
THE PROSPECTS AND CHALLENGES OF BUILDING AUTOMATION SYSTEM IMPLEMENTATION IN THE NIGERIAN CONSTRUCTION INDUSTRY

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ABSTRACT

This paper discusses the prospects and challenges of Building Automation System implementation in the Nigerian construction Industry. Building automation system controls various components within a building's structure, such as heating, ventilation, air conditioning and security alarms. The primary goal of this type of infrastructure is to improve system efficiency, reduce costs and increase safety. A centralized building management platform brings all of these parts together, but this description is a simplification of what's really going on behind the scenes. The need to innovatively integrate the construction process and address project development challenges has to do with the integration of building automation system (BAS) in the building design and development cycles. However the adoption of BAS in the Nigerian construction Industry is not encouraging and its implementation is poor. Hence, this study seeks to assess the prospects and challenges of Building Automation System implementation in the Nigeria.

Key Words: Building Automation System, Prospects, Challenges, Nigeria

INTRODUCTION

A building is an expression of self, privacy, investment and above all a safe haven in which property owners, business manager and occupants experiences comfort, convenience, safety, security, long-term flexibility and marketability. Dafe and Akinola (2017) assert that a building is often seen by most individuals as not more than mere fulfillment of shelter but as a basic need. A conventional building can be defined as that which traditionally separates building systems or functions such as temperature control, energy management, fire and security. A building controlled by a building automation system is also called an intelligent building or a smart home (IBI, Intelligent Building Management Navigant Research). An intelligent building, according to the Intelligent Building Institute (IBI) is that which produces a useful, valuable and efficient environment by making best use of basic elements of structure, systems, service and management and how they are related to each other.

According to Gerhart and James (1999), Building automation means the use of computer and Information Technology (IT) to manage building appliances for better performance of an automated building. The control system consists of smart network of electronic devices designed to check and control the mechanical, electronic and lighting systems in a building. Building automation system requires engineering services and products for automatic control, operation, monitoring and optimization, human management to achieve energy efficiency, economical and safe operation of building services systems. Building automation system is sometimes called Building Automation and Control Systems (BACS),

Energy Management system (EMS), Central Control Monitoring system (CCMS) or Building Management Systems (BMS) (ISO, 1999).

An effective Building Automation and Control Systems (BACS) produces the lowest energy cost, manages occupied space and makes occupancy productive through centralized control and automation and avoids waste of energy. The HVAC system plays a very important role in energy consumption and construction cost of buildings (Honeywell, 1997). Mohammed and Ahmad (2017) assert that construction companies are faced with the need to innovatively integrate the construction process and address project development challenges. One way of doing that is the integration of building automation system (BAS) in the building design and development cycles.

Building Automation Systems (BAS)

According to Ogunde, Olaolu, Afolabi (2017), building is the product of humanity that has been in existence from creation. Building automation system implies the technical control of heating and air-conditioning, lighting, security, fire protection, telecommunication and data services. BAS refers to a system of network integrated computer components which automatically controls many building operations like access control, lighting, HVAC, fire protection, audio-visual systems security and more. It is known to have a centralized, interlinked networks that have hardware and software, which monitors and controls the environment in any type of facility. The automation system saves energy, lightens loads, and ensures the facilities operate effectively and efficiently so the occupants are comfortable and safe. In other words, building automation begins with control of mechanical, electrical, and plumbing systems. A building controlled by a BAS is called an intelligent building, smart building or a smart. It can be computerised to minimize HVAC and lighting energy usage, and for other conveniences (Cook and Das, 2005).

The development trends of BAS is enhanced greatly by the advancement of Information Technology (IT) and Communications Networks (CN) resulting in the increasing demand for Intelligent Buildings and Smart Environment (Clements-Croome, 2004). The prefabrication method of building construction and this concept is taking a trend in Nigeria construction industry as few companies and occupants are embracing the concept. There are different types of BAS, some are simple remote control of lighting and temperature others are complex network of computer/micro controller that have different levels of intelligence and automation (Harper and Richard, 2003). However, an exemplary BAS could be a programmable thermostat able to define the temperature setting for an air conditioning and heating equipment for each time of the day. Andrew (2014) asserts that when compared to old conventional thermostat with metal coils and mercury switches that start and stop heating and cooling equipment based on manual settings. Programmable thermostats are simple automated system, but cannot provide full sense of scope and complexity that it is possible with BAS. However, household thermostats is a simple illustration of basic principle of BAS when compared to programmable thermostats.

