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ORIGINAL

REALISTIC DILEMMA AND REALIZATION MECHANISM OF ICE AND SNOW SPORTS INDUSTRY DEVELOPMENT IN POST-EPIDEMIC ERA

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ABSTRACT

The sudden epidemic has caused great challenges to people's lives, and this epidemic has also had a certain impact on promoting the growth of the ice and snow sports industry. Therefore, it is necessary to study the policy framework of its growth in order to promote the growth of its industry. Therefore, this paper proposes research on the real dilemma and realization mechanism of the growth of its industry in the post-epidemic era. In the end, the realization mechanism of the growth of the ice and snow sports industry in the post-epidemic era has been well confirmed. The overall trend of the average scores of the testers in the two groups is quite different.

KEYWORDS: Post Epidemic Era; Realistic Dilemma of Ice and Snow Sports Industry Growth; Industrial Realization Mechanism.

1. INTRODUCTION

Since the outbreak of the new coronavirus in 2020, it has not only brought great harm to human life and property, but also brought incalculable economic growth to various industries (Leonidovna & Borisova). The new crown pneumonia epidemic has brought some shocks to the sports industry. However, there are often opportunities in crises. Since COVID-19 made it impossible to gather together to hold competitions, a series of new forms of online sports events such as the cloud marathon have been born. There are also certain limitations for the public to go out to exercise. In the healthy stage, there are differences in the awareness of exercise among different groups (Koh-Tan, 2011). However, in the face of this epidemic, in the face of threats to life and

health, any group will immediately join the movement (Le et al., 2020). Therefore, the epidemic is a drastic process for the growth of national fitness. Since the outbreak of the epidemic, many people who are isolated at home have exercised at home in various ways, which is also an opportunity to promote the positive growth of national health. In recent years, with the rapid growth of the economy, policies on accelerating the growth of the ice and snow sports industry have been successively introduced, which has promoted the vigorous growth of it. In the context of the rapid spread of the new crown pneumonia epidemic, the accelerated implementation of isolation and control measures has seriously affected people's demand for offline sports consumption. Large-scale sports activities are suspended, postponed, cancelled, moved to other places, the production and sales of sports goods are blocked, and sports fitness, leisure and entertainment, training services and other industries were forced to stagnate, and the sports tourism industry basically bid farewell to the golden peak season of the sports industry. But in general, the rapid growth of ice and snow sports is largely based on the solid foundation of economic and social growth (Zhen, 2023). On the other hand, after this epidemic, the public's concept of hygiene will return to people's attention, and the demand for sports and fitness will be further expanded and strengthened, which is beneficial to the growth of its industry (de Bruijn et al., 2011). However, the impact of the epidemic on it cannot be ignored. We should actively analyze the epidemic situation and analyze the hidden problems behind it, in order to minimize the impact of the epidemic on the ice and snow sports industry and find growth opportunities. Therefore, in order to explain the impact of the new crown pneumonia, this paper takes Heilongjiang as example to analyzes its industry in after the epidemic, in order to grasp the future trend of the ice and snow sports industry after the epidemic, and use collaborative filtering algorithms, association rules and other algorithms, in order to achieve scientific basis, lay the foundation for the future. Ice and snow sports industry is a business activity, mainly engaged in the production and sales of ice and snow sports products. With the rapid economic growth and the continuous optimization of the industrial structure, it has become one of the most promising industries. However, affected by the epidemic, it has also suffered a serious impact. At present, most of the research on it is cultural industry, industrial economics, etc., and a series of theoretical studies have been made on this basis (LIU & WANG, 2019). However, the current research perspective, depth and breadth cannot meet the actual needs of its industry. However, the growth of its industry is a systematic project including many environmental factors, the diversification of influencing factors, and the evolution process is also a complex process. Niche is an important concept in ecology, which not only reflects the characteristics of energy exchange between plants and the environment, but also reflects their geographical location, spatial characteristics, resource requirements and role functions. The ideas of "competition", "harmony", "diversity", and "balance" make the concept of "ecology" go beyond

the traditional biological category, and penetrate into all aspects of society, becoming an important part of people's analysis of social phenomena and problems of effective way.

2. Related Work

The ice and snow sports industry are an important part of the sports industry, and its definition must conform to the definition of the sports industry and highlight its resource and environmental characteristics. On this basis, its industry is defined as a series of economic activities with it as the core. Here's a rewritten version of your paragraph: Zhen initiated a study of the ice and snow health industry, utilizing supply-side theory to explore its content from this perspective. They offered constructive insights and targeted suggestions for the growth of the public ice and snow industry. Their proposed governance path is detailed in reference (Zhen, 2023). Li J analyzed the business model of the ice and snow sports industry through management and sociology lenses, categorizing the industry into three dimensions based on its current growth along the industrial chain. He identified three distinct business models, each with varying basic conditions and potential for improvement, focusing on governance paths related to technology upgrades, service industry quality enhancement, and efficient governance in the leisure sector (Li et al., 2022). Ji & Yu discussed the importance of developing ice and snow sports in relation to the coordinated growth of both the ice and snow industry and the tourism sector. He identified three key areas for advancement: leveraging government policies, achieving a relative balance between northern and southern venues, and exploring the training mechanisms for ice and snow talent (Ji & Yu, 2023). Zhen highlighted the significance of national traditional culture in the ice and snow sports industry, noting how large-scale international events showcase national strength and enhance the global influence of ice and snow culture (Zhen, 2023). Sun examined the social impact of the ice and snow tourism industry, analyzing factors such as employment rates, social satisfaction, and economic conditions, particularly in the context of the United States and Canada. He explored the economic relationship between this industry and social growth (Sun, 2020). Zhang R conducted an extensive discussion on the ice and snow sports industry, considering economic, cultural, geographical, and environmental factors. He emphasized that Heilongjiang Province's geographic location provides natural advantages for the industry's survival and growth, with high latitudes offering significant benefits. Cultural aspects also play a crucial role in fostering long-term growth, as Heilongjiang Province strives to enhance the national cultural presence within the industry (Zhang, 2016). Zhao et al's research holds both theoretical and practical significance for the development of the ice and snow sports industry in Heilongjiang Province. It advocates for leveraging government regulatory functions, formulating reasonable growth strategies tailored to local conditions, and promoting regional cooperation for sustained development (Zhao et al., 2023). Han emphasized the need for

structural optimization within the ice and snow sports industry chain. Following an analysis of existing challenges, he proposed comprehensive strategies for optimizing the industrial chain structure (Han, 2023). John provided a summary of the ice and snow tourism industry chain structure in Heilongjiang Province, focusing on its industry chain dynamics (John, 2021). Finally, Changyao et al., 2022's research stressed the importance of ice and snow sports culture in industry chain development, noting that the lack of cultural competitiveness hampers the effectiveness and appeal of cultural initiatives within the industry (Changyao et al., 2022).

