and Technology Entrepreneurship Park	Yellow River Industrial Park	Longcheng Small and Micro Entrepreneurship Park	Borona Micro Park	Jia Hong Micro Park	Focus on small and micro parks	Jin Tian Industrial Park	Zhongrong Science and Technology Park
Cover an area of area	0.43	0.52	0.63	0.67	0.72	0.73	0.74	0.84	0.84	0.86	0.87	0.875
Small and micro business park	New Shuangjing Industrial Park	Nengke Light Industry Park	Huaxin Micro Park	Wenlong Micro Park	New City Entrepreneurship Park	Century Industrial Park	Small packaging micro park	New Ya Industrial Park Phase I and Phase II	Kang'er Micro Park	New city textile industry promotion park	Shuguang Industrial Park	High-end mechanical intelligent manufacturing park
Floor space	0.91	1.24	1.36	1.41	1.47	1.59	1.73	2.33	4.25	5.97	6.47	7.56

Median: 0.89 mu, first quartile (Q1):0.74 mu, third quartile (Q3):1.63 mu

Table 3: Sampled Data Statistics on Occupied Land Areas of SMEs in City-Wide Industrial Parks.

Statistical indicators	Sample capacity (n)	Mean	Median (Median)	Range (Extreme values)	Standard deviation (SD)	Variance	Interquartile range (IQR)
Numeric value	20	1.867	0.895	7.120 (0.434~7.555)	2.131	4.543	0.89 (Q1=0.74 Q3=1.63)

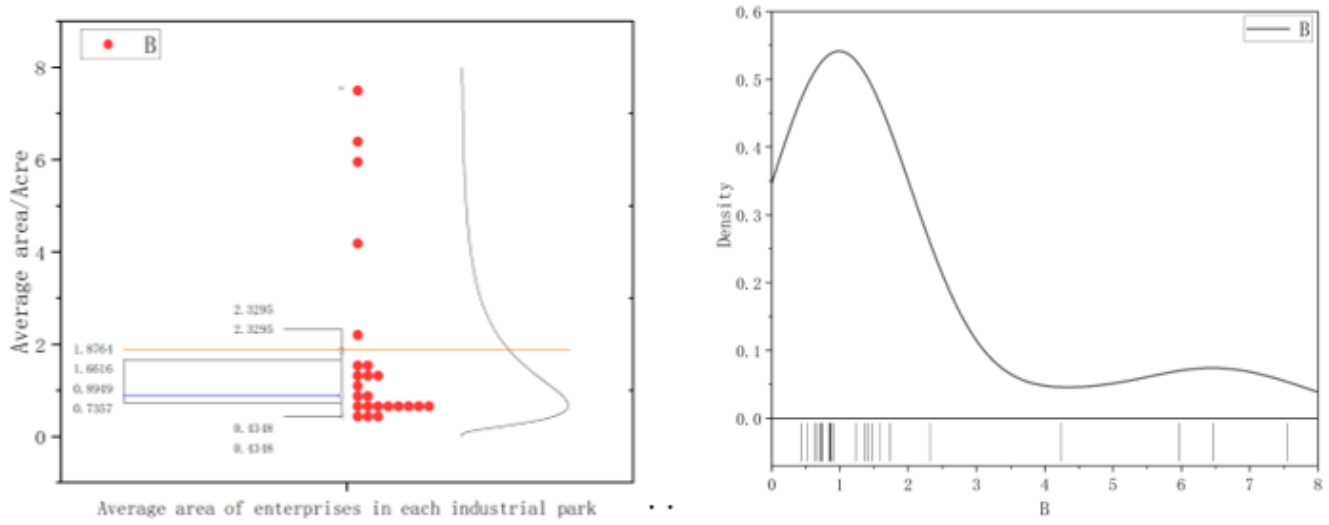

Figure 2: shows the box diagram of the area occupied by each enterprise.

3. Regional risk matrix model

To conduct a thorough analysis of seven types of risk factors—industrial structure risk, human resources risk, investment momentum risk, park operation risk, departmental supervision risk, enterprise clustering risk, and high-risk enterprise risk—and their proportions in the overall risk matrix, a regional risk matrix model is established. This model quantitatively evaluates the weight and impact of each risk factor, establishing a comprehensive regional risk analysis matrix model that ensures the total weight of all risks is 1. The model combines subjective

and objective weighting methods, determining the weight distribution through expert scoring and data analysis. Due to insufficient data, some city-wide data are replaced with data from the new city.

