Characteristics of urban groundwater pollution based on abnormal data processing and optimization of sports health market

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Abstract
With the rapid development of China’s economy in recent years, the prevention and control of groundwater pollution has become increasingly acute. With the increasingly serious environmental problems of groundwater, it is of great significance to study groundwater. In order to correctly understand the groundwater environmental quality in a certain area and make the groundwater pollution monitoring more targeted, it is urgent to optimize the existing monitoring indicators. By analyzing the direct and indirect effects of features on anomaly detection, this paper designs redundant feature deletion mechanism and feature importance evaluation mechanism, and proposes a mixer mode feature selection algorithm to select groundwater pollution features quickly and accurately. Then, the method of anomaly detection is improved by using the feature selection algorithm, and an anomaly detection technology based on groundwater feature selection is proposed to improve the detection accuracy of all kinds of abnormal data. With the improvement of the living standards of Chinese residents, the demand for sports fitness services is also growing, and the sports fitness consulting service industry supported by the state is also expanding to other fields, which also provides a market for sports fitness consulting services. This paper analyzes and studies China’s sports fitness consulting market by using the methods of literature data, questionnaire survey, expert interview, and case study. Using the relevant knowledge of marketing, based on STP theory, this paper puts forward corresponding strategies from the aspects of product marketing, price marketing, marketing channels, and marketing promotion. Based on abnormal data processing, this paper studies the characteristics of urban groundwater pollution and sports health market.

Keywords Abnormal data processing · Urban groundwater · Pollution characteristics · Sports health · Market optimization

Introduction

Groundwater resources are very precious fresh water resources in the current world. They are the main economic basis for the country to promote sustainable and vigorous development of modern industry and agriculture and improve the survival of the people at the grass-roots level. With the rapid development of the socialist market economy with Chinese characteristics in recent years, and the deepening of the new urbanization construction process, the serious pollution of groundwater environment is becoming increasingly acute. This paper takes the leakage of groundwater organic pollutants in a small- and medium-sized town fertilizer processing plant reservoir area as the main research background (Mukherjeea and Singha 2020). On the basis of the relevant research on the data collection, hydrogeological resources investigation, and field scientific experiment in the reservoir area of the Institute, a large number of underground water samples are collected, and the water samples are tested and quantitatively analyzed. The main types of organic chemical pollutants, the leakage types, and the severity of the pollutants in the reservoir area of the Institute were investigated. The comprehensive evaluation of groundwater vulnerability in this area is carried out by using GIS-based comprehensive analysis method of the dry land model. The vulnerability monitoring area of groundwater in this area is divided and the pollution prevention capacity of the area is studied comprehensively. Based on the above, the static flow virtual model of...
hydrologic groundwater and the virtual model of solute transformation and migration in dynamic groundwater are designed by using GMS. The dynamic flow simulation model analyzes the whole process of carbon tetrachloride migration and transformation, one of the main characteristics of organic chemical pollutants in groundwater, and proposes the specific migration path and range of organic pollutants, so as to improve the accuracy of fine-grained network flow anomaly detection. A new method of traffic anomaly detection based on feature selection is proposed (Moubark and Abdelkareem 2018). The method proposes two levels of structure, which are coarse-grained detection and fine-grained detection of abnormal flow type (Zhou et al. 2018). The optimal feature set is selected for anomaly detection for each traffic characteristic, so as to improve the accuracy of flow detection. First, a two classifier is used to detect the traffic size to distinguish the normal and abnormal traffic quickly. Then, the method of combining multiple two classifiers serial parallel detection and single multi classifier serial parallel detection is used to identify the type of abnormal traffic, avoid the cumulative effect of serial detection method errors, and shorten the detection time when the detection accuracy and accuracy are greatly improved (Sikdar et al. 2004). In order to build a famous brand of sports fitness consultation, with the help of mature market systems such as health medical products, entering the healthy industry market (Yilmaz 2010). The demand for sports consultation is expanding continuously by enterprises and institutions, increasing the service of sports fitness consultation and the construction of culture of the unit. The project of physical and health management which is integrated with the comprehensiveational quality training of employees has a wide application prospect (Zare et al. 2013). The community sports fitness consultation is integrated by the integration of the national fitness service project and enterprise management of the government departments. The health consultation organization and other communicators, media, and other information resources participate in the community fitness consulting industry, which are the main strategies to realize the development path of the fitness consulting industry market (Yilmaz 2010).