3. Methodology

3.1 Definition of Policy Framework for the Growth of Ice and Snow Sports Industry

When formulating a policy framework for the ice and snow sports industry, it is necessary to take into account the pulling effect and practical operability of the entire country from a macro perspective. Defining the policy framework for the growth of it is actually the basis for analyzing its growth policies. That is to focus on research priorities, formulate and formulate policies and systems for the growth of it, in order to promote the formulation of corresponding policies. The system structure of ice and snow sports industry is shown in Figure 1.

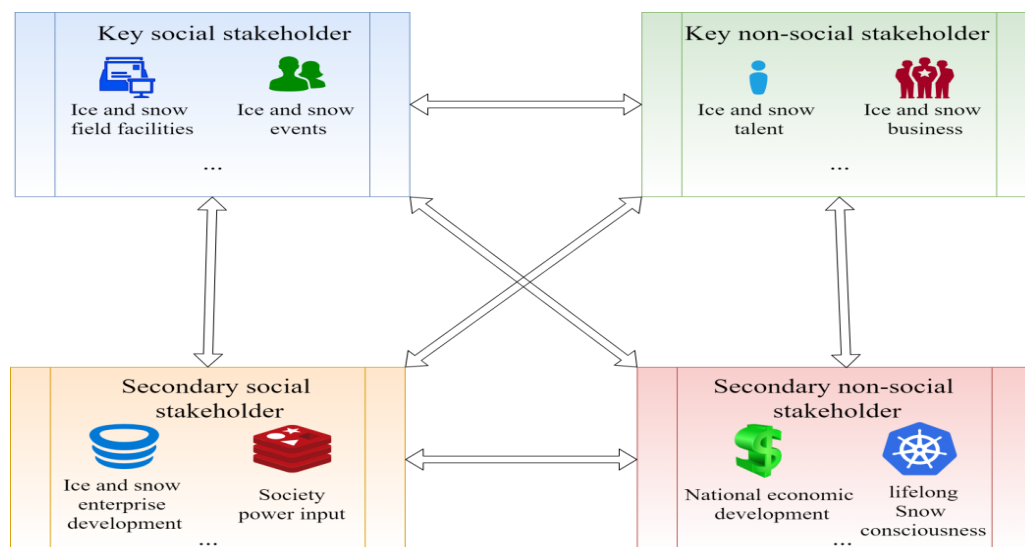


Figure 1: System Structure of Ice and Snow Sports Industry

The connotation of the policy framework for the growth of the ice and snow sports industry: From the perspective of industrial growth policy, the sports industry growth policy is a series of specific policies to achieve the goal of internationalization and industrialization of the sports industry. It policy requires that the role of its resources be brought into full play, so that they can be reasonably allocated, so as to expand their own supply capacity and

enhance their market competition and dynamic advantages. Therefore, the policy framework for the growth of it must deeply reflect the inherent needs of its policies, in order to provide strong support and guidance for the growth of the entire country. The content of the policy framework for the growth of it is clarified, mainly in two aspects. Therefore, the established policy framework must have the ability to promote the efficient allocation of ice and snow sports resources in the market. Policy framework function: As the policy basis for determining the growth of the ice and snow sports industry, it can guide the formulation and research of relevant policies at multiple levels. Its specific functions include: firstly, it can provide comprehensive guidance and research on relevant policies; secondly, it is necessary to clarify the overall level of the entire policy, so as to better conduct policy research and formulation; secondly, it can reveal policies and policies for the growth of the ice and snow sports industry. The focus of policy formulation, the determination of the framework should not only reveal the biggest policy orientation for the growth of the ice and snow sports industry, but also clarify the needs of all levels in the current growth process, and then fundamentally solve the policies required for the growth of the ice and snow sports industry; Shorten the time for policy growth and facilitate the specific policies needed in the future, and expedite the formulation of relevant actual policies.

3.2 The Connotation of the Value Chain of Ice and Snow Sports Industry

The ice and snow industry encompasses the economic, cultural, and social activities derived from harnessing ice and snow resources in contemporary society (Li et al., 2020). Heilongjiang, taken as an example, this industry is primarily focused on tourism and cultural elements. The ice and snow sector in this region possesses distinct characteristics and values, spanning from culture to tourism and from economic activities to service offerings. Currently, there is no universally accepted definition of the value chain associated with the ice and snow sports industry, leading to ongoing discussions in academic circles about whether it falls under the sports industry or the cultural industry. The value chain specific to the ice and snow sports industry represents a unique framework, characterized by the interplay between supply and demand, as well as the inputs and outputs of various sports sectors. Its core objective is to maximize value and ensure the equitable distribution of benefits. A comprehensive value chain in the sports industry is a process of continuous optimization, enhancement, and coordinated operation, aimed at achieving growth, market presence, and high profitability. Take Heilongjiang Province as an example; the value chain of the ice and snow sports industry revolves around ice and snow-related activities, integrating products, technology, and capital into a cohesive strategy for value creation. This chain currently emphasizes ice and snow sports, tourism, and competitive events. The presence of high-quality ice and snow events can significantly stimulate the overall growth of the industry in Heilongjiang Province.

3.3 The Significance and Practical Dilemma of Developing the Ice and Snow Sports Industry in Heilongjiang Province

(1) Heilongjiang Province takes advantage of the growth of the ice and snow sports industry and its own ice and snow resources to create its own unique ice and snow sports industry culture. By creating a brand of "ice and snow sports industry", Heilongjiang Province can show more distinctive features in China and even internationally. By creating a strong ice and snow sports industry culture, it can not only attract tourists from home and abroad to visit Heilongjiang Province, but also enrich the leisure and entertainment activities of the people of Heilongjiang Province.