3.1 Regional risk panoramic analysis matrix model

Indicator screening. Core parameters are selected according to data availability and policy sensitivity

Weight calculation. The stratified weight is assigned by the coefficient of variation method

Risk calibration. The industry baseline value and the historical data of the jurisdiction are used as double benchmark verification

Risk coupling. Establish the standardized processing model R=Σ (ωi×Ri)

A regional risk panoramic analysis matrix model containing 7 types of risk factors was constructed. The weights were determined by principal component analysis (PCA), Analytic Hierarchy Process (AHP) and expert scoring, ensuring that the total weight was 1. The weight allocation matrix for the 7 types of risk factors is shown in Table 4, and the values of each item in the regional panoramic risk analysis matrix model are shown in Table 5.

3.2 Regional risk panoramic analysis matrix model equation

The total risk equation of the regional panoramic risk analysis matrix model is as follows:

$$\begin{cases} R_i = \sum_{i=1}^{i=7} \beta_i \cdot R_{ii} \\ R = \sum_{i=1}^{7} \omega_i \cdot R_i = \sum_{i=1}^{7} \omega_i \cdot (\sum_{i=1}^{i=7} \beta_i \cdot R_{ii}) \end{cases}$$

Where: βi is the weight value of the key quantitative index in each risk factor (0<βi<1)

ωi is the weight value of each risk factor (0 <βi <1).

Table 4: Sampled Data Statistics on Occupied Land Areas of SMEs in City-Wide Industrial Parks.

Kind of risk Ri	Weight (ω)	Key quantitative indicator Rix
1. Industrial structure risks	0.2	(1) The gap degree of R11 enterprises above the scale. (3.1%-1.74%)/3.5%=43.87% (2) R12 industrial concentration entropy value. Printing industry proportion =60% (3) Use linear equation: R1=43.87%*0.4+0.6*0.6=0.53548
2. Human resource risk	0.1	(1) R21 high-skilled talent gap degree. The human resources expert scored 75 points, and the risk was replaced by the high-skilled talent gap degree. R21 high-skilled talent gap degree is about 25% (among which: technical workers gap degree is 15.5%, engineers 40%, experts 65.7%, and high-skilled 43.8%) (2) R22 training gap. The training expert score is 59 points, and the risk is replaced by R22 training gap: manufacturing employees are trained for 6 days a year (3 days for new employees + 1 day for retraining + special operation days), and the actual number is about 3.5 days (1+0.5+2). The training gap is 41.67%, and the score is 59 points (3) Nonlinear attenuation equation is adopted: R2=1-e^(-0.02* (75^2+59)) =0.574
3. Investment momentum risk	0.15	(1) R31 R&D intensity gap. [(3.2%-1.49%)/3.2%=53.4%] (the industry baseline is 70%, the higher the proportion, the greater the risk) (2) Aging index of R32 equipment. The proportion of equipment used for more than 8 years is 63.2%. (3) Use linear equation: R3=0.6* (54.3%/70%) +0.4*60%^ (1/2)=0.775
4. Operation risks of the park	0.1	(1) Professional operation of R41 Park. The expert score is 3.2 points (9 provincial/28 =0.32), and the risk is 0.68. (2) Facility integrity rate. Using national data, R42=80.57%. In 2024, equipment failures accounted for about 18.64% of all equipment accidents nationwide, with 12,600 special equipment units being sealed (0.05%), and 169,500 inspection orders issued (0.74%). Thus, the national equipment integrity rate is 80.57%. (3) Use linear equation: R4=0.6*0.68+0.4*0.8057=0.73028
5. Departmental regulatory risks	0.17	(1) R51 monitors the risk of regulatory vacuum duration. For example, in the mining industry, 2,948 enterprises are overseen by 48 technical inspectors, averaging 103 enterprises per inspector. With an inspection rate of 2 enterprises per person per day, over a 5-working-day week (3.5 working days for inspections, 0.5 working days for document processing, and 1 working day for other tasks), it would take at least 15 weeks to inspect all 103 enterprises, typically around 4 months (120 days). Most printing companies use hazardous chemicals, which require inspections once a quarter. The R51 ratio is calculated as 120-90 / 90=33.33% (2) R52 Hidden danger omission rate. Among the 950 multi-level hidden danger inspection data of provinces, cities and counties from 2023 to 2025, only 337 were found at the county level. The hidden danger omission rate of county departments = (950-337)/950=64.5%. (3) Use linear equation: R5=0.3*0.33+0.7*0.64.5=0.5985

