Research on the Construction of a Digital and Intelligent Platform for Steel Enterprises Based on FineBI

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Abstract: This paper focuses on the construction of a digital innovation training platform for steel enterprises based on FineBI, and explores its application and implementation in depth. Through the analysis of the policies, development trends, and enterprise practice cases of digital transformation in the steel industry, combined with the functional characteristics of FineBI, the specific implementation path of platform construction is elaborated in detail, including data integration, indicator system design, and intelligent analysis application. Research shows that the platform can effectively improve the data-driven decision-making capabilities of steel enterprises, promote business innovation and management optimization, and help steel enterprises achieve high-quality development.

Keywords: FineBI; Digital Transformation of Steel Enterprises; Innovation Training Platform; Data-Driven; Business Innovation

1. Introduction

In today's digital wave, the steel industry is undergoing profound changes, and digital transformation has become a key path for steel enterprises to enhance competitiveness and achieve sustainable development. However, many steel enterprises face problems such as data silos, high analytical thresholds, and lack of data support for decision-making during the transformation process. FineBI, as a leading business intelligence tool, provides strong support for the construction of a digital innovation training platform for steel enterprises with its powerful data processing, intelligent analysis, and visualization capabilities. This article aims to study the specific application and implementation of a digital innovation training platform for steel enterprises based on FineBI, providing a reference for the digital transformation of steel enterprises [1] .

2. Background and Trends of Digital Transformation in the Steel Industry

2.1 Policy-Driven Digital Transformation

In recent years, relevant national departments have issued a series of policies to promote the digital transformation of the steel industry. For example, the "Guiding Opinions on Promoting High-Quality Development of the Steel Industry" jointly issued by the Ministry of Industry and Information Technology and other three departments in 2022 clearly requires that by 2025, the CNC rate of key processes should reach about 80%, the digitalization rate of production equipment should reach 55%, and more than 30 smart factories should be built. In addition, it also proposes specific tasks such as carrying out the intelligent manufacturing action plan for the steel industry and building a big data center for the steel industry, which points out the direction for the digital transformation of steel enterprises [2-3] .

2.2 Driven by Industry Development Needs

China's steel industry is undergoing a transformation from scale expansion to quality and efficiency, and faces multiple challenges such as reduced development, green transformation, and changes in the competitive paradigm. Future competition will no longer be about scale and cost, but a comprehensive competition of technology, brand, standards, and ecosystem; digitalization will become a mandatory course. Steel companies need to achieve intelligent management and scientific decision-making in production and operations through digital transformation, thereby improving product quality and market competitiveness [4] .

2.3 Lessons from Enterprise Practice Cases

Jinding Steel Group has built an industrial

internet digital platform, integrating advanced technologies to achieve digitalization, intelligence, and socialization, supporting rapid business innovation. Hebei Iron & Steel Digital has adopted its self-developed big data center to establish a standardized, automated, and intelligent data analysis system, assisting in intelligent management and scientific decision-making in production and operations. These cases provide valuable experience for the digital transformation of steel companies, demonstrating that building a digital platform is an effective way to promote the development of steel companies [5-6] .

3. FineBI Features and Advantages

3.1 Powerful Data Access and Integration Capabilities

FineBI provides comprehensive data access capabilities, supporting various data sources, including relational databases (such as MySQL and Oracle), multidimensional databases, non-relational databases, text data sources (Excel files, TXT files, XML files), and other data sources (program data sources, JSON data, SAP data sources, etc.). Steel companies can integrate data scattered across different departments and systems, such as CRM data from the sales department, financial software data from the finance department, and MES data from the production department, into FineBI for analysis, breaking down data silos and building a unified data view.

3.2 Self-Service Data Analysis and Intelligent Charts

FineBI supports advanced analysis functions such as self-service modeling, intelligent charts, and natural language question answering, greatly reducing the data application threshold for business departments. Business personnel do not need to program; they can quickly build data analysis models and generate multidimensional visualization dashboards through drag-and-drop operations. At the same time, the built-in AI analysis engine allows users to ask questions in natural language, automatically generating advanced reports such as trend prediction and sensitivity analysis, realizing "everyone can use data," enabling business personnel to independently explore data, quickly verify ideas, and make decisions based on the latest information [7-8] .

