Journal of Advances in Science and Technology
Vol. 19, Issue No. 2, April-2022, ISSN 2230-9659

DOI: https://doi.org/10.29070/qxtgh871

Study of Application of ERP in Construction Project

Mr. Pradip Paul [1] , Prof. Ganesh Jarad [2]

1. Department of Civil Engineering, PVPIT College of Engineering Bavadhan, Pune, India ,
2. Associate Professor, Department of Civil Engineering, PVPIT College of Engineering Bavadhan, Pune, India

Abstract: The Indian economy still adheres to the primitive work pattern that results in low productivitybad resource management poor waste management worse quality excessive power consumption budgetoverruns time extensions among other issues Even if the aforementioned challenges need significantthinking effort more focus must be placed on innovative project management practises to ensure that theIndian development narrative does not stop abruptly This study is centred on the merger of Leansustainable building for residential development with a triple bottom line perspective i e environmentalsocial and economic Literature demonstrates the confluence of Lean and Sustainability managementideas their relationship areas A proposed model for the combination of Lean and Sustainability methodsto improves the productivity of residential development taking into account the triple bottom line ispresented The present research also evaluates the impact of the deployment of various tools inresidential projects based on a conceptual framework The application of these methods has resulted ingood impacts on all three facets of sustainable Social economic environmental Practitioners areinterested in this work because they may build on this research to adopt these methods which caneventually lead to an improvement in environmental social economic performance.

Keywords: ERP, Construction Project, Management

X

INTRODUCTION

General

ERP is a software system that attempts to merge all departmental systems in an unique integrated software programme and utilises a database server so that departments may exchange and discuss information more readily Entrepreneurship Asset Management ERP operating system is a marketing system that delivers potent analytics using information from a multitude of construction processes including financial reporting planning construction company managerial staff hardware management people management project planning supplier relationships offer management Customer Relations CRM planning submissions wealth management and much more Erp solutions may help the operations of a construction firm in several ways ERP systems integrate every aspect of a business allowing for more effective management Erp solutions are capable of minimising data duplication managing the data generated by many departments minimising data registration mistakes ERP systems are packaged software application components with interconnected architectures that firms employ to combine data and process data in real time throughout the distribution chain The consequences of installing an ERP system have made them an indispensable component of modern organisations The construction business has issues that are distinct from that of the industrial and service sectors This requires effective resource allocation project planning personnel tracking and also most crucially employee monitoring . Information dissemination Due to its specific needs and the extremely restricted availability of software for the

construction sector in developing nations firms in these nations are often hesitant to implement ERP systems

Concept of Enterprise Resource Planning (ERP)

A "Enterprise resource planning" software is a completely integrated company management system that includes Logistic Product Financial Accounts and Human Resource Management It organises and combines operational processes and data flows in order to achieve the most effective utilization of resources like as people money materials and machines.

Organization Resource Planning ERP offers a single database a single application and a single interface for the whole enterprise where formerly different systems governed production distribution finance sales This is a technology that helps workers managers plan monitor govern the whole organisation by using data from each function A contemporary ERP system improves a manufacturer's ability to properly plan production maximise capacity utilisation decrease inventory and fulfil shipment deadlines It is a comprehensive laptop system for managing available resources including as physical assets economic ability material and human capital.

This is a computer architecture designed to enable the information flow across all business processes inside the organization's borders and to handle the links to external stakeholders ERP solutions combine all company processes into a consistent corporation system environment by leveraging a centralised database and a single computer platform.

Objective

Aim

ERP systems are designed to combine the many company operations ERP systems combine a number of common application into a single system.

Objective

1. To investigate concepts using ERP in building projects.
2. To investigate the present status of typical processes.
3. Determine the applicability of ERP.
4. To determine the benefits of ERP above conventional processes.