6. Enterprise clustering risk	0.13	(1) Density of R61 Industrial Park. The safety density warning line of international industrial park is less than 0.35 enterprises per mu; the average number of enterprises is 1.92 mu, which is converted into 0.52 enterprises per mu, R61=0.52-0.35/0.35=48.57% (2) The proportion of hidden dangers in R62 electrical appliances. 17.9% of the 950 hidden dangers. (3) R63 fire passage occupancy rate. 8.1% of the 950 hidden dangers. (4) Use linear equation: R6=0.5*0.4857+0.3*0.179+0.2*0.081=0.31275
7. Risks of high-risk enterprises	0.15	R71 High-risk enterprise concentration: 1196/1355=88.26% （2）R7=R71=0.8826

Table 5: Regional panoramic risk analysis matrix model with various numerical values.

Risk factor	Model weight comparison Deepseek assigns weights	VAR	Risk contribution comparison Deepseek calculates contributions	Comprehensive judgment risk grade	Propose
1. Industrial structure	0.2/0.15	0.53548	0.107096/0.080322	★★★	1. Establish an industrial structure adjustment fund, focusing on providing relocation subsidies to new energy equipment enterprises 2. Build an industrial chain service platform to promote equipment sharing among upstream and downstream enterprises (it is recommended that the annual sharing rate should be at least 60%)
2. Human resources	0.1/0.04	0.574	0.0574/0.02296	★★	We will implement a three-year plan to improve personnel, and increase housing subsidies and other policies
3. Investment momentum	0.15/0.06	0.775	0.11625/0.0465	★★	1. Increase r&d intensity 2. Extract production safety expenses and replace machinery and equipment with "two new" technologies
4. Park operation	0.1/0.1	0.73028	0.073028/0.0573028	★★★	1. Cultivate professional operation enterprises and entrust third-party organizations to conduct daily inspections by purchasing services 2. Formulate the property service quality (KPI) assessment system of the park, and the assessment result is linked to 15% fluctuation of the property management fee
5. Departmental supervision	0.17/0.18	0.5985	0.101745/0.10773	★★★★	1. The economic development department shall take the lead in setting up a joint law enforcement office and formulating a cross-departmental risk consultation system 2. Develop a smart supervision platform, integrating 25 core parameters such as enterprise production data, environmental monitoring and energy consumption indicators 3. A trial annual "white list" mechanism will be adopted to give administrative approval green channel to enterprises that have reached the rating standard for three consecutive years
6. Enterprise agglomeration	0.13/0.21	0.31725	0.0406575/0.0656775	★★	1. Optimize the spatial layout, implement the modular stamping of industrial units, and reorganize the enterprise community according to the relationship of industrial chain 2. Upgrade dynamic monitoring, focusing on enterprises with high risks 3. Economic regulation, construction of new parks, encourage enterprises to move out, and provide subsidies for moving out

7. High-risk enterprises	0.15/0.26	0.8826	0.13239/0.229476	★★★★★	1. Establish a dynamic enterprise access system, and implement "negative list + special review" dual control for special enterprises such as hazardous chemicals storage 2. Implement the "three-level inspection system" (self-inspection by enterprises, inspection by property management and joint inspection by departments), and introduce the Internet of Things gas monitoring and intelligent inspection system 3. Compulsory safety production expenses (no less than 3% of operating income) shall be set up to establish an emergency material reserve system in the park
Amount to			0.6285665/0.6040935		

3.3. Model results

Calculated:

$$R = \omega_1 \cdot R_1 + \omega_2 \cdot R_2 + \omega_3 \cdot R_3 + \omega_4 \cdot R_4 + \omega_5 \cdot R_5 + \omega_6 \cdot R_6 + \omega_7 \cdot R_7$$
$$= 0.2 \cdot 0.53548 + 0.1 \cdot 0.574 + 0.15 \cdot 0.775 + 0.1 \cdot 0.73028 + 0.17 \cdot 0.5985 +$$
$$0.13 \cdot 0.31275 + 0.15 \cdot 0.8826$$
$$= 0.6285665$$

The regional risk value is calculated to be 0.63907. Using Deepseek analysis and assigning weights to each risk factor (see Table 4), the calculated value is 0.6040935, a difference of 4.05%. The differences are in the risk values for industrial structure, human resources, investment momentum, enterprise clustering, and high-risk enterprises. Overall, the weights assigned by Deepseek to each type of risk are relatively reasonable, with the regional risk value being approximately 0.604, placing it within the high-risk range. Comparing the results from my own calculations and those from Deepseek, I found that the risks of high-risk enterprises, departmental supervision, park operations, and industrial structure are particularly high, requiring enhanced attention to mitigate these risks.

