

ADVANCED TECHNOLOGIES OF SUPPLY CHAIN MANAGEMENT IN NEARLY ZERO ENERGY BUILDINGS

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Abstract

Time and cost estimation for infrastructure projects especially related to road construction often face challenges. The rising concerns for energy efficiency in the construction sector have led research to the use of energy-efficient technologies to be implemented in the design, construction and operation of new buildings and retrofits to increase the performance of existing buildings. To this end, the scientific community and EU Member State governments have made a remarkable effort worldwide to encourage the use of effective building architecture and the proper building integration of energy-efficient and renewable energy technologies considered to be key points for achieving the Nearly Zero-Energy Buildings goal.

Key Words: ICT, IoT, BIM, Block chain

1. Introduction

In recent years, environmental and economic issues have contributed to increasing national and international efforts to promote sustainable development. The construction industry can help advance sustainable development, for example by using natural resources more sustainably, saving energy and assessing the impact of effects on ecosystems.

Buildings account for over one-third of the overall energy consumption and related greenhouse gas emissions, both in developed and developing countries. Although buildings embody major impacts on the climate, they also present one of the opportunities where major mitigation can be accomplished at low cost to the society. The general topic in these projects is "how to manage supply chain and information in nZEB constructions". The researcher will focus on the project supply chain and information management side of nZEB construction, using sub-foci such as ICT (Building Information Modeling, blockchain technology and Internet of Things) to improve communication, collaboration, project efficiency and data security. and reduce the effort and cost of the project

1.1 Literature Review

Jamie D. Collins, et.al.,(2021)"Knowledge management, supply chain technologies, and firm performance" The purpose of this paper is to provide an overview of the relationship between information management,

investment in supply chain technology, and the overall performance of the company. combines multiple functions and knowledge management technologies IT investments are based on overall performance and not on supply chain efficiency. supply chain managers looking for IT or other technological improvements should focus on multiple performance indicators.

xue le shen , et.al., (2021)"Enhance the integration on process in construction supply chain management" he suggested, in this context, that information and communication technology (ICT) could be used to achieve a better organizational approach for efficiency, customer loyalty and value. Various IT technologies have been used in the literature to improve the integration process in the procurement management of building materials In order to improve material efficiency.

Monica Colina, et.al., (2019)"Information and Communication Technology as a Key Strategy for Efficient Supply Chain Management in Manufacturing SMEs" Recommended knowledge and expertise in supply chain management At present, service delivery is influenced by a variety of factors. It is based on book reviews and evaluations of construction workers' opinions. Finding a better business relationship leads to the confidence to present data in order to have a reliable information management system that has chosen a way to allow supply chain management to better adopt ICT. With a special focus on adequate procurement and asset management, a good forecasting system and a better computer control system allow these types of businesses to have competitive advantages and better performance.

Sanjay prakash(2021) "The campus design demonstrates innovative design thinking to arrive at a blueprint for community scale net zero design" India should benefit from the development of Net Zero Energy in more than one building or home. An example of an upcoming project hosted by IIT jodhpur. The author calls this method to build and desert. The compass id is built with modern technology and a friendly environment.

Annakramers, et.al.,(2011),"ICT applications for energy efficiency in buildings" This paper examines network feasibility in the construction industry. Demonstrate an ICT application in the construction the industry and the benefits related to the roles played in business sector as a visual demonstration of real-time

prices for user awareness and decision support. Smart grid is possible in construction. Integration technology is collaborating with stakeholders and sharing information across multiple forums in ICT tools.

Anders Segersted, et.al.,(2010), '*Supply chains in the construction industry*' This paper discussed the construction industry and the management of its supply chain. Explain the specification process before customer order arrives showing different levels of specification: developer to order, adjust to order, prepare to order, select different. from the topic of the current study Understanding the principles of supply chain management and efficiency in the poultry industry series. Discussed by a combination of research and development of simulation models, the impact of various supply chain management processes on project performance was measured.

V. Sumateja Reddy (2020), "Net Zero Energy Building Movement in India" The purpose of this study is to analyze the problems faced in India for the use of NZEB these are a major factor as a developing country. in real estate redevelopment. With the exception of the hot envelope prepared for integrated power, the heating and cooling capacity and utilization of resources are higher than required. Also explain i. Obstacle and legal challenges and lack of political will, Business case and funding, Lack of awareness and familiarity with design professionals, Difficulty in finding qualified contractors, Inadequate knowledge base, Lack of quality and competitive market for efficient products, Lack of awareness of design and lack of expertise. for quality.

METHODOLOGY

This project will be based on descriptive ideas and real applications. Developing knowledge, generating ideas and questions, making estimates and observations, as well as experimental theories, use positivist credentials. Variables and random connections to determine relationship size and frequency. In addition, the researcher determines which variables should be tested and selects the tools that produce the most reliable and valid results. Design Science Research addresses important and unique issues or solves problems in a more efficient and informative way.

