IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

CONSTRUCTION EQUIPMENT MANAGEMENT PRACTICES FOR IMPROVING LABOUR PRODUCTIVITY IN MULTI-STOREY BUILDING CONSTRUCTION PROJECTS

Ar.VIGNESHWAR KB,
M.arch - construction project management,
Dr. M.G.R. Educational and Research Institute, Chennai-95, India
(Deemed to be university)

Abstract: **The construction industry faces significant challenges in optimizing Labour productivity, particularly in multi-storey building projects. Effective construction equipment management plays a crucial role in addressing these challenges, ensuring that projects are completed on time, within budget, and to the desired quality standards. This study investigates the current practices in construction equipment management and their impact on Labour productivity in multi-storey building construction projects. Based on the findings, the paper proposes a set of best practices for construction equipment management tailored to the specific needs of multi-storey building projects. These practices include strategic equipment planning, investment in operator training programs, implementation of preventive maintenance protocols, and leveraging digital technologies for real-time equipment monitoring and management. The research concludes that a systematic approach to equipment management can lead to substantial improvements in Labour productivity, ultimately contributing to the successful delivery of multi-storey building construction projects. Recommendations for future research include exploring the impact of emerging technologies on equipment management and extending the study to different types of construction projects for broader applicability**

I.INTRODUCTION

AIM:

Efficient construction equipment management plays a pivotal role in enhancing Labour productivity, particularly in the context of multi-storey building construction projects.

This research explores contemporary practices and strategies employed in construction equipment management to optimize Labour efficiency, reduce project timelines, and enhance overall project performance.

OBJECTIVES:

Eliminate Waste: One of the central tenets of Lean methodology is the identification and elimination of waste in processes. This can involve reducing unnecessary tasks, waiting times, excess movement, and any other activities that do not add value to the final outcome.

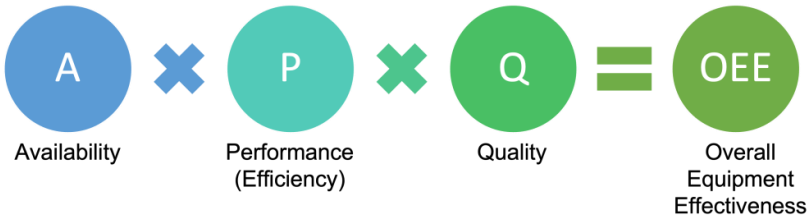
Improve Efficiency: Streamlining Labour processes through Lean techniques helps in minimizing delays, bottlenecks, and other inefficiencies. This leads to smoother operations and quicker completion of tasks.

Identify and analyses challenges and obstacles in the current construction equipment management practices.

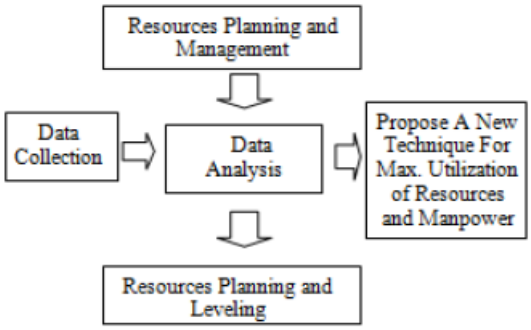
Assess how these challenges affect Labour productivity in multi-storey building construction projects.

Explore the correlation between the effectiveness of construction equipment management practices and Labour productivity.

Determine how well-managed equipment contributes to efficient and timely project completion.



METHODOLOGY:



LIMITATIONS:

Optimal Equipment Selection:

Choose construction equipment based on project needs and specifications.

Ensure equipment efficiency aligns with multi-story construction requirements.

Equipment Utilization Planning:

Develop a comprehensive plan for efficient equipment deployment.

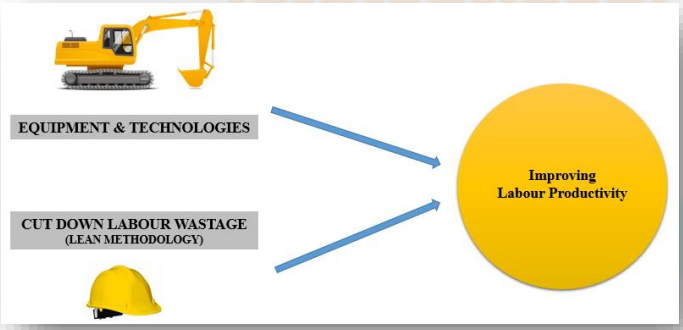
Schedule equipment usage to minimize downtime and enhance construction progress.

RESULT:

To avoid delay, the present study says to adopted new technologies and new equipment in the construction projects, it also help in reduction of construction cost

Equipment technology can help improve and control the performance of machines on your job site. When you can monitor and manage your operations, you can work to enhance construction productivity and efficiency while keeping operating costs down.

IDEOLOGY:



STANDARDS:

ISO STANDARDS - IS: 7272 (Part I) – 974

Indian standard

Recommendation for Labour output

Constants for building work

PLASTERINGLABOUR PRODUCTIVITY

vii) Plastering and Pointing					
a) 15 mm thick cement plaster to ceiling including mixing of mortar	M²	Mason Mazdoor Bhisti	0·08 0·10 0·10	— — —
b) 15 mm thick cement plaster on brick walls (exterior) including mixing of mortar	M²	Mason Mazdoor Bhisti	0·06 0·10 0·10	— — —
c) 15 mm thick cement plaster on brick walls (exterior). Under layer 10 mm cement sand plaster and top layer 5 mm, cement : Marble powder : stone grit, including mixing	M²	Mason Mazdoor Bhisti	0·15 0·15 0·15	— — —
d) 15 mm thick cement plaster on brick walls (interior) including mixing mortar	M²	Mason Mazdoor Bhisti	0·08 0·10 0·10	— — —
e) Struck pointing to brick work in cement mortar including mixing mortar	M²	Mason Mazdoor Bhisti	0·08 0·10 0·10	— — —
f) Tuck pointing to random rubble masonry in cement mortar including mixing mortar	M²	Mason Mazdoor Bhisti	0·10 0·15 0·10	— — —

