Frontiers in Business, Economics and Management
ISSN: 2766-824X | Vol. 17, No. 3, 2024

Research on EPC Project Management Mode and Improvement Based on Blockchain Technology

Lingyi Shen *

Department of Finance, Nanjing Audit University, Nanjing, China
* **Corresponding author**: Lingyi Shen (Email: sly2284192526@outlook.com)

Abstract: The concept of project management first appeared in the industrial revolution of the last century, and then with the continuous development of economy and the trend of globalization, project management has also improved. Therefore, with the rapid development of gold today, project management still occupies an indispensable position in the development of enterprises and projects. However, most current research on project management is limited to the analysis of a single project, and the conclusions obtained cannot be extended to more aspects. Therefore, this study adopts multi-case analysis, comparative analysis and literature analysis to further analyze the main data center project of China Railway and Yidu City Civic Center project. The progress of EPC project management method based on DBB mode and the improvement of EPC+PPP mode to EPC mode are concluded. Finally, combining with today's hot blockchain and big data technology, the possibility of further development of EPC+ mode is proposed.

Keywords: EPC management mode, DBB management mode, EPC+PPP management mode, Blockchain, China Railway main data Center, Yidu City Citizen Activity Center.

1. Introduction

1.1. Introduction to the Background of Project Management Research

The research background of project management can be traced back to the Industrial revolution in the early 20th century. With the acceleration of industrialization and the expansion of enterprise scale, the number of orders received by enterprises has increased sharply, and the complexity of order management and the need for organization and coordination have also undergone new changes. In this context, the concept of "project management" was put forward by management scientists represented by Frederick Taylor and Henry Ford, and management came into being. Since then, with the rapid development of economy, enterprise project management has gradually become an indispensable part of the orderly transaction process of a company. Project management technology combines a variety of disciplines to ensure that complex projects can get strong theoretical support and efficient management, and bring higher benefits to people at all social levels such as entrepreneurs and governments. In the era of vigorous development of information technology and complicated economic globalization, global supply chain, transnational cooperation and complex market environment have invisibly further emphasized the importance of project management in the company and even the society, and enterprise management has become a hot topic. Therefore, this paper will also focus on project management. Explore the improvement of EPC model and the method of combining project management with the latest information technology to deal with massive transaction and engineering data.

1.2. The Significance of Project Management Research

First of all, as a topic that economists continue to explore and improve, enterprise project management occupies a very important position in daily life:

Enterprise project management helps us to carry out strategic execution: Enterprise project management helps to transform the enterprise's strategic objectives and relatively abstract development plans into specific projects and work arrangements, and through the planning, execution and control of phased projects to achieve the final strategic objectives and company development in an orderly manner.

Second, project management can help us to optimize the allocation of resources: enterprise project management can help enterprises in multiple projects carried out at the same time for reasonable allocation and optimization of resource management, from human resources, equipment, capital and other aspects of analysis, in order to expect to use a certain amount of resources to obtain the maximum effect, to help companies and various institutions to obtain the ultimate goal of profit.

Third, project management can also play a role in risk management to a certain extent: Project management tends to carry out overall planning before the project is carried out (Zang Lijuan, 2024). By formulating risk management plans, implementing risk countermeasures and monitoring risk situations, enterprises can reduce the business risk of project failure in the process and improve the probability of strategic realization (Chen Xinyun, 2024), which is a kind of overall management that overtakes the supervision department. It can help enterprises better cope with uncertainties and changes, and improve their ability to resist risks.

Fourthly, project management can learn from past projects and make continuous improvement, which helps the company avoid the possibility of repetition: Enterprise project management pays attention to the evaluation and learning of the project in the development process. By summarizing the experience and lessons of the past project, the project management method is constantly improved, so that the management method of the enterprise is more in line with the realistic development state and the competitiveness is improved.

Therefore, in the era of economic globalization and complicated information development, we can learn from the above functions that project management occupies a very important position in engineering and enterprises. In a sense, mastering more advanced project management theories and technologies can help an enterprise to save more resources to a certain extent. Or get higher utility in the same industry, so as to occupy a larger share in the market. Therefore, the study of project management has become an urgent, necessary and marginal utility choice for people to pay attention to, we can continuously analyze the case of past projects to promote strengths and avoid weaknesses, we can also combine big data technology with project management to further innovate the project management method. So as to promote the continuous development of project management in the background of The Times and the flood of economic development, and bring more possibilities for enterprises or all walks of life.