(2) Generally speaking, in a region, the optimal allocation of industrial structure should be dominated by the tertiary industry, followed by the secondary industry, and the least by the tertiary industry (Ramaswamy et al., 2015). Heilongjiang Province is dominated by petroleum, coal, wood, and raw grains with the "original" brand name. There are many high-energy-consumption and high-pollution industries such as energy and chemical industry, and the industrial structure is relatively simple. To this end, Heilongjiang Province must speed up the adjustment of industrial structure, actively promote energy conservation and emission reduction and the growth of circular economy. Using the growth of the ice and snow sports industry can generate certain economic benefits, so that the tertiary industry in Heilongjiang Province can obtain greater economic benefits, or by increasing the production of peripheral products of the ice and snow sports industry, the secondary industry in Heilongjiang Province can obtain more economic benefits. Therefore, the growth of ice and snow sports industry can promote the economic growth of our province to a certain extent, and promote the sustainable growth of our province's economy. The regional resource analysis of ice and snow sports industry growth is shown in Figure 2.

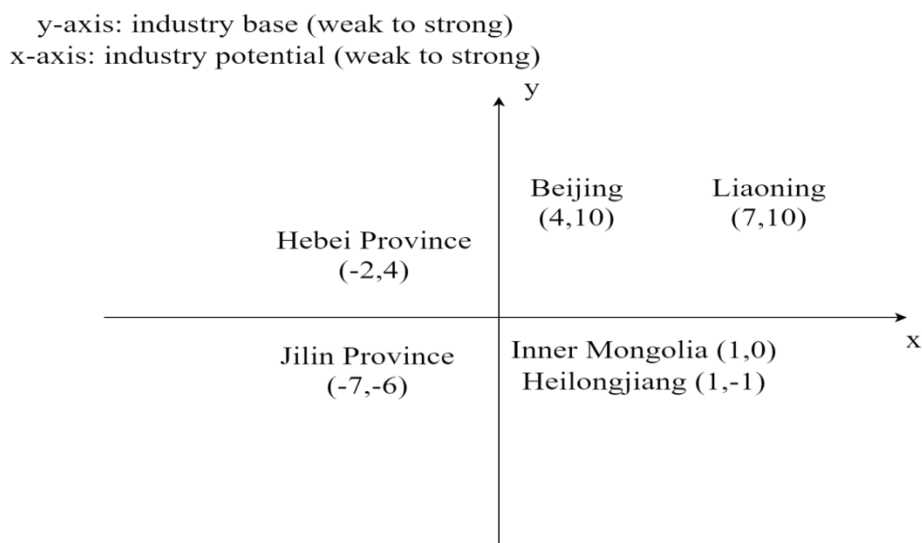


Figure 2: Analysis of Regional Resources for the Growth of Ice and Snow Sports Industry

The fiscal revenue of Heilongjiang Province has always been relatively single. However, the growth of ice and snow sports industry can not only develop it, but also promote the growth of related hotels, restaurants and tourist souvenirs. At the same time, they are also an important factor in promoting the growth of the tertiary industry. The tertiary industry can generate greater economic benefits due to its competitive advantages such as low cost and quick returns. And on this basis, it has played a role in promoting the overall economic growth of Heilongjiang Province. In addition, the growth of its industry has a certain positive effect on the construction of resource-based cities in Heilongjiang Province, the growth of county economy, and the promotion of employment.

(3) While developing it in Heilongjiang Province, it must also increase investment in cities, and strengthen the management of urban transportation, greening, and large-scale sports venues. Therefore, the growth of ice and snow sports can optimize the urban construction in various regions of Heilongjiang Province to a certain extent.

(4) While developing the ice and snow sports industry in Heilongjiang Province, a strong atmosphere of ice and snow sports can be formed in the whole province, and it can attract the masses to participate. This can not only improve the attractiveness of ice and snow sports to young people, but also allow more people to subconsciously participate in the sport, and maybe even develop into a professional ice and snow sports player. Therefore, it has played a positive role in the growth of ice and snow sports competitions. Heilongjiang Province has already produced many talents in ice and snow sports such as curling, short track speed skating, skiing, etc. However, driven by the vigorous growth of it in Heilongjiang Province, more ice and snow sports talents will emerge in Heilongjiang Province, which will be awarded worldwide, got more championships around the world. But there are still real dilemmas:

(1) The cognition level of ice and snow resources is not high enough. Many places in Heilongjiang Province do not pay enough attention to the growth of the ice and snow industry, resulting in the growth of the ice and snow industry in Heilongjiang Province is either shelved or swarmed, lacking scientificity.

(2) The external environment such as transportation and communication need to be improved urgently. As we all know, the site conditions of ice and snow projects in the ice and snow sports industry are fixed, so there is a certain disconnection with the market demand, resulting in a decline in the utilization rate of resources. At the same time, the characteristics of it in the wild make it difficult to carry out rescue work, and the backward transportation and communication facilities have caused great obstacles to the growth of the ice and snow sports industry in Heilongjiang Province.

(3) The ecological environment of the ice and snow sports industry in Heilongjiang Province is relatively fragile, and its ecological environment is special. Once damaged, it will be difficult to restore. Blind and disorderly growth and excessive waste of resources, such as excessive construction of ski resorts and excessive growth of groundwater, have become an important obstacle to the ice and snow sports industry in Heilongjiang Province.

(4) The value chain of the ice and snow sports industry in Heilongjiang Province has not been fully established.

(5) The core industry of the ice and snow sports industry in Heilongjiang Province lacks competitive advantages: the products of it in Heilongjiang Province lack influence. At present, most of the ice and snow cultural activities in Heilongjiang Province are held by the tourism departments of the national and local governments. The brand awareness is low, the brand effect is poor, and there is a lack of excellent competitions. Its scale is far less than that of Europe, the United States, Japan and other countries. Although Heilongjiang Province has also held several Winter Olympics, the number is not large. Event organizers and investors have focused more on the vested interests of the project than on its potential business opportunities.

(6) The influence of the ice and snow sports industry projects in Heilongjiang Province is insufficient and the publicity is weak. In the industry competitions in Heilongjiang Province, there is a lack of competitive and potential sports intermediaries, which seriously restricts the competition of it in Heilongjiang Province, so that the entire industry chain of it in Heilongjiang Province has the best growth.

