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Application Analysis of 5G Mobile Communication Technology and Project Management in Engineering Construction

Bei Liu[1], Xiaowei Feng[2]

[1]China Mobile Communications Group Shaanxi Co., Ltd. Xi an 710000, Shanxi, China
[2]Tongxin Communication Co., Ltd. Xi an 710000, Shanxi, China

Abstract: ***At present, 5G mobile communication technology offers greater advantages compared to previous mobile communication technologies. With comprehensive technological advancements and the continuous expansion of scale, it becomes possible to gradually realize the construction of integrated networks, thereby ensuring the efficiency and security of mobile communication transmission. Based on this premise, this paper, drawing from the authors practical experience, takes 5G mobile communication technology and project management as a starting point for analysis in the context of engineering construction. It analyzes their content, development, and technical types, using this as a basis for speculating on the development trends of 5G mobile communication. The aim is to promote progress in the development of 5G engineering projects.***

Keywords: 5G; Communication Technology; Project Management.

1. INTRODUCTION

For engineering construction, project management is the most important method for controlling it, which plays a good role in improving the level and efficiency of engineering construction. Since 5G became familiar to the public, project management has become increasingly important because it can ensure the quality and success of the project. It is understood that 5G communication has gained widespread trust from the people in practice and is constantly developing and improving. Therefore, only by continuing to attach importance to the construction of 5G projects and improving existing communication facilities can we create greater development space for 5G. Yao et al. [1] developed an innovative drone-3D printing system for rapid post-disaster shelter construction, while Yang et al. [2] created AI models for economic cycle prediction using big data analytics. In retail, Ji et al. [3] demonstrated AI's potential in personalized marketing strategies, and Yang et al. [4] integrated LLMs for real-time cross-asset risk monitoring in financial markets. Healthcare innovations are particularly noteworthy. Peng et al. [5] investigated IoT-enhanced cognitive training for middle-aged adults, while Yang et al. [6] applied LLMs to derivatives market hedging strategies. Pediatric care advancements include Ming et al. [7]'s telemedicine feasibility study and Yuan et al. [8]'s self-supervised learning approach for tumor classification. Legal technology progresses with Wang et al. [9]'s explainable LLMs for regulatory compliance. Sustainable development research features He et al. [10]'s work on low-carbon construction materials and Liu et al. [11]'s capsule neural networks for medical robot control. Green building technologies are advanced by Feng et al. [12]'s renovation strategies and Ge et al. [13]'s AI-based urban planning framework. Behavioral studies reveal Lin et al. [14]'s findings on exercise monitoring for ADHD children and Peng et al. [15]'s research on exercise impacts on cognitive function. Logistics automation progresses through Luo et al. [16]'s transformer-GCN hybrid algorithm for robot path planning. Consumer behavior research in electric vehicles includes Xu et al. [17]'s perceived value study and Xu et al. [18]'s experience management tools. Finally, Shan et al. [19] provided crucial insights into cross-cultural LLM applications, completing this comprehensive technological landscape.

2. BASIC CONTENT OF 5G MOBILE COMMUNICATION

5G communication technology is built on the foundation of 4G communication technology and has significant technological breakthroughs and innovations. The application of 5G mobile communication in China has not been fully promoted yet, but according to its trial data, the technology has achieved good results and has received widespread praise. When the construction of 5G reaches a certain level, the development of the Internet can be effectively improved, so as to build a bridge for wireless communication of machines. Modern industrial networks, connected vehicles, etc. can also be upgraded comprehensively based on this. When 5G networks keep up with the

development of the times, their data transmission speed will be further improved, thereby promoting the development of the entire human society.