LITERATURE REVIEW

Abhijit N. Bhirud (Jan-Feb 2016). ERP or Erp Systems enables businesses to improve their business operations and enables the management that is required Thus ERP may be described as software system that can combine several project operations and give a unified output to improve performance and boost revenues A building ERP system offers Cost optimization the incorporation of design revisions consistent quality conformity dependable faster as well as on delivery the incorporation of value engineering a collaborative work environment and a facility for team tracking The test case relevant to the installation

of ERP by infrastructure building companies is explored Findings indicate that in order to achieve an effective ERP installation businesses must also have a compelling rationale for doing so establish the tradeoff choose a suitable re-engineering approach and identify and manage any risks On the basis of the results construction sector ERP installation management techniques are established.

Boo Young Chung (June-2009) To better integrate multiple business operations a substantial number of big construction organisations have recently implemented unified technological solutions including enterprise resource ERP systems However infrastructures in the construction companies face a unique set of issues distinct from others in the manufacture and other service industries Numerous ERP system installation failures have occurred in the past thus it is essential to identify understand the elements that significantly impact the success of failure of ERP installation in the construction business The method of establishing an Erps model based to lead a good ERP installation project and identify ERP systems implementation elements is described by the author Woo Yong Chang finds elements linked with the successes and failures of enterprise resource ERP systems creates a model to analyse success. the links between critical components and system success The suggested Enterprise system success model incorporates the acceptance and use of technology and the information management success model developed by DeLone and McLean and combines them with essential project management concepts The Enterprise system success model aims to improve the evaluation planning and implementation of ERP projects assist senior managers in making more informed choices on ERP systems for their firm organization. management principles. The goal of the ERP systems success model is to better evaluate, plan, and implement ERP projects and help senior managers make better decisions when considering ERP systems in their organization.

C. S. Dudgikar (Sept-2012) India has In terms of globalisation India has now settled into a rhythm It has led to the adoption of global standards and practises by local big and medium corporations In light of the needs of the Indian market it became more of a cause for IT technology solutions to be optimistic In recent years Indian businesses have significantly increased their expenditures on information technology according to available data ERP was among the earliest IT ideas to enter the Indian industry but its success was limited Erp ERP is a software based company management system that combines all corporate functions such as planning production sales marketing The corporate environment has gotten more complicated and the market has expanded internationally Constant pressure is placed on management to increase competitiveness by reducing operational costs and enhancing logistics Therefore organisations must be more sensitive to the consumer and competitors As ERP as just a solution provider attempts to aid management by establishing better business processes and providing them with appropriate data to make timely choices Construction industry is the methodical control of the time cost safety of a project construction based on recorded study and practise The majority of the construction companies in India are aware of enterprise resource planning ERP systems but relatively few have adopted them The primary reason is that implementing an ERP system requires a substantial commitment of time money and resources However when applied to tackle the appropriate business challenges these ERP systems may be a potent instrument for company enhancement A highly fragmented business is the building industry For the development of the ERP quality module a resource based 5 M's e Model has been created This module's reports have been created to provide succinct and accurate information on the

quality attributes of a construction project to its many stakeholders including the developer designer contract project manager quality inspector and last but not least the customer This article also presents these reports which educate the many stakeholders and assist them in determining the appropriate quality standards at the appropriate time and within the appropriate budget

Hans Voordijk (2003). Enterprise Resource ERP solutions has supplanted single document information platforms by integrated maintainable software in the majority of big Dutch construction companies The installation of Erp software in such organisations is challenging More ERP deployments have failed than succeeded to date This research focuses on the compatibility between both the following pairs of aspects in Erp implementation projects business and IT strategy IT infrastructure maturity and the strategic role of IT and implementation methodology and organisational transformation This study's thesis is that an ERP deployment to be effective these aspects must somehow work together A case study of three ERP deployments in distinct business divisions of a Dutch construction company was used to perform empirical research Large construction companies in the Netherlands have often dealt with ERP by implementing many systems inside a single organisation The research demonstrates that the effectiveness of ERP installations is contingent upon consistent patterns between IT strategy and business strategy IT maturity and the strategic role of IT and implementation technique and organisational transformation.