1.3. Literature Review

Project management first sputtered in the industrial revolution at the beginning of the 20th century, proposed by management experts represented by Frederick Taylor and Henry Ford, put forward scientific management theory, management process theory and other ideas handed down to the present day, emphasizing the use of scientific methods to manage enterprises and projects, standardized production process, in order to achieve the purpose of improving the production efficiency of enterprises. Then, in the 1930s, project demonstration and other methods were put forward one after another. People gradually evaluated and considered the development of the project from various aspects, and began to pay comprehensive attention to and analyze the cost, quality, risk and other factors. Then, with the further development of probability theory, econometrics and other disciplines, Management scientists introduced the concepts of mathematics and big data into Project management, and developed probabilistic analysis, Project 2000, database and other technologies to assist enterprises to carry out better and more accurate project management. Throughout our country, our enterprise project management plate started late, until the 1980s of the last century, some scholars began to propose the project management enterprise, the project management reform, improve investment efficiency (Li Daming, 1987), while the project and work management from many aspects and stages, "the management of each stage has its own special scope and content" (Xu Zhiwu, 1987), however, with the continuous remarkable achievements of China's reform and opening up to the outside world, project management has also been well developed in China. Now, "Research on innovation theory based on PMO model" (Liang Xianxian, Yuan Ye, Wu Bichang, 2024), "PDCA cycle Management System" (Wang Bo, 2024), using database, Microsoft Project software to carry out accurate project management and other more efficient and accurate integrated management system has been proposed by Chinese scholars, management scientists and related practitioners, enthusiasts expect to stand on the basis of probability theory, computer science and information technology and other aspects of the project management for further exploration and sublimation, Project management is still a hot topic of The Times favored by most researchers.

2. Research on Main Data Center Project of China Railway Group (EPC Project Management Mode)

2.1. Project Overview

The main data center of China Railway Group is the production and operation center of the basic and application system of the project work of China Railway Group. It is mainly responsible for data collection and storage as well as the deployment and operation of related systems in the project of China Railway Group. For the enterprise management of a large railway company, it occupies an important position. The main data center of China Railway is located in Gaocun Science and Technology Innovation Park, Wuqing District, Tianjin, covering an area of about 70.23 mu, with a total floor area of 54,393 square meters. It is about 72 kilometers away from China Railway Corporation and 200 meters away from Beijing-Tianjin Expressway, with convenient transportation. The park mainly includes three buildings: information Building, operation and maintenance building, Chaifa Building and supporting facilities of the park. Positioned as the highest level information center and the highest level data processing center of China Railway, it is the core to realize the overall plan of informatization of China Railway Group, and is also a demonstration project and important infrastructure for the construction of national railway informatization. In addition to the normal basic buildings and soft decoration, the project also includes power, communication, greening, computer room and drainage system and other related contents, but does not include the information system of the main data center of the national railway and the relocation of the existing information system and land purchase and relocation project.

2.2. Introduction of the Basic Content of EPC Mode

The so-called EPC enterprise project management mode is the classic general contract project management mode that combines the three modules of Engineering(design), Procurement(procurement) and Construction(construction). The general contractor of the project is provided by the general contractor according to regulations. Undertakes the design, procurement, construction and trial operation of the project, and is fully responsible for various projects involved in the project.

In the EPC project management mode, it mainly includes the following three stages:

First, design stage: In the EPC project management mode, the Engineering stage belongs to the first stage of the company's enterprise project. In this stage, the contractor not only needs to carry out engineering design, but also needs to be responsible for the planning of the entire construction project, and make comprehensive design arrangements for the implementation, organization, management planning and specific work of the entire project construction, so as to ensure the overall design of related engineering projects from various aspects and angles, so as to ensure the feasibility and rationality of the design. To meet the needs and requirements of the owners.

Second, procurement stage: After the completion of the basic project design, we need to purchase equipment and materials according to the design scheme provided in the design process. In the procurement process, the general

contractor not only needs to purchase the relevant building materials, but also needs to purchase the relevant professional equipment and materials that may be used. In this stage, the company needs to do a good job in the selection of suppliers, cooperation negotiations, supply arrangements and other work to ensure that the equipment and materials needed for the project can be in place on time.