3.4 Text Representation Model

In the realm of technology, the challenge lies in enabling computers to interpret the vast array of information present in nature, which is often unstructured and ambiguous. To bridge this gap, we rely on various linguistic technologies that transform raw data into structured, recognizable sentences. This transformation is crucial in numerous applications, including sentiment analysis of news articles, evaluation of consumer feedback on products, and the development of intelligent question-answering systems. The extraction of textual features plays a pivotal role in these processes, as it allows for a deeper understanding of the meaning and context behind the words. Generally, there are two primary approaches to feature extraction: the vector space model and topic modeling. The vector space model represents text as mathematical vectors, enabling efficient processing and comparison of documents. In contrast, topic modeling identifies and categorizes the underlying themes present in the text, providing insights into the broader subjects being discussed. Both methods are essential for harnessing the power of language and

enhancing the capabilities of computational systems in understanding human communication.

(1) Vector Space Model: The vector space model posits that each document can be represented as a vector within a multi-dimensional space. In this model, the characteristics or features of the text are quantified and expressed as components of these vectors. This allows for the comparison and analysis of documents based on their content. The features of the text can be expressed as follows:

$$d = (t_1, t_2, t_3, \dots, t_n) \tag{1}$$

The vector space model posits that each document can be represented as a vector, denoted as $(w_1, w_2, w_3, \dots, w_n)$. In this model, the features of the text are expressed through various dimensions that correspond to specific attributes of the documents. These features may include:

$$d = (t_1, w_1, t_2, w_2, t_3, w_3, \dots, t_n, w_n) \tag{2}$$

In this context, the similarity between vectors serves as a proxy for measuring the similarity between the corresponding texts. This relationship allows us to quantify how closely related different documents are based on their vector representations. The following figure illustrates this concept, showcasing how vector proximity can effectively indicate textual similarity.

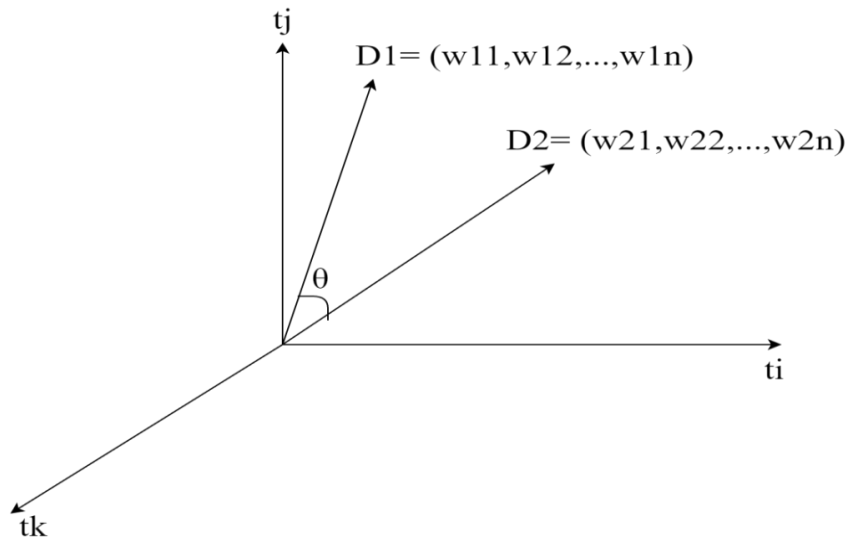


Figure 3: Representation of the Vector Space Model

The following $D1$ and $D2$ respectively represent two documents, $(w_{11}, w_{12}, w_{13}, \dots, w_{1n})$ which are the feature vectors corresponding to the first document and the feature vectors corresponding $(w_{21}, w_{22}, w_{23}, \dots, w_{2n})$ to the second document. But:

$$D_1 = d_1(w_{11}, w_{12}, w_{13}, \dots, w_{1n}) \quad (3)$$

$$D_2 = d_2(w_{21}, w_{22}, w_{23}, \dots, w_{2n}) \quad (4)$$

To express the similarity between them, the cosine formula of the following vector can be used.

$$\text{similarity} = \cos(\theta) = \frac{A \bullet B}{\|A\| \cdot \|B\|} = \frac{\sum_{i=1}^n A_i \times B_i}{\sqrt{\sum_{i=1}^n (A_i)^2} \times \sqrt{\sum_{i=1}^n (B_i)^2}} \quad (5)$$

(2) Topic model: The topic model serves as a powerful mathematical framework grounded in the analysis and mining of text semantics, representing a key approach within the realm of unsupervised learning. One prominent variant of this model is the Probabilistic Latent Semantic Analysis (PLSA), commonly referred to as the PLSI model. This method allows for the identification of various themes or topics present within a document, each contributing differently to the overall content. Typically, a single article encompasses multiple topics, each with a distinct weight that signifies its relevance to the text. Furthermore, each topic is characterized by a set of words, with individual weights assigned to these words based on their significance within the context of the topic. This nuanced representation enables a deeper understanding of the underlying themes in the text. Below, we will illustrate these concepts using a few mathematical symbols:

(1) Document Collection:

$$d = (d_1, d_2, d_3, \dots, d_n) \quad (6)$$

(2) The Collection of Words:

$$w = (w_1, w_2, w_3, \dots, w_n) \quad (7)$$

(3) Theme Collection:

$$z = (z_1, z_2, z_3, \dots, z_n) \quad (8)$$

But:

$$p(w_j|d_i) = \sum_{k=1}^K p(w_j|z_k)p(z_k|d_i) \quad (9)$$

Given that the document-word matrix $p(w_j|d_i)$ is established through the analysis of textual data, this paper focuses on deriving two additional matrices: the text-topic matrix and the topic-word matrix. To achieve this, we employ the Expectation-Maximization (EM) algorithm, which is a powerful technique for parameter estimation in statistical models. The EM algorithm iteratively refines estimates, allowing us to uncover the underlying relationships between documents, topics, and words effectively. By leveraging this approach, we can gain deeper insights into the structure of the text data and the distribution of topics across documents.

