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Research on Digital Monitoring of Business Environment in the Era of Big Data

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Abstract: ***The construction of the business environment is one of the most concerning issues for governments at all levels and various types of enterprises. In recent years, local governments have successively introduced relevant work plans, systematically promoted the construction of the business environment, and explored entrusting third-party organizations to conduct evaluations. However, in practice, various regions increasingly feel that monitoring and evaluation are powerful tools for promoting the construction of a business environment, but there are many difficulties encountered in the actual operation process. The problem lies in the difficulty of collecting evaluation data, high cost of data collection, small sample size, weak representativeness, lack of objective data support for many indicators, frequent controversies in evaluation, and low acceptance of evaluation results by the evaluated parties. Fully leveraging the advantages of digitalization and utilizing massive government data based on big data technology is crucial for solving problems in the business environment. Building an information platform based on big data analysis can effectively digitize all monitoring items and the entire monitoring process, helping various regions benchmark advanced optimization and improvement, ensuring objective, fair, and efficient monitoring and evaluation.***

Keywords: Business environment big data; Monitor; Assessment.

1. Introduction

China attaches great importance to the construction of a business environment. Since 2015, some advanced provinces, autonomous regions, and municipalities have successively evaluated the business environment in their respective areas, striving to promote improvement and excellence through evaluation, achieving good results, and continuously optimizing the business environment in various regions[1-6]. But with the continuous deepening of China's state-owned business environment construction, the shortcomings of the original evaluation methods, such as large discretion, incomplete survey samples, and local repeated evaluations causing grassroots burdens, have gradually become apparent [7-10]. They can no longer fully meet the needs of business environment construction and urgently need to explore new ways to optimize the business environment. At the same time, after years of digital government construction, China has continuously promoted system integration and optimization, as well as data interconnection and sharing [11-16]. The level of digitization has significantly improved, laying a solid foundation for exploring new ways to build a business environment. Deep learning, as a new direction in machine learning, greatly improves performance in

fields such as speech and image recognition by learning the inherent patterns and representation levels of sample data. The core idea is to mimic the human brain neural network and automatically learn and extract features from raw data. Convolutional neural network (CNN), as a type of deep learning, optimizes the network structure by reducing parameter and weight sharing, and performs well in tasks such as image classification and object detection. In practical applications, deep learning technology has demonstrated its enormous value [17-22]. For example, in the e-commerce field, optimizing product recommendations by analyzing user behavior data; In financial risk control, achieve automated risk prediction and control; In the field of healthcare, assisting doctors in disease diagnosis.

2. Problems Faced

At present, while the level of business environment construction in China is constantly improving, the monitoring and evaluation of the business environment situation are also increasingly exposing some problems, mainly including the following aspects:

Firstly, monitoring and evaluation mainly focus on the questionnaire filling results of the responsible departments for various indicators of the business environment. In the context of big data, the traditional way of questionnaire filling highlights the problem of not fully utilizing real data in the production process, resulting in evaluation work still relying on individual sampling questionnaires to extract local information such as departmental work summaries, policy documents, and data statistics. At the same time, the materials required for irregular evaluations and assessments vary, and the repetitive and numerous tasks make grassroots workers at the end of policy implementation generally feel stressed and burdened.

Secondly, the evaluation agency has greater discretion. The original method of monitoring and evaluating the business environment was mainly judged by evaluation agencies. The third-party evaluation agency evaluates the development of the business environment in various regions by examining the questionnaire filling results, providing supporting materials from different regions, and conducting on-site research with a small sample size. However, the large amount of accurate and comprehensive data related to business environment construction accumulated by government departments at all levels in their daily work cannot provide support for evaluation, which results in a large amount of real and objective data being unable to be utilized. At the same time, it is widely reflected that third-party evaluation agencies have strong subjectivity in overall evaluation.