Third, construction phase: After the completion of the design and procurement phase, the project enters the construction phase. The general contractor is responsible for organizing the construction of related construction projects, and is responsible for the whole project from the aspects of construction site management, schedule control, quality management and safety management, testing and technical training. Ensure the quality and schedule of the project, ensure that the project can be carried out smoothly in accordance with the regulations and requirements, and the relevant construction units can carry out normal work after receiving.

2.3. The Project Organization and Management Form

In the construction project of the main data center of China Railway, the general contractor adopts the EPC project management mode of the consortium, that is, in the process of the project, the design institute as the joint leader is responsible for the project management and related project design. At the same time, A company and B company, which have signed a joint agreement, as members of the consortium, respectively carry out the construction of civil engineering and the construction of electric power, communication and intelligent buildings and computer rooms according to the division of labor agreed before the project starts, in order to achieve the purpose of efficiently completing the project construction tasks. In terms of the project organization structure, the consortium company headed by the design Institute decided to adopt the method of personnel interspersed management: Set up six main departments under the project department: Design Department, Purchasing Department, Engineering Department, Finance Department, Comprehensive Department and Safety and Quality Department, and require relevant project staff to select idle personnel from other five departments in the project design stage and place them in the design department to help the design department personnel carry out the project planning and provide professional advice. In order to reduce problems and changes in the subsequent project construction process. In the subsequent procurement and construction stage, idle personnel from the design department are selected to help members of other departments to carry out related work. Under the condition that the project has signed a fixed total price contract, it greatly helps the general contracting consortium company to save costs and ensure the feasibility of the project in the construction process. In addition, as the main data center project of China Railway adopts the EPC project management mode of the consortium, the construction filing of the derivative part of the project, the issuance of the construction permit by the relevant departments, the engineering safety and quality inspection and other related work are also managed and coordinated by the general contractor unit. At the same time, in order to facilitate the internal staff of the project in the planning, design, construction of the construction process to better information exchange and project management, in this project, the general contractor uses BIM technology to assist the daily work of the main data center of the National railway. BIM technology, namely building information model, has been adopted by a number of projects as a more important technology in the digital transformation of engineering in recent years. Its basic principle is to integrate the data of similar material procurement, project design and construction progress related to the project into a three-dimensional model to achieve the purpose of information exchange and the whole life cycle management of the project. From the visualization, integration, parameterization and graphics can help the general contractor and customers to communicate on the 3D building model issued by BIM technology and the collaborative work of design, construction and operation in the project process, the use of digital technology to facilitate huge and complex construction projects, to a certain extent, help the management and development of EPC mode. Finally, the cost of the main data center project of China Railway is distributed within the project consortium according to the principle of splitting and related workload. In the BIM design fee plate, the main lead person takes 80% of the design fee, and the remaining units split the remaining 20% according to the workload. In the project design optimization and saving costs, the main lead person accounts for 70%. The remaining 30 percent is also distributed according to the workload.

2.4. Advantages Over Traditional DBB Mode

DBB mode mainly refers to the traditional design-biding-build mode. In the early stage of the project, the owner selects the relevant architects and engineering companies to carry out the basic design planning of the project, and at the same time, tenders are conducted in the design stage to select the more suitable contractors to carry out the later work. This kind of project management mode is more common in the early international market, and is a more traditional management way. As an early stage enterprise project management mode, DBB mode also has some advantages. For example, through competitive bidding, it can help owners to select higher quality engineering parties and reduce related project costs. By designing the design link into the first stage, it is convenient for the owner to strictly control the overall design and planning of the related project, and improve the design quality; And flexible planning to solve the problems in each stage, clear the division of responsibility of the project, and finally achieve the purpose of reducing the risk of the owner. However, as a former management model, DBB must also have its inherent shortcomings: Due to the design of the project management mode in which design and construction are separately responsible, there are certain information barriers between the design stage and the bidding and construction stage, which leads to the inability to share information directly in the two stages, and it is likely that the follow-up project progress is inconsistent with the design link. Meanwhile, the DBB management mode assigns projects in different stages to different contractors. Therefore, it may also cause the problem of decentralized responsibility and difficult change management, which makes the corresponding work lack of coordination and brings many risks to the engineering project.