4. High frequency hazard analysis of industrial parks

Among the four major risks, adjusting the industrial structure is challenging and requires significant time, human resources, and financial investment. The optimal solution is to enhance the intensity and frequency of supervision, which can significantly reduce the risk probabilities associated with high-risk enterprises, departments, and park operations. To achieve this, it is essential to understand the classification of potential hazards, particularly those that occur frequently (i.e., those that are frequently and repeatedly identified during law enforcement inspections). To thoroughly investigate the distribution of various types of hazards in industrial parks, especially the high-frequency hazards, and to ensure the fairness of the research, we selected the '3030' mechanism hazards identified and addressed during the provincial and municipal supervision of Longgang as the research subjects. We included 950 major and general hazards (including key issues) discovered by the provincial, municipal, and county-level supervision from August 2023 to January 2025 in our study sample, as detailed in Table 6 and Figure 3.

Table 6: Regional panoramic risk analysis matrix model with various numerical values.

Industry area	Hierarchical risk classification						Source of the problem			amount to	percentage
	Major risks			General hazard							
	the county level	city level	provincial level	the county level	city level	provincial level	the county level	city level	provincial level		
Mining	86	104	9	38	189	59	124	293	68	485	51.05%
extinguishing and protection	7		83	18	12	5	25	95	5	125	13.16%
City operations	45	15			14	3	45	29	3	77	8.10%
building operations	37	2		2	22	21	21	39	24	84	8.84%
special equipment	36	12		11			47	12		59	6.21%
Culture and tourism	19		3	5	5	9	24	5	12	41	4.32%
hazardous chemical substance	2	5		7	11	2	9	16	2	27	2.84%
Sea-related and fishery-related	11	5			6	5	11	11	5	27	2.84%
road transport	13		1		4	4	13	4	5	22	2.32%
new form of industry						3			3	3	0.32%
amount to	256	143	96	81	263	111	319	504	127	950	100%

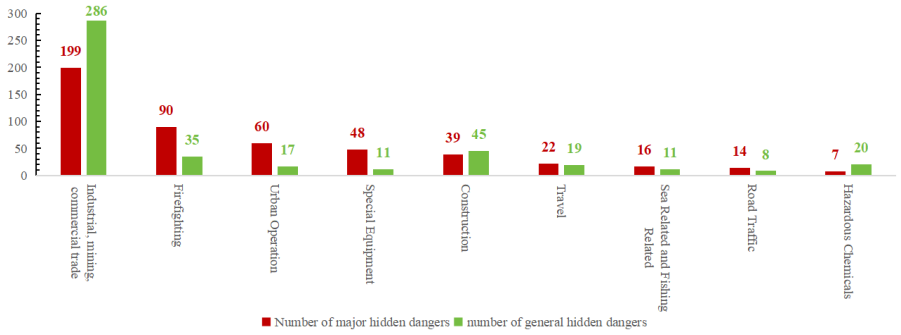

Figure 3: Number of general and major hidden dangers in various fields of Longgang City.

4.1. Overall situation of hidden dangers

Classified by the entities responsible for identifying and addressing potential hazards, there are 319 at the county level, accounting for 33.58%; 504 at the Wenzhou city level, accounting for 53.05%; and 127 at the provincial level, accounting for 13.37%. Among these, 495 are major hazards: 256 were identified at the county level (mainly 86 from industrial and mining, 45 from urban operations, 37 from construction, and 36 from special equipment), accounting for 51.7%; 143 were identified at the Wenzhou city level (mainly 104 from industrial and mining), accounting for 28.9%; and 96 were identified at the provincial level (mainly 83 from fire safety), accounting for 19.4%. The focus of provincial supervision is on fire safety, while the city-level focus is on industrial and mining, and the county-level focus is on industrial and mining, gas, construction, and special equipment.