Thirdly, government data has not been fully utilized. There are a large number of various information systems constructed by government departments at all levels, and the amount of information data related to the business environment is enormous. Although most systems have achieved varying degrees of integration, data has not been fully consolidated onto a unified aggregation and sharing platform, and some systems have not opened data interfaces, making it difficult to collect data. Therefore, government departments urgently need to implement dynamic monitoring of the business environment by fully utilizing data, and further promote the breaking down of data barriers and the development and utilization of data resources in various regions and departments through construction tasks.

3. Requirement Analysis

The level of business environment has a significant impact on the overall development level of a region. A good business environment is an important reflection of a region's development level and also an important guarantee for its sustainable and stable development. Optimizing the business environment

is regarded as an important way to enhance the competitiveness of cities in various regions. A scientific and complete business environment can provide important guidance for improving the local business atmosphere. Continuous scientific and comprehensive monitoring of the construction of the business environment can provide important guidance for optimizing the local business environment and provide objective basis for the government's macro decision-making.

The advantages and disadvantages of the business environment have a significant impact on the development of cities and social regions, and a good business environment plays a key role in the development of strong cities. Improving the business environment is an important tool for enhancing local competitiveness.

In the process of conducting monitoring and evaluation of the business environment in various regions, firstly, it is necessary to be able to compare objective data with the latest concepts and innovative practices in advanced international and domestic regions, help government departments discover bottleneck problems that restrict the improvement of the local business environment level, make them the focus of institutional and mechanism reform, and thus form a benign situation of jointly promoting and optimizing the business environment. Secondly, it is necessary to establish a monitoring, supervision, and feedback system for the business environment, strengthen the implementation of local responsibilities, and focus on the pain points, bottlenecks, and difficult issues in the local business environment. Thirdly, it is necessary to establish a closed-loop mechanism for monitoring and supervision through the unique means of continuous collection and monitoring of massive data on big data platforms, strengthen institutional innovation and long-term management.

4. Research Ideas and Design Points

4.1 Research Approach

Based on big data technology and the government data aggregation and sharing platform, a business environment monitoring platform is constructed. Through objective indicator parameters and standards, the platform can conduct daily monitoring, satisfaction surveys, and on-site verification and supervision of the business environment, forming a closed-loop mechanism of horizontal departmental linkage and vertical guidance for business environment monitoring and supervision, achieving digitalization and standardization of business environment monitoring and evaluation.

Establish a business environment monitoring platform based on big data technology, with dedicated areas in various regions, connecting relevant government departments and regional business systems. The platform is supported by a business environment data center, which includes core systems such as analysis and judgment, benchmark comparison, market subject satisfaction, task supervision, and data collection. It integrates and manages business environment related work scattered in various levels and fields, taking into account monitoring, analysis, and supervision functions. It helps departments at all levels to comprehensively and objectively understand the business environment situation in their respective regions and fields, identify shortcomings and weaknesses, and make timely improvements.

By relying on the platform, dynamic monitoring, analysis, and benchmarking of the business environment can be carried out, and problems in the construction of the business environment in various regions can be discovered in a timely manner. The platform promptly displays a list of issues related to various indicators in different regions and supervises rectification. In the process of rectification, various regions can also use indicator verification and review to compare benchmark cities, clarify the bottlenecks in key areas of the business environment, and promote local improvement

of the business environment.

Relying on the platform to achieve automatic collection and calculation of monitoring indicators for the business environment, strengthening daily monitoring of the business environment, presenting the overall situation of the business environment in real time, and providing data support for optimizing the business environment. By automatically calculating through data models, the workload of filling out indicator questionnaires at the grassroots level can be reduced, the objectivity of evaluation data can be improved, and the fairness and impartiality of evaluations can be enhanced.