Jonathan Jingsheng Shi (2003). ERP Enterprise Resource Planning Originating in the manufacturing industry It provides a general working environment for a company to connect its key business management operations with a single unifying database so that data can be provided management functions may communicate effectively This article begins with an overview of the ERP system its inception and its current general development ERP demonstrates its possibilities for the construction sector based on the requirements of operating a construction business However the industry's specific characteristics hinder a straightforward installation of current ERP systems which are largely designed for the manufacturing sector This study emphasises the significance of establishing the fundamental theory for the development of project erp software systems CERP! A CERP must address the broad industrial practice's nature In the work fundamental characteristics are found and analysed The author proposes a three tier client/server design and discusses the roles and essential components of each tier The need for study on CERP structures project management functions enhanced planning methodologies standardising management functions and modelling human intelligence is emphasised Examples of construction management are included into the discourse.

Mahmood Ali (2017). The importance of Enterprise Resource ERP systems has been elevated by the advantages gained from their implementation Those methods that are based on industry best practices are occasionally unable to meet particular organisational requirements like those unique to the construction sector which presents a unique set of issues distinct from those of the manufacturing and service sectors The purpose of this article is to examine the creation of in ERP system in an organisation in a developing country and to investigate comprehend the evolution of an ERP system tailored specifically to the demands of an organisation This study employs a qualitative research style based on case studies Through with an analysis of conversations conversations with the project leader development personnel and end users primary data is gathered end users. Through good preparation paired with a thorough needs assessment a suitable organizational change strategy an experienced project team and the selection of a

suitable software development any organisation can develop an ERP system that meets the organization's unique requirements according to the study's findings Consequently removing the requirement for significant software adaptation or business process modification In addition by designing an internal system the likelihood of a disastrous deployment is considerably decreased enabling the firm to concentrate on its main business while reaping the benefits of the new system.

Piyush Deole (2013). ERP is a laptop strategy that attempts to merge all departmental systems with a single unified software programme and uses a database server so that departments may exchange discuss information more readily ERP system processes include data registration analysis reporting This study is conducted on two construction companies in order to determine the key and supplementary criteria necessary for the effective operation of ERP systems in the construction industry Using the Likert Scale a questionnaire was constructed to assess these qualities The replies of the workers from these two companies were assessed using SPSS The output of SPSS tools enabled the identification of primary and supporting ERP system success factors in project oriented construction enterprises.

Parvathy Mohandas (2013). ERP is a laptop system that seeks to merge all departmental systems with a single unified software package and utilises a database server so that departments may exchange and discuss information more readily ERP system processes include data registration analysis reporting ERP systems may help the operations of a construction firm in several ways ERP systems integrate every aspect of a business allowing for more effective management ERP systems are capable of minimising data duplication controlling the data generated by many departments and minimising data registration mistakes This study is conducted on two construction companies in order to determine the key and supplementary criteria necessary for the effective operation of ERP systems in the construction industry Using the Likert Scale a questionnaire was constructed to assess these qualities The replies of the workers from these two companies were assessed using SPSS The output of SPSS tools enabled the identification of primary and supporting ERP system success factors in project oriented construction enterprises.

Rohit Chaudhari, (2019). A substantial number of big construction organisations have used combined information systems including such enterprise resource ERP systems in an effort to combine corporate operations more effectively However infrastructures in the construction industry face a unique set of issues distinct from others in the manufacturing and other service industries Numerous ERP system implementation failures have occurred in the past thus it is essential to identify comprehend the elements that largely impact the success or success of ERP installation in the construction business This article describes the procedure for establishing an Enterprise system success model to lead a successful ERP deployment program and also to identify ERP systems completion success criteria The author examines elements related with successes and failures of ERP systems and builds successful model to study the links between key success criteria and ERP system success. The ERP systems model aims to improve the evaluation planning implementation of ERP projects assist senior managers in making more informed choices on ERP systems for their firm The industrial sector was the foundation of erp systems ERP It offers a general working environment for an organisation to combine its key business management operations with a single common database allowing for the sharing of information and effective communication across management units The market for enterprise resource planning system has

expanded at a quick rate over the last few years and is expected to continue expanding at a rapid rate in the future Since the construction industry operates differently than other domain businesses The need to design a construction specific enterprise resource planning The programme in development will offer a comprehensive solution for construction company management Implementing Business Intelligence into the Construction ERP will aid in the decision making process of management personnel Thus the building ERP will help to the organization's general functioning growth development of the construction organization.