Classified by industry, there are 485 items in the mining and industrial sector, 125 in fire safety, 84 in construction, 77 in urban operations, 59 in special equipment, 41 in cultural tourism, 27 in maritime and fishing activities, 27 in hazardous chemicals, 22 in road traffic, and 3 in new business models (1 from the Municipal Economic Development Bureau and 2 from the Municipal Resources and Planning Bureau). By hazard level, there are 495 major hazards, accounting for 52.1% of the total, mainly concentrated in mining and industry (197 major hazards and 2 key issues, accounting for 40.2%), urban operations (50 hazards, accounting for 10.1%), special equipment (48 hazards, accounting for 9.7%), and construction (39 hazards, accounting for 7.88%). There are 455 general hazards, accounting for 47.9% of the total, mainly concentrated in mining and industry (286 hazards, accounting for 62.86%), urban operations (45 hazards, accounting for 9.9%), fire safety (35 hazards, accounting for 7.7%), hazardous chemicals (20 hazards, accounting for 4.4%), and cultural tourism (19 hazards, accounting for 4.2%).

As can be seen from the above data, major hidden dangers and general hidden dangers found at the provincial, municipal and county levels account for 50% each, and major hidden dangers are mainly in the industrial and mining fields.

Table 7: Statistical Table of High Frequency Hidden Danger Classification (718 items in total, accounting for 75.6% of the total 950 hidden dangers).

Seven categories of hidden dangers	25 categories of hidden dangers	Total items in subcategory	The proportion of subcategory to category is%	The proportion of sub-categories in the total%	Total categories / items	The proportion of the total category is%
Fire safety	The combustible/toxic gas leak detection device is not set, missing or faulty	92	28.70%	9.70%	320	27.16%
	Evacuation passage/safety exit blocked, emergency lighting missing	77	24.10%	8.10%		
	Fire extinguisher problems (expired/insufficient pressure/unchecked/ monthly inspection/exhausted)	70	21.90%	7.40%		
	Damaged fire protection facilities (fire hydrants, emergency lighting, explosion-proof facilities)	56	17.50%	5.90%		
	Fire door/fire separation is not up to standard	25	7.80%	2.60%		
Safety management system category	No safety management agreement signed/unified coordination	53	41.41%	5.58%	128	13.47%
	The safety production ledger is missing (hazard	42	32.81%	4.42%		
	No emergency plan or drill	33	25.78%	3.47%		
Electrical safety category	The electrical circuit is not protected by pipe / private connection	52	43.70%	5.47%	119	12.53%
	Hidden dangers of distribution box (not connected, lack of protective cover, clutter)	40	33.61%	4.21%		
	Leakage protector/grounding wire missing	27	22.69%	2.84%		
Special equipment category	Pressure vessel/elevator/forklift overdue for inspection/unqualified	50	84.75%	5.26%	59	6.20%
	Special operation personnel operate without a license	9	15.25%	0.95%		
hazardous chemical substance	Hazardous chemicals are mixed/unstored in special areas	8	22.86%	0.84%	35	3.68%
	Problems with combustible gas alarm devices	7	20.00%	0.74%		
	The explosion-proof measures are missing	6	17.14%	0.63%		

Management category	Tank/container management defect	5	14.29%	0.53%		
	Safety signs and operating procedures are missing	5	14.29%	0.53%		
	Emergency plans and training are inadequate	4	11.43%	0.42%		
Major threat category	Dust work not cleaned	14	43.75%	1.47%	32	3.37%
	The production and operation site and dormitory evacuation passage are blocked	8	25.00%	0.84%		
	Dormitories or three-in-one places are set up in the plant/warehouse	6	18.75%	0.63%		
	Explosive sites are not equipped with explosion-proof equipment	4	12.50%	0.42%		
Building safety	Illegal construction (photovoltaic cover/occupying fire passage/ insufficient steel structure protection)	15	60.00%	1.58%	25	2.63%
	Lack of scaffolding/cavity protection	10	40.00%	1.05%		

Table 8: High frequency hazard classification (by regulatory difficulty).