Technological advancement and inventions all over the world is rapidly increasing as well as building designs and development which has affected the major areas such as structure, system, services and management. A combination of these factors has created the era of automated and intelligent buildings, which have been established to be energy efficient, which is commonly used now in developed countries. It has codes for proper efficient utilization of energy and in future zero energy consumption (ILC, Navigant Consulting, 2013). In Europe, the European commission has set a standard 80% target for all European homes to be equipped with smart meters by the year 2020 while in China, the 12th five-year plan (2011-2015) set very strong targets for energy efficiency. Every building and

home is unique in energy consumption levels and therefore building automation systems should be introduced to utilise available resources for maximum energy efficiency at minimum cost (Navigant research, 2014). Himanen (2003) recognize the advantages of concept of Intelligent building as reduction in building preservation and energy costs; enhanced productivity, gains in rent, investments, occupancy rates, retention; and ability to change use of space. The actual cost of an intelligent building is not only its cost of construction but the cost of operation and maintenance of the structure over its life span.

Building Automation System and the Nigerian Construction Industry

The construction industry plays a significant role in the national economy and economic development of any nation. Its significance is due to the role it has in the economy, but that role varies greatly from one nation to another. In developing countries, the construction industry is a very important sector providing mainly new infrastructure in the form of roads, railways, airports as well as new hospitals, schools, housing and other buildings (Dakhil, 2013). The construction industry is a key industry in many countries, usually making up to 5–10% of the overall gross domestic product (GDP) (Park and Hong 2012). After restructuring and re-basing Nigeria Account at 2010 constant basic price, Nigeria's economy became the largest in the Sub-Saharan African. Consequently, Nigeria's GDP increased from 18% in 2009 to around 32% in 2013 and thus outpaced the South African economy which used to be the largest economy, but whose share decreased from 30% in 2009 to 22% in 2013 (EMIS, 2015). The sudden drop was a result of the current slump in oil prices, which caused serious problems for the Nigeria economy and presented a major risk for the construction industry. This has resulted in reduced budget revenues and restricted government's abilities for infrastructural investment, thereby, leading to freezing of budget-funded projects and increased number of redundant people in the construction industry (EMIS, 2015). Ogwueleka and Ikediashi (2017) asserted that the global construction industry is on the verge of significant shift in the ways projects are delivered by focusing not only on traditional design but also on environmental, economic and social effects of a building project as a whole.

Challenges of Building Automation Systems (BAS) in Nigeria

The Nigeria construction industry is undergoing a major setback because of inadequate knowledge and understanding of the concept of BAS by the professionals. The major automation systems used in residential homes are the CCTV system and often times plumbing systems. These systems are found mostly in the urban areas of cities in Nigeria. Construction industries in developing countries due to identified challenges and unavailability of the clear understanding of best practices, are dithering whether to adopt this technology (Sahil, 2016). Research studies over the years have highlighted a number of challenges that affect BAS implementation (Ibrahim and Ahmad 2016; Eastman et al. 2011). Ibrahim and Ahmad (2016) identified the following as BAS challenges; Challenges with collaboration and teaming, legal changes to documentation ownership and production, Changes in practice and use of information, Implementation issues, among others. The Royal Institute of Chartered Surveyor (2015) confirmed that lack of awareness among stakeholders, lack of standard to guide implementation, lack of information technology (IT) infrastructure, lack of education and training, lack of government direction are the major challenges faced in the adoption of BAS technologies. Looking at construction projects in Nigeria that still use traditional technology, they find that projects in those countries are experiencing challenges within their construction industries due to rework (Sahil, 2016). In order to enable the adoption and implementation of BAS by organizations, designers and managers need an in-depth understanding of factors that lead to or hinder BAS utilization from being achieved.

The factors leading to BAS adoption might be examined on the individual, organizational and institutional levels (Doubouya et al, 2016).

Prospects of Building Automation System in Nigeria

Mohammed and Ahmad (2017) asserted that Construction companies are faced with the need to innovatively integrate the construction process and address project development challenges. The construction industry is undergoing a radical change as project owners are demanding for more project visibility at lower cost and better risk management. This has increased the use of new technologies in project implementations (Ogwueleka and Ikediashi, 2017). One way of doing that is the integration of building automation system (BAS) in the building design and development cycles (Mohammed and Ahmad, 2017). Olorunkiya (2017) posited that the adoption of BAS is a healthy disruption to the status quo. It is arguably the right way to go in the face of global competition and increasing clients' demands for quality projects to be delivered within or below budget and time. The Nigerian construction industry will benefit immensely from the adoption and integration of BAS in order to improve on the current fragmented and highly uncoordinated way of working among construction professionals.

CONCLUSION

There is a lack of awareness of BAS by professionals and the public at large. Since the benefits of BAS assist the users in their daily activities and help to save energy consumed by the buildings, it concludes that there is need for awareness and training by the construction professionals and occupants, and building automation be adopted into our present day construction of residential buildings to guarantee better efficiency and productivity.

Recommendation

The following recommendations were made:

1. There should be more enlightenment and training of the construction professionals on the importance of building automation for better efficiency and productivity
2. There should be an effective and sustainable public enlightenment programme to sensitize the residents, developers and other stakeholders in the building industry on the need for building automation system, as this would implicitly create a conducive and harmonious environment for living working and recreating.

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