

Identifying Critical Issues in Construction Industry Using Pareto Analysis

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Abstract- The small construction companies are experiencing several challenges. For example, improper resource management, lower productivity due to unorganized activities and inefficient labour productivity. These challenges result in higher cost, wastage of resources, inferior quality, among others. However, with the implementation of Total Quality Management (TQM) principles, one can mitigate these effects to achieve higher productivity. The paper focuses on 'Factual Approach to Decision Making' which is one of the eight principles of TQM. Five major factors affecting the construction industry were identified through a literature survey. These are Resource Wastage, Material Wastage, Casting Problems, Inadequate Safety Practices, Financial Hindrances. With this in focus, a survey was conducted in a construction company to identify the most critical problem amongst these. Analysis of the survey results was performed using Pareto Analysis which is a statistical technique for decision making. This resulted in the principle finding that two problems, Material Wastage and Financial hindrances are the major obstacles in the progress of the surveyed company. The research effort identified these causes to be a result of lack of coordination among the members, inadequate labour training and lack of commitment toward TQM.

Keywords- Total Quality Management (TQM), Pareto Analysis

I. INTRODUCTION

The primary barrier to management system implementation success seems to be the nature of the construction process: the projects are often very large, labour intensive and seldom situated in the same location; the workforce tends to be transient; and demand fluctuates, subject to the client's perception of the value of the construction project. The nature of construction is a complex system in which several participants, each with their perspectives and interests, are brought together to complete a project plan that typically changes several times during construction, while each tries to minimize the effects of weather, occupation hazards, schedule delays, and building defects. The many changes can lead to delays in completion of the project, complaints instead of a cooperative relationship

between parties involved, with claims by different parties as a result.

II. CASESTUDY

The survey was conducted in a medium-sized construction firm situated in Pimpri, Pune.

A. Site Details

Table I
Survey Firm-A

	Sr. No.	Description	Details
A	1	Construction Firm	Shri Shankeshwar Developers
	2	Location	Pimpri, Pune
	3	Site	Shankeshwar Darshan
	4	No. of Employees	30-40
	5	Survey Date	28-September-2019

Table II
Survey Firm-B

	Sr. No.	Description	Details
B	1	Construction Firm	Siddhivinayak Developers
	2	Location	Ravet, Pune
	3	Site	Neelay
	4	No. of Employees	30-40
	5	Survey Date	23-October-2019

B. Survey Analysis

Distribute survey questioner in the construction firm to obtain the data to analyze it. This data was used to assess the most critical factor which affects the operation of construction activity by using Pareto Analysis is also known as 80/20 Analysis.

i. Position infirm

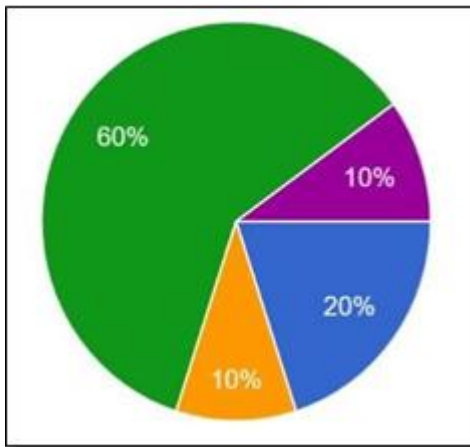


Fig. I Staff Position.

Blue-Owner; Yellow- Project Manager
Green- Site Engineer; Purple- Labour

ii. Resource Wastage

Table III
Pareto Analysis-Resource Wastage

Resource Wastage	Points Allotted	Cum. Points	Cum. %
Worker's Mistake	84	84	35
Power Wastage	82	166	69
Water Wastage	74	240	100



Fig. II- Pareto Chart Resource Wastage

iii. Material Wastage

Table III
Pareto Analysis-Material Wastage

Material Wastage	Points Allotted	Cum. Points	Cum. %
Worker's Mistake	70	70	20
Improper Inventory Man	81	151	43
Unaccounted Damage	68	219	63
Project Changes	72	291	83
Shuttering Issues	59	350	100



Fig. III Pareto Chart-Material

iv. Imprecise Casting

Table V
Pareto Analysis- Imprecise Casting

Imprecise Casting	Points Allotted	Cum. Points	Cum. %
Beam & Column	63	63	21
Reinforcement	75	138	46
Worker's Issues	82	220	73
Formwork Issues	80	300	100

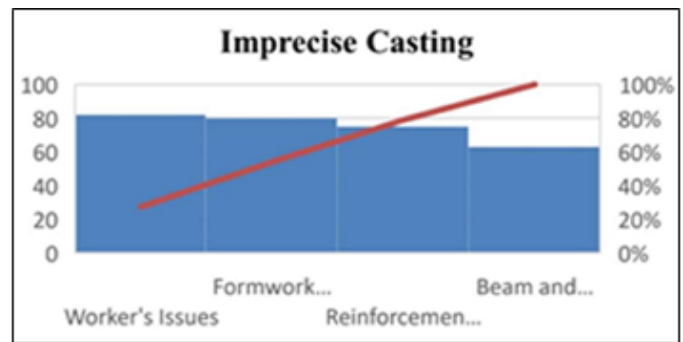


Fig. III- Pareto Chart Imprecise Wastage

v. Poor Safety On-Site

Table VI
Pareto Analysis-Poor Safety On-Site

Poor Safety Onsite	Points Allotted	Cum. Points	Cum. %
Improper Management	69	69	20
Improper Equipment	69	138	39
Careless Attitude	79	217	62
Insufficient knowledge	79	296	85
Unsafe Site Conditions	54	350	100