BRICKWORK LABOUR PRODUCTIVITY

Sl No.	Description of Work	Unit	Labour	Recommended Constant in Days	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
iv) Brick work (Straight Walls)					
a) Brick work in walls exceeding one brick thick, in cement/ lime mortar	M³	Mason Mazdoor Bhisti	0·94 1·80 0·20	i) The constants include labour involved in scaffolding
b) Brick work in walls, one brick thick, in cement/lime mortar	M³	Mason Mazdoor Bhisti	0·25 0·40 0·10	ii) The constants could be adopted for brick work with any mix or mortar
c) Half brick walls (with or without hoop iron reinforcement) in cement mortar	M²	Mason Mazdoor Bhisti	0·12 0·20 0·07	iii) Labour for mixing mortar will be extra
d) Tile work in super-structure in cement mortar	M²	Mason Mazdoor Bhisti	1·80 1·80 0·20	— — —

Brickwork productivity ISO

PLASTERING MACHINE PRODUCTIVITY

Model NO. N2 MPS55
Cost- US DOLLAR 16000
IN INR 1136000
Vibrating Amplitude Trailer Concrete Pump
With Electric or Diesel Power
Certification ISO9001: 2000, CE, BV
Condition : New
Color : Yellow
Container : 1*20′gp
Rubber Hose : 16m

N2 MPS55 plastering machine

Sr. No.	Objective	Existing method	Automatic plastering machine
1.	No. of labors required	2 to 3	1 or 2
2.	Time required (hours)	6 to 7 (hours)	1 to 2 (hours)
3.	Material	More material required compared to plastering machine as there is more wastage of mortar.	Less material required, compared to conventional method as less material wastage is there.
4.	Cost	Comparatively high cost. (As number of labors and time required is more)	Comparatively low cost. (As no. of labors and time required is less)

plastering productivity

II JOURNAL STUDY

JOURNAL STUDY CLASSIFICATION

LEAN CONSTRUCTION JOURNALS

- Lean Labour in AEC industry: from theory to implementation.
- Implementing lean construction: stabilizing work flow.
- Sustainable management of construction Labour.
- The analysis of essential factors responsible for loss of labor productivity in building construction projects in India.
- Supply chain management and lean concept in construction a case of Ghanaian building construction industry.

LABOUR PRODUCTIVITY

- Factors affecting construction Labour productivity in Trinidad and Tobago.
- Factors influencing construction Labour productivity: an Indian case study.
- The analysis of essential factors responsible for loss of labor productivity in building construction projects in India.
- Cost and time control factors for high rise residential construction projects.
- How industrial contractors are handling skilled labor shortages in the united states

COMPARING - EQUIPMENT & LABOUR RESOURCES

- Comparison of Labour - based/light equipment and heavy equipment-based methods of construction for a typical rural road in Nigeria.
- Planning, selection and management of Labour and equipment in construction industry.
- Resource management in construction projects.
- A critical review of factors affecting manpower and equipment productivity in tall building construction projects.
- Modelling manpower and equipment productivity in tall residential building projects in developing countries.

PLASTERING MACHINE AND AUTOMATION

- The future of construction automation: technological disruption and the upcoming ubiquity of robotics.
- Development priorities and key challenges of automation and robotics in high-rise building construction.
- Design of automatic wall plastering machine.

OVERALL JOURNAL INFERENCE

LEAN construction based journals:

LEAN CONSTRUCTION offers a systematic approach to improving construction projects by minimizing waste, maximizing value, and fostering collaboration among all stakeholders. By implementing lean principles, the construction industry can create more efficient, cost-effective, and sustainable projects that deliver superior results for clients, contractors, and the entire construction ecosystem.

LEAN LABOUR

The implementation of the short-interval scheduling (SIS) method proves advantageous. The adoption of innovative construction systems such as the bautex wall system can prove transformative. This system emphasizes reduced material consumption, a streamlined process with fewer steps, decreased labor requirements, faster project timelines, and a simplified overall approach.

LABOUR PRODUCTIVITY based journals

The survey highlighted the critical role of timely material availability in impacting construction labor productivity.

The study underscored the need for effective project management, collaboration, and attention to motivational aspects to ensure optimal productivity. The distinct viewpoints of different participant groups illustrated the complex interplay of factors that contribute to construction.

COMPARING equipment and Labour resources based journals:

Cost Considerations and Construction Methods:

The EBM (presumably referring to "Local Building Materials") approach is significantly more cost-effective compared to the LBM (presumably referring to "External Building Materials") method.

This inference highlights the importance of finding construction approaches that align with the economic realities of a country, taking into account factors such as equipment availability and import costs.

III. CASE STUDY

CASE STUDY 1

EQUIPMENT PRODUCTIVITY ANALYSIS

(AUTOMATIC RENDERING PLASTERING MACHINE)

CASE STUDY 2

LABOUR PRODUCTIVITY ANALYSIS

(MANUAL PLASTERING)

CASE STIDY-1
EQUIPMENT PRODUCTIVITY ANALYSIS
(AUTOMATIC RENDERING PLASTERING MACHINE)

MANUAL PLASTERING
1team (3 masons + 3 helpers)
= 250 Sq.ft/day.

250 Sq.ft x 10 teams (30 masons + 30 helpers)
= 2500 Sq.ft/day.

2500Sq.ft x 90 days
= 2, 25,000 Sq.ft.

MACHINE PLASTERING
1team (2 Skilled masons + 2 helpers)
= 1000 Sq.ft/day.