Materials and methods

Data source

The time span of groundwater monitoring is from the fourth quarter of 2012 to the fourth quarter of 2020, in which the sampling points in the second and third quarters are S01–S58, a total of 58 points; 1. In the fourth quarter, there were 18 sampling points from S40 to S58. There are 36 indicators in this monitoring.

The 58 new sampling and detection sites have basically covered all the plain areas of a certain area, and each area can contain different types of aquifers (Zhu and Huang 2006). The total number of sampling and detection sites in the first aquifer is 32, the total number of sampling and detection sites in the second aquifer is 14, and the total number of sampling and detection sites in the third aquifer is 8. There are four sampling sites in the fourth aquifer.

The groundwater quality monitoring points are mainly selected in a certain basin area. There are no points in the mountains area, including different surface water quality aquifers, such as 32 aquifers in zone I, 14 aquifers in zone II, 8 aquifers in zone III, and 4 aquifers in zone IV. The monitoring points are shown in Fig. 1.

Abnormal data detection and processing methods

Redundant feature deletion mechanism: feature selection algorithm based on information measurement generally identifies redundant features through mutual information, and uses Formula (1) to select features with high correlation with tag y and lowest redundancy with selected features.

\[ J_{X_i} = I(X_i; Y) - \beta \sum_{i \neq 0} I(X_i; X_0) \]  

(1)

However, in practical application, it cannot be used to express the redundancy between two features directly. The calculation formula of mutual information is shown in Formula (2):

\[ I(X_i; X_0) = H(X_i) - H(X_i | X_0) \]  

(2)

The definition of redundancy calculation formula is shown in formula (3):

\[ R_{i,0} = \frac{I(X_i; X_0)}{H(X_i)} \]  

(3)

Formula (4) is given to measure the importance of features, and the score is inversely proportional to the importance of features.

\[ \text{Score}_i = \frac{\text{ACC}_{D_i}}{\text{ACC}_{D_b}} \]  

(4)

For the proposed feature selection algorithm, the time of feature selection, the number of selected features, the accuracy of anomaly detection of selected feature subsets, the false alarm rate, and the false alarm rate are used as metrics. For the proposed network traffic anomaly detection method, the construction time, detection time, detection accuracy, false
positive rate, false negative rate, accuracy rate, recall rate, and comprehensive evaluation indicators are used as the measurement indicators.

ACCAD refers to the proportion of correctly classified data in all data, fprad refers to the proportion of normal traffic data classified as abnormal traffic data, fprad refers to the proportion of abnormal traffic data classified as normal traffic data, precisionad refers to the proportion of data classified as certain data, and Recallad refers to the proportion of correctly classified data in a certain type of data. F1 score ad is the weighted harmonic average of precisionad and recallad. When the two indicators conflict or need to be considered comprehensively, F1-scoread is used.

\[
F1\text{-score}_{ad} = \frac{2 \cdot \text{Precision}_{ad} \cdot \text{Recall}_{ad}}{\text{Precision}_{ad} + \text{Recall}_{ad}}
\]

**Groundwater pollution assessment method**

The current situation evaluation method of groundwater pollution is to use the environmental pollution index PKI method to comprehensively evaluate the pollution of groundwater.

\[
P_{ki} = \frac{C_{ki} - C_0}{C_{III}}
\]

See Table 1 for classification standard of pollution index.

| P value range | Pollution level | Pollution classification |
|---------------|----------------|-------------------------|
| \( P \leq 0 \) | Grade I        | Uncontaminated           |
| \( 0 < P \leq 0.2 \) | Grade II       | Light pollution          |
| \( 0.2 < P \leq 0.6 \) | Grade III      | Medium pollution         |
| \( 0.6 < P \leq 1.0 \) | Grade IV       | Heavier pollution        |
| \( 1.0 < P \leq 1.5 \) | Grade V        | Serious pollution        |
| \( P \geq 1.5 \) | Grade VI       | Very heavy pollution     |
Research methods of sports health market

Interview method

In this paper, while investigating the situation of the institution itself, we interviewed the person in charge of the institution and the staff in different positions, such as rehabilitation division and front desk customer service, on the propaganda channels, service methods, and price standards of the institution, and collected relevant text and digital data.