Fig. V Pareto Chart- Poor Safety On-Site

vi. Improper Utilization of Money

Table VII
Pareto Analysis-Improper Usage of Money

Improper Usage of Money	Points Allotted	Cum. Points	Cum. %
Inaccurate Project Estimate	79	79	20
Project Design Error	79	158	41
Not Planning Change	50	208	53
Administration Error	64	272	70
Poor Site Management	62	334	86
Incompetent Team	56	390	100

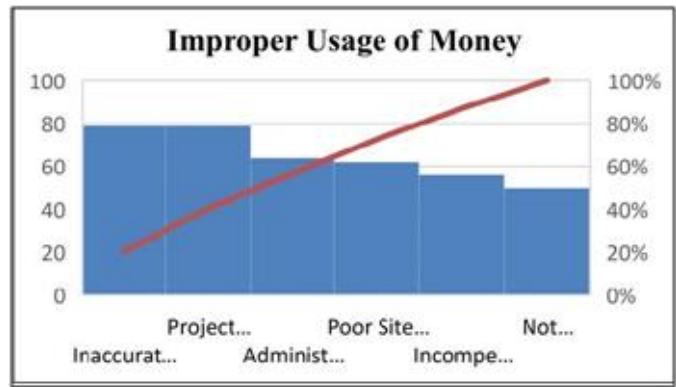


Fig. VI Pareto Chart- Improper Usage of Money

vii. Major Effect

The major effects which occur on the site can be shown with the help of Pareto Chart for all five effects.

Table VIII
Pareto Analysis-Overall Effects

Effects	Points Allotted	Cum. Points	Cum. %
Resource Wastage	68	68	19
Material Wastage	77	145	41
Imprecise Casting	64	209	60
Poor Safety On-site	70	279	80
Wastage of Money	71	350	100

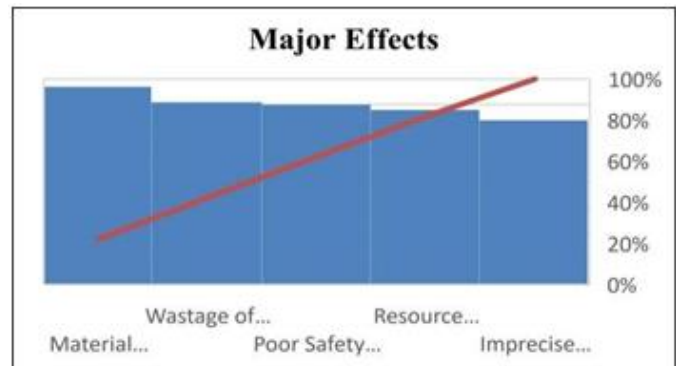


Fig. VII- Pareto Chart- Major Effects

III. RESULTS

Table IX Summary of Results

EFFECTS	CORRESPONDING CAUSES
Improper Usage of Money	Inaccurate Project Estimate
	Project Design Error
	Administration Error
	Not Planning Change
	Poor Site Management
Material Wastage	Incompetent Team
	Worker's Mistake
	Improper Inventory Management
	Project Changes
	Unaccounted Damage
Imprecise Casting	Shuttering Issues
	Worker's Issues
	Formwork Issues
	Beam and Column Issues
Poor Safety Onsite	Reinforcement Issues
	Improper Management
	Careless Attitude
	Insufficient knowledge
	Improper Equipment
Resource Wastage	Unsafe Site Conditions
	Worker's Mistake
	Power Wastage
	Water Wastage

From the above analysis, the major effects for the problems on the chosen sites can be found to be Material Wastage and Improper Usage of Money. The major reasons for improper usage of money can be found out to be In accurate project estimates, Project design errors, administration error, whereas the major causes for material wastage were worker's mistake, improper inventory management and frequent project changes.

IV. CONCLUSION

The principles of TQM should be applied beyond management levels and include workers on construction sites. These workers must be empowered, involved, and trained in problem-solving. Companies need to work on improving working relationships in the same way that they do for their external customers. Through effective communication and improved project, coordination workers must be motivated to improve their work. Contractors must move away from their obsession with the bottom line. They need to bind all parties together including subcontractors by mutually set and internalized goals. However, any attempt to bring about meaningful change concerning implementing TQM on construction sites will only succeed if top or senior management commit and involve themselves in the TQM process.

This research determined those success factors necessary for the implementation of TQM during various phases of project planning, design and construction in the construction firm situated in Pune A factor analysis was carried out on the collected data, and the Pareto principle was utilized to identify

Five critical success factors with twenty-three sub-critical success factors of TQM. It was shown that continuous improvement is the most critical factor for the successful implementation of TQM. The results were validated to determine whether there was a degree of agreement on the levels for each of the factors affecting TQM implementation among the owner, contractor, and consultant; it was found that there was a significant degree of agreement among them. In conclusion, the present study achieved the following objectives:

- Critical success factors affecting quality during project phases were defined.
- The relative weighting of the impacting factors was also derived to provide guidelines for implementing total quality management.

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International Journal of Quality & Reliability
Management.