Category of hazard	Specific hidden dangers	Specific risk scenarios and threats of hidden risks	quantity	Total hidden danger ratio
Easy to supervise (9 subcategories, 457 items, 48.1%)	Evacuation passage/safety exit blocked	Structural escape barriers (e.g., goods stacking barriers)	77	8.10%
	Fire extinguisher problems (expired/insufficient pressure/ unchecked/monthly inspection/exhausted)	Lack of initial fire response capacity	70	7.40%
	Gas monitoring and alarm device is missing/faulty	The risk of unanticipated leakage of flammable and	92	9.70%
	Damaged fire protection facilities (fire hydrants/ emergency lighting/explosion-proof facilities)	The fire protection system is not functioning properly	56	5.90%
	No safety management agreement signed/unified	There is a vacuum in cross-enterprise coordination	53	5.60%
	The safety production ledger is missing (hazard investigation/ training)	Lack of traceability for safety management	42	4.40%
	No emergency plan or drill	The emergency response time is delayed by more than 30%	33	3.50%
	Fire door/fire separation is not up to standard	The spread of the fire increased by 60%	25	2.60%
	Special operation personnel operate without a license	The risk of accidents caused by the three violations increases	9	0.90%
Specialized (12 subcategories, 229 items, 24.11%)	The electrical circuit is not protected by pipe / private connection	Short circuit ignition of a chain reaction of combustible material	52	5.50%
	Pressure vessel/elevator/forklift overdue for inspection	The explosion of the pressure equipment led to a secondary accident	50	5%
	Hidden dangers of distribution box (not connected, lack of protective cover, clutter)	The arc spark triggered the dust explosion	40	4.20%
	Leakage protector / missing grounding wire	The risk of death from electric shock increases to FR≥8	27	2.80%
	6 items of hazardous chemicals management	Contact with prohibited substances triggers a chain reaction	35	3.70%
	Illegal construction (photovoltaic cover/occupying fire passage/insufficient steel structure protection)	The collapse of the roof has increased the leverage effect	15	1.60%
	Lack of scaffolding/cavity protection	Free fall combined with object strike	10	1.10%
Major threat category (4 subcategories, 32 items, 3.37%)	Dust work not cleaned	The concentration of suspended dust reaches the explosive limit	14	1.50%
	Dormitories or three-in-one places are set up in the plant/ warehouse	The overlap rate of densely populated areas and hazard sources is greater than or equal to 90%	6	0.60%
	The production and operation site and dormitory evacuation passage are blocked	The escape exit is blocked at all times	8	0.80%
	Explosion-proof equipment is not used in explosive places	The probability of electric spark ignition increases P=0.82	4	0.40%
High frequency hazard summary			718	75.60%

Table 9: Multiple hidden dangers, cross risk scenarios, and threats.

Multiple hidden risk crossover scenarios	Description of hazard	Threats in risk scenarios
Fire safety + Building safety	Dormitories are provided in the plant/warehouse	The spread of the fire is accelerating, the evacuation channels are blocked; the building structure is not enough to withstand fire and is prone to collapse.
	The kitchen is not separated from the evacuation stairwell	In the case of fire, high temperature smoke spreads vertically through the stairwell and the escape path is invalid.
	The roof is illegally built as a warehouse	The collapse was caused by structural overload, the illegal use of materials aggravated the fire; the stacking of flammable materials led to three-dimensional combustion.
	The fire door of the workshop and the stairwell is damaged and a roller shutter door is added	The fire door fails to block the fire, and the roller shutter falls off after melting to block the exit, hindering escape and rescue.
Fire safety + Electrical safety	The goods on the rack are too close to the lamp	The lamp is heated for a long time to ignite the goods, and the electric short circuit spark directly contacts the inflammable material.
Hazardous chemicals management + fire safety	The storage room stores gas cylinders/ oxygen cylinders/flammable materials without protection and fire and explosion protection devices	The accumulation of flammable gas will explode when it meets the source of fire, and oxygen will help to expand the fire.
	Liquefied oxygen protection and warning signs are missing	The liquid oxygen leakage causes a violent oxidation reaction, and the contact with grease spontaneously ignites.
	The combustible alarm device fails when using bottled gas	Gas leakage cannot be warned in time, and it will explode when it reaches the explosion limit and meets an open flame.
	There is no fire extinguishing equipment for open-air storage of gas cylinders	The tank was heated by high temperature and burst, and there was no initial means to control the fire when it leaked.
Hazardous chemicals management + electrical safety	The exhaust fan of the liquefied gas warehouse is not explosion-proof, and the combustible gas alarm is faulty	The spark ignited the leaked gas when the ordinary exhaust fan was running, and the alarm failed to delay the disposal time.
Hazardous chemicals management + special equipment	The safety valve of the gas storage tank has not been inspected for a long time	Overpressure cannot be released, resulting in a physical explosion, and debris causes a secondary accident.
Hazardous chemicals management + major threat	The gas alarm system of the intermediate warehouse of hazardous chemicals has no backup power supply	The failure to monitor leaks during a power outage and the failure to trigger exhaust ventilation lead to an explosion risk
	The fire protection level of the paint mixing room is insufficient and there is no flammable gas alarm	The solvent volatilizes to form an explosive environment, and the fire isolation fails to cause a chain fire
	The spray booth using non-aqueous paint does not have a flammable gas monitor	Acute poisoning is caused by the accumulation of benzene series, and deflagration is caused by static spark
Special equipment + safety management system	The easy lift lacks protective doors and interlocking measures	Personnel fall or limbs are involved to cause mechanical injuries, and lack of interlocking causes the equipment to start unexpectedly.
	The limit of the maintenance window of the material hoist fails	During maintenance, the equipment starts up mistakenly, resulting in crushing injuries and the risk of falling objects from high altitude.
Special equipment + major threat	The heavy oil storage tank is not identified as a confined space	During maintenance, hypoxia or oil and gas poisoning may occur, and blind rescue may lead to the expansion of casualties.
Safety management system + building safety	The factory in the factory is not uniformly coordinated and managed	Crossing the work led to the spread of the fire and the escape route was blocked by the lessee.
	No safety agreement has been signed with the lessee	Responsibility shirking delays accident handling, dangerous work lacks approval and supervision.