- Construct: Conceptualization used to explain or identify solutions to problems.
- Model: group of proposals that explain interactions between constructs
- Method: Measures required to do the task
- Implementation: realization of an artifact

To understand the general project management problems in nZEB construction management in developed and developing countries" and "to explore supply chain and information management in nZEB construction project management" considered as the **awareness of problem**

To propose an emerging ICT based supply chain Project Information Management framework for the Construction

Project Management for nZEBs" considered as the **framework development**.

And, To present the framework and validate it for the TRNC context" considered as the **validation** process.

SUPPORTING TECHNOLOGIES INTEGRATION WITH SUPPLY CHAIN INFORMATION MANAGEMENT

6.1 ICT in Supply Chain Project Information Management

Supply Chain Management (SCM) is the management of an integrated network of companies involved in the supply of overall product and service packages required by end customers. Sharing information within supply chain networks helps supply chain drivers work together for efficient supply chain management with the goal of synchronized and organized supply chains. Information and information increase efficiency and reduce the risks of supply chains, as it delivers completed transactions to systems and creates opportunities for decision makers when they need it and in the format they need. This is where ICT comes into play and consists of hardware and software applications. ICT also plays an important role in satisfying the quantity and quality of products by bringing together producers, producers, distributors and consumers. Throughout the entire supply chain, companies can gather vital information and respond quickly to any foreseeable market changes, thereby gaining competitive advantage by using SCM effectively. The goals of ICT in SCM are to provide accessibility and visibility to information, provide a single point of contact for data, enable decisions based on complete supply chain information, and allow collaboration with partners.

6.2 IoT in Supply Chain Project Information Management

Information and communication technology (ICT) has been and continues to be an important enabler for efficient management of supply chain. It plays a key role in helping supply chains cope with the demands of the rapidly evolving world and the multitude of threats at all levels. ICT has a significant impact on the design and function of supply chains, thanks to its ability to incorporate multiple processes internally and most importantly, externally connect them with suppliers and consumers. This has been done by improving communication, data collection and delivery, thus enabling efficient decision making and increasing the efficiency of the supply chain.

Internet of Things (IoT), one of the latest IT trends, is a modern ICT movement that offers a paradigm shift in many fields including SCM. The IoT takes supply chain communication to another level: contact between people and things and the possibility of autonomous collaboration between 'things' when stored in a warehouse or transported between various organizations in the supply chain. These new capabilities offer tremendous opportunities to deal with SCM issues more efficiently. The IoT offers new levels of visibility, versatility and adaptability in the supply chain to tackle different SCM challenges. When efficiently collected, processed and transformed into useful

information, the data emitted from smart objects can provide unique insights into all aspects of the supply chain, providing early warnings of internal and external conditions that require improvement.

6.3 Building Information Modeling (BIM) in Supply Chain Project Information Management

Sustainable design has become an important building planning goal in recent years due to global environmental concerns. As society, culture, and technology grow exponentially, the physical environment of planet earth deteriorates. As a system, BIM contains the necessary information to communicate in construction project management and enables the reduction of design and construction costs through collaboration, interoperability and communication. It ensures that everyone involved in all phases of the construction project receives the information they need from the begins of the project, using the tools/programs/software necessary to set organizational and project standards and responsibilities.

BIM can be thought of as a technology-driven approach that supports all AEC products and processes by collecting and presenting project information and thus facilitating information exchange. In addition, BIM can be viewed as a simulation of a construction project from inception to demolition, providing a virtual 3D environment with an integrated information workflow through a software package. By incorporating the results into a model, BIM can anticipate and reduce errors and problems. The model offers specific theoretical insights for visualized design that could lead to digital production and management. In addition to influencing project management (PM) within an organization, BIM's impact on projects also affects all SC-related activities.

6.4 Block-Chain Technology in Supply Chain Project Information Management

Blockchain technology is a distributed database of shared public/private records or registers of all digital activities conducted and shared by participating agents on the blockchain. By incorporating four main features, Blockchain technology differs from most current designs of information systems; non-localization, confidentiality, auditability and smart execution.



Blockchain affects both the functioning of the supply chain and the management of goods, as well as financial transactions between different parts of the network. Eliminating the intermediation of financial intermediaries, including payment networks, exchanges, and money transfer services, is an important potential benefit of the

blockchain supply chain. This makes business processes between partners more efficient. Inefficiencies in the flow of finance in the supply chain can be minimized with supply chain finance tools and strategies such as reverse factoring and dynamic discounting.

CONCLUSION

In this project has observed a practically relevant problem which is the deficiency of supply chain project information management in the construction industry decided with the supervisor that it has a potential. Case studies (which are going to be discussed and selected with the supervisor) are going to be used in the whole thesis to investigate the nZEB project management in its context, so that root problem causes can be understood. General and comprehensive understanding of the topic is going to be obtained more deeply by reviewing the literature, conducting interviews as well as focus groups and the research is going to involve theoretical understanding and the establishment of a theoretical or conceptual frameworks. After general and comprehensive understanding of the topic obtained, project is going to construct a unique framework for information management in SCM for nZEB projects and demonstrate it. Evaluation process of the project is going to take place as user perception and performance measurements through focus groups and interviews. At the end, it is believed that the project will have an explicit contribution to knowledge and reflect upon general application of the solution.

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