3.3 Rich Visualization and Interactive Functions

Based on the well-known improved graphics grammar design, FineBI offers unlimited visual analysis possibilities. It supports unlimited combinations of chart types, such as bar charts, scatter plots, heatmaps, line charts, area charts, rectangular block charts, pie charts, text charts, filled maps, funnel charts, dashboards, etc., which can be combined into rich visualization effects in the same chart component. At the same time, it supports different attribute mappings for different indicators, and colors, sizes, prompts, and labels can all be customized to achieve unlimited attribute mapping. In addition, it provides OLAP online analysis functions, which can perform interactive analysis such as drill-down, linkage, jump, and filtering through lightweight configuration, as well as data interpretation functions, and one-click viewing of key influencing factors of data [9] .

3.4 Collaborative Sharing and Security

FineBI provides users with collaborative sharing capabilities, making it convenient for users to achieve editing collaboration and space sharing within the team, as well as data conclusion sharing outside the team. Users can share folders or analysis topics with other users for viewing or editing. They can also publish dashboards or datasets to public spaces, where administrators or sub-administrators can configure permissions to set the scope of users allowed to view and use them. Public link sharing is also supported, allowing users to quickly view shared content without logging into the system. Regarding data security, FineBI solves enterprise information security problems through the cross-combination of permission carriers, permission entities, and permission types. It supports data anonymization, security protection, access control, SQL injection prevention, and global watermarking, providing multi-dimensional protection for data and system security [10] .

4. Specific Application Implementation of the Steel Enterprise Digital Innovation Training Platform Based on FineBI

4.1 Platform Architecture Design

The architecture of the steel enterprise digital

innovation training platform based on FineBI is a multi-layered system with clearly defined functions, mainly including a data access layer, data processing layer, data analysis layer, application display layer, and security layer. These layers work together to provide comprehensive digital support for steel enterprises.

Data Access Layer: Responsible for accessing various data sources both inside and outside the steel enterprise, covering business systems (such as ERP, MES), databases (relational and non-relational), text files (Excel, CSV), and external data interfaces (such as market data APIs). For example, a large steel enterprise successfully integrated data from eight different business systems through FineBI's data access function, including real-time data from the production system, order data from the sales system, and cost data from the financial system, improving data access efficiency by 60%.

Data Processing Layer: Cleans, transforms, and stores the accessed data. Data cleaning removes duplicate, erroneous, and incomplete data; data transformation unifies the data into a standard format; and data storage employs efficient data warehouse technology. Taking this steel company as an example, after processing by the data processing layer, the data quality significantly improved, and data consistency reached over 98%, providing a reliable foundation for subsequent analysis.

Data Analysis Layer: Utilizing FineBI's analytical functions for data mining and intelligent analysis. FineBI offers a wealth of analytical tools and algorithms, such as association analysis, cluster analysis, and predictive analysis. Through association analysis of production data, the steel company discovered a potential relationship between equipment failures and production environment parameters, providing strong support for equipment maintenance.

Application Display Layer: Displays the analysis results to users in the form of visual charts, reports, etc., and provides interactive functions. Users can use chart drill-down, linkage, and other operations to gain a deeper understanding of the information behind the data. For example, production managers can use interactive dashboards to monitor the production line's operating status in real time, promptly identify problems, and make decisions.

Security Layer: Ensures the platform's data security and stable system operation. Data encryption, access control, backup and recovery technologies are employed to ensure the confidentiality, integrity, and availability of data. Through the construction of a security layer, this steel company reduced the risk of data leakage by 80% and achieved system stability of 99.9%.

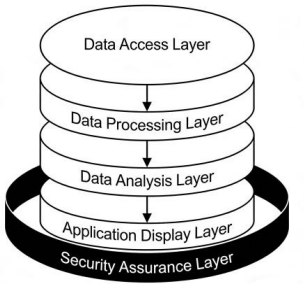

Figure 1. Platform Architecture Diagram

4.2 Data Integration and Indicator System Design

4.2.1 Data Integration

The steel company possesses diverse data assets, including business data (such as production data, sales data, and inventory data), financial data, and external market data. After identifying these data assets, FineBI's data access function was used to integrate these scattered data sources and establish a unified data warehouse.