In the process of building a platform system, attention should be paid to establishing an integrated and collaborative monitoring system. Through the platform, closed-loop management is carried out for the entire process of policy implementation and target tasks, including issuance, receipt, execution feedback, problem rectification, and rectification tracking, to real-time grasp the situation in various regions.
We should pay attention to the sense of gain and satisfaction of the enterprise and the masses. You can refer to national indicators and divide the evaluation of the business environment into several primary indicators, and design satisfaction survey questionnaire templates for different types of enterprises. By organizing online and offline reporting by enterprises, ensure that the collected valid samples can meet the needs of the investigation. Guided by the needs of service enterprises, investigate and understand the convenience level of government environment, service environment, innovation environment and other aspects, objectively reflecting the effectiveness and shortcomings of business environment construction.

4.2 Architecture Design Based on Big Data

Based on big data, a new model for optimizing the business environment is created by combining daily monitoring of the business environment, enterprise satisfaction surveys, and on-site verification, starting from the sense of gain and satisfaction of enterprises. The focus of the optimized platform architecture design needs to be on the business and data architecture levels.

1) Overall Architecture

Fully utilize cloud computing, deploy the platform on the government cloud platform, and utilize cloud platform resources for computing and storage capabilities. The data sources include business systems of government departments at all levels, aggregation and sharing platforms at all levels, national vertical management systems, business systems of public utilities departments, and data reported by various units. Through the data collection platform and data crawling tools, access data from the government data gathering and sharing platform and the Internet to form a business environment basic database, theme database, and thematic database, including business environment business information database, business environment indicator database, business policy database, excellent case database, market perception database, analysis and judgment database, target task database, benchmarking database, and provide a data base for the platform. The support layer provides the basic support capabilities for the platform's functions, including unified management, monitoring, scheduling capabilities, data crawling service capabilities, text intelligent analysis, and chart visualization capabilities.

The platform is directly aimed at users and utilizes the capabilities of the application support layer and data resource layer to monitor and supervise the business environment, including multiple systems such as comprehensive display system, market perception system, analysis and judgment system, etc.

The platform can authorize functions to be used by various regions through authorization, for monitoring the construction of the business environment in their respective jurisdictions. The overall system architecture is shown in Figure 1.

2) Data Architecture

Through multiple data collection, all kinds of multi-source heterogeneous data from government data aggregation and sharing platform data, satisfaction survey data, the Internet, and public sector data will be collected in various ways. Multi source heterogeneous data is generally distributed on various types of databases, local storage, and other media. At the same time, data centers need to have universal big data collection and transmission services, responsible for transmitting various structured and unstructured data to the data center, such as MySQL, Oracle, SQLServer, LocalFileSystem to HDFS, HIVE, etc. The platform needs to support the batch or incremental writing of structured and unstructured data into the business environment big data center.

Figure 1

In terms of data center design and construction, it is necessary to classify data resources and meet business application requirements. Data cleaning, integration, and processing should be carried out to form data resources that are integrated with the business, including various basic libraries and theme libraries, to support business environment research and planning, multi-dimensional evaluation of the business environment, analysis of business environment scoring, task tracking, and other data application analysis.

Establish a comprehensive data governance system. Establish a sound data governance system, achieve unified metadata management, data standard management, data quality management, data resource management, data security management, etc., realize end-to-end management of data throughout the entire process, better manage data assets in the business environment, and reduce problems such as data chaos and low data quality.

After governance, the data can provide good data services for the platform. The platform's various

systems have a unified interface method, sharing data support services provided by the data layer, supporting various data service methods such as API interfaces and database docking, and can also provide data service support for other related government systems.

Through the overall data architecture design, relevant data required for the business environment can be sorted, analyzed, and applied. Combined with business needs, data cleaning, data fusion, data quality control, data lifecycle management, metadata management, and other work can be completed. The overall data architecture is shown in Figure 2.