1000 Sq.ft x 8 teams (16 masons + 16 helpers)
= 8000 Sq.ft/day

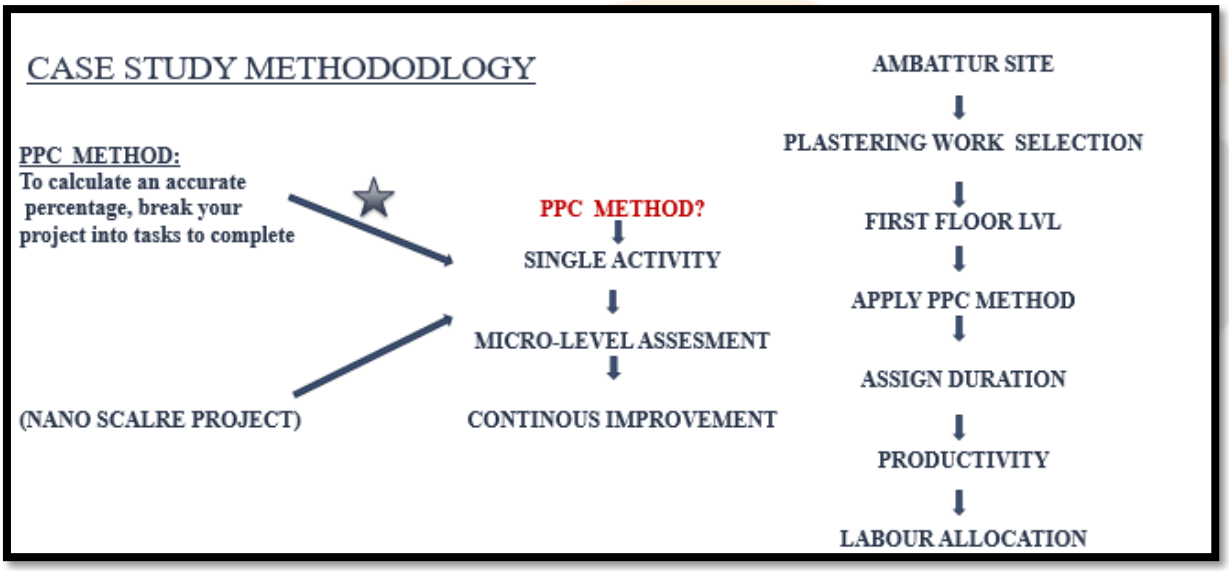
8000Sq.ft x 90 days
= 2, 40,000 Sq.ft

PROJECT OVERVIEW

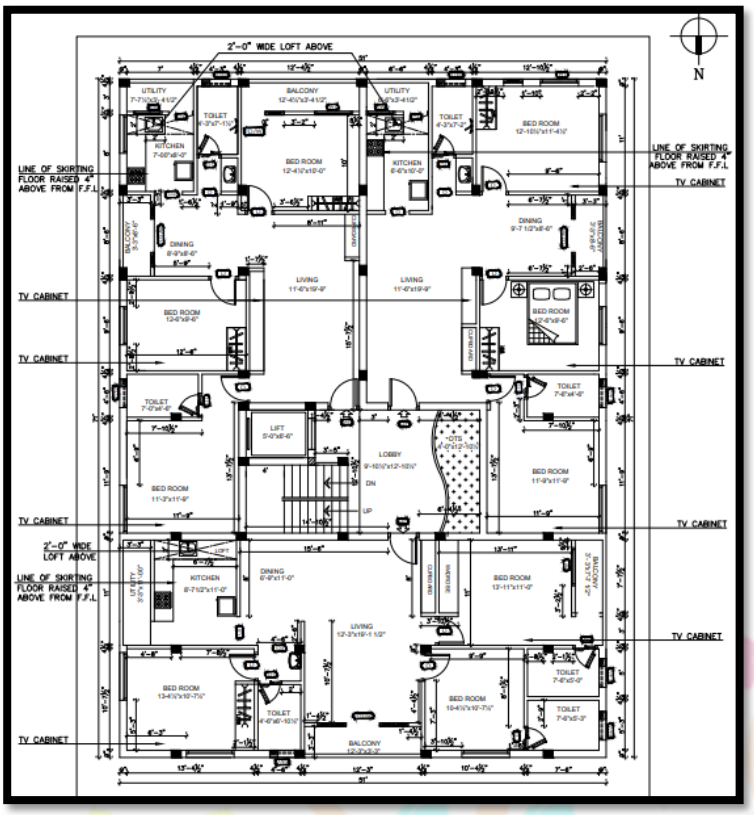
Project typology : Residential building
Location : 25th avenue,
Banu nagar,
Ambattur.
Total floors : G +5 floors
Total buildup : 18,105 sq.ft (1682.01 sq.mt)
Builders name : Aravind foundation
(Builders & flat promoters)

Ambattur site image

METHODOLOGY



FLOOR PLAN



FIRST FLOOR PLAN (TYPICAL FLOOR PLAN)

Project area overview

TOTAL BUILTUP AREA	**18,105 Sq.ft**
SINGLE FLOOR AREA (TYPICAL FLOOR AREA)	**3,621 Sq.ft / floor**
PLASTERING THICKNESS	**12mm THK**
TOTAL INNER WALL PLASTERING AREA PER FLOOR	**9804.05 Sq.ft / floor**
TOTAL NO. OF FLOORS	**G+5 FLOORS**
TOTAL INNER WALL PLASTERING AREA PER FLOOR	**49020.25 Sq.ft**

DATA ANALYSIS

LABOUR ALLOCATION

Description of work	Unit	Area	Duration	Productivity	Labour allocation
Internal wall plastering	Sq.ft	9804.05 Sq.ft / floor	10 days/ floor	980.04 Sq.ft/day	2 skilled Mason + 1 helper + 1 bhisthi

RATE ANALYSIS

Area covered / day	Labour allocation	Labour cost
980.04 Sq.ft / day	2 skilled mason + 1 helper + 1 bhisthi	Rs.2,000 + Rs.700 + Rs. 600
	TOTAL	Rs.3,300 / day

