

Intelligent Building System: A Panacea to the Challenges of Energy Crisis for Sustainable Industrial Development in Nigeria

Ibrahim Dauda
Industrial and Technology Education Department,
Federal University of Technology Minna

Abstract

The importance of energy in the sustenance of economic activities and their contributions to sustainable industrial development and standard of living cannot be over-emphasized for any nation. The potential to energy savings is substantial in three most consuming sector of the economic namely household, industries and transportation. This paper examined Intelligent Building System and the potential within Intelligent Building System to energy conservation and the surrounding technology. The paper also examined the need for intelligent building system and how to bridge the gap between present building construction method and intelligent building construction system.

Introduction

Energy is an essential ingredient for socio-economic development and economic growth of any nation (Sambo 2003). One of the most effective ways to save energy is to improve operation and maintenance in building construction industries. The potential for energy savings is substantial in the three most energy consuming sectors of the economy namely household, Industries and Transportation. In smart buildings, intelligent management and control solutions include the convergence of building and energy management with security, fire and life safety, communication system, IT server rooms, machine automation, and vertical specific applications to create a highly adaptable, sustainable, and cost-effective building. Today, energy management remains a passive activity in many instances, restraining the large scale engagement of intelligent building solution. In many buildings, it is possible to save large percent of energy usage by changes in operation and maintenance. The type of building system that will maximize energy crisis for sustainable industrial development in Nigeria can be attributed to Intelligent Building System. Intelligent building system can be described as that system of construction that maximizes the efficiency of its occupants and allow effective management of energy resources with minimum life cost (Gary 2003). The origin of intelligent buildings and building management system have root in the industrial sector in the 1970's from the system and control used to automate production processes and optimize plant performances. Donald, Coggan & Ingemen (2006), noted that the potential within intelligent building system and the surrounding technology is vast because our lives are changing from the effects of intelligent building

development on our living and working environment. Nigeria is looking forward to be among the 20th most developed nation by the year 2020. To achieve this vision, new approaches to controlling energy consumption (crisis) must be put in place. The potential within intelligent building system and the impact on facilities planning and management can be a way of achieving this vision and the challenges to energy crisis.

The high technology concept of intelligent building system was first introduced in the United States in the early 1980's. Although no formal definition exists as at then. Intelligent building system uses electronic extensively and are high technology related (Degw & Eibg, 2008). In fact, the National academy of science in Washington D. C. has a committee dealing with "electronically- enhanced" building in United States (US), China, Japan and other developed nations uses Intelligence building system as one of the focal point.

Concepts of Intelligent Building Systems

Intelligent building system according to Degw, (2005) is that type of building that is more responsive to user's needs and has the ability to adapt to new technology or changes in the organizational structures. In the same vein, Eibg (2005) sees intelligent building system as one that maximizes the efficiency of its occupants and allow effective management of resources with minimum life costs. According to them, intelligent building system uses electronic extensively which are highly technologies related. The field of intelligent building encompasses an enormous variety of technology across commercial, industrial, institutional and domestic building including energy management system and building controls.

Components and elements of Intelligent Building System

Degw & Eibg, (2008) categorized the components of intelligent building system into two:
- Active and Passive components.

Active components: - are those components in the building system which includes; file server, hub equipments routers, switches, printers. Building management systems outstation and controller, card readers, building sensors/cameras among others.

Passive components: - are those components such as main distribution frames, intermediate distribution frames, riser cable/backbone, patch panel, patch cords, horizontal cabling, floor/ceiling boxes fly leads among others. According to Degw (2005) flexible power plant

distribution and telecom networks among other things are elements that make up an integrated or intelligent building system. In recognition of the electronic aspect of the intelligent building system, Coggan (2006) explained that four operations are involved in intelligent building system. These include; energy efficiency, life safety system, telecommunication system and work place automation.

Energy Efficiency: - this consists of the reduction of energy use to the barest minimum. According to Coggan, computerized system are used extensively such as building automation system (BAS), energy management system (EMS), central control and monitoring system (CCMS) and facilities management system (FMS). These systems according to Gary are strategized to reduced energy consumption in intelligent building system through the use of programmed start/stop, optimal start/stops, duty cycling, set point reset, electric demand limiting, adaptive controls, chiller optimization, boiler optimization and optimal energy sourcing among others.