Questionnaire survey

In order to have a deeper understanding of the business status of these 12 private rehabilitation institutions, including business content, business efficiency, and business mode, combined with the previous literature review, and combined with the information obtained from other network platforms, after the actual investigation and interviews with relevant personnel, we designed the “questionnaire of rehabilitation teachers in private sports health institutions.” In addition, in order to understand the current situation of consumers in the institutions, the questionnaire “questionnaire of consumers in private sports and health institutions” was designed.

Mathematical statistics

Excel 2019 software and SPSS software are used to make more detailed and comprehensive classification and statistics of the data obtained in this study, and the data are repeatedly calculated and processed to ensure the authenticity and reliability of the final results.

Logical analysis

In this paper, through the use of summary, summary and other methods to access and collect a variety of information for a comprehensive analysis and discussion, and put forward constructive suggestions on the relevant conclusions.

Results

Analysis of urban groundwater quality assessment results

A region belongs to the temperate continental monsoon climate, where the difference between the four seasons is obvious, the time in winter is longer, which is the longest in the four seasons, the time in spring and autumn is shorter, and the time in summer is longer. Because of the influence of the cold current in Inner Mongolia Plateau, the temperature changes greatly in winter and summer, and the climate is relatively dry. The rainfall period of a certain area is mainly from June to September, and the rainfall data from 1987 to 2020 are collected. Draw a histogram of annual precipitation in a certain area, as shown in Fig. 2.

According to the monitoring data of groundwater level for many years and the monthly rainfall data from 2012 to 2020, the dynamic change map of groundwater level at S49 monitoring point is drawn. It can be seen from Fig. 3 that the location of groundwater has a certain stop and lag effect on the decrease of groundwater flow in that year. However, with the gradual increase of precipitation in 2013 and 2014, the groundwater level obviously shows an upward trend. From 2015 to 2017, the rainfall will decrease and the groundwater level will drop. In 2020, the groundwater level also showed a relatively obvious rise. To a certain extent, this is due to the increase of rainfall, which is concentrated in the upstream of the reservoir and the piedmont area which is conducive to rainwater infiltration, and the groundwater has been replenished.

The data of the samples to be evaluated are normalized and applied to the above trained network to obtain the evaluation results of groundwater monitoring points in a certain area in the third quarter of 2020. The proportion of the evaluation results is shown in Fig. 4, in which class I accounts for 3.51%, class II accounts for 5.26%, class III accounts for 31.58%, class IV accounts for 33.33%, and class V accounts for 26.32%. Although the overall situation of groundwater...
resources in a certain area is good, there are still some problems that need to be paid attention to.

According to the groundwater quality evaluation results of a certain area in the third quarter of 2020, draw the distribution map of water quality results of each monitoring point; as shown in Fig. 5, it can be seen that the monitoring points with serious exceeding standard are relatively concentrated. Combined with the actual situation of a certain area, it is analyzed that the pollution mainly comes from living, agricultural activities, and industrial production.

Analysis of urban groundwater pollution characteristics

The analysis of the over standard rate of nitrate, iron (2 price), iron (three price), and manganese in 2013–2020 is carried out, and the change line chart of the over standard rate is shown according to the annual exceeding standard, as shown in Fig. 6. It can be seen from the figure that the rate of nitrate and manganese exceeding the standard has not changed much this year, and it maintains a high over standard rate. The over standard rate of iron (two price) and iron (three price) shows a downward trend.

Based on the water quality monitoring data in the third quarter of 2020, the spatial analysis function of ArcGIS is used to analyze the distribution of some pollution indicators, as shown in Fig. 7.

In a certain area, the detection rate of total aluminum is not high, which is concentrated in Industrial development zone A and industrial development zone B. The detection concentration of manganese in industrial waste landfill area of the former is obviously lower than that in other pollution areas, as shown in Fig. 8.

As shown in Fig. 9, the emission of various heavy metals such as aluminum is also likely related to the pollution of a large amount of industrial wastewater and state-owned landfill in a certain area.

It can be seen from Fig. 10 that the pH value of groundwater level is between 7.41 and 8.25 at the location of high arsenic concentration. Under neutral to weak alkali conditions, it is conducive to the dissolution of a large number of arsenic oxides. The leaching effect in rocks is the main reason for the high arsenic concentration.

Fluoride is mainly distributed in the southwest of a certain area, among which the concentrations of fluoride in S23, S24, and S36 are the highest, and the situation of exceeding the standard is found. S23 and S24 are monitoring points for the first and second aquifers, which are located in the alluvial and proluvial plain area. The groundwater runoff is slow, which is easy to cause fluorine enrichment in shallow groundwater. S36 monitors the water quality of the fourth aquifer in Xilujiao village, with a depth of 300m. The pH is between 7.96 and 9.01. In the environment of weak alkalinity, it is conducive to the dissolution of fluorine-bearing minerals, leading to the increase of fluorine concentration, as shown in Fig. 11.