In the process of data integration, the quality and consistency of data are crucial. Data cleaning, deduplication, and standardization are required. Taking this steel company as an example, it was found that there are differences in data formats and measurement units among different production lines when integrating production data. Through data cleaning and standardization, all production data is unified into the same format and measurement units, ensuring the accuracy and usability of the data. The integrated data warehouse contains over 100000 production records, 50000 sales records, and 20000 financial records, providing abundant data resources for subsequent analysis.

Table 1. Comparison before and after data integration

Data type	Number of data sources before integration	Differences in data format before integration	Integrated data volume	Data consistency after integration
Production data	5	Significant difference	100000 pieces+	98%
Sales data	3	Partial differences	50000 pieces+	97%
Financial data	2	Minor differences	20000 pieces+	99%

4.2.2 Indicator System Design

Build a multi-level indicator system of "strategy business operation" around the strategic goals of steel enterprises, transmit the enterprise's strategic goals to each business unit, and ensure that innovative measures are consistent with the overall direction.

At the strategic level, indicators such as "revenue growth rate," "market share," and "profit growth rate" are set to reflect the overall development status of the enterprise. For example, the steel company has set a strategic goal of achieving a revenue growth rate of 15%, a market share increase of 5%, and a profit growth rate of 12% over the next three years.

Business Level:

Production Department: Indicators such as "production efficiency," "product quality pass rate," and "equipment failure rate" were set. FineBI's analysis of production data revealed a close correlation between production efficiency and factors such as equipment uptime and raw material supply. By optimizing production scheduling and raw material supply management, the steel company improved production efficiency by 10%, achieved a product quality pass rate of 99.5%, and reduced equipment failure rate by 20%.

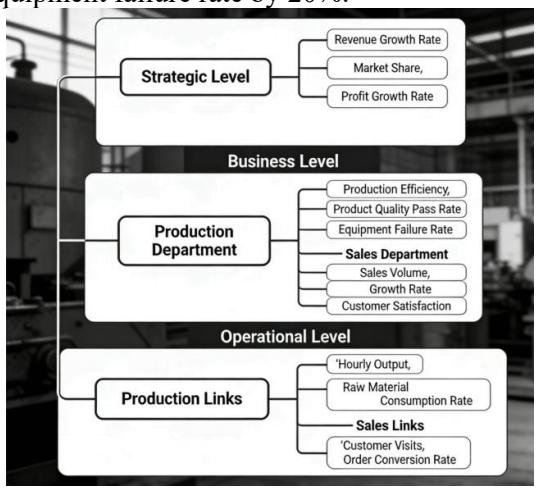

Figure 2. Schematic Diagram of Multi-level Indicator System

Sales Department: Indicators such as "Sales Revenue," "Sales Growth Rate," and "Customer Satisfaction" were set. Using FineBI to analyze sales data and customer feedback data, the steel enterprise adjusted its sales strategy, launching personalized products and services for different customer groups. Sales revenue increased by 18%, the sales growth rate reached 12%, and customer satisfaction improved to 90%.

Operational Level: Set more granular indicators, such as "hourly output" and "raw material consumption rate" in the production process, and "customer visits" and "order conversion rate" in the sales process. Through monitoring and analysis of these indicators, the steel company optimized its production and sales processes, increasing hourly output by 8%, reducing raw material consumption rate by 5%, increasing customer visits by 20%, and increasing order conversion rate by 15%.

4.3 Intelligent Analysis Application Scenarios

4.3.1 Production and Operation Optimization

FineBI was used to analyze the steel company's production data, enabling real-time monitoring and optimization of the production process.

Equipment Failure Prediction: By analyzing the operating data of production equipment, such as temperature, pressure, and vibration, a fault prediction model was established. This steel company used FineBI's predictive analytics to predict faults in key production equipment. In the past year, it successfully predicted 10 equipment failures, arranged maintenance in advance, reduced downtime by a total of 50 hours, and avoided production losses of approximately 2 million yuan due to equipment failures.