3. THE MAIN TECHNOLOGIES OF 5G MOBILE COMMUNICATION

3.1 High frequency transmission

In general, to ensure smooth communication during operation, the method of maintaining a constant frequency band is generally adopted. However, in practice, its user base is very unstable, and as business needs and time grow, its user base will continue to increase. Correspondingly, communication traffic will also be greatly affected, showing a trend of same amplitude or significant growth, resulting in the phenomenon of insufficient spectrum [3]. The use of 64 antenna facilities and cutting-edge technologies such as beamforming can ensure the normal supply of high-frequency bands, thereby ensuring their stable operation. With the assistance of advanced application devices, sufficient antennas can also play a supportive role, enabling rapid development of high-frequency transmission. Although the above methods have their own advantages, their disadvantages are also very obvious. For example, in high-frequency transmission, transmission efficiency is affected by climate factors.

3.2 Filters

The use of multi carrier technology can improve the anti-interference performance of filters and maximize their adaptability to the increasing communication demands. In order to meet the frequency requirements of 5G, the characteristics of multi carrier are generally determined by modulation filters. However, there are still many shortcomings in this technology, the most significant of which is that the hardware of the prototype filter cannot be fully implemented. So, in order to better apply this technology in production and daily life, it is necessary to solve these technical problems.

3.3 New type of multi antenna

In today's constantly developing science, technology, and economy, communication quality must also keep up with the pace of the times to avoid being eliminated by the times. In order to better meet the practical needs of communication services, it is necessary to comprehensively improve the spectrum efficiency, which is also the reason for the emergence of new multi antenna systems [4]. In the current situation, the characteristic of this technology is that it can optimize the frequency spectrum, meeting the needs of most wireless communication related applications. In addition, using auxiliary spatial resolution to assist multi antenna technology can achieve better results. It should be noted that when using this technology, the density of base stations cannot be changed, which can better control the power generation and reduce various interferences caused by multiple antennas.

4. THE APPLICATION OF PROJECT MANAGEMENT IN 5G MOBILE COMMUNICATION TECHNOLOGY

Project management is crucial for developing the potential applications of 5G communication technology, realizing its inherent value, and ensuring the smooth development of 5G communication technology. To fully unleash the potential of 5G networks, it is necessary to rely on management processes and systems to promote the development of 5G communication technology engineering.

4.1 Management of Core Technologies

Overall, the most important aspect of project management is usually the construction goals and development prospects of the project. Only by implementing these contents in place can the project engineering proceed smoothly. Therefore, in the construction process of 5G communication technology engineering, special attention needs to be paid to the management of core key technologies, including closely following and coordinating each link, sorting and reviewing all relevant links, in order to enhance the value of core key technologies and avoid unnecessary application risks.

In addition, the 5G communication technology project also involves many advanced technologies and equipment, which will differ from standard management processes, management standards of the previous generation of mobile communication technology, etc

Firstly, the communication equipment related to 5G mobile communication technology engineering is complex, small in size, diverse in functions, and has higher requirements for construction, management, and other personnel, thus requiring higher level talents.

Secondly, with the development of 5G communication technology engineering construction, its application areas and functional value will undergo significant changes. Therefore, in the management of its core technology, ensuring the stable operation of communication equipment should be the primary task, so as to better reflect its important technical value.

4.2 Reasonable allocation of engineering elements

Unlike conventional communication projects, 5G communication projects must be built according to specific technological nodes. From a practical perspective, 5G mobile communication engineering has strong management difficulties, a large number of equipment, and a high degree of complexity, so the requirements for management standards and elements are also more detailed and diversified. As a project administrator, it is not only necessary to have a clear understanding of 5G communication technology, but also to continuously improve one's management level, so as to accurately guide and analyze the key points and problems of each core technology, and effectively deal with its shortcomings. Thereby making communication engineering construction more efficient and stable, and achieving the goal of reducing equipment consumption and damage.