*** Labour rate analysis & Allocation productivity**
Source: Aravind foundation (Builders and flat promoters)

MACHINE SERVICE RATE ANALYSIS

EQUIPMENT NAME	AUTOMATIC RENDERING PLASTERING MACHINE (WINDRA MACHINES)
RATE OF MACHINE	Rs.4,80,0000/-
ELECTRICITY CONSUMPTION	3 - 3.5 UNITS / day (Rs.28.00 / day)
SERVICE CHARGES	
BELT SERVICE (For every 4,00,000 Sq.ft)	Rs.22,000 - 25,000/-
BLADE SERVICE (For every 4,00,000 Sq.ft)	Rs.23,000 - 25,000/-
ROPE SERVICE (For every 50,000 Sq.ft)	Rs.2,000/-

RATE ANALYSIS FOR INTERNAL WALL PLASTERING - 12mm THK

TOTAL AREA COVERED / day	980.04 Sq.ft / day [Approx. 1000 Sq.ft / day]
LABOUR ALLOCATION	2 Skilled labour + 1 helper + 1 bhisthi
LABOUR COST	Rs.3300/day
EQUIPMENT ALLOCATION	AUTOMATIC RENDERING PLASTERING MACHINE (WINDRA MACHINES)
CURRENT UNIT COST	4 Units / day Rs.28/day
TOTAL COST FOR MACHINE PLASTERING PER DAY	Rs. 3328 /day

CAPEX AMOUNT CALCULATION

COST OF MACHINE : 4, 80,000.00
INTEREST PERCENTAGE : 12%
DURATION OF LOAN : 24 months
TOTAL COST OF INVESTMENT
(INCLUSIVE INTEREST RATE) : 5, 95,200.00
PER MONTH INTEREST COST : 24,800.00
PER DAY (24 WORKING DAYS) : 1033.00
LABOUR COST : 3328.00
INVESTMENT PROFIT (RENT PER DAY)
: 2000.00
TOTAL COST PER DAY : 6361.00

CASE STUDY-2

LABOUR PRODUCTIVITY ANALYSIS
(MANUAL PLASTERING)

PROJECT OVERVIEW
PROJECT TYPOLOGY
IT BUILDING (OFFICE)

LOCATION :
PATTABIRAM VILLAGE,
AVADI TALUK

TOTAL FLOORS
G+21 FLOORS

TOTAL BUILTUP
5.57lakh sq. ft

ENGINEERING CONSULTANT:
Taamaesek Engineering Consortium, Mylapore, Chennai - 600 004.

CONTARACTOR TEAM:
V.SATHYAMOORTHY & CO (VS&N CO), NAMMAKAL.

LABOUR'S ACTUAL PRODUCTIVITY

DESCRIPTION OF WORK	AMOUNT OF WORK	LABOUR PRODUCTIVITY
INTERNAL PLASTERING	12-15 Sqm (130- 161.4 Sq.ft)	1mason + 1helper (900+700)

Labour actual productivity

LABOUR CHARGES FOR INTERNAL PLASTERING (SOURCE: VS&CO)

DESCRIPTION	UNITS		Price / unit	Total price
LABOUR CHARGES FOR 12MM THK PLASTERING	Sq.ft	10.76	Rs.15.00	Rs.161.46
LABOUR CHARGES FOR RCC HACKING	Sq.ft	2.50	Rs.2.00	Rs.5.00
MESH – SUPPLY & LAYING	Rm	1.25	Rs.72.18	Rs.90.23
INTERNAL SCAFFOLDING FIXING	Sq.ft	4.31	Rs.2.00	Rs.8.61
INTERNAL SCAFFOLDING REMOVING	Sq.ft	4.31	Rs.1.50	Rs.6.46
TOTAL(1sq.m)				**Rs.271.76**

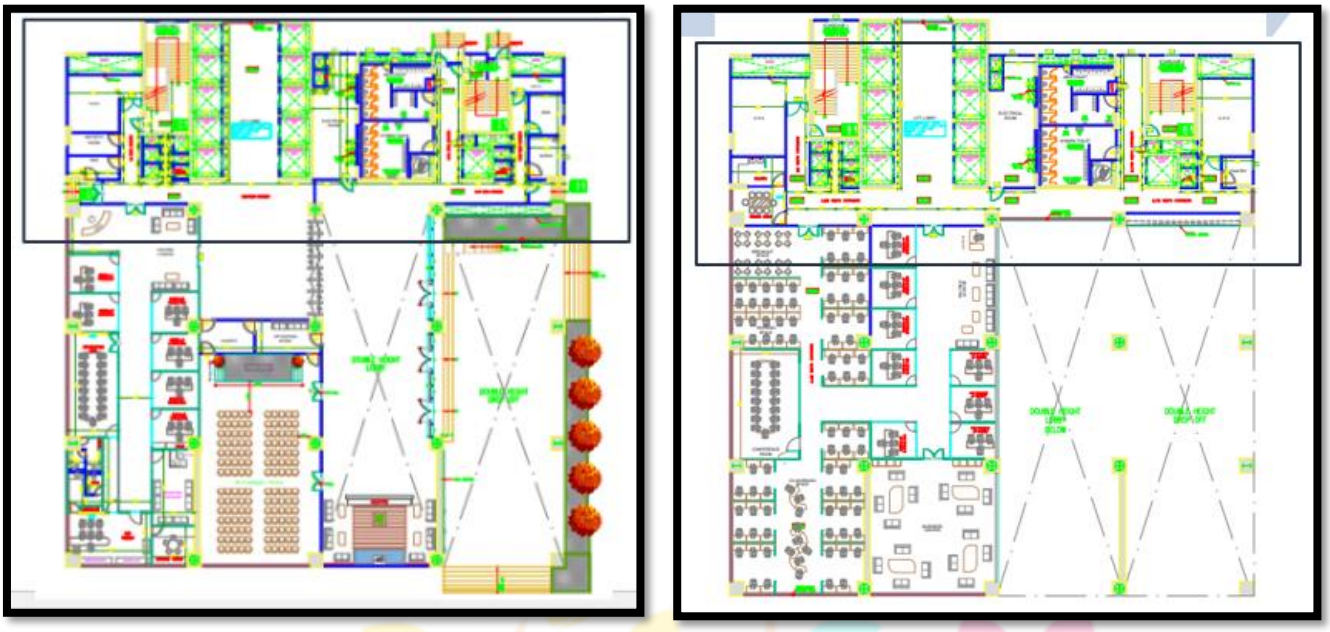
Labour rate per square meter

DATA COLLECTION
PRODUCTIVITY CALCULATION

TOTAL(1sq.m) - Rs.271.76
Convert it for 1 Sq.ft

RATE / Sq.m → 271.76 / Sq.m → Rs.25.25/Sq.ft
10.76 sq.ft → 10.76 sq.ft

TIDEL PARK PLAN



Ground floor plan &first floor plan (typical)

