

# Replacement of Equipments at Construction Site

Chandrashekhar Nivrutti Wani.  
 Prajakta Chandrashekhar Wani.  
 Prajwal Chandrashekhar Wani.

**Abstract:-** The study examines the factors that influence equipment replacement decisions, including equipment condition, technological advancements, regulatory requirements, and financial considerations. There is the need of replacement of equipments for various reasons, including technical obsolescence, wear and tear, damage, safety concerns, changes in regulations or industry standards. The existing research provides insight into methodologies, models and factors used to make informed decision about equipment replacement, with a focus on optimizing maintenance, reliability, and cost-effectiveness. It also highlights the importance of effective communication, risk management, and project management. The Methodology for replacing equipment involves assessing the current equipment, defining replacement requirements, developing a replacement plan, implementing the replacement and conducting post-replacement evaluation. The replacement of equipment improved the safety, increased reliability, and better compliance with regulations and industrial standards.

**Keywords:** *Equipment Replacement, Decisions, Current Equipment, Industrial Standards.*

## I. INTRODUCTION

The construction industry heavily relies on the use of equipment for various tasks such as excavation, grading, material handling, and transportation. However, with the aging of equipment and increased demands for higher productivity, construction companies are increasingly considering equipment replacement as a viable option to optimize their operations. Equipment replacement can help address various issues, including outdated technology, inefficiency, safety concerns, and regulatory compliance. Nonetheless, replacing equipment can be a complex process that involves assessing the equipment's condition, evaluating the cost-benefit analysis of purchasing new equipment, and planning for the transition process. Effective communication with stakeholders and providing appropriate training on new equipment is also essential. Successful equipment replacement requires careful planning, effective project management, and a focus on achieving project objectives while minimizing risk and maximizing efficiency. This research paper aims to examine the process of equipment replacement at construction sites and its impact on project efficiency, safety, and cost. The paper will provide an overview of the factors that influence

equipment replacement decisions, explore the different strategies and models used in equipment replacement planning, and provide practical recommendations and guidelines for successful equipment replacement at construction sites.

## II. METHODOLOGY

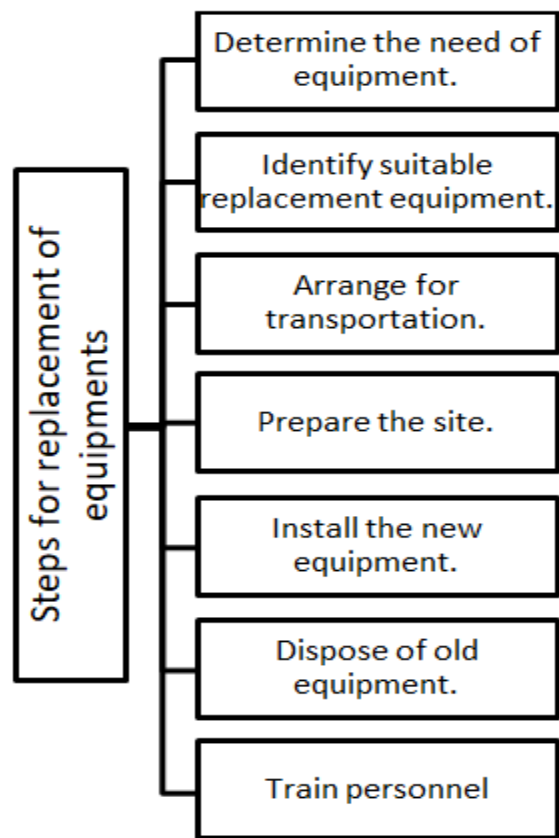


Fig 1 Steps for replacement of equipments

Replacing equipment at a construction site may be necessary due to various reasons such as equipment failure, damage, or obsolescence. The following steps can be taken for replacing equipment at a construction site:

- Determine the need for replacement: Assess the condition of the equipment and determine if it needs to be replaced. This can be done through routine inspections and maintenance checks.
- Identify suitable replacement equipment: Once it has been established that the equipment needs to be replaced,

identify the most suitable replacement equipment based on the required specifications and budget.