3.5 Collaborative Filtering Algorithm

The essence of the collaborative filtering algorithm lies in the concept of collaboration, where the aim is to leverage the preferences and behaviors of similar users or items to enhance recommendations for a target user. Collaborative filtering can be broadly categorized into two main types: user-based collaborative filtering and item-based collaborative filtering. This approach operates on the premise that users who have historically agreed on certain items will likely have similar preferences in the future (Huang et al., 2011). For example, if User A and User B both rated several movies highly and User A liked a new movie, User B might also enjoy that film. This method utilizes a sparse user-item matrix, where many users may not have rated all products, leading to gaps. To fill these gaps, collaborative filtering identifies users with similar tastes to predict how the target user might rate an unseen item. In contrast, item-based collaborative filtering focuses on the relationships between items rather than users. It looks at the similarities between items based on user ratings, suggesting that if a user liked item X, they might also appreciate item Y, which has been rated similarly by other users. This method is particularly effective when the user-item interactions are sparse. Building on traditional collaborative filtering, modern approaches incorporate machine learning techniques and deep learning algorithms, such as Convolutional Neural Networks (CNNs). These advancements enable the model to capture complex patterns and relationships in the data, improving recommendation accuracy. For instance, consider a travel recommendation system. By analyzing users' preferences for various travel destinations, the algorithm can identify users with similar tastes. If User A enjoys beach resorts and User B has a history of liking similar locations, the system can recommend a beach resort that User B has rated highly to User A. This personalized approach enhances user satisfaction by aligning recommendations with their unique preferences (Escudero-Tena et al., 2023). In summary, collaborative filtering harnesses the power of user and item interactions to provide tailored

recommendations, and the integration of advanced algorithms further enhances its effectiveness.

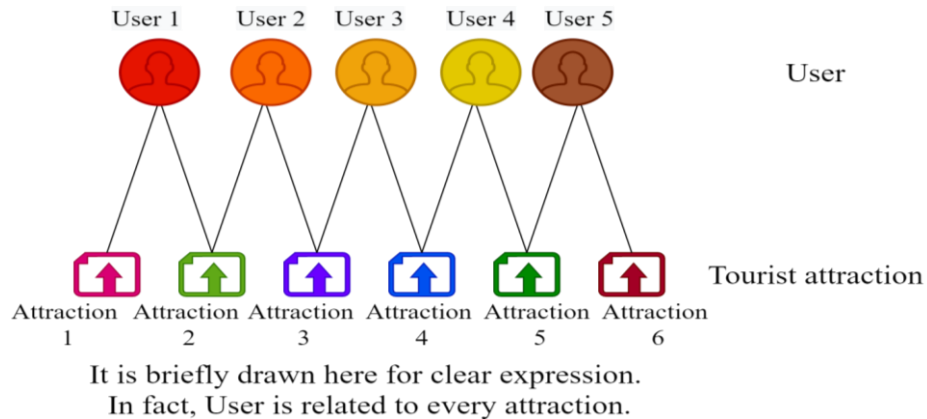


Figure 4: An Example Diagram Illustrating the Recommendation Principle of the User-Based Collaborative Filtering Algorithm.

Four methods are primarily employed when assessing the similarity between statistical samples: Euclidean distance, cosine similarity, Pearson similarity, and Jaccard similarity.

(1) Euclidean Distance Method: The Euclidean distance is calculated using the distance formula. A smaller distance indicates a higher similarity between samples. The formula is expressed as follows:

$$\rho = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad (10)$$

(2) Cosine similarity: Cosine similarity is calculated by calculating the cosine value of the angle between two sides to express their similarity.

$$\cos(\theta) = \frac{A \cdot B}{\|A\| \cdot \|B\|} = \frac{\sum_{i=1}^n A_i \times B_i}{\sqrt{\sum_{i=1}^n (A_i)^2} \times \sqrt{\sum_{i=1}^n (B_i)^2}} \quad (11)$$

(3) Pearson Similarity: Pearson similarity is an enhancement of cosine similarity, designed to account for the centralization of user ratings. This adjustment helps to standardize the rating system across users. The formula for calculating Pearson similarity is as follows:

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}} \quad (12)$$

(4) Jaccard similarity: The formula is as follows:

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} \tag{13}$$

3.6 Association Rules

The representation of $X \rightarrow Y$ association X rules is called the predecessor in the Y association rule and the successor in the association rule. Y the meaning of expressions refers to X the laws that appear at the same time as they appear.

Item, itemset: An item is an object we study, an itemset is a collection of single or multiple objects, and the objects in the itemset cannot be repeated. Let $I = \{i_1, i_2, i_3, \dots, i_n\}$ be an n itemset containing items, where i_k is an item and I is an n -itemset. Support:

$$\text{support}(A) = \frac{\text{count}(A)}{\text{count}(\text{dataset})} = P(A) \tag{14}$$

Confidence measures the likelihood that item "B" is purchased given that item "A" has already been bought. It is calculated by dividing the number of transactions that include both items "A" and "B" by the total number of transactions that contain only item "A." Essentially, confidence indicates the probability of a customer buying product "B" if they have chosen product "A." A high confidence value suggests a strong relationship between the two items, meaning that when customers purchase "A," they are very likely to also purchase "B." This makes it advantageous to bundle these items together for sales or promotions. Conversely, a low confidence score implies that there is little likelihood of purchasing "B" after buying "A," rendering the association rule less useful. Thus, confidence serves as an important indicator of the practical value of association rules in analyzing purchasing behavior.

$$\text{confidence}(A \rightarrow B) = \frac{\text{count}(AB)}{\text{count}(A)} = \frac{\frac{\text{count}(AB)}{\text{count}(\text{dataset})}}{\frac{\text{count}(A)}{\text{count}(\text{dataset})}} = \frac{P(AB)}{P(A)} = P(B|A) \tag{15}$$

4. Result Analysis and Discussion

The recent skiing situation in Heilongjiang is shown in Table 1. The construction of the outdoor site is shown in Table 2.

Table 1: Data of the Number of Skiers

	2022	2021	2020
SKI TRIPS	2113	1843	1510
INCREASE	14.4%	18.8%	20.8%

Table 2: Ski Resort

ADVANCED SKI RESORT	INTERMEDIATE SKI RESORT	LOW-LEVEL SKI RESORT
>1000M	800-1000m	≈ 500m

The first part is the main part, which tests the evaluation of 15 perceptual elements (indicator layer indicators).