Starting from the case of the main data center project of China Railway, we can find that EPC project management mode can solve the above problems well. By adopting the general contracting method and using BIM technology to assist related projects, it can help staff at various stages to

carry out basic information exchange and information sharing. It is convenient to put forward and solve the relevant problems in a timely manner. The mode of setting six main departments under the project also facilitates the general contractor's management, and the characteristics of one-stop service also help the owner save time and cost. To a large extent, EPC project management mode optimizes DBB mode in all aspects, and has the advantages that DBB management mode cannot match. Therefore, it has become a popular engineering project management mode in recent years.

2.5. Still Exciting Problems

Although the EPC project management mode has been improved to a certain extent after decades of development of project management, there are still endogenous problems caused by design. For example, because all the projects are contracted by one company or team, the project may lack of competition, resulting in high project cost and loose management. Secondly, under this management mode, all responsibilities are likely to be concentrated on the contractor, resulting in huge losses to the general contractor once a project goes wrong. At the same time, it may also lead to the owner's supervision and control of related projects becoming relatively weak, resulting in unclear responsibilities. Finally, it is also the most important problem in design. Although the use of BMI technology can enhance the communication between departments to a certain extent and reduce the problems that may occur in the subsequent project stage, it is not guaranteed that relevant engineering problems will not occur. Once a problem occurs, as the design link is the first step in the whole project sequence, it is difficult for us to change the design scheme. In case of problems, the design process is the first step of the project sequence, which will bring greater losses.

3. Yidu City Citizen Activity Center Project (EPC+PPP Project Management Mode)

3.1. Project Overview

Yidu City Civic Activity Center project is located in Yidu City, Yichang City, the total planning area of about 465,600 square meters, the total construction area of about 112,800 square meters, mainly by the grand theater, library and exhibition center three merge, determined to create a complete function of integrated cultural and entertainment buildings. To provide a better and more comfortable living environment for Yidu citizens. The building is divided into 4 above-ground floors and 1 underground floor, of which the underground part covers an area of 2706 square meters and the above-ground part covers an area of 63,109 square meters. At the same time, the Grand Theater section of the Civic Center has 1,112 medium-sized comprehensive B-scale theaters, supporting a variety of drama, drama and musical performances; The library section is a medium-sized construction project, supporting the collection of more than 200,000 volumes; And the exhibition center has three exhibition hall design, the exhibition hall contains 782 international standard booths, recording hall, conference room and staff office area, the exhibition hall is equipped with related public activity space, to facilitate the public travel, communication and rest. In addition, Yidu City Civic Activity Center is equipped with a number of bus stops, by taking Yidu Road 202 and Yidu Road 2 bus can achieve direct access, at the same time also built around a number of parking lots, to provide short-term parking services, convenient Yidu city residents flexible choice of a variety of transportation modes to travel. In the process of the project, the scope of the project of the general contractor China Construction No. 3 Bureau includes construction facilities, power system, communication system, surrounding greening and infrastructure construction, excluding land purchase.

3.2. Introduction of EPC+PPP Mode

EPC+PPP enterprise project management mode is the composite mode of EPC mode and PPP mode, and has the characteristics of both EPC project management mode and PPP mode. PPP mode refers to the "public-private cooperation mechanism", that is, the government cooperates with social capital in accordance with certain procedures and ways, through joint investment in the construction and operation of infrastructure projects or public facilities projects (including project financing, construction, operation and maintenance), in order to achieve the advantages of both sides, save project costs and share project risks. The EPC project management mode has been specifically introduced in the previous section, mainly refers to the general contracting responsibility system during the project, in which a general contractor is responsible for all matters in the project to ensure that the project handed over to the owner can be put into use immediately. Therefore, EPC+PPP mode means that the general contractor in the EPC mode intervenes in the project through the form of investment and financing through the PPP mode to implement the design, procurement and construction of the project, and the investment unit also obtains the corresponding return by signing the franchise agreement, and in accordance with the EPC mode, it will be handed over to the government when the project expires.

EPC+PPP project management mode is mainly composed of the following five stages:

First, project planning and preparation stage: In this stage, the owner needs to determine the needs and construction objectives of the project, formulate the relevant project planning and feasibility study report. Then, according to the understanding of the project and the adequacy of relevant policies and funds, the management mode suitable for the project is decided, so as to facilitate the subsequent project design and engineering construction stage to obtain the maximum benefit with the least consumption.