4.2. Hazard risk characteristic

From the perspective of hidden risk, the risk characteristics are analyzed, and 718 high-frequency hidden risks are sorted out by deepseek. They are classified from the perspective of ownership, supervision and major threat respectively, as shown in Table 7 and Table 8.

Classify the 950 identified hazards based on their potential impact. High-frequency hazards are identified by categorizing them into seven major categories and 25 subcategories, totaling 718 items, which account for 75.6% of all identified hazards. These categories include fire safety, safety management systems, electrical safety, special equipment, hazardous chemicals management, major threats, and building safety. Specifically, the three most frequent hazard categories—fire safety, safety management systems, and electrical safety—comprise 505 items, or 53.16% of all hazards, more than half. See Table 7 for details.

Classified by the difficulty of supervision. Among the 7 high-frequency hidden dangers, according to the difficulty of supervision and the degree of danger, the high-frequency hidden dangers are divided into three categories: easy to supervise, professional and major threat, as shown in Table 8.

High-frequency hidden dangers that are easy to monitor, such as the absence or malfunction of combustible and toxic gas leak detection devices, blocked evacuation routes, issues with fire extinguishers, damaged fire protection facilities, lack of safety management agreements or unified management, missing safety production records, failure to develop emergency response plans or conduct drills, non-compliance with fireproof doors and fire compartments, and unlicensed operation of special operations personnel, among nine subcategories and 457 items, accounting for 48.11% of all hidden dangers.

(2) High-frequency hazards that require professional supervision. For example, electrical wiring without conduit protection or unauthorized connections, pressure vessels, elevators, and forklifts that have not been inspected or have failed inspections, distribution boxes with issues such as not being cross-connected, lacking protective covers, or cluttered with debris, leakage protection devices and missing grounding wires, illegal constructions such as photovoltaic installations, occupying fire lanes, and inadequate steel structure protection, missing scaffolding and opening protection, hazardous chemicals, and other 12 subcategories, totaling 229 items, which account for 24.11% of all hazards.

(3) Classification from the perspective of major threats. Although some hidden dangers are not frequent, they pose significant risks when viewed from the perspective of major threats. For example, dust operations not being cleaned up, production and operation sites and employee dormitories lacking exits that meet emergency evacuation needs, with clear signs and unobstructed access, setting up dormitories or three-in-one facilities in factories or warehouses, and not using explosion-proof equipment in explosive areas. These four subcategories, totaling 32 items, account for only 3.37% of all hidden dangers, but they are closely linked to accidents and their escalation.

4.3. Hazard risk scenario

The analysis of 25 categories of high-frequency hidden dangers found in the three levels of provincial, municipal and county inspections shows that there are different risk scenarios and different threats to production safety. See Table 8 for details.

In addition, some enterprises (sites) also have multiple different hidden dangers superimposed, which poses a greater threat to the production safety of enterprises (sites), and needs special attention. This paper only lists the intersection of the two main types of risks, see Table 9 for details. The intersection of the three types of risks is similar, and will not be listed one by one.