- Arrange for transportation: If the replacement equipment is not already on site, arrange for its transportation to the construction site. This may involve hiring a transportation company or using the services of an equipment rental company.
- Prepare the site: Prepare the site where the new equipment will be installed. This may involve clearing the area and ensuring that the site is level and stable.
- Install the new equipment: Install the new equipment and ensure that it is properly connected and functioning. This may require the services of a qualified technician or engineer.
- Dispose of old equipment: Properly dispose of the old equipment in accordance with local regulations. This may involve recycling or disposing of the equipment in a landfill.
- Train personnel: Train personnel on the proper use and maintenance of the new equipment to ensure that it operates safely and efficiently.[1]

#### A. Equipments:

Equipment that may need to be replaced at a construction site can include:

- Excavators: Excavators are heavy equipment used for digging and excavation. They may need to be replaced due to wear and tear, mechanical failure, or damage. A small mini-excavator in India can cost around 10 to 25 lakh rupees, while a larger excavator can range from 30 lakh to 1 crore rupees.
- Loaders: Loaders are used to load materials such as soil, rocks, and debris into trucks. They may need to be replaced due to mechanical failure or damage. A small mini-loader in India can cost around 5 to 15 lakh rupees, while a larger loader can range from 20 lakh to 50 lakh rupees.
- Cranes: Cranes are used to lift heavy objects and materials at construction sites. They may need to be replaced due to mechanical failure, damage, or obsolescence. A small mini-crane in India can cost around 10 to 20 lakh rupees, while a larger crane can range from 50 lakh to 5 crore rupees.
- Bulldozers: Bulldozers are used to move large quantities of soil, sand, and other materials. They may need to be replaced due to wear and tear, mechanical failure, or damage. A small mini-bulldozer in India can cost around 20 to 40 lakh rupees, while a larger bulldozer can range from 50 lakh to 2 crore rupees.
- Backhoes: Backhoes are used for excavation and digging. They may need to be replaced due to mechanical failure, damage, or obsolescence. A small mini-backhoe in India can cost around 10 to 20 lakh rupees, while a larger backhoe can range from 30 lakh to 80 lakh rupees.

- Pavers: Pavers are used for laying asphalt or concrete on roads, parking lots, and other surfaces. They may need to be replaced due to wear and tear, mechanical failure, or obsolescence. A small mini-paver in India can cost around 10 to 20 lakh rupees, while a larger paver can range from 40 lakh to 1 crore rupees.
- Compactors: Compactors are used to compress and flatten surfaces such as soil, asphalt, and concrete. They may need to be replaced due to mechanical failure, wear and tear, or obsolescence. A small mini-compact in India can cost around 5 to 10 lakh rupees, while a larger compactor can range from 20 lakh to 50 lakh rupees.
- Concrete mixers: Concrete mixers are used for mixing and transporting concrete to construction sites. They may need to be replaced due to wear and tear, mechanical failure, or obsolescence. A small portable concrete mixer in India can cost around 30,000 to 50,000 rupees, while larger stationary mixers can range from 1 lakh to 10 lakh rupees.
- Generators: Generators are used to provide temporary power to construction sites. They may need to be replaced due to mechanical failure, wear and tear, or obsolescence. A small portable generator in India can cost around 10,000 to 20,000 rupees, while larger stationary generators can range from 1 lakh to 10 lakh rupees.
- Welding machines: Welding machines are used for welding metal parts at construction sites. They may need to be replaced due to mechanical failure, wear and tear, or obsolescence. A basic arc welding machine in India can cost around 5,000 to 10,000 rupees, while a more advanced MIG or TIG welding machine can range from 20,000 to 1 lakh rupees.
- Air compressors: Air compressors are used for powering pneumatic tools such as jackhammers, drills, and nail guns. They may need to be replaced due to mechanical failure, wear and tear, or obsolescence. A small portable air compressor in India can cost around 5,000 to 10,000 rupees, while larger stationary compressors can range from 20,000 to 1 lakh rupees.
- Hydraulic equipment: Hydraulic equipment such as excavators, bulldozers, and cranes rely on hydraulic systems to function properly. Components of these systems may need to be replaced due to wear and tear, mechanical failure, or damage. Hydraulic equipment such as pumps, valves, and cylinders can range in cost from a few thousand rupees to several lakhs of rupees, depending on the specific equipment and its specifications. For example, a basic hydraulic pump can cost around 10,000 to 20,000 rupees, while a high-performance hydraulic cylinder can cost upwards of 1 lakh rupees.
- Power tools: Power tools such as saws, drills, and grinders are used for cutting, drilling, and shaping materials at construction sites. They may need to be replaced due to wear and tear, mechanical failure, or obsolescence.