Production Process Optimization: Data from each stage of the production process was analyzed to identify bottlenecks. Through FineBI's visualization analysis, a problem of excessively long waiting times was discovered in a certain production stage. The steel company optimized this stage, adjusting the production sequence and resource allocation, resulting in a 12% increase in production efficiency.

Product Quality Analysis: Product quality data was analyzed to promptly identify quality problems. Using FineBI's correlation analysis function, the correlation between raw material quality and product quality was discovered. The steel company strengthened its control over raw material quality, reducing product quality problems by 30% and achieving a product qualification rate of 99.8%.

Table 2. Comparison of Production and Operation Optimization Effects

Optimization Item	Indicators Before Optimization	Indicators After Optimization	Improvement Amount
Equipment Downtime	80 hours / Year	30 hours / Year	62.5%

Production Efficiency	85%	97%	12%
Number of Product Quality Issues	50 per Month	35 per Month	30%

4.3.2 Supply Chain Management Improvement

In terms of supply chain management, FineBI can help steel enterprises achieve visualized management and intelligent decision-making in the supply chain.

Procurement Planning Optimization: By integrating supplier data, procurement data, inventory data, and logistics data, the company monitors the supply chain's operational status in real time. This steel company utilized FineBI's analytics to conduct in-depth analysis of procurement and inventory data. It discovered a mismatch between the procurement and inventory levels of certain raw materials, leading to inventory buildup or stockouts. By optimizing the procurement plan, inventory turnover was increased by 20%, reducing inventory costs by approximately 1.5 million yuan.

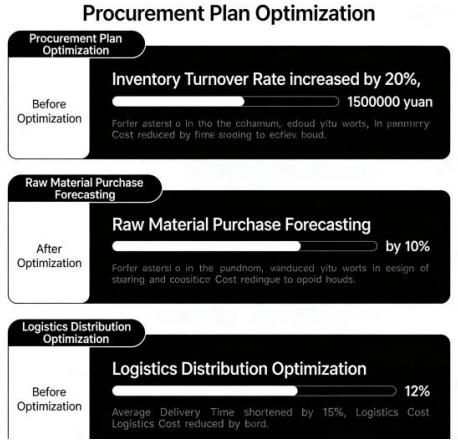

Figure 3. Effect Diagram of Supply Chain Management Optimization

Raw Material Procurement Forecasting: Utilizing predictive analytics, the company arranges raw material procurement in advance based on market demand forecasts and inventory levels. Through FineBI's market demand forecasting model, the steel company accurately predicted market demand for the next three months, procured raw materials in advance, and reduced procurement costs by approximately 10%.

Logistics and Distribution Optimization: Analyzing logistics data optimizes delivery routes. This steel company utilized FineBI's Geographic Information System (GIS) functionality to optimize delivery routes, reducing average delivery time by 15% and logistics costs by 12%.

4.3.3 Precision Marketing

Steel companies can use FineBI to analyze market and customer data to achieve precise marketing.

Market Dynamics Analysis: By analyzing market trend data and competitor data, we can understand market dynamics. This steel company utilized FineBI's market analysis capabilities to discover the growing demand trend for high-end steel. It promptly adjusted its product strategy, increased investment in the R&D and production of high-end steel, and increased its market share by 8%.

Customer Demand Analysis: Analyze customer demand data to understand changes in customer needs. Through the analysis of customer purchasing behavior and preference data, the steel company segmented customers into different groups and developed personalized marketing plans for each group. For example, for large construction companies, customized steel products and preferential procurement policies were launched, resulting in a 25% increase in customer orders.

Marketing Effectiveness Evaluation: Using FineBI's marketing analytics capabilities, the effectiveness of marketing campaigns was evaluated. Through analysis of marketing campaign data, the steel company discovered that certain marketing channels were performing poorly. They promptly adjusted their marketing strategy, reducing investment in these channels and concentrating resources on high-performing channels, resulting in a 20% increase in marketing ROI.