Second, the bidding and selection stage: After completing the basic project planning, the owner decides to use EPC+PPP project management mode to assist the smooth progress of related projects. Therefore, the government needs to attract private enterprises and social capital to participate in the project through bidding. At the same time, it also needs to select the appropriate EPC contractor, sign the contract and clarify the relevant responsibilities and rights. In order to ensure that the subsequent process can proceed smoothly.

Third, the project implementation stage: After determining the responsibility and authority, the project will be constructed in accordance with the EPC project management mode. Starting from the three stages of project design, material procurement and engineering construction, the project will be constructed and maintained in all aspects in order to complete the project with quality and quantity when the project expires.

Fourth, operation and maintenance of the project: After the completion of the specific construction of the project, the

private enterprises and social capital to carry out the basic operation and maintenance of the project. At the same time, the government and relevant regulatory rating agencies supervise and evaluate the project to ensure the long-term stable operation of the project.

Fifth, risk management and supervision: In the process of the project, all parties to the project need to strengthen the supervision of design, planning and construction, and bear risks together to ensure the smooth progress and sustainable development of the project. Government departments also need to conduct timely supervision of engineering projects to facilitate the adjustment and optimization of relevant project management methods in the process, so as to reduce the loss that may be caused by unknown risks.

3.3. The Project Organization and Management Form

In the Yidu City Civic activity Center construction project, China Construction Third Bureau (Yidu) Civic Activity Center Investment and Construction Co., LTD., as the EPC+PPP mode of investment and financing and general contractor, is mainly responsible for the PPP project's investment and financing, construction, operation, maintenance and management. Due to the nature of EPC+PPP project management mode is still the general contracting mode, so the organization structure of Yidu Civic activity Center still continues the design of EPC mode, that is, under the project department set up the design department, procurement department, engineering department, finance department, comprehensive department and safety and quality department, according to different stages of the project to complete the corresponding work, convenient project development and management.

In the Yidu City Civil Activity Center project, the third bureau of China Construction also used BIM technology to help staff timely upload the relevant building data to the cloud platform, facilitate data and information sharing, and improve work efficiency. In addition, BIM technology is also used in various stages of engineering construction. For example, when working in the engineering design Department, modeling technology is used to carry out comprehensive analysis of stair ramps, hardbound ceiling and pipeline design, etc., which makes the relevant content design more accurate and safe and ensures the normal use of the building; The use of three-dimensional field model to design the relevant living area, office area, material handling channel and vehicle access channel, so that resources can be fully utilized, improve the use efficiency of the site, convenient for subsequent construction. In terms of engineering construction, China Construction Third Bureau also made full use of the auxiliary analysis brought by BIM technology, carried out visual verification of the major and difficult problems in the construction process, and helped the general contractor to provide 23 suggestions on net height and collision analysis to ensure the stability and safety of the building, and also helped China Construction Third Bureau to save 10% of building losses. Reducing the possible risks and unnecessary expenses from the root cause.

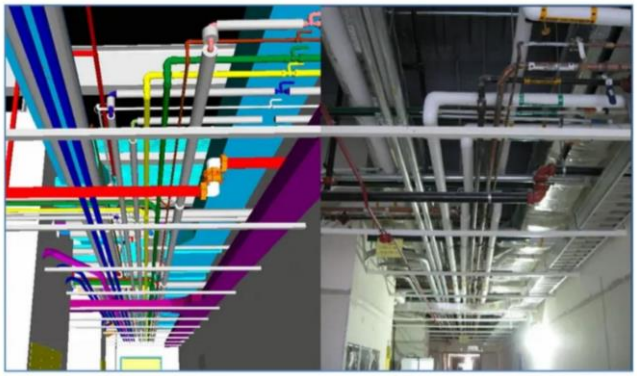

Figure 1. The Application of BIM in Projects

3.4. Advantages and Possible Disadvantages Compared with EPC Mode

EPC+PPP enterprise project management mode, as an organic combination of the general contracting mode and the "public-private-cooperation" mode, makes up for the possible endogenous shortcomings of EPC mode to a certain extent: First, the existence of PPP mode can help the government to enrich the source of funds. By absorbing the investment of private enterprises, it can alleviate the financial pressure of the government at the root, reduce the capital risk, and ensure the smooth progress of the project. Second, by adding PPP mode, it can be found that it can improve the situation of the original EPC mode project which may cause huge losses to the general contractor. It can help the government and relevant units to disperse risks, reduce the risk level of the project, and promote the smooth progress of the project. Third, the PPP model makes the project team pay more attention to the maximization of project profits, which can help the relevant general contractors to improve the management efficiency during the project process and increase the sense of crisis, so as to better complete the project task.