A basic power tool like a drill machine in India can cost around 1,000 to 5,000 rupees, while a more advanced power tool like a circular saw or angle grinder can range from 5,000 to 20,000 rupees.[2,4]

- Deterioration: If the equipment has deteriorated over time due to wear and tear, corrosion, or other factors, it may no longer be safe or effective to use.[3,5]

**B. Factors Affecting :**

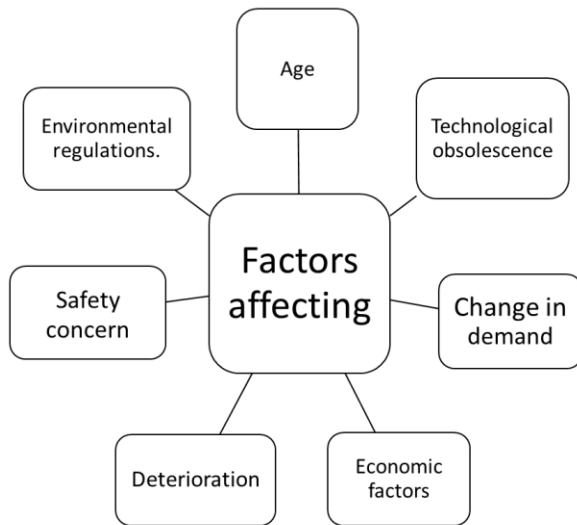


Fig 2:- Factors Affecting

- Age: The older the equipment, the more likely it is to require frequent repairs and maintenance. As equipment ages, the cost of repairs may increase, and the risk of equipment failure may also increase.
- Technological obsolescence: Newer technology may offer better efficiency, productivity, or functionality than older equipment. The need to stay competitive and keep up with industry standards can also drive the replacement of equipment.
- Changes in demand: If there is an increase or decrease in demand for a product or service, the equipment used to produce or deliver that product or service may need to be replaced or upgraded.
- Safety concerns: Equipment that poses a safety hazard to employees or customers may need to be replaced, even if it is still functional.
- Environmental regulations: Changes in environmental regulations may require equipment upgrades or replacement to meet new standards.
- Economic factors: Replacement decisions may also be influenced by economic factors, such as the cost of maintaining old equipment versus the cost of new equipment, the availability of financing, and the potential return on investment.
- Capacity requirements: Changes in production volume or capacity may require equipment upgrades or replacement to meet increased demand.

**III. CONCLUSION**

The replacement of equipment at a construction site can have a significant impact on the project timeline, budget, and overall success of the project. It is important for project managers to carefully plan for equipment replacement and budget accordingly to minimize the impact on the project.

Lessons can be learned from the equipment replacement process, such as the importance of regular maintenance, planning for equipment replacement in advance, proper disposal of old equipment, documenting the replacement process, training staff on new equipment, and conducting post-replacement reviews.

By taking these lessons into consideration and implementing them in future equipment replacement processes, project managers can improve the effectiveness and efficiency of equipment replacement and minimize the impact on the project timeline and budget. Ultimately, proper equipment replacement is essential to the success of any construction project and should be given careful consideration and attention.

**REFERENCES**

- [1]. J. Douglas. Construction Equipment Policy. New York: McGraw-Hill, 1975, pp. 47–60.
- [2]. Selinger S., Economic Service Life Of building Construction Equipment, American Society of Civil Engineer’s Journal of Management in Engineering, 109(4), 1983, pp.355–482.
- [3]. William C.L., and Terveer K.R., Integrated Construction Preventive Maintenance System, American Society of Civil Engineer’s Journal of Management in Engineering, 110(1), 1984, pp. 43–59.
- [4]. C.M. Popescu. Managing Construction Equipment, 1st ed. Austin, TX: C&C Consultants, 1992, pp. 4.1–4.49.
- [5]. T. Lesley and Gokhale S., Equipment Productivity, 4th edition, Chennai: CRC Press LLC, 2003 pp.82-105.