2026 International Journal of Management Science Research, Vol.9, Issue 1, (Jan)
ISSN 2536-605X
DOI: 10.53469/ijomsr.2026.01(12).03

# Policy-Driven Development and Communication Technology Integration in China's Intelligent Building Sector

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**Abstract:** ***As science and technology continue to advance, communication technology has emerged as a critical enabler in the development of intelligent building electrical systems. Its integration supports key functionalities such as automation control, energy management, safety monitoring, and data interoperability across subsystems. A proper understanding of communication technologies—including wired and wireless protocols, IoT frameworks, and network architectures—is essential for optimizing the performance, scalability, and sustainability of smart buildings. Furthermore, recognizing the symbiotic relationship between communication technology and intelligent building design is vital for fostering innovation and ensuring coherent system evolution. This paper examines the foundational and applied roles of communication technology in smart electrical systems, discusses current integration challenges, and highlights future directions for research and practice aimed at synergistic development. Emphasizing this interconnectedness not only enhances operational efficiency and user experience but also paves the way for next-generation built environments that are adaptive, secure, and energy-conscious.***

**Keywords:** Communication technology; Intelligent building; Application.

## 1. INTRODUCTION

At present, China's intelligent building sector is in a phase of sustained and rapid development, driven by national urbanization goals and the strategic promotion of digital transformation in infrastructure. To ensure the systematic and high-quality advancement of intelligent building projects, the Chinese government has introduced substantial policy support, including financial incentives, standardization frameworks, and demonstration projects under initiatives such as "New Infrastructure" and "Smart City" development plans. These policies aim to accelerate the adoption of advanced technologies, improve energy efficiency, enhance operational safety, and elevate the overall sustainability of built environments. Concurrently, significant emphasis has been placed on promoting the application of communication technologies—such as 5G, IoT, fiber optics, and wireless sensor networks—throughout the construction, operation, and maintenance phases of intelligent structures. The integration of reliable and high-speed communication systems is critical to enabling real-time data exchange, supporting automation control, facilitating predictive maintenance, and ensuring interoperability among diverse building management systems. This policy-technology synergy not only strengthens the technical foundation of intelligent buildings but also fosters innovation in smart services and long-term operational resilience. Looking forward, continued alignment between national policy frameworks and technological deployment will be essential to scaling intelligent building solutions across China and achieving broader urban intelligence objectives.

## 2. MEANING OF INTELLIGENT BUILDING

The core of smart buildings lies in the continuous development and innovative application of communication technology, making it essential to holistically consider the integration of building functions, systems, and digital infrastructure during the design and construction phases. In such projects, various communication technologies—such as the Internet of Things (IoT), 5G networks, building automation systems (BAS), and fiber-optic networks—must be cohesively merged with the architectural and functional layout of the building itself. This technological integration amplifies the advantages of smart buildings over conventional structures, particularly in terms of operational efficiency, sustainability, and user experience. Notably, smart buildings excel in resource recycling and functional adaptability. Through real-time monitoring and intelligent control of energy consumption, water usage, and indoor environmental conditions, they significantly reduce energy waste and lower associated carbon emissions. Moreover, advanced waste management systems and predictive maintenance enabled by sensor networks and data analytics further minimize the generation of construction and operational waste. By embedding sustainability into building operations, smart structures not only cater to the evolving demands of

occupants for comfort, safety, and connectivity but also contribute substantially to environmental conservation. Thus, the development of smart buildings represents a dual achievement: meeting contemporary human needs while advancing long-term ecological goals.

## 3. CHARACTERISTICS OF INTELLIGENT BUILDINGS

Intelligent buildings, also known as smart buildings, integrate advanced technologies and responsive systems to enhance operational efficiency, occupant comfort, and environmental sustainability. Their main characteristics can be categorized as follows:

### 3.1 Communication technology is the main support of intelligent building

At present, communication technology is widely used in the world, and communication technology has become a major product that cannot be absent in people's daily life. Communication technology plays an important role in the development of intelligent buildings, so the application of communication technology on a large scale in intelligent buildings has begun and some architectural results have been achieved. In the form of communication technology smart building development, people have established centralized control and unified management of the different functions of the building. Today's communication technology not only improves the management efficiency of various functions of buildings, but also unifies the management and control of building energy.

### 3.2 Communication technology is an important part of intelligent building

The progress of society cannot leave the communication of information, so people attach greater importance to the communication function of intelligent buildings. With the integration of communication technology in smart buildings, people can use and control smart buildings more conveniently, and communication technology in intelligent buildings provides people with richer information content. To achieve the purpose of social resource sharing, today's society is an information age, and social information exchange cannot leave communication technology, so efficient communication technology is the main factor that can ensure the communication function of intelligent communication buildings.