However, in addition, EPC+PPP mode also has many shortcomings. First of all, because EPC+PPP mode involves some financial institutions and private enterprises, the interests are involved in many parties, and the interest demands are more complicated, so it is likely to lead to communication problems and benefit distribution problems, thereby slowing down the project progress; Secondly, because EPC+PPP mode requires long-term investment and cooperation from both sides, the corresponding return cycle is longer, which is still greater for the financial pressure of related enterprises than for some projects that can obtain benefits in the short term. Third, in the process of the project, it may lead to unfair contract signing due to information asymmetry, and even lead to information leakage, which threatens the information security of related projects and affects the smooth progress of the project; Finally, because EPC+PPP mode involves more complex capital flow allocation and project management process than the simple EPC mode, it may lead to the improvement of project supervision and project management requirements, bringing problems and difficulties to the development of the project.

Therefore, in order to solve the above problems, this study believes that the more cutting-edge blockchain technology and big data as well as the successful cases of relevant companies can be used to help the traditional EPC model to further improve on the basis of PPP model markup, and use BIM and blockchain technology to correct the root causes of

problems such as complex management and information asymmetry.

4. Suggestions on EPC+ Mode Based on Blockchain and Big Data Technology

With the continuous improvement of the level of science and technology and the development of information technology in society, blockchain technology has gradually been widely used in various industries. However, under the hot research environment of blockchain, blockchain technology is still rarely used in actual construction industry engineering projects. Therefore, by combining the main EPC project management mode of state-owned enterprises and the core characteristics of blockchain technology, this paper hopes to help enterprises overcome some shortcomings in the design of project management methods in engineering projects, so as to reduce risks and possible losses suffered by enterprises, and help enterprises successfully complete engineering construction and obtain maximum benefits.

First of all, blockchain refers to a decentralized database, which is very common in the development and application of Bitcoin. As the underlying technology of the existence of Bitcoin, it is a string of data blocks generated by associating with cryptography. Each data block contains a batch of information about the transactions of the Bitcoin network, which is used to verify the validity of the information and generate the next block. This chain data structure and the addition of cryptography are very suitable for data storage, and it is a relatively reliable and secure database.