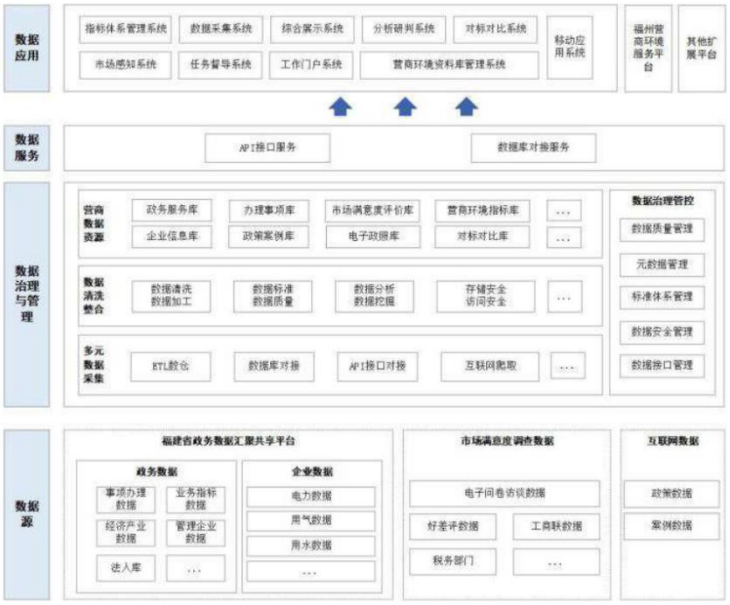

Figure 2

4.3 Design Points

The business environment monitoring supported by big data has the advantage of speaking with all the result data and being objective and quantifiable. In the design, emphasis should also be placed on the design requirements for indicator management and data collection.

1) Indicator management

Based on the platform, the indicators corresponding to the assessment of the business environment are classified and managed in a hierarchical manner, and can be flexibly adjusted according to changes in indicator weights, achieving continuous tracking, comparison, and management of national and local characteristic indicator systems. Indicator management is used to configure and manage the business environment assessment indicator system, forming a digital indicator system. Indicator data is obtained through automatic data collection and a small amount of data reporting, and indicator results are automatically calculated to support daily monitoring and annual evaluation of the business environment.

The management of indicator system includes setting up indicator system configuration, where management departments at all levels can configure their own indicator system to support the configuration of various indicator systems such as national business environment indicator system and local characteristic business environment indicator system. The second should implement indicator version management, supporting multi version management of indicators. For the same indicator,

different calculation methods can be used to form multiple versions. Thirdly, it supports the sharing of indicator systems. Superior departments can set the sharing authority of indicator systems for various regions, so as to facilitate the sharing of the results of superior indicator systems among regions.

2) Data collection

Data collection should have the ability to dynamically collect data, submit data, and monitor data collection. By collecting heterogeneous data from multiple sources, dynamic collection and submission of relevant data such as business environment monitoring indicators and market satisfaction survey results can be achieved, and real-time monitoring of collection progress and content can be carried out to visually present the overall situation of data collection.

The collection of diverse heterogeneous data should be able to achieve task prefabrication and reuse. Multiple types of collection tasks that will be used in the collection can be configured in advance in the system. When starting a new project's collection task, existing tasks can be directly selected from the task management, and the selected collection tasks can be edited, modified, and managed for adding or deleting indicator items. The collection task is the assembly and classification of indicator items under each indicator, and the collection of required indicator items for a certain indicator into a collection task for data collection.

5. Conclusion

The theory of business environment monitoring and evaluation based on big data technology proposed in this article uses big data methods to carry out periodic automated data collection, directly connecting the data sharing channel between business systems and business environment monitoring platforms, reducing the pressure on government departments to fill in and other work, and solving the key problem of more efficient and standardized collection of business environment related data. By monitoring the business environment supported by data, actively benchmarking international and domestic leading levels, and accurately identifying gaps, the government can establish a comprehensive monitoring and evaluation network that covers all service entities involved in the business environment, and organically combine government service capabilities with market subject perceptions. This has important reference value for achieving a more objective and reasonable grasp of the development level of regional business environment.

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