Table 3. Comparison of Precision Marketing Effects

Effect Indicators	Indicators Before Optimization	Indicators After Optimization	Improvement Amount
Market Share	20%	28%	8%
Customer Order Volume	1000 Orders/Month	1250 Orders/Month	25%
Marketing ROI	3	3.6	20%

4.4 Platform Implementation Steps and Safeguard Measures

4.4.1 Implementation Steps

Platform implementation can be divided into the planning stage, construction stage, and

promotion stage, each with clear tasks and objectives.

Planning Stage: Clarify platform construction goals and requirements, and formulate project plans and budgets. During the planning stage, the steel company organized a cross-departmental research team to conduct a comprehensive survey of the company's business processes, data status, and digital transformation needs. The platform construction goals were determined to be improving data-driven decision-making capabilities, optimizing production operations and supply chain management, and achieving precision marketing. A detailed project plan was formulated, clarifying the time nodes and tasks for each stage, with a budget of 5 million yuan.

Construction Phase: Data access, system development, and testing were conducted to ensure the platform's stability and reliability. During the construction phase, the steel company selected a professional technical team to develop the platform, constructing the data access layer, data processing layer, data analysis layer, application display layer, and security layer according to the platform architecture design. After three months of development and two months of testing, the platform's functions were stable and reliable, and it passed internal acceptance.

Promotion Phase: Training was provided to the steel company's internal employees to improve their ability and enthusiasm for using the platform, gradually promoting its application. The steel company developed a detailed training plan, providing categorized training for employees at different levels. Management received training on the platform's strategic significance and usage methods; business personnel received training on data analysis and application operations; and technical personnel received training on platform maintenance and development. Through the training, employees' ability and enthusiasm for using the platform significantly improved, and the platform was widely used throughout the company.

4.4.2 Safeguard Measures

To ensure the smooth implementation and application of the platform, the steel company should take the following safeguard measures.

Organizational Support: A dedicated project team was established, with clear responsibilities and division of labor for each member, strengthening team collaboration. The steel company established a project team led by senior management, including business department heads, technical personnel, and data analysts. Clear responsibilities and division of labor for each member were established, a regular communication mechanism was set up, and team collaboration was strengthened, ensuring the smooth progress of the project.

Technical Support: A professional technical team was selected for platform development and maintenance, ensuring the platform's technological advancement and stability. The steel company selected a technical team with extensive experience in steel enterprise digitalization projects for platform development, adopting advanced technical architecture and development tools. Regarding platform maintenance, a comprehensive technical support system was established to promptly resolve technical issues arising during platform operation, ensuring the platform's technological advancement and stability.

Training Support: A detailed training plan was developed, providing targeted training for employees at different levels to improve their digital skills. As mentioned above, the steel company developed a detailed training plan, providing categorized training for employees at different levels. Through training, employees' digital skills were significantly improved, providing strong support for the smooth application of the platform.

Cultural Support: Promoting the "Data-Driven Decision-Making" Concept Throughout the Corporate Culture and Encouraging Employees to Actively Participate in Platform Applications and Innovative Practices. This steel company promoted the "data-driven decision-making" concept throughout its corporate culture through internal promotion, training, and case sharing. An innovation reward mechanism was established to encourage employees to actively participate in platform applications and innovative practices. During the platform application process, employees put forward many valuable innovative suggestions, contributing to the platform's optimization and the company's digital transformation.

5. Conclusion

Building a steel enterprise digital innovation training platform based on FineBI is an effective way to promote the digital transformation of steel enterprises. By utilizing FineBI's powerful

data access, integration, analysis, and visualization capabilities, steel enterprises can break down data silos and achieve data-driven decision-making and management. In the specific application implementation process, steel enterprises should focus on data integration and indicator system design, build intelligent analysis application scenarios in conjunction with business needs, and take effective implementation steps and safeguard measures. Practice shows that this platform can effectively improve the data-driven decision-making capabilities of steel enterprises, promote business innovation and management optimization, and help steel enterprises achieve high-quality development in fierce market competition. In the future, with the continuous development of technology and the continuous expansion of application scenarios, the steel enterprise digital innovation training platform based on FineBI will play an even greater role.

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