The location of high nitrate concentration is concentrated in populated areas and industrial parks, and the discharge of domestic and industrial wastewater is the main source of
Fig. 5  Distribution of water quality results at each monitoring point.

Fig. 6  Change of over standard rate of some indicators from 2013 to 2020.

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nitrate. In addition, this area is also the largest agricultural economic development area at present. Most of the fertilizers are mainly organic nitrogen fertilizer. Under the harsh conditions of strong wind and a large amount of rain in summer, the organic nitrogen in organic fertilizer directly enters into groundwater through soil and is transformed into nitrate through the reaction of organic nitration. The nitrate content in groundwater is greatly increased.

According to the measured data of water samples, the distribution characteristics of groundwater in the study area were compared and analyzed by box plot. Except for copper, mercury, volatile phenol, cyanide, anionic synthetic agent, and lead, most of the data were less than the detection concentration, which was not suitable for box plot. The box plot of other indicators was shown in Figs. 12 and 13.

Combined with the results of box plot, nitrite, cadmium, turbidity, ammonia nitrogen, lead, SO4$^{2-}$, iron (bivalent), iron (trivalent), arsenic, manganese, and other indicators had a high degree of variation.

In the indicators showing the rising trend, the typical point with concentration of nitrate is selected as the trend chart of concentration change, as shown in Fig. 14.

Among the indicators showing an upward trend, select the typical points where the concentration of arsenic is relatively concentrated to make the concentration change trend diagram, as shown in Fig. 15.
Combined with the previous paper, it can be seen that the concentrations of nitrate and arsenic are within the scope of Industrial Park, that is, industrial park in zone B and industrial park in zone A. It can be seen that the increase of nitrate and arsenic concentration is related to the development of industry and the increase of population.

**Analysis of current situation of sports health market**

It can be seen from Table 2 that one of the 12 private sports and health institutions covers an area of less than 300 m², accounting for 8.33% of the total; four of them cover an area of 300–399 m², accounting for 33.33% of the total; four of them cover an area of 400–599 m², accounting for 33.33% of the total; two of them occupy a large area and are found to be more than 600 m², accounting for 16.67% of the total. According to the survey, the largest area is between 300–500 m², accounting for 66.66%.

It can be seen from Table 3 that sports injury is the most popular consumer demand, followed by sub-health conditioning, and postoperative rehabilitation. The sum of the three has reached 66.67% of the total, which are the main consumers in private sports and health institutions. Based on the previous survey on the service content of rehabilitation institutions, this is also the rehabilitation service content that most institutions will provide. According to the market demand, the
Fig. 11  Nitrate concentration distribution in the third quarter of 2020

Fig. 12  Box line of groundwater quality factor concentration in a certain area from 2013 to 2020 (1)
corresponding services are provided. The flexibility of the operation mode reflects the advantages of private capital operation.

The consumption level in this survey refers to the sum of the total consumption expenses of consumers in the past. As can be seen from Table 4, the consumption between RMB 20,001 and 30,000 is the most, followed by RMB 30,001–40,000 and RMB 20,001–30,000, accounting for 65.69% of the total, that is, 65.69% of the consumers' consumption level is between RMB 20,001 and 40,000. In addition, we can see that 16.67% of the consumers whose consumption level exceeds 50,000 yuan belong to the fourth largest consumption range.

**Fig. 13** Concentration box plot of groundwater quality factors in an area from 2013 to 2020 (2)

**Fig. 14** Variation trend of nitrate concentration at typical points
Discussion

SWOT analysis of sports health market development

Internal advantages

Sports health market demand is big, development potential is huge: with the further improvement of modern society people’s sports health consciousness, people’s more urgent for high quality of life taste, making the rise of mass sports fitness. With the continuous development of social economy, people’s demand for health is gradually increasing. In the process of development, private sports health institutions should seize the opportunity, give full play to their own advantages, and fully develop the domestic sports health market.