4.4. High frequency hazard analysis

1) The 7 categories and 25 sub-categories of high-frequency hidden dangers are the focus of supervision, accounting for about 2/3 of the total number of hidden dangers;

2) The main body of high-frequency hidden dangers is fire safety, management system and electrical safety, accounting for more than half of the total number of hidden dangers;

3) From the perspective of regulatory difficulty, hidden dangers that are easy to regulate account for nearly half (48.1%) of the total hidden dangers, professional hidden dangers account for about 1/4, which need to be assisted by experts; hidden dangers with major threats account for less than 1/20 (3.37%).

4.5. Application of results

By limiting the scope and focusing solely on the management of easily manageable risks, enhancing only the management of such risks can reduce the regional risk level from 0.604 to 0.54 (with other factors, including weight, remaining unchanged), a reduction of 10%. As shown in Table 10, it is evident that, considering changes in other factors, such as weight, the reduction should be at least 30% or more.

Table 10: Only strengthen the risk value in the case of easily regulated hidden dangers.

Risk factor	Weight	VAR	Risk value contribution
1. Industrial structure	0.15	0.53548	0.080322
2. Human resources	0.04	0.574	0.02296
3. Investment momentum	0.06	0.775	0.0465
4. Park operation	0.1	0.63428	0.063428
5. Departmental supervision	0.18	0.21394	0.0385092
6. Enterprise agglomeration	0.21	0.29655	0.0622755
7. High-risk enterprises	0.26	0.8826	0.229476
Amount To			0.5434707

5. Conclusion

The following conclusions can be drawn based on the research:

1. There are 7 types of risk factors in Longgang, and the four types of risk are high, such as high-risk enterprises, department supervision, park operation and industrial structure.
2. The risk value of Longgang area is 0.604, which is in the high-risk range.
3. By introducing DeepSeek intelligent risk analysis and building a three-in-one model of "intelligent prediction, graded intervention and dynamic optimization", we can effectively identify and control high-frequency hidden dangers and significantly reduce the regional risk threshold. By strengthening the management of easily regulated hidden dangers, the regional risk can be reduced by more than 10%-30%.

References

1. Goh Y M, et al. (2020). Regulatory challenges in balancing innovation and safety for emerging technologies. *Saf Sci*; 132: 104936.
2. Zhong M, et al. (2020). Accident risk transmission model of industrial parks based on system dynamics. *Syst Eng Theory Pract;* 40(10): 2712-2723.
3. Liu S, et al. (2023). AI-enabled dynamic risk assessment for urban infrastructure safety using multi-source data fusion. *Adv Eng Inform*; 56: 101985.
4. Aven T. (2018). An emerging new risk analysis science: Foundations and implications. *Risk Anal*; 38(5): 876-888.
5. Ministry of Emergency Management. (2022). Industrial Park Safety Risk Assessment Specification (Trial). (Policy basis for the formulation of risk classification standards for domestic industrial parks).
6. Chen C, et al. (2023). Pattern recognition of gas industrial accidents based on GAN-CVAE. Process Saf Environ Prot; 173: 606-621.
7. Zhang B, et al. (2021). Dynamic risk assessment model for chemical industry parks driven by multi-source heterogeneous data. *China Sci Technol Work Saf*; 17(9): 5-11.
8. Zhang Y, et al. (2021). DeepRisk: A deep learning approach for industrial accident prediction. Reliab Eng Syst Saf; 215: 107876. (Industrial risk prediction technology route based on LSTM-CNN hybrid model).
9. Wang F. (2020). Parallel Intelligence and Industrial Safety: From ACP Method to Intelligent Supervision. Acta Autom Sin; 46(2): 230-242. (Parallel system theory: a localized intelligent algorithm framework for guiding the development of "Risk Situation Propagation Model").
10. Arulkumaran K, et al. (2017). Deep reinforcement learning: A brief survey. IEEE Signal Process Mag; 34(6): 26-38.
11. Leveson N. (2011). Engineering a safer world: systems thinking applied to safety. MIT Press.
12. Wang X, Wu J. (2022). Practical Exploration of the Flattening Reform of Grassroots Governance —— A Case Study of the 'City-Managed Community' Reform in Longgang City, Zhejiang Province. Soc Gov; (02): 94-96.
13. Chen Z. (2021). "Innovations in Flat Grassroots Governance of City-Managed Communities" —— Case Study Analysis of Longgang, Zhejiang. Local Gov Res; (01): 27-34+78-79.

DOI:10.31579/2690-4861/934