PRODUCTIVITY

DESCRIPTION OF WORK	TOTAL AREA	DURATION	PRODUCTIVITY
INTERNAL WALL PLASTERING	25,840.06Sq.ft / floor	15 days / floor	1772.6 sq.ft/day

LABOUR ALLOCATION

LABOUR FREQUENCY ⟶ 11 set (1 mason + 1 helper)

DATA ANALYSIS

LABOUR ALLOCATION & CALCULATION

LABOUR RATE = 11 x (Rs.900 + Rs.700)
= 11 x (Rs.1600)
= Rs. 17,600/ day.

COMPARITIVE ANALYSIS

COMPARITIVE ANALYSIS for OVERALL PROJECT

PARAMETER	LIVE CASE STUDY-1 (MACHINE PLASTERING)	LIVE CASE STUDY-2 (MANUAL PLASTERING)
PROJECT TITLE	Mr.SOUNDARAPANDIYAN's Residence	TIDEL PARK – IT Office
LOCATION	AMBATTUR, Chennai	PATTABIRAM, Chennai
AREA COVERED	18,105 Sq.ft	5.57 lakhs Sq.ft
TYPE	Residential Building	Office Building
PRODUCTIVITY	1000 Sq.ft/day	1772.6 sq.ft/day
NO. OF LABOURS	2 SKILLED MASONS + 1 HELPER + 1 BHISTI / day	11 SET (1 MASON + 1 HELPER)
COST COVERED / day	Rs.6631/ day	Rs.17,600 / day
TIME CONSUMED	9804.05 Sq.ft in 10 DAYS	25,840.06 Sq.ft in 15 DAYS
MACHINE	AUTOMATIC-RENDERING PLASTERING MACHINE	-
UNIT CONSUMED	3 – 3.5 units	-

NO .OF FLOORS	G+5 FLOORS	G+21 FLOORS

COMPARITIVE ANALYSIS for 1000 SQUARE FEET

IV. PROPOSAL CASE STUDY
LIVE CASE STUDY (RESULT ANALYSIS)
PRODUCTIVITY?
EQUIPMENT vs. LABOUR.

PARAMETER	MACHINE PLASTERING	MANUAL PLASTERING
PROJECT TITLE	Mr.SOUNDARAPANDIYAN's Residence	TIDEL PARK – IT Office
LOCATION	AMBATTUR, Chennai	PATTABIRAM, Chennai
PLASTERING AREA	1000 Sq.ft	1000 Sq.ft
NO.OF DAYS CONSUMED	1 Day	1 Day
NO.OF LABOURS	2 skilled Mason + 1 helper + 1 bhisthi.	6 SET (1 mason + 1 helper)
PERCENTAGE OF WORK DONE	100%	56.4%
UNIT CONSUMED	3 - 3.5 units	-
DIFFERNCE IN LABOUR COST	Rs. 6361/-	Rs.11,200/-

PROJECT OVERVIEW
PROJECT TYPOLOGY :
RESIDENTIAL BUILDING (DURGA ELEGANCE)
LOCATION :
SHASTRI NAGAR 8TH CROSS STREET, SHASTRI NAGAR, ADYAR,
CHENNAI SOUTH, CHENNAI
TOTAL FLOORS
STILT + 6 FLOORS
TOTAL BUILTUP
21,195 SQ.FT

ARCHITECTURAL CONSULTANT:
C R RAJU ASSOCIATES, SAIDAPET, CHENNAI - 600 015.

ENGINEERING & CONTRACTORS TEAM:
DHURGA CONSTRUCTION COMPANY,
NO.2, 5TH LANE, INDIRA NAGAR, CHENNAI -20

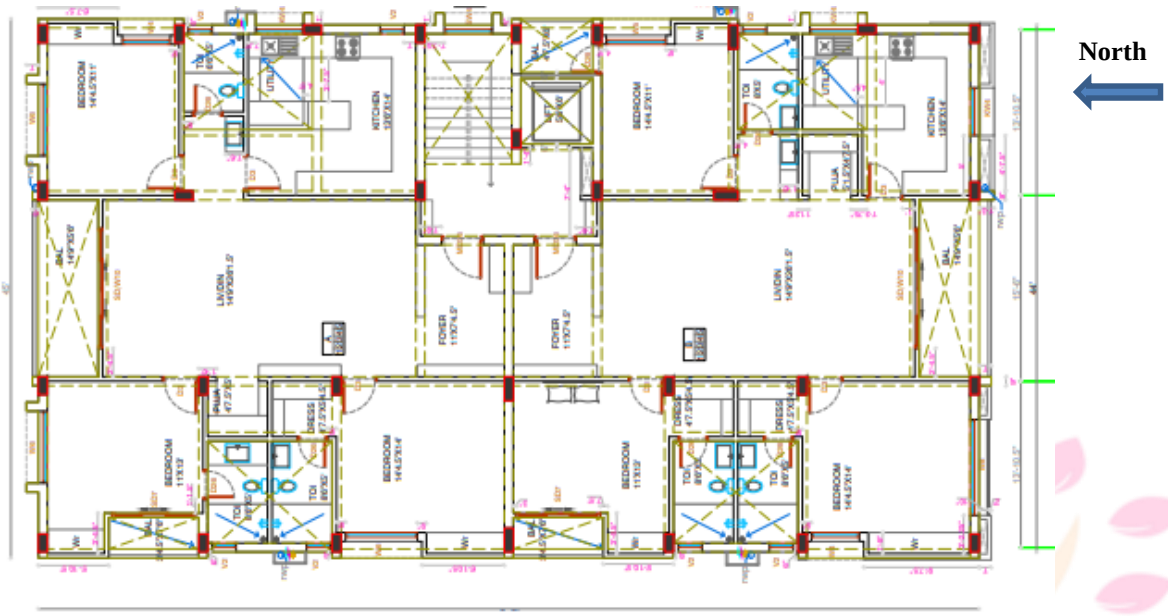
LABOUR PRODUCTIVITY

Labour productivity

DATA COLLECTION

FLOOR PLAN (TYPICAL FLOOR PLAN-5 FLOORS)