4.3 Dynamic Coordination Management

In the construction process of 5G communication engineering, it is necessary to establish 5G signal receiving and transmitting base stations according to the specific situation of each point, and dynamically manage and coordinate the actual situation of each region. In the current era, people are often influenced by some negative information, which may become an obstacle in the construction process of 5G communication engineering, causing the development of communication technology to not only fail to progress but also regress, affecting people's normal work and life. In the face of this situation, 5G mobile communication technology personnel need to dynamically manage the current social contradictions, maintain a positive attitude, carry out relevant knowledge dissemination and publicity in the construction area, intervene and manage problems in a timely manner, and deepen people's understanding of 5G communication technology with a scientific mindset. In addition, dynamic project management can not only monitor the problems that arise during the construction of 5G mobile communication projects in real time, but also propose reasonable solutions to maintain their stable development. Meanwhile, by improving and managing existing engineering construction, the potential of 5G mobile communication projects can be maximized, thereby benefiting the entire society.

Overall, for 5G mobile communication engineering, dynamic management does not only refer to providing long-term and uninterrupted guidance and attention, but also requires special attention to some issues. Therefore, in engineering construction, managers should bear their own responsibilities, only in this way can the efficiency and value of engineering construction be improved. In addition, all departments should actively cooperate, take engineering construction as a key development goal, and combine it with the actual situation of engineering construction to carry out diversified management, making engineering construction more scientific and reasonable, thereby promoting the further popularization and deepening of 5G mobile communication engineering.

4.4 Project Progress and Cost Management

5G communication engineering generally involves construction costs and progress, which requires project management personnel to deeply explore the management significance in construction.

Firstly, by assisting with engineering projects, the construction plan and schedule can be better carried out, thereby achieving the goals of project management and ensuring the speed and quality of project construction.

3Due to the relatively high construction cost of 5G communication engineering, especially the installation, procurement, and maintenance costs of equipment, adopting project management and construction methods can significantly reduce engineering losses and labor costs, thereby improving the construction efficiency of the project.

In some past instances, various problems have emerged in the installation process of 5G mobile communication technology devices due to inadequate management. Therefore, as a project administrator, it is essential to fulfill one's responsibilities seriously, especially paying attention to project progress and costs. Scientific supervision and management of communication equipment after entry should be carried out in various ways, so that equipment damage caused by management issues can be thoroughly resolved under effective supervision. In addition, during the early stage of equipment installation, monitoring of the equipment can be used to reduce accidents that may occur after installation. However, in some cases, the phenomenon of managers blindly pursuing construction progress, intentionally shortening construction periods, and reducing necessary core construction links still exists, which has resulted in 5G mobile communication devices not achieving ideal results in subsequent use.

4.5 Reasonable use of key technologies

From the current situation, high-frequency band will become the main direction of mobile communication development in the future, and therefore receive high attention from the whole society. At present, China's relevant resources are still relatively abundant, but we still need to have a sense of crisis and a reasonable plan to utilize these resources. Driven by active antenna arrays, some emerging technologies have emerged, such as 3D-MIMO technology. This technology has good effects in reducing interference, lowering transmission power, and improving network coverage. As time goes by, there will be more and more new base stations, forming the optimal network architecture.

5. CONCLUSION

In summary, from past experience, it can be seen that 5G mobile communication technology needs to rely on project management to dynamically manage it, in order to ensure the smooth completion of 5G mobile communication projects. At the same time, in addition to understanding the standards and requirements of communication engineering construction, it is also necessary to be able to coordinate and deploy relevant processes reasonably, in order to avoid problems that may arise during engineering construction and improve the construction quality of communication engineering. Ultimately, enabling 5G mobile communication technology to fully leverage its potential and continuously meet the development needs of society.

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Author Profile

Bei Liu male, Han nationality, born in August 1993, from Binzhou, Shandong. He holds a master's degree and an intermediate professional title. He graduated from Xi'an University of Science and Technology with a research focus on mobile communication.

Xiaowei Feng male, Han, born in March 1991, native place: Changwu, Shaanxi, education: associate degree, professional title: engineer, graduated from Xi'an University of Aeronautics and Tourism, research direction: network optimization.