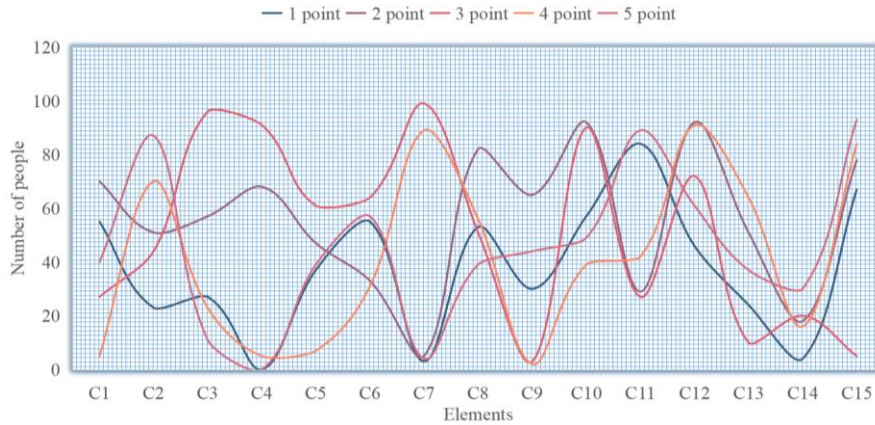


Figure 5: Evaluation Results

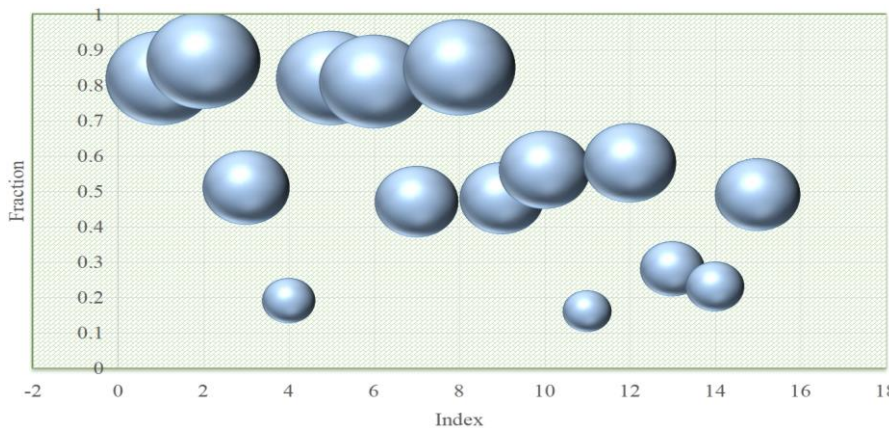


Figure 6: Influence Results of Various Elements

The experimental findings indicate that the evaluation model for the growth of the ice and snow sports industry, which employs collaborative filtering algorithms and association rules, can effectively assess and predict various datasets, yielding precise results. As illustrated in Figures 5 and 6, the distribution of scores reveals a range of opinions among respondents regarding the industry's growth. While there are diverse perspectives, a significant number of individuals rated the industry with a score of 3. Notably, many participants expressed a positive outlook, awarding it a score of 5, reflecting their interest in ice and snow sports. Additionally, factors 9 to 12—pertaining to the theme, attractiveness, and business aspects of the ice and snow sports industrial zone—appear to exert a considerable influence on these evaluations.

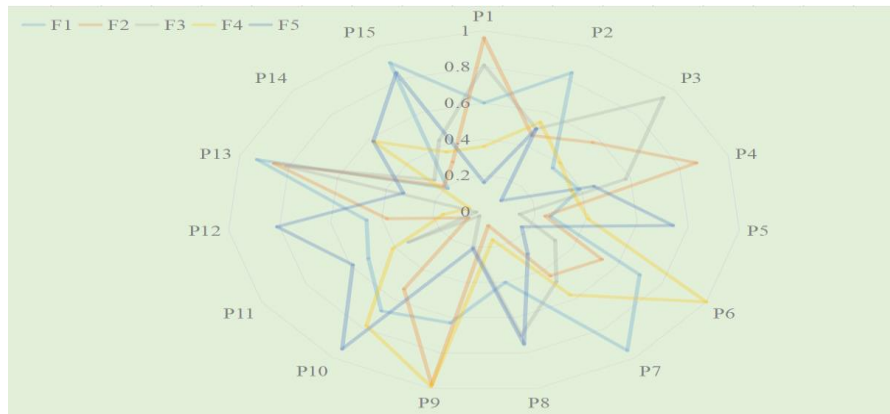


Figure 7: Online Random Scoring

Figure 7 presents the scoring outcomes of the implementation mechanism for the growth of the ice and snow sports industry in Heilongjiang Province. Due to significant errors in the online random scoring, the following analysis focuses on the growth and realization mechanisms specific to this industry in Heilongjiang. The research team established two groups: Group A, which examines the growth realization mechanism for the ice and snow sports industry in the post-epidemic era, and Group B, which focuses on the traditional growth realization mechanism in Heilongjiang. The team divided participants into these two groups, with Group A consisting of 717 testers and Group B comprising 734 testers. From these groups, 36 testers were randomly selected to evaluate their satisfaction with the growth and realization mechanisms of the ice and snow sports industry in Heilongjiang Province.

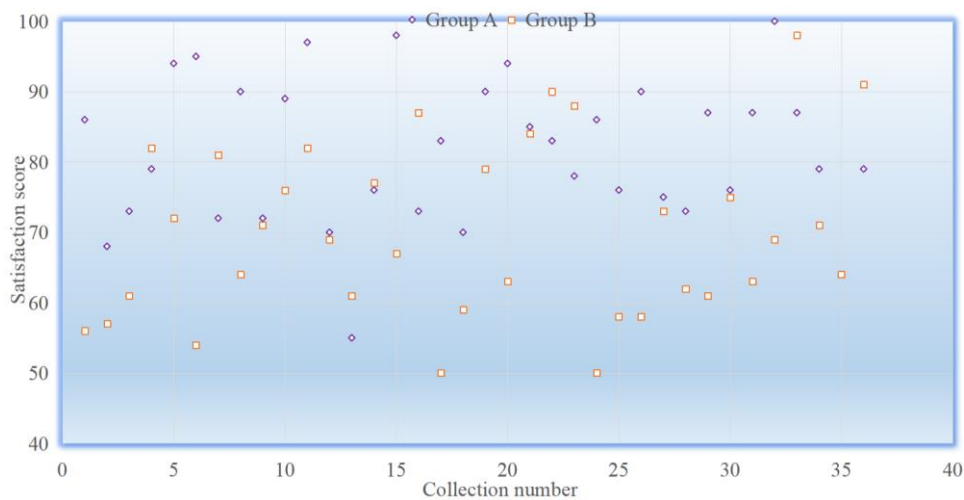


Figure 8: Group A and Group B's Ratings of Satisfaction with the Realization Mechanism of the Growth of the Ice and Snow Sports Industry in Heilongjiang Province

As can be seen from Figure 8 above, the overall trend of the average scores of the testers is similar, and they are all between 50-100 points. Due to the random selection of testers, they will be divided into groups A and B for investigation.