## 4. INTELLIGENT BUILDING PROJECTS AND ELECTRONIC COMMUNICATION TECHNOLOGY

### 4.1 Intelligent building project content

An intelligent building can provide a service building for users according to the user's requirements, The information system center in intelligent building is composed of information application system and facilities system, and completes the optimization of the whole combination. In intelligent buildings, the intelligent function realization of intelligent buildings is also accomplished through a series of structures, in order to ensure the reasonable wiring system, automated construction, and complete information equipment of the overall system. Under these conditions, the building The functions will also be automated, and with the continuous improvement of China's information technology and scientific and technological standards, the functions of intelligent buildings are also gradually improved. With the development of intelligent construction, traditional buildings are gradually replaced, making intelligent buildings gradually become the main trend of construction development, so China's electronic communication technology must continue to develop.

### 4.2 Contents of modern communication technologies

Other countries also refer to modern communication technology as remote communication technology, Modern communication technology in China mainly refers to telecommunications technology. With the continuous progress of current science and technology, modern communication technology is gradually maturing. China's communication mode is also continuously optimizing its development with the upgrading of technological means to allow it to be systematized and optimized in terms of content. China currently has a fairly comprehensive coverage of the development of information technology, which mainly covers scientific and technological aspects. For example, asynchronous transmission technology, comprehensive business digital network technology, access technology, broadband multimedia technology, etc., the continuous popularization of information technology of various technologies has made this form of technology rapidly develop toward scientific and intelligent

development. From the development trend of this technology, its upward space is very obvious. The integration of modern electronic communication technology and intelligent construction has a great effect on the development of China's overall construction industry, and will also promote the healthy and upward development of Chinas national economy.

### 4.3 The Connection between Communication Technology and Intelligent Building

Beginning with the construction of the world's first smart building in the United States, the entire world also saw a historic transformation of the construction industry in various countries with the advent of this building. Many countries have begun to include intelligent design in the construction process, making traditional construction projects move towards an intelligent direction, which is also the development trend of the construction industry for a long time to come. In this large-scale development, smart building has become a professional research discipline, and the key factors of smart building success, including systems, are identified from most smart building success cases. Management, service, integration and the related design of various elements should focus on analyzing project investment when carrying out smart building design, not only to ensure the scientific nature of the investment, but also to ensure that the project is comfortable, safe, efficient and convenient to meet people's living needs. With the continuous development and optimization of the current intelligent construction industry, it has become a common phenomenon to incorporate more emerging technologies in architectural design. Communication, control, computers and other technologies are integrated in buildings. Communication technology is a type of information technology. This technology is the main tool for completing all kinds of information transmission, and the integration of communication technology in intelligent buildings, such as computers, the Internet, data, information, telephone, and other technologies, can strengthen the close connection between technology and communication technology, thereby safeguarding the high demands of current society for communication technology. Therefore, in the intelligent building industry, communication technology needs to be utilized to further improve the development of intelligent buildings.

## 5. PRACTICAL APPLICATION OF COMMUNICATION TECHNOLOGY IN INTELLIGENT BUILDINGS

### 5.1 Application of communication technology to information facility systems

Modern intelligent information facility systems play a crucial role in the construction of intelligent buildings as well as in their daily operation. It is an important prerequisite for achieving intelligent building informatization management and intelligent communication, and also the main means to improve the level of intelligent building modern information management. Early intelligent information facility systems, in their construction and application, simply utilized computer central control and discrete control systems to interact with each other to effectively control the normal operation of intelligent equipment. With the development of society and technology, modern intelligent information technology has been widely used in various industries, especially in the construction of intelligent buildings and the operation of information system. The information facility under the traditional model is a simple call system, and in the actual application process, the basic communication method is used, with analog communication as the mainstay. With the continuous development of computer control systems, modern intelligent information control technology is gradually applied to all types of intelligent buildings. In order to improve the intelligent level of the building and enhance the personalized and intelligent experience of people, it is necessary to use the internet, speech recognition and data communication to complete the normal operation of the information facilities.

### 5.2 Application of Communication Technology in Building Automation System

The building self-control system has a strong complexity and systemic nature, including air conditioning unit control system, freezing station system, heat exchange system, public lighting system, etc. Its working nature is strong electric drive. Under normal circumstances, the power equipment within the relevant system is of an open working nature, and timely data cannot be obtained on the operation and energy consumption status of the equipment, which will cause a large amount of energy loss and waste during the operation of the equipment. The state in service and energy consumption of electrical equipment in the building can be monitored in real time by using modern communication technologies. To test the electrical equipment, through the line back to the control room of the central computer, by the relevant information system analysis of the results, and then return to the equipment terminal to achieve regulation, and this process is completed smoothly and efficiently with the help of modern communication technology to help intelligent building to achieve energy saving.

### 5.3 Application of Communication Technology in Intelligent Building Information System Integration

The intelligent integration process of various subsystems in an intelligent system is to utilize comprehensive information resource sharing to improve work efficiency and work quality. Comprehensive wiring system, computer network system, and digital automation system are important parts of the intelligent system. In the process of intelligent system integration, if the wiring is not reasonable, it will cause the various subsystems to fail to play their important role. It is also impossible to form a good system among the various subsystems. In order to ensure that the various subsidiaries can operate efficiently, coordinated and unified, and to improve the overall intelligent level, it is necessary to optimize the subsystems to ensure the integration of intelligent systems. In practical terms, the main features of system integration include the following.

