Innovation of Engineering Project Management under the Background of Big Data

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Keywords: Big data; Engineering project management; Innovation

Abstract: Under the current big data environment, the construction industry has also been extensively and deeply developed with China's rapid economic and social development. However, big data and the Internet are impacting almost every part of the industry, and the conventional modes can no longer meet the requirements of the society for data informatization management. How to use many data information resources for quality engineering construction and to ensure the optimization and upgrading of professional technology and management system have become the future work of current quality engineering management. This work analyzed the significant differences between traditional project management innovations in terms of innovation environment and conditions, innovation methods and ways, innovation results and the factors which influence success, and finally put forward suggestions from changing culture of the enterprises and decision-making mechanisms, reorganizing the organization and business processes with the center of informatization, and increasing the number of data processing professionals.

1. Introduction

The research of management innovation based on big data is basically focused on the level of enterprise; project management research based on big data emphasis on specific application and analysis, however, the problem of project managements innovation based on big data and from the perspective of project organization is rarely can been seen [1]. Big data technology is a kind of technology which can classify, store, analyze, learn, and invoke content data. In the modern age of advanced information technology, this technology has shown great application value, therefore, it has been widely welcomed in many ranges in the society, while engineering project management is one of them. With the development of construction engineering, it needs to process a large scale of data, however, the traditional manual mode has difficult in processing data efficiently and accurately due to the limitation of capabilities [2]. Therefore, relevant researchers put their eyes on big data and propose many innovative ideas for combining big data technology with engineering project management.

2. Basic Background of Project Management Innovation Based on Big Data

Considering the characteristics of project-based organizations and projects, the “big” of big data is mainly shown in three aspects: large data scale, multiple source isomerism and dynamics. (1) From the scale of data, the scale of data that project-based organizations can use in project management innovation is beyond the scope of traditional cognition. First, since the establishment of the project-based organization, various information and data related to the project have been accumulated continuously; Second, with the improvement of relevant rules, a large amount of data related to project-based organizations and projects has been disclosed via the government information platform; Third, all kinds of related data and information spread all over the media and the Internet [3]. Adding all this information up can become the endless fortune to be developed by project-based organizations for project management innovation.

(2) From the perspective of data sources and structures, big data has the characteristic of multiple

  DOI: 10.25236/icem.2019.003

source isomerism. The multiple source is reflected in the data related to project management innovation that comes from not only the project-oriented organization and the project itself, but also the relevant government departments, other organizations and online media; On one hand, isomerism is reflected, in the data representation, and the data in project management innovation exists not only in digital form, but also in other forms such as paper or audio-visual products [4]. On the other hand, from the perspective of users, the data includes not only structured data that can be directly used, but also a large scale of semi- structured data and unstructured datathat need further processing .

(3) From the perspective of data dynamics, the project-based organization, the project itself, and external related data are in a continuous process of accumulation. Real-time processing of these new data streams provides possibilities for continuous improvement of project management innovation. In summary, big data has become the basic background of current project management innovation.

3. Effective Application of Big Data Analysis in the Whole Life Cycle Management of the Project

The life cycle of the project is the information drawn from the analysis based on the actual development of each stage of the actual work situation and the different key points. Compared with the simple project information management, the life cycle of the project can be combined with the characteristics of each stage of the actual work better, control the project management work overall, summarize and analyze according to the data in progress, so that the project management can be carried out more effectively [5]. The whole life cycle of the project tracks the whole process of the project,and tracks up effectively for sales personnel, customers, project managers and executives from the aspects of bidding, signing, execution and the collection, storage and analysis of data, so as to improve the efficiency and quality of project management.

3.1 Project Data Collection.

In the process of project management, a large amount of data information will be generated, covering the whole process from cost to process, work quality information, personnel information, configuration information and so on, and the work characteristics of different work stages are also very different, the generated data information is also different. For these large amounts of structured and non-structured data, the collection methods are often different. Among them, structured data generally has its unified format and fields, while non-structured information is widely distributed with no fixed formats and fields, and the format will change from time to time. When such information is being collected, it should be transformed into structured data through integration to form an inherent model [6]. Through the calculation, analysis and statistics, the staff can find the connection and key points, then improve the feasibility of project management.

3.2 Project Data Storage.

Project data storage includes storage of its data content, standardized data and data index. Due to the complexity of big data, it is difficult to effectively store project data, but it also determines that the project data has the characteristics of large amount of data and high feasibility, and the project data provides accurate data for project management work, which makes project management more scientific and effective. When storing project data, it is necessary to pay attention to data backup to improve data security, and improve the analysis ability of project data storage, to provide an effective method and ensure the feasibility of operation for effective search, analysis and application of large amounts of data to.