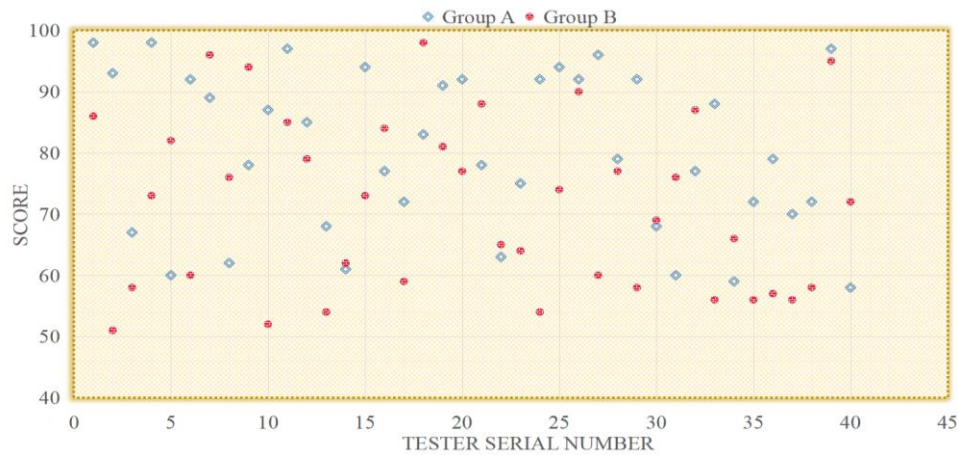


Figure 9: Scores of Group A and Group B

Figure 9 illustrates a notable difference in the overall average scores between the testers in the two groups. Testers in Group A scored significantly higher than those in Group B. While some individuals in Group B performed exceptionally well, a larger number of testers scored between 50 and 60 points. In contrast, Group A had a greater concentration of testers scoring between 90 and 100 points, highlighting a stark contrast between the two groups. The average score for Group A was 80.125, compared to 71.45 for Group B. Group A's highest score reached 98, while the lowest was 58. In Group B, the lowest score was 51. These findings indicate that the implementation mechanism for the growth of the ice and snow sports industry in Heilongjiang Province has proven to be highly effective in the post-epidemic era.

5. Conclusions

In a word, the growth of the ice and snow sports industry is of great significance to create a characteristic ice and snow sports culture, to adjust the economic growth structure, and to promote the overall economic growth. Ice and snow sports play an irreplaceable role in improving people's physical fitness. While enhancing physical fitness, it can also delight body and mind. It is necessary to actively cultivate people's awareness of ice and snow sports, strengthen the publicity of ice and snow sports, organize more participation in ice and snow sports, and cultivate a life-long physical exercise lifestyle. Ultimately, we should grasp the following points:

5.1 Policy Guidance at the National Level

1) To encourage institutional reform, promote the growth of the industry, and respond to emergencies, various government departments have issued important instructions in a timely manner, taken active emergency measures, and gradually introduced relevant support policies and guidance to minimize the impact of the epidemic. social impact. According to the current situation facing the ice and snow sports industry, relevant departments should take

active countermeasures. First of all, after the sports and fitness industry was forced to shut down, the operating expenses remained high. The biggest one is the rent pressure of stadiums. Therefore, it is possible to consider giving rent or financial subsidies to a certain extent, or through financial, taxation, etc. Ways to alleviate the problem of poor funds in the sports and fitness service industry during the epidemic. Secondly, under the guidance and support of national policies, local governments are encouraged to reform their policies and systems. In areas where sports events are closely related to urban growth, “hard-core” investment in event subsidies and resource supply can be increased. Finally, the relevant departments will use the ice and snow sports industry guidance fund for sports enterprises, especially the problem of insufficient funds for small and medium-sized sports enterprises. In short, during the epidemic, the industry is facing financing difficulties, and the government will issue corresponding policies, including finance, taxation, etc.

2) Strengthen government procurement to ease the pressure on the industry, which is a pillar industry in the future. First, the sports in question are purchased by the government. In terms of financing methods, according to the basic situation of the organization and operation of sports events, a variety of methods led by the government or led by sports companies can be adopted, which can alleviate the economic losses caused to the event operators due to large-scale shutdowns, delays or cancellations. It can also alleviate the challenges of social resource coordination, business cooperation and exchanges, and social and public security incidents caused by the gathering of sports events after the epidemic. Second, provide government procurement for mass fitness services. Government agencies hold large-scale mass sports events through leaseback or paid use of stadium services, which can not only promote the needs of mass sports consumption, but also effectively solve the problem of capital flow in the sports industry. Through the government's procurement of public sports services, it can help sports goods companies to face the problem of excess inventory during the epidemic, and at the same time strengthen the government's investment in social resource platforms, especially online service platform resources, to open up corresponding online green service channels for sporting goods companies.

3) Make full use of the resources of ice and snow sports events to promote the growth of demand for ice and snow sports and fitness, which restricts the sports consumption of residents to a certain extent, especially in the offline participatory sports consumption of ice and snow sports, which has stagnated. Although people's demand for sports and fitness has received enough attention during the epidemic, the "haze" caused by the disease will not subside soon in the short term, and the growth of sports consumption is limited to the Internet, which seriously affects with the recovery and growth of the sports industry. Therefore, after the epidemic is over, if conditions are met, relevant departments should take the initiative to release resources for sports

activities, simplify and decentralize the approval procedures for sports activities, relax conditions, lower financing thresholds, and actively support qualified ice and snow sports. The company's participation in the operation and management of sports activities can not only promote the demand for sports consumption, but also compensate for the economic losses caused by the interruption of sports activities due to the epidemic, so as to activate the sports market and achieve rapid growth.