Sudhanva Kadoli, (2014). India is a developing nation whose economy is significantly impacted by globalisation It is noticed that the majority of the country's development is focused on urban infrastructure It is vital to accommodate and offer basic infrastructure amenities to meet the ever increasing needs of an urbanising population Consequently it is essential for construction companies to effectively manage their operations and meet consumer demands by balancing the operations of their various divisions An enterprise resource planning system for the construction industry is the best way to manage the complete organisation under one roof This article describes an effective ERP system for managing several departments in line with the company's regulations and consumer demands ERP is able to integrate corporate business processes This will solely automate Construction Company's operations BI DSS are built with feedback logic in order to facilitate company wide decision making based on past future risk.

Syed M. Ahmed. Strategic Planning ERP is currently regarded as a cornerstone for the convergence of enterprise wide information systems ERP systems integrate the administration financial human resources manufacturing and distribution functions of a complete firm In addition they link the business to its consumers and suppliers across the many phases of the item or process life cycle Very few studies have been conducted about the deployment of Erps in the construction sector especially for construction contractors Prioritization has so far been placed on customer organisations or engineering and design businesses The purpose of this article is to examine the applicability and deployment state of Erps in contractor organisations The approach used is a combination of literature study market research and a comprehensive questionnaire survey The most of contractor businesses are aware of enterprise resource planning ERP systems but relatively few organisations have deployed them The primary reason is that implementing an ERP system requires a substantial commitment of time money and resources When adopted to tackle the correct challenges however these ERP systems may be a potent instrument for company enhancement In addition to shedding light on the impediments to the deployment of Erp software in the construction sector the research emphasises key lessons learned and the advantages achieved by businesses that have implemented such systems.

Sergey V. Zykov, Frequent focus shifts in the evolution of a versatile firm need the swift and adaptable adaptation of people organisational structure to an ever changing market with intense competition Such an adaption must be based on the strategic software integration so it is particularly critical for extensive ERP systems that comprise a collection of technologies that provide the support of complicated production and trade cycles Enterprise resource ERP technologies are gaining in popularity Nonetheless no completely integrated solution has yet been suggested The ERP categorization is provided Humanresources HR management solution is used to examine latest events in commercialsystems Presented is a novel "straight through" design and implementation method for integrated event driven

corporate solutions that are open safe and scalable The outcomes of implementation are provided.

Thakare Amol K, (2013). An enterprise resource planning is a completely integrated business system that encompasses the operational areas of a company such as logistics production finance accounting and human resources among others It organises and combines operation processes and data flows in order to achieve the most efficient use of resources like as people money materials and machines ERP is a comprehensive globally connected closed loop system business solution bundle Simply said Enterprise Resource Planning guarantees a single database application and user The purpose of this research is to examine the efficacy of ERP deployment in the construction sector EDSS Pvt Ltd 's HIT OFFICE enterprise resource planning ERP application was the subject of the study By budgeting planning material planning contractor management and billing in HIT OFFICE utilising the software's Quotation Purchasing Inventory Study & Accountancy modules the efficacy of ERP deployment was investigated A questionnaire was designed to elicit feedback from Research Managers and Project managers of different firms in order to assess the effects of ERP implementation ERP is the greatest choice for firms willing to make substantial investments and able to adapt to changes in their working systems as it will result in resource optimization time money and also most importantly energy savings.

Yu-Cheng LIN, Erp ERP is by far the most current high business application facilitated by information systems ERP systems are extremely complex information systems The installation of the these systems is laborious expensive involving a significant investment of time Several ERP installations have been considered failures due to inability to fulfil predetermined corporate goals The author identifies the most crucial success elements for a successful implementation On the premise of experiences gathered through interviews with professionals a synopsis of success Factors implementation is presented discussed in terms of a set key factors.