Life Safety System: - which consist of the use of high technology to maximize the performance of fire alarm and security systems while at the same time minimize cost. This system can be controlled through the use of reduced manpower dependence, closed-circuit television, card access control, smoke detection, instruction alarms and emergency control of elevators among others.

Telecommunication System: - this system consists of offering to tenant many sophisticated telecommunication features at a considerably reduced cost due to the fact that the equipment is shared by many users. Some of the telecom features according to him includes telephone system, cable vision, video text and electronic mail among others.

Workplace Automation:- this consist of the use of high-technology office automation system to render the operation of a company more efficient, which can be done at a reduced cost to tenants by virtues of the equipment being shared. Some of the factors involved in workplace automation in intelligent building system are centralized data processing, work processing, computer aided design and information service among others.

Purpose of Intelligent Building System

*The importance of intelligent building system is to control, monitor and optimize building services for examples; lighting, heating, security, alarm system, access control, audio-

visual and entertainment system, ventilation, filtration and climate control (Gary 2003). According to Gary, the use of Intelligent Building System allows the optimization of various site and building services, often yielding significant cost reduction and large energy savings.

*Intelligent Building System contributes directly to the reduction in energy use in commercial, industrial, institutional and domestic residential sectors (Barmilouve 2006). According to him, intelligent building system that suitably applied building management systems are good for the environment, legislation and environmental standard, health and safety regulations and global trends towards improving indoor air quality standard.

*Intelligent Building System is clearly the building of the future (Jenk 2002). According to him, such buildings can be leased up more easily and at higher rates too by virtue of the services offered.

*Intelligent buildings owners will gain often at the expense of other building owner because, it provides system that makes sense and offers a reasonable return on the investments. It is a respected building system for the industries because of its ability to accurately evaluate a customer's needs.

Typical Services of Intelligent Building System

The typical services of Intelligent Building system are as follows; message center, word processing, teleconferencing, computer services and electronic mail.

Message Center: - the message center is a back-up telephone switchboard for tenants. It answers all tenants' telephone and is connected to printer conveniently located in or near the office of the tenants for immediate delivery of messages. When a telephone line is busy or doesn't answer after four rings, the message center answer the call automatically. The terminal in the center displays the name of the person whose phone is ringing so that the operator can answer the call cautiously and accurately. The caller's company telephone number, brief message, time of call and the operator's name are then recorded and immediately printed in the recipient's office.

Word Processing:- this system includes the electronic creation, revision storage, retrieval and transmission of correspondence documents with pick-up and delivery service, 24hours document turn around during business hours and premium one-hour turn around a word processing service and offer convenience and economy.

References

- Barmilouve, Q. (2006) intelligent building design, smart homes and building management system technology: Retrieved on internet 23/7/2008 at <http://www.businessballs.com/intelligent-buildings-design.htm>
- Coggan, S. (2006) intelligent building system: Retrieved on the internet on the 2/7/2008 at <http://www.coggan.com/intelligent-building-systems.html>
- Degw, O. (2005) Integrated or Intelligent building system: Retrieved on the 2/7/2008 at <http://website.lineone.net/brain-flude/page-4.htm>
- Donald, A. Ingemen, P., Coggan, S. (2006) Engineer Mastering internet business cash flow. (www.coggan.com)
- Eibg, R. (2005) Integrated or Intelligent building system: Retrieved on the 2/7/2008 at <http://website.lineone.net/brain-flude/page-4.htm>
- Gary, M. (2003) Intelligent building design and building management system: Retrieved on the internet on 23/7/2008 at <http://www.businessballs.com/intelligent-building-design.htm>
- Jenk, P. (2002) Truswal system (intelligent building solutions): Retrieved from [http://intelbuildsys.com/\(www.truswal.com\)](http://intelbuildsys.com/(www.truswal.com))
- Pwaya, A. R. (2004) building technology program: Retrieved on the internet at <http://web.mit.edu/bt/www/> on 24/02/2008
- Sambo, A. S. (2003) Renewable energy for rural development: The Nigerian perspective; Abubakar Tafawa Balewa University; Bauchi