AREA – 78'6" X 45'0" = 3532.5 SQ.FT



PRODUCTIVITY

DESCRIPTION OF WORK	TOTAL AREA	DURATION	PRODUCTIVITY
INTERNAL WALL PLASTERING	3424 Sq.ft / floor	7 days / floor	489.14 sq.ft/day

LABOUR ALLOCATION

LABOUR FREQUENCY ⟶ 4 set (1 mason + 1 helper)

DATA ANALYSIS

RATE CALCULATION

LABOUR FREQUENCY = 4 set (1 mason + 1 Helper) / day

LABOUR RATE = 4 x (Rs.900 + Rs.700)

= 4 x (Rs.1600)

= Rs. 6,400/ day.

Description of Labour works

- Labour charges for 12mm thk plastering
- Labour charges for rcc hacking
- Mesh – supply & laying
- Internal scaffolding fixing
- Internal scaffolding removing

MANUAL PLASTERING RATE ANALYSIS

Plastering area per floor : 3424 sq.ft

Duration : 7 days

Per day work (plastering) cost : Rs 6400.00

Total cost to finish internal

Wall plastering per floor : Rs.44, 800.00

Total building
Internal wall plastering
Cost (5 floors) : Rs.2, 24,000.00

Total duration (to complete) : 35 days

MACHINE PLASTERING CALCULATION:

TOTAL BUILTUP AREA	**21,195Sq.ft**
SINGLE FLOOR AREA (TYPICAL FLOOR AREA)	**3532.5 Sq.ft/ floor**
PLASTERING THICKNESS	**12mm THK**
TOTAL INNER WALL PLASTERING AREA PER FLOOR	**3424.00 Sq.ft / floor**
TOTAL NO. OF FLOORS	**G+5 FLOORS**
TOTAL INNER WALL PLASTERING	**17,120 Sq.ft**

PRODUCTIVITY TABLE

DESCRIPTION OF WORK	TOTAL AREA	DURATION	PRODUCTIVITY
INTERNAL WALL PLASTERING	**3424 Sq.ft / floor**	**3.5 days / floor**	**978.2 sq.ft/day**

RESOURCE TABLE

MACHINE / EQUIPMENT	AUTOMATIC WALL PLASTERING MACHINE
LABOUR FREQUENCY	2 SKILLED MASONS + 1 HELPER + 1 BHISTI / day

LABOUR ALLOCATION

Description of work	Unit	Area	Duration	Productivity	Labour allocation
Internal wall plastering	Sq.ft	3424 Sq.ft / floor	3.5 days/ floor	978.2 Sq.ft/day	2 skilled Mason + 1 helper + 1 bhisthi

RATE ANALYSIS

Area covered / day	Labour allocation	Labour cost
980.04 Sq.ft / day	2 skilled mason + 1 helper + 1 bhisthi	Rs.2,000 + Rs.700 + Rs. 600
	TOTAL	Rs.3,300 / day

CAPEX AMOUNT CALCULATION

Cost of machine : 4, 80,000.00
Interest percentage : 12%
Duration of loan : 24 months
Total cost of investment
(Inclusive interest rate) : 5, 95,200.00
Per month interest cost : 24,800.00
Per day (24 working days) : 1033.00
Labour cost : 3328.00
Investment profit (rent per day) : 2000.00
Total cost per day : 6361.00

MACHINE PLASTERING RATE CALCULATION

Plastering area per floor : 3424 sq.ft
Duration per floor : 3.5 days

Per day work (plastering) cost : Rs.6361.00

Total cost to finish internal
Wall plastering per floor : Rs.22, 263.50

Total building
Internal wall plastering
Cost (5 floors) : Rs.1, 11,315.00

Total duration : 15 days

COMPARITIVE ANALYSIS

PARAMETER	MACHINE PLASTERING	MANUAL PLASTERING
Man power frequency & total no. Of days to complete work	Low & 4 days	Comparatively high & 7 days
Percentage of work completed	**25%**	**14.28%**
Plastering area	3424 sq.ft	3424 sq.ft
Amount of area	856 sq.ft	489.14 sq.ft
NO.OF LABOURS per day	2 skilled Mason + 1 helper + 1 bhisthi .= Rs.3300.00	4 SET (1 mason + 1 helper) = Rs.6400
Equipment rent (investment profit)	3033 per day	
Unit consumed	3 - 3.5 units	
Difference in labour cost	**Rs.6361.00**	**Rs.6400**

Comparative analysis

COMPARITIVE ANALYSIS for 3424(approx. 3500) SQUARE FEET

PARAMETER	MACHINE PLASTERING	MANUAL PLASTERING
Compaction pressure rate	High - **8bar/115psi**	Comparatively low
Plastering setting time	Low	High
Plastering area	3424 sq.ft	3424 sq.ft
No.of days consumed	4 days	7 days
NO.OF LABOURS per day	2 skilled Mason + 1 helper + 1 bhisthi.	4 SET (1 mason + 1 helper)
Equipment (investment profit)	3033 per day	
Unit consumed	3 - 3.5 units	
Difference in labour cost	**Rs.22,263 /-**	**Rs.44,800/-**