First, smart buildings include security, office automation and other aspects，When multiple subsystems carry out structural wiring work, it is necessary to ensure that the various subsystem interfaces can form a unified and coordinated working form, and realize the integration of intelligent technology on the basis of multi-interface, multi-device, multi-protocol, and multi-technology communication systems. Ensure that the hardware and software between the subsystems are effectively connected.

Second, smart buildings are developed on the basis of modern building technology, automation technology, communication technology and computer technology. The latest parts of these technologies are integrated into smart buildings, and there is a cross-cutting and coordinating role between different technologies. The differences between different systems should be fully considered when implementing system integration.

Thirdly, when the integrated planning is realized in each subsystem, it is necessary to ensure the smooth data and information channel, so as to realize the coordination and control among the subsystems。 It is necessary to combine the characteristics of the equipment and the differences of the system software in the design process to ensure that the application software in the system management and organization to achieve mutual cooperation. Only after the various subsystems form a strong integrated system can the integrated system have good properties, and the subsystems must fully integrate the relevant standards implementation to connect with each other during the integration process. The features of the integrated system have a direct impact on the performance and intelligence of the overall smart building. Therefore, when completion of subsystem optimization and integration, it is necessary to take the intelligent level of the intelligent building as the core and standard.

In a word, information system integration is to integrate information system through modern information technology and communication technology. Based on the various subsystems in the intelligent building, an integrated plan for image, monitoring, signal, data, voice and other aspects is formed, and a structured comprehensive wiring is used as a bridge to achieve effective connectivity between various communication signals.

### 5.4 Application of Intelligent Technology in Automatic Control of Building Electrification

Intelligent technology has played a very important role in building electrification control, effectively improved the safety performance of building electrical equipment, and significantly reduced the probability of accidents occurring in building electrical devices. The application of intelligent technology in building electrical technology mainly manifests itself in the management and control system set up inside electrical equipment, which effectively ensures the safety and reliability of building electrical equipment. In the process of management and control of electric construction, it is necessary to use GPS positioning technology, precision sensing technology and computer processing technology.

(1) The use of GPS positioning technology. The use of the GPS technology in the building electrical management system can improve the accurate positioning of electrical equipment by the control system, which is the basic guarantee for controlling operations of the control system;

(2) The application of precision sensing technology can improve the effectiveness and accuracy of building electrical information, which is the key to ensuring that the control system accurately collects electrical equipment information data, and the application of Precision Sensing technology is complementary to GPS technology.

(3) The use of computer processing technology must be based on precision sensing technology and GPS technology, effectively realizing the comparison and analysis of data of construction and construction of electrical equipment, and realizing the function of problem investigation.

The application of these three technologies is the basis for the automated control of building electrical, effectively guaranteeing the safety and reliability of building electricity, and significantly reducing the probability of unexpected events.

### 5.5 Application of Intelligent Technology in Fault Detection and Analysis of Building Electrical Engineering

Intelligent technology plays a basic role in building electrical automation, and it also plays an important role in building electric engineering fault detection and analysis, with the role of timely predictive analysis. In order to keep the electric equipment in normal state in service, it is necessary to carry out real-time troubleshooting for the electric equipment. The traditional fault checking method has the characteristics of complex procedures, low efficiency and low accuracy, and is only suitable for traditional management methods. Building electrical equipment that is automated through intelligent technology can also rely on intelligent technology to improve the monitoring management system.

At present, the results of intelligent technology in this field are mainly expressed in intelligent monitoring technology, which realizes intelligent failure prediction analysis of building electrical equipment. The technology mainly combines expert system, neural network and fuzzy system to realize real-time fault detection and troubleshooting for key equipment and complex circuit system. The implementation of intelligent fault detection and analysis provides scientific and effective data for technicians to repair, effectively improving the efficiency of building electrical equipment maintenance work.

## 6. KEY POINTS OF APPLICATION OF COMMUNICATION TECHNOLOGY IN INTELLIGENT BUILDING

Communication technology is widely used in smart buildings, and technicians need to clarify the main points of application. In order to improve the application effect of communication technology, play its important advantages, in intelligent building projects, we can strengthen the training of technical personnel, improve the maintenance of communications equipment to ensure the stability of communication systems. Qualcomm.

The application of communication technology in all aspects of intelligent construction requires higher professional skills, work experience and comprehensive quality of designers and construction personnel. To realize the advantages of the application of communication technologies, it is necessary to strengthen the training of relevant personnel. This allows designers to clarify the application points, difficulties and priorities of communication technology in intelligent buildings, improve the rationality, practicality and science of the design plan, and lay the foundation for the construction of intelligent systems and automatic control systems in the future. The comprehensive abilities of technicians can be tested through pre-service training and evaluation. For some difficult coefficient, high requirements for quality of the design and construction links, must require technical personnel certification posts, in order to avoid lack of professional skills lead to building intelligence, reduce customer satisfaction.

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