5.2 Mutual Assistance and Integration of Resources from all Walks of Life

1) Use industry capital leverage to establish a social financing mechanism the new crown pneumonia epidemic has blocked residents' ice and snow sports and fitness activities for scene-based participatory experience. The production and sales of sporting goods enterprises were hindered. The essence of this phenomenon is that due to the poor flow of funds in the ice and snow sports industry, capital turnover is difficult and stagnant, which seriously hinders the healthy and orderly growth of the industry. The turnover is difficult, and the capital chain is broken. Therefore, in the context of the current epidemic, the key to helping small and medium-sized sports companies survive the crisis of life and death lies in how to solve the financing problem. Therefore, relevant departments of the industry, related enterprises, financial institutions, and large-scale industry enterprises can reduce the financing threshold of the industry by establishing social financing, and provide financial credit support for the industry. Or sports management departments, etc. can take the initiative to undertake the financing of credit guarantees, and jointly build a social financing mechanism that is conducive to the rapid recovery and growth of the ice and snow sports industry market.

2) Enterprises in various industries support each other, promote each other, and enhance immunity. In recent years, the ice and snow sports industry are an emerging industry. Because it involves many industries, there has been a business model with sports companies as the main body and individual management as the main body. Under the impact of the epidemic, sports companies in various industries will be affected to varying degrees, especially small and medium-sized enterprises. Due to the lack of liquidity and a single source of funds, the capital chain is easy to break. Therefore, during the epidemic, if ice and snow sports companies continue to fight alone and individually resist the impact of the epidemic, it will greatly weaken the viability of sports enterprises, thus making them face severe tests of survival and survival. Therefore, under the impact of the epidemic, sports enterprises in various industries must abandon the single-operating thinking and seek cooperation methods of group heating, sharing resources, mutual help and mutual benefit, so as to continuously improve and improve the ability of enterprises to resist risks and setbacks. To deal with the difficulties faced by the ice and snow sports industry under the epidemic, this is the inevitable choice

for all sports enterprises to cooperate and cooperate to overcome the epidemic.

3) The coordinated operation of social resources. Although the new crown pneumonia epidemic has had a huge impact on the normal operation of the offline sports market, it has also continuously stimulated the sports consumption demand of online residents, showing a trend of sharp increase in the kinetic energy of sports and fitness demand. Under the impact of the epidemic, the sports industry, which has always been offline as its main goal, has not been able to quickly enter the online sports and fitness market, and it is difficult for sports companies that rely only on their own to achieve the conversion and integration of offline and online. Therefore, it is necessary to actively coordinate and use various social resources, build a media network platform, and effectively transform the consumption demand of offline sports and fitness into offline sports products, sports information, sports training, etc., so as to meet the needs of residents to exercise at home. Guidance and fitness needs, so as to continuously expand the market area of online sports consumption demand in the sports industry, and also prepare in advance for the sharp increase in sports consumption momentum after the epidemic, and jointly build an industrial growth model that integrates offline and online. It can not only meet the needs of sports and fitness consumption, but also break through the barriers that hinder the production and sales of online and offline sports products, sporting goods, etc., and help the sports industry market get out of the "haze" under the epidemic as soon as possible (Zhang & Wang, 2022).

5.3 Endogenous Mechanism of Sports Enterprises

1) Relying on industry policy support to reduce operating and management expenses Due to the impact of the new crown pneumonia epidemic, the marketing activities of the offline ice and snow sports industry have basically come to a standstill. As a major participant in the industry, the biggest impact of the epidemic on the industry is the rupture of the industry capital chain, and the smooth flow of industry funds. It is also related to the survival and growth of the industry. Therefore, in this epidemic, the ice and snow sports industry is facing a financial crisis and needs to take corresponding countermeasures. Specifically, first of all, it is necessary to have an in-depth understanding and grasp of the government's relevant industry policies and guidelines, and strive for the government's policy support and financial support; secondly, sports enterprises should actively explore diversified financing methods, from the sports industry competent departments, With the help of sports financial institutions, social financial institutions and other resources, reduce the threshold and risk of financing, provide the necessary credit guarantee and support for the growth of the sports industry, and win more industry guidance funds; Reasonable planning is carried out internally to maximize operating expenses, increase revenue and reduce expenditure, and

focus on arranging special funds to ensure that sports enterprises can survive and develop in the face of the epidemic.

2) Find a media resource platform to improve the quality of the ice and snow sports industry In the face of the impact of the new crown pneumonia epidemic, the early investment of sports enterprise event organization, the sponsorship of sports events by relevant social enterprises, etc., such as social public security, event business operation and cooperation Communication, event organization and operation management capabilities, early investment in sports event organization, and sponsorship of sports events by relevant social enterprises. To this end, major sports companies must make full use of existing sports event resources, actively improve their ability to organize, operate, manage and manage sports activities, and seek support from all walks of life to solve the social problems caused by intensive sports activities. In order to improve the quality of its products, expand its social influence, so as to provide more resources for more sports events. In addition, my country's sports industry still has a lot of inventory, and the design and supply of new products are hindered. Sports enterprises should actively explore online and offline cooperation methods, solve the imbalance between supply and demand in production, and establish an online and offline integrated model to solve the imbalance between the lack of new product supply and the increase in demand momentum to the greatest extent, and the inventory of sports products. To solve the problem of excess, realize the timely return of funds and help sports companies get out of the epidemic dilemma.

3) Analyze the situation and lay out the prospects, and take precautions. Sports enterprises should make scientific analysis of their own situation in combination with the growth of the economy and the ice and snow sports industry (Peng & Lian, 2022). In the face of this epidemic, we should look for opportunities, seize the gaps in the epidemic, carry out our own self-training and improvement, make arrangements in advance, and prepare for the future sports industry. For example, improve their competitiveness in society by exercising their own abilities, improve their own quality, and promote new formats and new models of the sports industry through Internet media resources. After the epidemic is over, there will be a certain process of economic recovery, especially for the ice and snow sports industry, there will be a weak recovery period. Therefore, the ice and snow sports industry cannot blindly borrow money to hold games, let alone increase investment, so as to increase the financial burden. In short, under the epidemic situation, sports-related enterprises should comprehensively judge the industry prospects of the sports industry and the focus of future growth according to their own actual conditions, and carry out targeted policy growth and product upgrades, look for growth opportunities in the crisis, and become a sports enterprise. The core issues that should be focused on during the epidemic.

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