METHODOLOGY

Concept Of Erp In Construction Project

Introduction

Generally Material management often involves planning identifying acquiring storing receiving distributing supplies Material management has a considerably broader scope encompasses all areas of material supply use expenditures It is a set of knowledge that assists managers in increasing capital productivity by minimising material costs avoiding significant amounts of capital from becoming locked up for extended periods increasing the asset turnover ratio Therefore material management is a comprehensive concept embracing the whole organisational structure It may alternatively be described as the acquisition of the correct amount of materials of the highest possible quality from of the right source just at right time and in the right price.

- First step Identify commonly employed Modules in building and also have experts evaluate it.
- Second step Define benefit assessment criteria and have experts validate it The same ERP specialists approve six benefit assessment criteria for ERP modules Chung Skibniewski 2007 1 cost savings 2 greater efficiency 3 enhanced decision making 4 enhanced information quality 5

enhanced user happiness 6 enhanced organisational adaptability

- Third step Evaluate ERP Modules in relation to each benefit criterion using the significance index
- Fourth step compute the overall weight for ERP modules to assess the total ranking of ERP modules

Identifying and validating commonly utilized Modules in construction is the first stage

- Second step Define benefit assessment criteria and have experts evaluate them The same ERP specialists approve six benefit assessment criteria for Erp systems Chung Skibniewski 2007 1 cost savings 2 greater efficiency 3 enhanced decision making 4 enhanced information quality 5 enhanced user happiness 6 enhanced organisational adaptability
- Third step Evaluate ERP Modules in relation to each benefit criterion using the significance index
- Fourth step compute the overall weight for ERP modules to assess the total ranking of ERP modules

Identifying and validating commonly utilized Modules in construction is the first stage

- Second step Define value assessment criteria and have experts evaluate them The same ERP specialists approve six benefit assessment criteria for ERP modules Chung Skibniewski 2007 1 cost savings 2 greater efficiency 3 enhanced decision making 4 enhanced information quality 5 enhanced user happiness 6 enhanced organisational adaptability
- Third step Evaluate ERP Modules in relation to each benefit criterion using the significance index
- Fourth step computing the overall mass for ERP modules to assess the total ranking of ERP modules.

Working of Modules of ERP for Inventory in Construction Industry

The procedure begins with the calculation of quantities and production of a project estimate followed by the preparation of resources work item specifications or rate analysis The LBD measurements formula with direct quantity are used to arrange measurements Project estimation is imported In the development of the bar chart for project planning materials volume planning is performed In the course of project execution inventory related tasks are accomplished All processes including material request price request contrast purchase order material inbound entries on a daily issue slip entries or site bill register are completed After supplier subcontractor & client billing for a project reconciliation reports are generated are made.

STUDY AREA –NITHYAM BY GADA GROUP, CHAROLI

Nithyam located in the holy area of Alandi provides comfort and ease Our 1 and 2 BHK houses provide you with a healthy work life balance Alandi is among the most rapidly expanding neighbourhoods in Pune a significant business center Nithyam is the ideal residence for many since it is situated in a location

surrounded by abundant vegetation It provides convenient access to the city's premier leisure and entertainment destinations Then there is the pricing advantage Despite its proximity to major cities Mandala Park View is affordably priced Chakan MIDC and the Sant Dyaneshwar shrine are also nearby Due to its closeness to prestigious educational institutions banks and convenience shops a house here gives convenient access to lifestyle amenities.

Figure 1: view Nithyam from outside, Charoli

SPECIFICATIONS

- Structure Seismically Rcc Frame Structure Design
- Masonry Ciporex Chunk Work Internally and Externally
- Gypsum Interior Walls Plastered Smoothly
- Internal Wall Painting Superior Finish Using Washable Emulsion Paints
- Entrance Lobby 2' x 2' Vitrified Flooring
- Cooking / Utilities Granite Top Platform.