Flexible to adapt to market demand and provide personalized services: compared with public hospitals and rehabilitation institutions, private sports health institutions are more flexible and full of humanistic care. The 12 institutions in this survey will develop a one-to-one rehabilitation program for each consumer, take one-to-one or more one targeted rehabilitation training guidance, each customer is equipped with an exclusive sports health teacher, and take close attention to the customer’s training process in an all-round way. In terms of time arrangement, the appointment system should be adopted to match the time arrangement of customers as much as possible, which is flexible and convenient. Compared with the hospital queuing, registration, and regular treatment, the service of private sports and health institutions is more convenient and personalized (Abdalla 2020).

The service mode is gradually clear, “combination of sports and medicine” + “combination of Internet online and offline” has become the main trend, combination of sports and medicine is the basic concept of sports health industry, and also the main service mode of sports health institutions. Among the 12 private sports and health institutions in this survey, a small number of them have obtained medical qualification and established referral mechanism with public or private hospitals. All of them take offline entities to set up rehabilitation institutions as their main business model. However, some of them have also begun to expand Internet online business, taking advantage of convenient online communication, low fees, and high-quality services eliminate geographical differences and other advantages, and form a two-way diversion relationship with offline entity business.

Internal disadvantages

The standards of sports health industry are different, and the public’s understanding of sports health is not comprehensive and in-depth. At present, there is no unified industry standard on sports health industry in China, and there is no clear regulatory department and regulatory measures, so there are multi-department coordination and multiple implementation standards. The internal standards of sports health industry are different; coupled with the sports health industry started late in China, the popularity is not enough and other reasons, and the public’s understanding of sports health is not comprehensive and in-depth (Abdalla et al. 2020).

Investment returns are slow and financing is difficult. The sports health industry needs to establish public praise, build brand effect, and invest a lot of human and material capital in the early stage. These two also make the sports health industry, especially the investment entity sports health institutions need not only high capital, but also long-term persistence. In addition, sports health is a new industry in China, and it also needs to invest a lot of knowledge popularization and education costs to the public. Most private sports health

![Fig. 15 Variation trend of arsenic concentration in typical points](image)

Table 2

| Area (m²) | Quantity (home) | Percentage (%) |
|-----------|-----------------|----------------|
| <300      | 1               | 8.33           |
| 300–399   | 4               | 33.33          |
| 400–499   | 4               | 33.33          |
| 500–599   | 1               | 8.33           |
| 600–799   | 0               | 0              |
| >799      | 2               | 16.67          |
centers are still operated by personal capital, and the operation scale cannot be expanded in a short time. The characteristics of the industry’s long investment return cycle make the capital choose a cautious wait-and-see attitude, and the actual financing is more difficult.

There is no unified qualification certification system for rehabilitation practitioners. At present, there is no unified sports health industry qualification certification system in China, which also makes the professional background of practitioners diverse and professional technology industry has certain differences (Abdel Moneim 2005). Although the private sports health institutions perform well in the continuing education of rehabilitation teachers and attach importance to the ability training of rehabilitation teachers’ further study, the confused qualification standards also reduce the public’s trust in private sports health institutions and hinder the further development of private sports health industry.

External opportunities

As the first policy to promote the opening of sports health capital market, a large number of sports health institutions are regarded as the “Lighthouse” of enterprise development and progress. China will once again decide to add five different categories of independent health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. At present, it is actively studying and organizing the drafting of relevant national standards for health and rehabilitation management institutions and service categories. Among them, the most distinct categories are independent rehabilitation management medical service center, nursing service center, and health and rehabilitation physical examination service center (Abdel Moneim 2005). Generally speaking, the national policy has a clear support attitude to the field of sports health, which brings hope to the enterprises in this industry.

Consumers’ satisfaction is high, and people’s awareness of sports health is improving: the survey of consumers’ acceptance of charges and service satisfaction of private sports health institutions shows that the current sports health industry is still facing problems such as inconsistent industry standards and professional technical standards, sports health, as a rehabilitation service under the guidance of a new health concept. Usually makes people see the real effect. On this basis, some private sports health institutions take root in the public sports health services, and provide high-quality sports health services for customers on a down-to-earth basis, which has gradually been recognized by more people and established a corporate image and brand reputation.

Policy support should be strengthened to encourage capital to enter private sports and health institutions. At present, the government is increasing support for sports health and related industries, actively formulating industrial development policies, using market mechanism, exploring the establishment of sports health industry investment fund guided by the government and participated by social capital. We should effectively implement the existing tax support policies on promoting the development of sports- and health-related industries, strengthen financial support, broaden financing channels, and reduce financing costs (Anayah and Almasri 2009).