COST DIFFERENCE IS ABOUT Rs.22, 537/-

PAYBACK ANALYSIS (RESULT)

Total rate of machine : Rs.4, 80,000.00
Per day machine rent rate : Rs.3033.00
Total no .of sq.ft covered
(avg- 900sq.ft/day) : 2, 16,000 sq.ft
Total no. Of machine working
Days (20 days/month) : 240 days/year
Total turnover per year : Rs.7, 27,920.00
Yearly service charge (deduction): Rs. 52,000.00
Yearly interest cost (12%-deduction):Rs.2, 97,600.00
Total profit by machine : Rs.3, 78,320.00
Payback period : 15.2 months

V. CONSTRAINTS IN PLASTERING

SOURCES:
ARAVIND FOUNDATION
(BUILDERS & FLAT PROMOTERS)

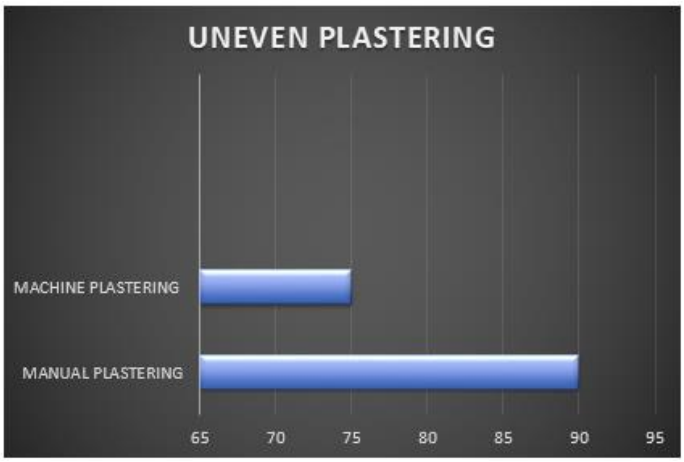
MR.GOKUL (SITE ENGINEER)
V.SATHYAMOORTHY & CO - VS. & CO.

MR.DURAIRAJ (SENIOR ENGINEER)
DEC. INFRA

MR.RAMPRAKASH (QUALITY ENGINEER)
PSN FAB TECH

MR.MAGESHWARAN
(MANUFACTURER &TRAINER)

UNEVEN PLASTERING



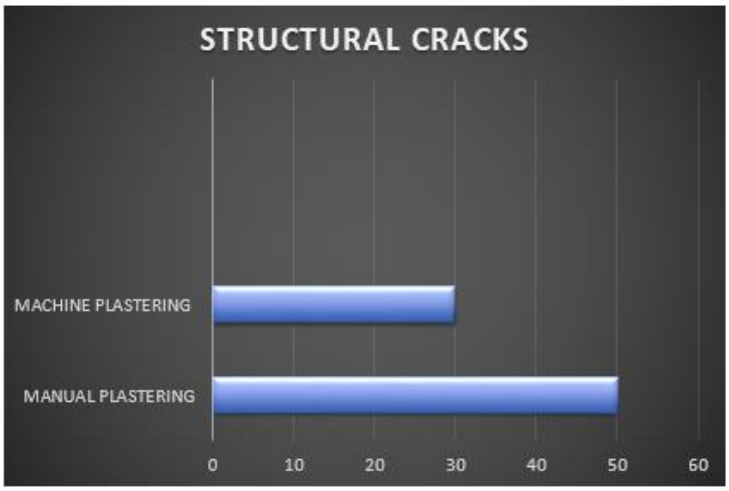
REASON:
Because of uneven block surface.
Plastering through machine plaster becomes uneven

REMEDY:
Skim coat: for minor unevenness, a skim coat can often suffice. Mix plaster to a creamy consistency and apply a thin layer over the uneven area, feathering the edges to blend with the surrounding surface**.**

GRINNING RATE IN PLASTERIN

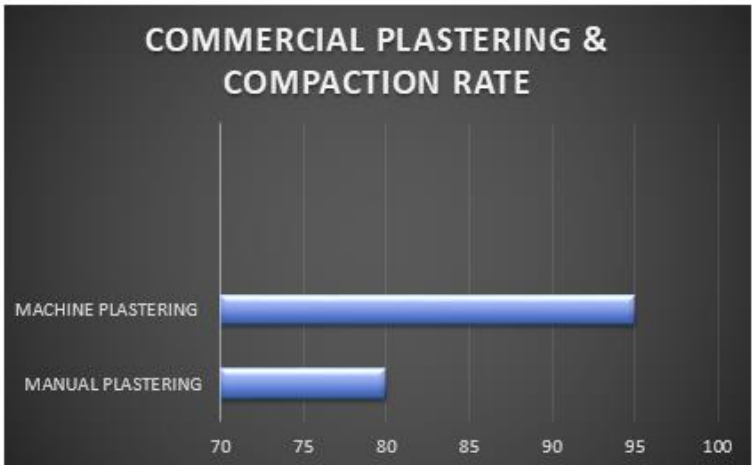
REMEDY:
Sand and Smooth: Once the patched or plastered area is dry, sand it down with fine-grit sandpaper to achieve a smooth finish. Take care not to over-sand and create new unevenness.

STRUCTURAL CRACKS



REMEDY:
Reinforcement: For larger cracks or areas prone to movement, consider using fiberglass mesh tape or other reinforcement materials. Apply the tape over the filled crack, pressing it into the wet filler to ensure a strong bond.