ANALYSIS IN ERP

Data Collection

Estimate Planning Method For Calculating Concrete and Cement Quantity

Aggregate

Distribution bars equals span of slab plus width of both side beams

Items List and supplier list update in ERP

Items List

Indeed this is a list of the most common building materials In the construction business several types of construction material are used to create buildings and bridges These goods and tools are used by the architectural construction manager to specify the materials and methods employed in building projects Certain construction materials such as chilly steel frames are seen as more modern than traditional construction processes including such block work wood Numerous building materials have a variety of

uses thus it is best to contact the producer to see whether a part is the best option for your project.

Labour category and list

Classification and listing of The classifications of labourers are unskilled skilled and specialised The majority of labourers here are illiterate and help with the building of stonework Masons are regarded as skilled labourers and occupy a higher rank in this system For aesthetic objectives specialised employees do tasks such as floor installation road construction and stonework aesthetic purposes.

Purchase Order (PO)

Purchases POs are documents that you as the customer send to a vendor conveying an order for products or services Each purchasing department will include an unique identifier which will be used to track the order across the systems as well as the item's kind quantity agreed upon price Detailed orders will include more information but in general the more information you supply the more effective your purchase order will be.

Material Requisitions Note

The product request also known as a resources online application or material request is a documentation used by the production line to request the materials required to complete a manufacturing process It is used to authorise and monitor the parts required to maintain acceptable inventory levels and keep production moving The data on the request is used to update the store record cards also known as that of the shipment and the stores accounting In addition it is utilised to determine the direct expenses incurred by various jobs or goods and the indirect materials required by different cost centres Typically the production manager submits the resources request form to the materials or warehousing division which stores all raw materials The application is then authorised by the material manager who organises transfer of the raw materials from the warehouse to the production floor The person requesting the products and the warehouse staff will each keep a copy of the paperwork Along with the specified objects a duplicate is delivered to their ultimate destination If any of the items on the form are out of stock a second copy may be forwarded to the purchasing department which will prepare a purchase requisition and sales orders to obtain the necessary supplies.

RESULT AND DISCUSSION

Rework the cost approach for the building project

In almost every construction project the possibility of rework affects the demand schedule of project activities As a consequence of the way that reworking has a comparable effect on costs schedules This cost effect should be calculated as it will aid project managers in decreasing rework related expenses.

Table. 1 Rework cost mechanism

Sr. No.	FACTORS	FORMULA
1	REWORK AMOUNT	RA= DC * RAW Where, RA= rework amount Dc = duration of critical activities RAW =weightage of rework activities
2	REWORK COST	RC = ∑ CC * ∑ RA Where, RC= rework cost ∑ CC = total critical activity cost ∑ RA =total rework amount

RA= DC * RAW

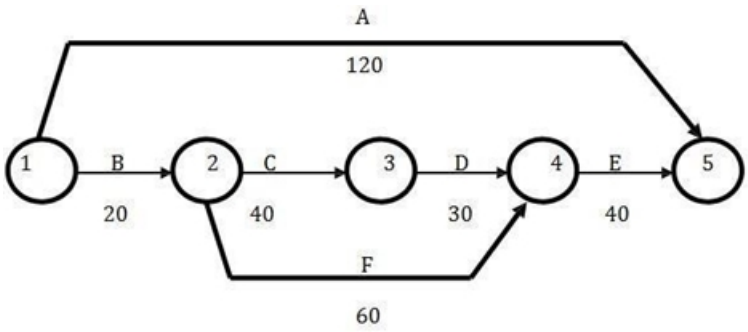
Where, RA = rework amount DC = 3 Months

= 3 Months=(Labour cost+Materialcost) per day 10000+ 15000= 25000

RA=3*25000=75000

RC = ∑ CC * ∑ RA

Where, Rc= 3*25000=75000



Rework cost calculation

In the course of this study endeavour Quantify the number of repair and the price of rework illustrate how to assess the quantity of rework as well as the price of rework using an example In just this example operations A B C D E F together with their duration and average cost are shown In addition a project charter detailing all of these actions is supplied.