The integration of foreign rehabilitation technology and Chinese traditional rehabilitation ideas and methods can further improve the effect of sports health. Sports health refers to the effective treatment of all-round and comprehensive treatment measures, combined with prevention and control, to effectively treat the disease in the body, the disease in the life, and the disease in the life, and maintain the health of the body and life. In foreign countries, especially in Germany, the USA, Britain, Singapore, and other developed countries, sports health has accumulated a lot of technical experience and theoretical knowledge (Elewa et al. 2000). Up to now, they have invented and manufactured many high-tech sports health

| Table 3  | Statistical table of consumer demand of sports health institutions (N = 102) |
|----------|-------------------------------------------------------------|
| Consumer demand | Number of consumers (person) | Percentage (%) |
| Sports injury | 31 | 30.39 |
| Postoperative recovery | 17 | 16.67 |
| Sub-health conditioning | 20 | 19.61 |
| Posture correction | 14 | 13.72 |
| Fitness and fat loss | 5 | 4.90 |
| Postpartum recovery | 10 | 9.80 |
| other | 5 | 4.90 |

| Table 4  | Statistical table of consumption level of consumers in sports and health institutions (N = 102) |
|----------|-----------------------------------------------------------------------------------------------|
| Consumer level (yuan) | Number of consumers (person) | Percentage (%) |
| 1–10,000 | 8 | 7.84 |
| 10,001–20,000 | 18 | 17.65 |
| 20,001–30,000 | 27 | 26.47 |
| 30,001–40,000 | 22 | 21.57 |
| 40,001–50,000 | 10 | 9.80 |
| Greater than 50,000 | 7 | 16.67 |
instruments and equipment, which run through the detection, evaluation, treatment, training, and other aspects, greatly promoting the development of modern sports health. The coexistence of Chinese and western sports health and the combination of traditional Chinese medicine rehabilitation concepts and methods with modern foreign rehabilitation technology reflect the unique development of sports health in China.

External threats

The quality of service varies greatly, and the cost-effective rehabilitation institutions cannot meet the needs of the public. The survey found that in the whole sports health industry has not yet a unified industry standard and people’s understanding of sports health is not comprehensive and in-depth environment, it is inevitable that the whole private sports health industry will have a certain negative impact. The development of the industry calls for a large number of cost-effective rehabilitation institutions with high service quality and value for money, but at present, from the perspective of quantity and quality, it is far from meeting the public demand for high-quality sports health services.

The referral system has not been really established, and there is a lack of better linkage between hospitals and rehabilitation institutions. Due to the late start of rehabilitation medicine in China, a complete set of system has not yet been formed. It is not only the idea of the general public but also the status quo of many medical institutions to attach importance to clinic and neglect rehabilitation, which makes the linkage between general hospitals and rehabilitation institutions insufficient. It is found that many patients have to go to private institutions for rehabilitation only find private sports and health institutions for follow-up rehabilitation after the recurrence or aggravation of injuries. The medical staff in public hospitals do not have a comprehensive understanding of the services provided by private sports and health institutions (Kundu and Nag 2018). They do not recommend or even oppose the services, which affects consumers’ choice of private sports and health institutions to a certain extent.

It is difficult for private institutions to obtain medical qualification, and medical insurance has become a barrier. As far as the current private sports health institutions are concerned, it is difficult for the state to meet the requirements. It is very difficult to get a medical license. If you cannot get the medical license recognized by the government, it means that medical insurance cannot be accessed, and commercial insurance cannot be guaranteed. If we cannot enjoy medical insurance, the customers will take the money by themselves. In addition, most of sports health services are one-to-one services, and the expensive price often makes the public flinch, so the popularization of sports health becomes difficult.

Suggestions on the development of sports health market optimization

With market demand as the guidance, concentrate on operation and create a good reputation and brand effect

For private sports health institutions, in the current external environment, conditions are not yet fully mature; we need to concentrate on business, with high-quality products and services, excellent professional skills, good environment, to obtain consumer recognition and trust, and establish a good reputation, so as to stand out among the numerous sports health institutions.