COMMERCIAL PLASTERING &
COMPACTION RATE



MACHINE PLASTERING (compaction):
Due to high compaction rate setting time of plastering is comparatively earlier than manual plastering.
High stability than manual plastering
Over pressurization apply between wall and mortar gives high bonding strength in plaster
COMMERCIAL PLASTERING:
Automated plastering machines can work much faster than manual plastering, covering larger areas in less time. This increased efficiency can result in reduced labor costs and shorter project timelines.
RESULT SHOWS 10.2 % works are completed earlier than manual plastering

VI. SWOT ANALYSIS

SWOT ANALYSIS FOR MACHINE PLASTERING

STRENGHT
Efficiency: Automation machines can plaster larger areas in less time compared to manual methods, leading to increased productivity and cost savings.
Accuracy: These machines can be programmed to apply plaster at precise thicknesses, ensuring quality control and meeting project specifications.
WEAKNESS
Initial Investment: Automation machines can be expensive to purchase or lease, requiring a significant upfront investment for construction companies.
Maintenance: Automated machines require regular maintenance and calibration to ensure optimal performance, which can add to operational costs and downtime.
OPPORTUNITIES
Market Growth: With the increasing demand for faster and more efficient construction methods, there is a growing market opportunity for automation in plastering technology.
Integration with BIM: Integration (BIM) software can enhance coordination and efficiency in construction projects, offering new opportunities for automation in plastering
THREATS
Resistance to Change: Traditional construction practices may hinder the adoption of automation in plastering, particularly among stakeholders who are resistant to technological change.
Economic Factors: fluctuations in construction activity could impact the demand for automation machine plastering solutions, affecting market growth and investment.

SWOT ANALYSIS FOR MANUAL PLASTERING

STRENGHT
Skill and Craftsmanship: Manual plastering relies on the skill and expertise of workers, allowing for greater attention to detail and customization to meet specific design requirements.
Flexibility: Manual plastering techniques can adapt to various surface types, shapes, and architectural features
WEAKNESS
Labor Intensive: Manual plastering is labor-intensive and time-consuming, leading to slower project timelines and potentially higher labor costs compared to automation
Limited Scalability: Manual plastering may not be scalable for large-scale construction projects or those with tight deadlines.

OPPORTUNITIES
Specialization and Customization: Manual plastering allows for specialization in niche markets or the provision of customized finishes tailored to individual client preferences.
Heritage and Restoration: Manual plastering techniques are often valued for their authenticity and heritage, presenting opportunities in restoration projects or historic preservation efforts.

THREATS

Competition from Automation: The rise of automation in plastering technology poses a threat to manual plastering services, particularly in markets where speed and efficiency are prioritized over craftsmanship.

Skill Shortages: Shortages of skilled plastering workers could limit the availability of manual plastering services, leading to increased competition for skilled labor and potentially higher labor costs

VII. CONCLUSION & RECOMMENDATION:

INFERENCE: Machine plastering offers numerous advantages in terms of productivity, quality, cost efficiency, safety, versatility, working conditions, environmental impact, and scalability. These benefits make it a preferred choice for modern construction projects, especially in the context of multi-storey buildings where efficiency and quality are paramount. By adopting machine plastering, construction firms can achieve superior results, enhance worker safety, and meet project deadlines more effectively.

RESULT Shows Machine plastering 10.2 % works are completed earlier than Manual plastering

RECOMMENDATION:

Training and Skill Development

Operator Training: Provide comprehensive training for machine operators to ensure they are proficient in using the equipment. This includes understanding machine settings, maintenance procedures, and troubleshooting.

Continuous Learning: Encourage ongoing training and skill development to keep operators updated on the latest techniques and best practices in machine plastering.

Efficient Project Planning and Scheduling

Detailed Planning: Develop a detailed plastering plan that outlines the sequence of work, areas to be covered, and timelines. This helps in coordinating with other trades and ensuring that plastering progresses smoothly.

Scheduling: Schedule plastering activities to minimize downtime and ensure that machines are utilized efficiently. Avoid scheduling conflicts with other construction activities that may hinder plastering work.

Maintenance and Upkeep of Equipment

Regular Maintenance: Implement a routine maintenance schedule to keep machines in optimal working condition. Regularly check for wear and tear, clean equipment after use, and replace parts as needed.

Preventive Maintenance

Conduct preventive maintenance to address potential issues before they lead to breakdowns. This includes inspecting hoses, nozzles, and other critical components.

ACKNOWLEDGEMENT

At the outset, I express my gratitude to the Lord for giving me the strength and good health to complete my thesis.

I would like to acknowledge my sincere thanks to my institution
Dr.M.G.R Educational and Research institute for the opportunity and encouragement throughout the thesis project.
I am very thankful to the Dean **Dr. Swetha Madhusudanan** and the Head of the Department **Ar. Radhika**, for providing me necessary support and guidance at right time during the progressive reviews.

I express my sincere and deep sense of gratitude to my thesis guides **Addt'nl HOD Prof. Ar. Z. Fathima Taskeen, Dy. HOD Prof. Ar. K. Indra Priya**, and **Prof. Ar. Vidya Naveen** and External Reviewer **Mr. Simon for** their valuable guidance, suggestions and constant encouragement for successfully completing my thesis work.

My heartfelt and sincere thanks to **Mr. Mr.MAGESHWARAN** – Plastering machine manufacturer(PSN FAB TECH), Chennai, **Mr.RAMPRAKASH** – CTRLS data Centre project, Chennai, **Mr. PUSHPARAJ – RESIDENTIAL BUILDING** Project, ,**Eng.BALASUBRAMANIAN.P - RAJAPATHI STAR CONSTRUCTION** ,TRICHY. For helping me through the case studies for the dissertation project with relevant information and assistance.

Finally, I want to express my sincere gratitude to my parents, family members, friends, seniors and juniors who stood beside me as pillars of support and providing their continuous motivation.

REFERENCES

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=DESIGN+OF+AUTOMATIC+WALL+PLASTERING+MACHINE&btnG=

https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=PLASTERING+MACHINE+&oq=

S Bhat, H Nishchith, UR Akshay Kumar… - Journal of Mechanical …, 2017 - academia.edu

International journal of engineering sciences & research technology design of automatic wall plastering machine
AN Askar, LP Raut - Int. J. Eng. Sci. Res. Technol. Des., 2017 - academia.edu

Plastering wall machine
A Al-Hamad, R Khraishi, S Yonis - 2016 - repository.najah.edu