Table 5.2 Rework cost calculation

Activity	Duration (days)	Normal cost (Rs)
A	120	12,000/-
B	20	1,800/-
C	40	16,000/-
D	30	1,400/-
E	40	3,600/-
F	60	13,500/-

Table 5.3 cost calculation for critical activity B

FACTORS	DURATION (DAYS)	COST	WEIGHTAGE	REWORK AMOUNT	REWOK COST
Lack of experience and knowledge of design and construction process.	20 DAYS	1800	.288	5.76	103.68
Poor quality of construction technique			.266	5.32	95.76
Poor use of advanced engineering			.133	2.66	47.88
Adverse natural condition			.111	2.22	39.96
Lack of use of advanced mechanical equipment's			.100	2	36.00

Table 5.4 comparative analysis

Task Name	Cost	Duration
quality planning	15,32,000	184
without quality planning	15,64,000	192

CONCLUSION

- A respected ERP system helps enterprises to plan production accurately increase capacity utilisation decrease inventory and meet guaranteed delivery dates
- The advantages of using an Erp software has made them an indispensable element of modern enterprises
- Extra efficient administration is achievable due to the fact that ERP systems properly integrate all facets of a firm
- ERP systems are primarily concerned with automation back office processes that had no direct influence on customers or even the wider public

- Currently developers are exerting more effort to integrate mobile devices with ERP software
- The obstacles may arise from the system company strategy equipment education or a loss of enthusiasm Despite the fact that older ERP systems were designed for big enterprises increasingly more small firms are using ERP systems
- The ERP framework unites diverse structural systems and facilitates erroneous transaction and production, hence enhancing the performance of a business. Before deploying an ERP software package, it is crucial for businesses to conduct a comprehensive examination of their business operations.

References

1. Abhijit N. Bhirud "Effective Implementation of ERP in Infrastructure Construction Industry" Volume 4, Issue 2 (March-April, 2016) PP 1-4
2. BooYoung Chung et. al. "Developing ERP Systems Success Model for the Construction Industry" ASCE / MARCH 2009 PP 1-11
3. C. S. Dudgikar "Development of ERP Module for Quality Management in Construction Industry" (IJEC), Volume – 1, Issue – 1, August 2012 PP 1-12
4. Hans Voordijk et. al. "Enterprise Resource Planning in a large construction firm: implementation analysis "Construction Management and Economics (July 2003)P 1-12
5. Jonathan Jingsheng Shi "Enterprise Resource Planning for Construction Business Management" ASCE / MARCH/APRIL 2003 PP 1-8
6. Mahmood Ali "Developing in-House ERP System for the Construction Industry in a Developing Country: A Case Study" Engineering Management Research; Vol. 6, No. 1; 2017 PP1-12
7. Piyush Deole "Research Analysis for successful functioning of ERP system in Construction Industry" (IJERT) Vol. 2 Issue 11, November – 2013 PP 1-6
8. Parvathy Mohandas et.al. "Research Analysis for successful functioning of ERP system in Construction Industry"(IJERT) Vol. 2 Issue 11, November – 2013 PP 1-6
9. Rohit Chaudhari et. al."Implementation Based ERP Module for Construction Site Management"(IRJET) Volume: 06 Issue: 06 | June 2019 PP 1-12
10. Sudhanva Kadoli "An Enterprise Resource Planning (ERP) For A Construction Enterprise Along with Business Intelligence (BI)" Vol. 3, Issue 2, February 2014 PP 1-7
11. Syed M. Ahmed "Implementation of Enterprise Resource Planning (ERP) Systems In The Construction Industry" PP 1-9
12. Sergey V. Zykov "Enterprise Resource Planning Systems: the Integrated Approach" ITERA

International Group of Companies PP 1-12

13. Thakare Amol K. "Cost Analysis and Project Planning using ERP in Construction Industry" ISSN: 2278-621X Vol. 2 Issue 4 July 2013 PP 1-15

14. Yu-Cheng LIN "Construction Enterprise Resource Planning Implementation: Critical Success Factors – Lesson Learning in Taiwan" PP 1-6