IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ANALYSIS ON BUILDING INTELLIGENT SYSTEM PROJECTS WITH THE USE OF CONSTRUCTION PROJECT MANAGEMNT THEORY

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ABSTRACT

Equipment management information systems have made it easier for large contractors to manage their construction equipment. Data mining approaches have made significant progress in the current IT environment, allowing data mining activities to serve as knowledge discovery and decision-support tools. Using computer networks, communication networks and automation technology, intelligent building makes a building more stable and attractive. An Intelligent Building Management System is the primary goal of system integration in a smart building. For efficient operation, this system's design allows it to incorporate hardware devices and other systems, as well as to coordinate with any object those accesses this system for easy integration. It is the result of the use of computer technology in the building industry that intelligent buildings are sustainable, friendly to people, and in harmony with the environment.

1. INTRODUCTION

Construction equipment management strives to enhance the value of a company's construction equipment assets and to meet the equipment requirements of its major contractors in a timely and cost-effective manner. Large contractors typically have a fleet of hundreds or even thousands of heavy equipment. If you're in charge of purchasing and maintaining the equipment you'll be working with, as well as allocating resources and making operational and disposal decisions, you should take your responsibilities extremely seriously. A construction equipment manager and his or her team are in charge of making most of the choices. Efficient collection of operational data and inventory tracking are now made possible by construction equipment management information systems and enterprise resource planning systems. Construction equipment data management is a fantastic illustration of this new technology. We can collect and store a lot of data on the condition of equipment using onboard computer control, wireless network or GPS or even mobile devices and scanning devices. A contractor who has access to a comprehensive set of equipment data can keep meticulous records of the activities related to his equipment fleet. Data repositories can be valuable, but only if the data are evaluated and turned into usable information and knowledge.

1.1 Background of the Study

People's knowledge of information technology and their desire for information have grown as a result of the rapid advancement of modern communication and computer technologies. In other words, they demand more than simply space and comfort from modern architecture; they also need efficiency, ease, safety, and the ability to communicate easily. Firms and the market economy may be able to meet if knowledge can be shared. These conditions allow Building Intelligence System to emerge and flourish quickly. While project management is not uncommon, certain of its intrinsic traits, such as intelligent buildings, are present in every instance of it. Developing intelligent building engineering is a complex technical process that includes elements of current control and information engineering as well as the electrical engineering of traditional buildings. In the beginning, the intelligent building project must be synchronised with the overall construction project. As a second step, the building's structure and other building systems are linked to the intelligent system. The project and other projects are intertwined. (Wang.W.X,2012) Collaboration and communication are essential because the project is so wide-ranging. As a product of high-tech industries, intelligent building has a strong comprehensiveness. There are numerous disciplines involved in its design, from system integration to control theory to acoustics to computer science and electronics. This shows that it has high-tech features and a wide range of difficult goal characteristics.

2. LITERATURE REVIEW

D. Minoli, 2017, The use of nonrenewable energy, greenhouse gas emissions, and electricity in industrialised countries account for more than 40% of nonrenewable energy usage. For heating, cooling, lighting, and electrical appliances, buildings require more energy than transportation or industry combined. Renewable and carbon-free energy is mandated by law in these nations by the year 2025. A major investment in smart grid technologies is being made in order to reduce the overall cost of energy. Technology that reduces energy use and improves network efficiency may be able to better manage renewable energy production.

Zhou et al. Present a case study on the use of Big Data to improve energy efficiency. Research on energy-related big data begins with an examination of the sources and characteristics of the smart grid before an in-depth examination of Big Data analytics is conducted for smart energy management.

Atnonopoulus et al. For energy demand response (DR) applications, present an overview of the work done by AI-based EMS. Using both AI/ML techniques and energy applications, the papers are categorised.

Kumari et al. Research on blockchain (BC) and AI-based energy management systems will be presented in this paper P2P energy trading is enhanced by merging BC and AI, which are studied in detail in this paper. These researchers focus on projects that use AI-based techniques to support a variety of services, such as energy load prediction, consumer classification, and secure energy management based on the immutability of data and a trust mechanism.