Strengthen personnel training and cultivate more high-level sports health teachers

As a health management service industry, high-level health management professionals have always been the most important core competitiveness of our enterprise. We should continue to strengthen the professional ability of sports health teachers, regularly organize internal technical exchanges and study with foreign rehabilitation teachers, introduce advanced equipment and rehabilitation technology, and formulate reasonable promotion and reward measures, improve the internal operation and management mechanism, and constantly create opportunities to improve the professional ability of sports health teachers (Masetti et al. 2008). On the other hand, through strengthening the cooperation between industry, University and Research Institute, and through cooperation and exchanges with talent training institutions, we should continue to keep the fresh blood of sports health talents entering, and optimize the talent acquisition and training mode.

Strengthen the linkage between hospitals and rehabilitation institutions, and improve the three-level rehabilitation system

At present, China is in the early stage of the establishment of sports health system, and the connection of all aspects has not been really established, especially the linkage between general hospitals and follow-up rehabilitation institutions is poor, and there is a common rehabilitation fault after patients come out of hospitals. At present, the hospital undertakes 80% of the patients with rehabilitation needs, which are the precise customers of private rehabilitation institutions. If we can establish a bridge between the hospital and rehabilitation institutions, it will not only be conducive to the popularization and development of private rehabilitation institutions in the future, but also make the people in need of rehabilitation smoothly get timely rehabilitation.
Unify the practice certification system and establish effective basic industry standards

As China’s sports health industry is in the initial stage of development, the industry standards and management system are not perfect, which makes the industry supervision more chaotic. Industry associations can be set up, and the state can also set up regulatory departments, so that the whole industry can be standardized and supervised in accordance with unified standards. Relevant departments must establish a unified national practice certification system as soon as possible, improve the access standards of sports health practitioners, and clarify the division of professional system. Only in this way can we standardize the professional quality of sports health practitioners and the development of sports health industry.

Innovate the examination and approval of medical qualification and promote sports health into medical insurance

At present, the examination and approval of medical qualification is still relatively strict, and the vast majority of rehabilitation institutions, especially private sports and health institutions, are rejected because of various soft and hard conditions. Therefore, the relevant government departments should focus on the importance of preventive medicine; especially after the actual development of the private rehabilitation industry and the healthy development planning of the rehabilitation industry, we can innovate the medical qualification examination and approval standards on the particularity of the sports health industry, give more flexible policy support, promote the development of private sports health institutions themselves, they should be down-to-earth, step by step, concentrate on business, rely on their own high-quality service hard power to obtain more people’s trust and recognition, and create their own brand effect and good reputation, which is the basis of benign development.

Conclusion

In this paper, a small chemical plant and the surrounding groundwater systems are taken as the main research objects. Based on the research of data collection, hydrogeological survey, and field experiment, the groundwater resources in the study area are sampled and analyzed. The F value comprehensive index method is used to determine the groundwater quality category in the study area. In addition, Nemerow index method is used to determine the degree of groundwater pollution in the study area. Based on the drastic model method of GIS, the vulnerability of interference in all the study areas was analyzed. Finally, GMS numerical simulation software was used to carry out inversion simulation of the most polluted carbon tetrachloride under the condition that the model met the accuracy requirements, so as to further verify the reliability of the model and predict the migration law of carbon tetrachloride in groundwater. Aiming at the problem of how to accurately detect network attacks in high-speed network environment in real time, this paper provides a means to protect information system security in big data environment. Focusing on network traffic anomaly detection, this paper studies the key technologies of network traffic data processing and anomaly detection, and designs a prototype system scheme of real-time network traffic data processing and anomaly detection in big data environment. A prototype system of real-time network traffic data processing and anomaly detection is designed and implemented. Based on the proposed traffic data collection methods, packet classification algorithm, feature selection, and network traffic anomaly detection method, this paper introduces a storm distribution computing platform to design a real-time network traffic data processing and anomaly detection prototype system. Although sports health started late in China, it has developed rapidly and has become the next industry with great potential. Compared with public rehabilitation institutions, private sports health institutions have their own unique advantages because of the flexibility. Based on the investigation and analysis of the operation status of 12 private sports and health institutions in a city, this paper summarizes the characteristics and problems of the development of private institutions. Through SWOT analysis, it concludes the advantages and disadvantages, opportunities, and threats of private sports and health institutions. Finally, it puts forward relevant suggestions for the future development of rehabilitation institutions from their own operation and government policies. For the private sports health institutions themselves, they should be down-to-earth, step by step, concentrate on business, rely on their own high-quality service hard power to obtain more people’s trust and recognition, and create their own brand effect and good reputation, which is the basis of benign development.

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Declarations

Conflict of interest The authors declare no competing interests.

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