3.3 Project Data Analysis.

With the collection and storage of large amounts of data, it is necessary to analyze these large amounts of data in order to apply the data to work production. Compared with traditional analysis methods, big data analysis provides more accurate data, making data analysis more efficient and

with high quality. Since big data analysis is carried out through efficient algorithms and patterns, the results are more secure and more precise. The project data analysis adapts to the needs of modern business, and can sort different data scales in real time, so as to effectively analyze the project data [7]. Adjusting continuously the differences can coordinate all aspects of data, improve the adaptability and reliability of project data, and play a good role in promoting the efficiency and quality of project work.

4. Application Prospect of Big Data Technology in Engineering Project Management

4.1 Management Path Optimization.

Due to the complexity of modern engineering project construction, the difficulty of project management is increasing. Many traditional project management paths are no longer applicable, which reflects the low efficiency, low applicability and insignificant efficacy. On the theoretical basis, the combination of big data and engineering project management can not only improve the shortcomings of the traditional management path, but also improve the scientific, accuracy, and processing ability of the management path, so as to realize the optimization application of the management path. Specifically, big data technology can put a large amount of data of modern project management into the database, and use its own data classification and data integration functions to ensure the orderly storage of data, avoid the data confusion caused by traditional management and reduce the workload of managers. The association rules of big data management path optimization are shown in Figure 1.

4.2 Improve the Risk Resistance of Project Management.

In the traditional project management, work errors often occur due to the inherent instability of the staff, such as engineering cost calculation errors. Such phenomena will seriously affect the economic benefits of the relevant units, so the engineering unit will regard such phenomena as economic risks and estabilish many management systems and penaltie; although these rules have indeed improved in some ways, they are very limited in their effectiveness [8]. However, under the application of big data technology, they can be used on their storage function to check the data to avoid erroneous data and improve the risk resistance of project management.

4.3 Big Data Decision.

Big data technology with analysis function can analyze the causal relationship among various data, which can help project management personnel understand the weight level and order of data, and project management personnel can also rely on big data analysis to make relevant management decisions [9]. This method is frequently used in other fields. In terms of application results, its accuracy, effectiveness, and energy efficiency have a good performance.

4.4 Data Prediction Function.

Behind the complex project management data, there are often many extended data hidden. For example, what kind of cost will be caused by engineering construction, whether there are risk factors or not, and what negative effects will be caused by risk factors? It is such a tedious task to rely on manpower for deduction. At the same time, it is difficult to guarantee the accuracy of the deduction results [10]. Under the analysis function of big data technology, data deduction can be accurately performed, and the data trend can be predicted. Finally, it will give a relatively complete and accurate data set, so that managers only need to develop management measures based on the data set.

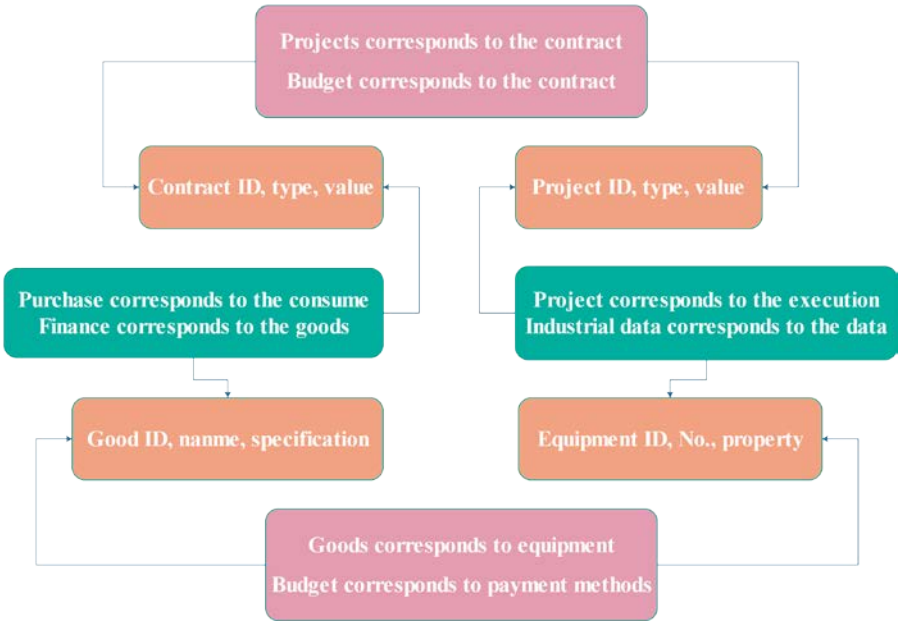

Fig 1. Big Data Management Path Optimization Data Association Rules

5. Summary

With the development of the times, the role of big data in project management has become more and more prominent and strengthened, which not only changes people's lives, but also greatly promotes the operation level of enterprise projects and improves the efficiency and quality of business operations. At the same time, big data can keep pace with the times according to the development of the technology, constantly meet the ever-changing needs of people and show unique advantages in enterprise project management. This work mainly analyzed the innovative ideas of project management based on big data. Firstly, it combined with the previous research results, then discussed about the application prospect of big data technology in engineering project management based on theory.

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