Carnemolla, P. 2018, A smart building system that is practical, user-friendly, and humanised is the ultimate goal of human–computer interaction. As a result, the stage of smart building system design that considers user interaction is critical. Many new smart building technologies have emerged as a result of the rapid expansion of smart buildings. "Interactive experience design that takes into account the user's emotional response is becoming increasingly popular." In Europe, the United States, and Japan, a variety of interactive experience-related technologies have been approved and vigorously marketed.

3. SYSTEM ARCHITECTURE FOR INTELLIGENT CONSTRUCTION EQUIPMENT MANAGEMENT

As a result of incorporating knowledge into the existing IT environment, intelligent software for construction equipment management can automate or facilitate the decision-making process.

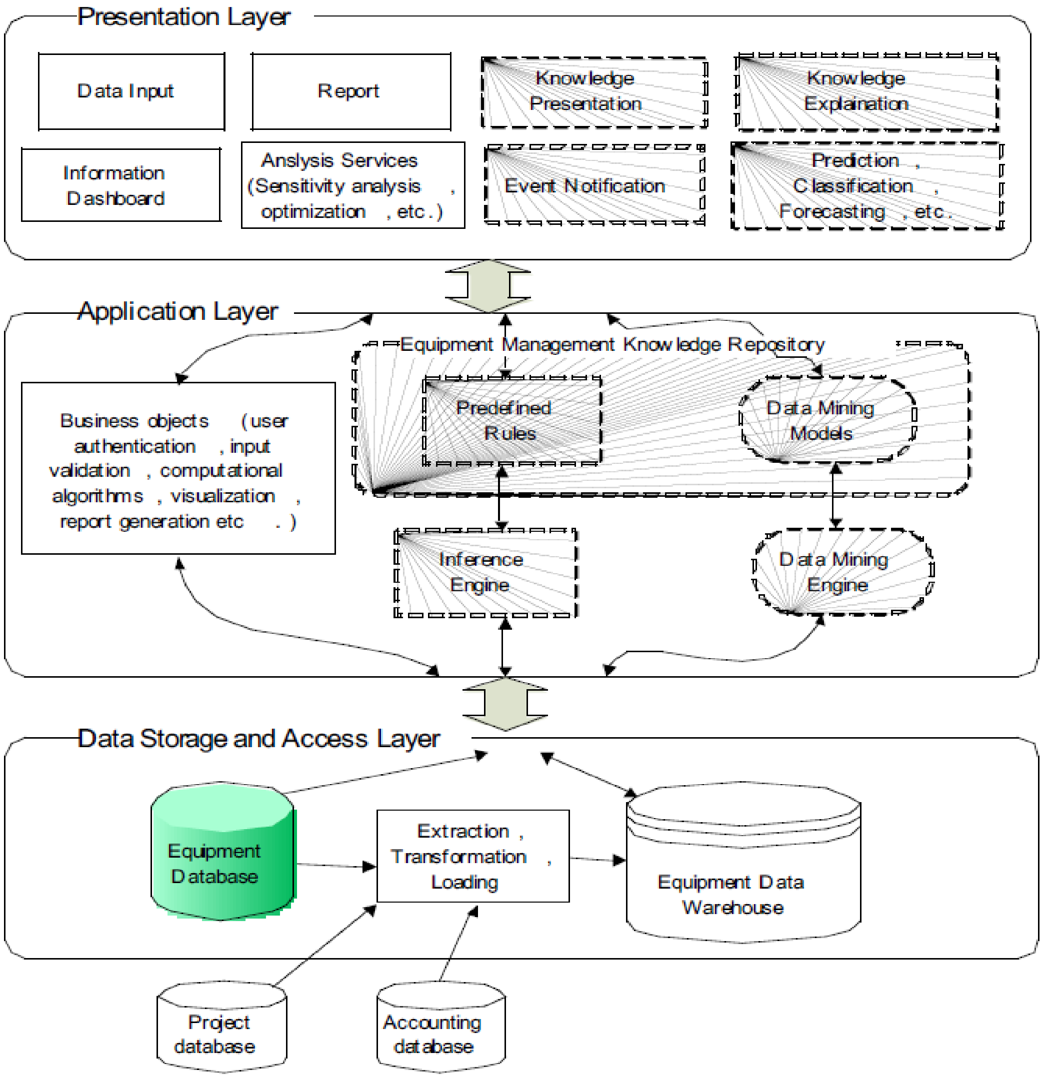

Figure 1. The design of a system for intelligent equipment control

As depicted in Figure 1, an intelligent equipment management system has a three-layer design and incorporates data mining models as a new knowledge category. After incorporating data mining modules, there have been major alterations to the current IT infrastructure, as described below:

(1) Presentation layer: Transparent data mining models enhance user experiences while making decisions. Those in charge of making decisions are presented with newly obtained visual knowledge that they can evaluate for its interest and utility. It is possible to classify, predict, forecast, and so on with the newly discovered knowledge that has been proven to be effective.

(2) Application layer: Knowledge gathered from data mining can be discovered and presented in many ways by using the engine's data mining capabilities. Using data mining methods, new knowledge is represented in the knowledge base.

(3) Data storage and access layer: An equipment database is often the major source of information in a project or accounting database. Field data and other manual records typically contain noisy data that must be cleaned up and validated. For example, internal validation procedures such as format and domain

integrity checks and enforced pattern updates ensure high-quality data in equipment information systems (Eis). Extract, transform, filter, and clean up data before feeding it into a data mining model can all be designed as automated system processes. An equipment data warehouse is strongly recommended in order to improve data quality and discoverable structures. A data warehouse for equipment gathers and organises data from a variety of disparate sources into a single repository, making it easier to analyse. With the use of equipment data warehouses, decision makers can acquire knowledge from a variety of views and at different levels of granularity under numerous business themes.

3.1 Intelligent building features

The following are some of the advantages of intelligent buildings:

3.1.1 It has a strong intelligent function.

The most fundamental difference between an intelligent building and a conventional building is the intelligent function of an intelligent building. Automation in the workplace, communication, and construction equipment are all examples of its intelligence. Using user-side phones to control humidity and temperature setpoints, the building management system and office automation system can alert the regional network of personal comm when the test value of the confirmation of energy use and equipment operating conditions is met using humidity and temperature values of the user-side phones for change control. Air conditioning systems and other systems for managing space reservations can be linked along with conference rooms through this method.

3.1.2 The rapid development and large capacity content

High-tech equipment such as multimedia computers and broadband integrated services data networks (B-ISDN) have been incorporated into 3A systems as a result of the rapid rise in intelligent buildings and their enormous capacity,

3.1.3 Great flexibility

There are two ways to see this. In an intelligent building, for starters, the ability to respond quickly to change is a given. Open floor plans with a living area (divider), an active floor with stations, and a large room that can be partitioned into cubicles are possible. It is possible to change the building's layout and the partition wall's position by simply reassembling the floor. As a second benefit, the pipeline design is flexible and can adapt to a variety of conditions such as tenant replacement, a shift in the mode of use, a relocation of equipment, or an improvement in performance. For example, a variety of energy-saving optimization control procedures as well as control of the baking value is all examples of how air conditioning systems use these techniques.

3.1.4 High energy efficiency and the ability to run in the most economical and reliable state

Air conditioning systems use various energy-saving strategies, including as baking controls, the best start-stop controls and setting value automated controls, to reduce the building's energy consumption dramatically. This results in large financial savings.

3.1.5 Benefits of intelligent building (I.B.)

1. Less time for preparation.
2. Faster installation.
3. Comfortable and efficient use of energy.
4. Increased safety and security for people, data, and construction processes.
5. Customers are able to focus on their primary business because of this.
6. Reduced costs of operations.
7. Improved infrastructure reliability.
8. Higher efficiency.
9. Improved investment security for the course of the building's lifespan.
10. Maximize performance by minimising project risk.

4. RESEARCH DESIGN

4.1 Intelligent Building

As a complex software system that can be used to manage various weak subsystems and monitor and control them as well as integrate and integrate the system, NMS should strive for openness and allow different interfaces between subsystems, products, and protocols so that the system can achieve interoperability and the integration of the system. Centralized network management is required to ensure maximum reliability, flexibility, and scalability by connecting to the server and the spinal cord of each division via a main backbone (COLLAPSED) technology and the central point of intelligent construction for all data in the network.