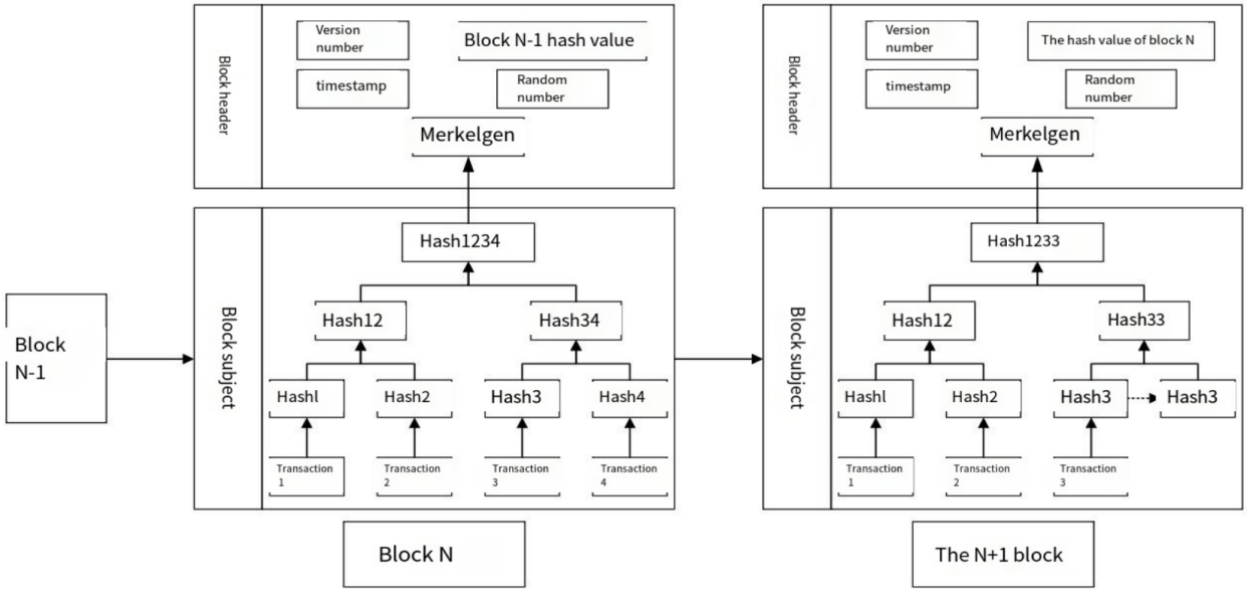

Figure 2. Principles of blockchain technology

Therefore, in the engineering construction project management, we can also boldly join the blockchain technology, such as on the basis of EPC+PPP mode, the use of blockchain technology to help the bidding management, so as to improve the bidding system query function and storage scale. At the same time, we can also apply it to the data sharing plate, combined with BIM technology, safe storage of engineering information, to prevent the occurrence of information troops, so as to prevent information leakage and a series of problems, to ensure the information security in the process of engineering development, to solve the credit problem of BIM in the project, Greatly make up for the EPC+PPP project management model of a short board. Third, we can improve the contracts signed in EPC mode into smart contracts. Through electronic signing, electronic approval and electronic ledger, it is convenient for project participants to confirm and modify relevant contracts in a timely manner, so as to promote the smooth progress of the project. Finally, due to the timely organic combination of blockchain technology and BIM, we can also quickly confirm the details of the project in the cloud platform, such as confirming the supplier information, ensuring the timely supply of materials, etc., to facilitate traceability and audit.

It can be seen that blockchain technology can bring huge benefits in engineering project management, and relevant construction enterprises should also pay attention to absorbing and cultivating technical talents of blockchain in their daily work, improve the utilization rate of blockchain technology, and gradually apply blockchain technology to the entire project management from small sections. Help EPC project management mode to overcome some of its own shortcomings, can better serve the construction of the project.

5. Summary

Enterprise project management is a process of continuous evolution and improvement, from the traditional DBB mode to the EPC mode to break the information barrier, aspects of unit management; From EPC mode to EPC+PPP mode, abundant sources of funds can disperse risks and improve the positive degree of general contractor construction; Finally, when it comes to the development of information security and digital cloud platform by blockchain technology, project management has always been in a state of continuous improvement. It is hoped that in the next research process, the enterprise project management mode (EPC+ mode) can continue to correct its shortcomings under the help of blockchain and database technology, and bring greater project benefits to the construction industry and society.

References

[1] Zang Lijuan. Research on the financial management of R&D expenses of High-tech Enterprises under the integration of

industry and finance -- Based on the case study of S Company [J]. Financial Management, 2024, (07):83-85.]

[2] Li Daming. On the enterprise of construction project management [J]. Highway, 1987, (04):37-38.

[3] Xu wu. Try to talk about project management [J]. Management world, 1987, (01): 162-171 + 218. DOI: 10.19744 / j.carol carroll nki. 11-1235 / f 1987.01.014.

[4] Liang Xian-xian, Yuan Ye, Wu Bi-Chang. Optimization path of enterprise multi-project management organization based on PMO model. China Information Industry, 2024, (03):62-64.

[5] WANG Bo. Research on Innovation of Scientific Research Project Management Mode in Aerospace Enterprises [J]. Science and Technology Innovation and Application, 2024, 14(21):28-31. DOI:10.19981/j.CN23-1581/G3.2024.21.007.

[6] Chen Xin-Yun. Research on the strategy of strengthening project investment risk management in State-owned enterprises [J]. Vitality, 2024, (13):130-132.

[7] Wang P. Typical case analysis of EPC mode of railway construction project -- taking the main Data center project of National Railway Group as an example [J]. Engineering economy, 2021, 31 (08): 5-8. DOI: 10.19298 / j.carol carroll nki. 1672-2442.202108005.

[8] Rao X. Research on Influencing factors of blockchain application to information management in construction phase of construction engineering [D]. Chongqing jiaotong university, 2024. DOI: 10.27671 /, dc nki. GCJTC. 2024.000070.

[9] LI Chenbo, Zhang Xiaotao, Qu Jiaxin. Block chain technology application in construction engineering project management [J]. Value engineering, the lancet, 2024 (01): 128-130. The DOI: 10.3969 / j.i SSN. 1006-4311.2024.01.041.