Design centre switches and routers can be hot-swapped for increased reliability. System design for networks must account for future growth in network size and technology in order to remain relevant over the long term. The necessary communication bandwidth is required for each of the system bandwidth levels. Virtual organisation and implementation management must be based on interconnected information systems. A project contract system based on an integrated information network is established to ensure that the correct flow and consistency of project information is maintained by effectively controlling the project's organisational structure through an integrated and effective management information system. Building intelligent systems engineering projects will be supported throughout their full life cycle by a virtual organisational structure and integrated information systems based on integrated management.

New network application models are needed to ensure that each user's community has absolute privacy, which is to ensure each user has their own cell-based secure network mechanisms from the physical network hardware system platform, based on the security requirements of the community network system. Switches configured for VCN 10/100M are found in the aggregation layer. That's an important point to bring up: Due to the fact that this current VCN10 / 100 M switch does not support the next generation of VCN switch, it is necessary to use a fibre optic transceiver with VCN10 / 100 M switch-related equipment that has an expansion slot. IBMS's general layout is depicted in Figure 2.

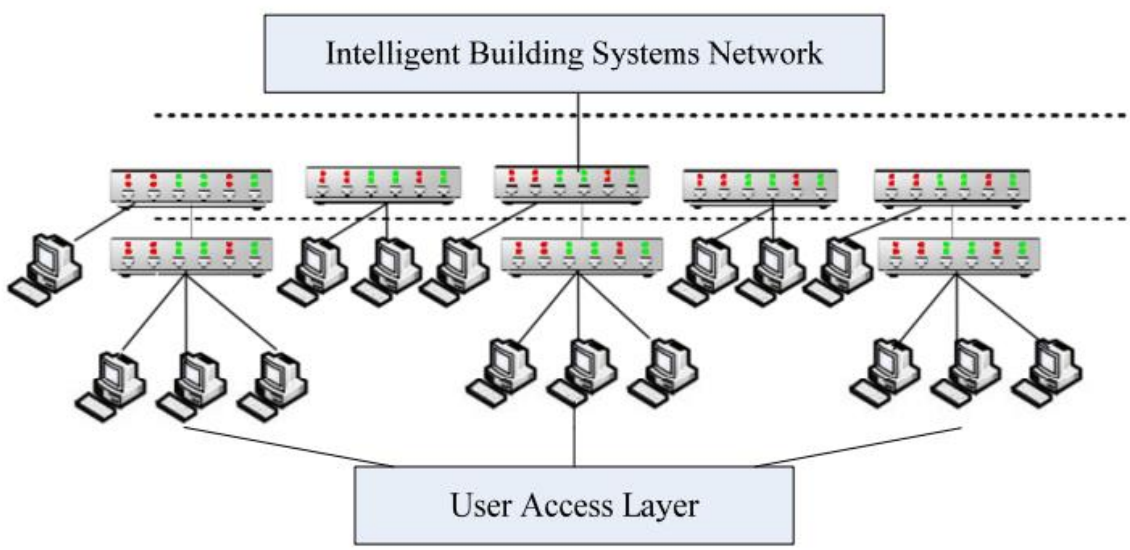

Figure 2 : The overall design of IBMS

5. METHDOLOGY

5.1 The main technical

For process management and manufacturing automation, OPC is a standard collection of interfaces, properties, and procedures. Microsoft technologies such as OLE (Object Linking and Embedding technology) and Component Object Mode (COM) make up OPC. Using a plug-and-play OPC client/server architecture is an option. Field devices are connected to OPC servers via a standard interface that allows any data from the field to be sent to the OPC server; while OPC servers provide a standard interface to the upper application, allowing an OPC client programme to use OPC server data for upwards of interconnection.

New Web services are built on top of existing Web technologies, such as HTTP and the Internet, by defining new standards and protocols. Soap, WSDL (Web Services Description Language), and UDDI are some of the most commonly used protocols and standards on the web (Universal Description, Discovery and Integration). SOAP is the backbone of Web services because it provides a mechanism for encapsulating and delivering messages. No matter what platform you use, the application will work because it uses the Soap programming language. There is no language or transport protocol requirement for SOAP, and it is not tied to distributed object infrastructure responsibilities. It makes advantage of industry standards and has now achieved cross-environment interoperability.

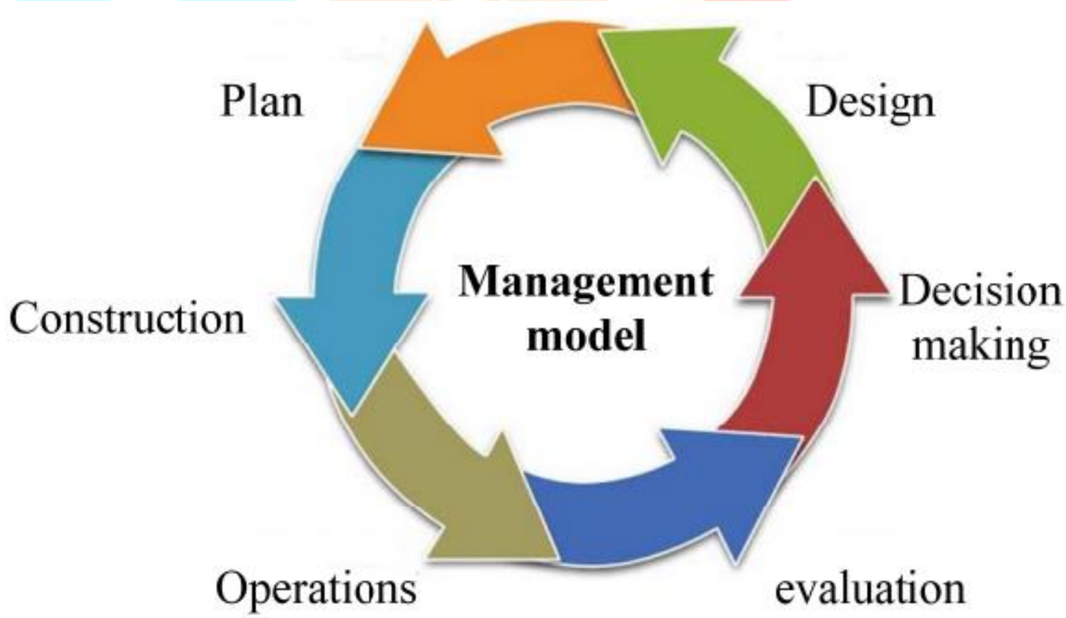

Figure 3: The management model analysis of IBMS

In order for the management of intelligent building systems integration projects to become systematic, the organization's non-static control and flexibility management must be achieved. Project management can be greatly improved through the use of virtual organisations with specialised areas that can quickly integrate external resources to achieve synergies, complete the project with a very clear mission, and cost structure and mobility advantages. IBMS's management model analysis is shown in Fig. 3.

Each room in the intelligent building systems engineering project differs significantly in terms of type, size, and complexity. According to the theory presented in this paper, the life cycle of an intelligent building systems engineering project can be divided into five stages, each of which includes integration tasks and implementation time. The stages are shown below, with their primary substance explained. As a means of ensuring that the parties' information is timely integrated into an information system that allows managers to make more scientific decisions, the major body of professional knowledge management should be put into full action Integration of information systems is an essential part of network virtual organizational structure in order to take advantage of the benefits of integrated management.

CONCLUSION

It is possible to construct a facility that is safe, healthy, and comfortable for its occupants by combining technology and process in an intelligent structure. To the advantage of present and future generations it can also demonstrate environmental sustainability. The number of intelligent gadgets in the structure is steadily increasing with the advancement of society. IB's functions and properties are examined in detail, as are its fundamental components, as well as the technological system that underpins them, in this study. The use of IT in IB and the consequences of such use are also discussed. Thus, this thesis develops two key function platforms, one for data collecting and the other for business operations, in order to achieve its final goal of providing users with more precise construction management capabilities: the collection system and the business system. To make intelligent building system integration a subject of research, the rapid development of modern information technology, as well as suitable conditions for depending on information technology to promote constructing the corresponding upgrading full function, have emerged.

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