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Using SPSS Software to Minimize the Time and Cost of the Construction Work

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Abstract: ***Over the past decade, India has experienced rapid growth in its residential and infrastructure sectors. However, building projects in the country are frequently plagued by delays, which have severe consequences for the projects. One of the primary causes of these delays, both domestically and internationally, is the shortage and delayed availability of materials. However, the specific underlying reasons can vary from country to country. In the case of India, the scarcity of materials primarily stems from their origin or availability. Additionally, it has been identified that inefficient systems for procuring materials and managing inventory, as well as delayed identification of required materials, are the leading causes of delays in material delivery.***

These findings serve as valuable insights for formulating or revising critical policies to ensure timely completion of projects. The repercussions of project delays are wide-ranging and include cost overruns, time overruns, contract cancellations, arbitration, and litigation.

The increasing prevalence of project delays directly affects the punctual delivery of construction projects. Therefore, it is imperative to investigate influential factors such as corrupt practices, lack of quality materials, incorrect design, sluggish material delivery, delayed approval and acceptance of completed project work, inadequate site management and performance, delayed budget or fund release, and ineffective project planning and scheduling. This study aims to assess the impact of construction delays and propose potential solutions to address them.

By identifying the root causes and implementing effective strategies, it is possible to ensure timely project delivery and minimize the adverse effects associated with delays.

I. INTRODUCTION

The construction industry plays a vital role in shaping the infrastructure and development of societies worldwide. However, one persistent challenge faced by construction projects is delays, which can result in increased costs, reduced productivity, and client dissatisfaction. In order to tackle this issue and optimize construction processes, our project aims to employ a comprehensive approach by utilizing a questionnaire survey and the Statistical Package for the Social Sciences (SPSS) software. The objective of this project is to identify key factors contributing to delays in construction works and to analyze the collected data using SPSS, a powerful tool for statistical analysis.

By employing this methodology, we aim to derive actionable insights and develop strategies that will help in mitigating delays, ultimately improving project timelines and overall construction efficiency. The project consists of two main components: the questionnaire survey and the SPSS analysis.

The questionnaire survey will be conducted on construction sites, targeting various stakeholders including project managers, engineers, contractors, and workers. The survey will focus on gathering information related to different aspects that potentially lead to delays in construction projects.

These aspects may include but are not limited to, project planning, resource allocation, communication protocols, procurement processes, and external factors such as weather conditions or regulatory constraints. SPSS, a widely used software tool for statistical analysis. SPSS offers a range of advanced statistical techniques, allowing us to uncover relationships, patterns, and correlations within the collected data.

By employing descriptive and inferential statistics, we can identify significant factors influencing construction delays and quantify their impact on project timelines. The outcomes of our analysis will serve as a foundation for the development of effective strategies to decrease delays in construction works.

These strategies may include process improvements, resource allocation optimization, risk management enhancements, and communication streamlining. The insights gained from this project will empower construction professionals and decisionmakers to make data-driven decisions, leading to more efficient construction practices and improved project outcomes.

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In conclusion, our project aims to address the persistent issue of delays in construction works through a comprehensive approach combining a questionnaire survey and SPSS analysis.
By identifying key factors contributing to delays and providing data-backed insights, we strive to foster a culture of continuous improvement within the construction industry.
By implementing the strategies derived from this research, we can pave the way for streamlined construction processes, reduced delays, and enhanced project efficiency, ultimately benefiting all stakeholders involved.

II. METHODOLOGY

A. *Research Framework*

1) To study the literature review to know about present scenario of Infrastructure projects and Method of construction Technology in India.
2) Define the objective based on the necessity concluded from present scenario.
3) Preparation of set of questions based on literature review, survey of the labours, and for conducting the questionnaire survey focused on method of construction manufacturing as technology based.
4) Interviews and discussions with technical persons to validate about method of construction technology.
5) Analysis of data, by SPSS method, obtained from the Questionnaire survey to rank the attributes frequently affecting the performance of the project.
6) Analysis of data, by SPSS method, obtained from the Questionnaire survey to know the impact of attributes on the project affecting the performance of the project.

Method of construction technology, Disputes in construction industry, Labour productivity and recommendation through case study.

B. *Objective*

To study the SPSS (Static Package for Social Science) to improve the construction Work.

III.DATA ANALYSIS

The questionnaire design practice advanced on a communicating basis. It was categorized into profile of the respondent and various factors affecting construction cost and time required completing particular work with both RCC and Ferro-cement material.
Questions in the respondent profile were created to collect information such as job position, experience of the work, locations of the current and/or previous works and contact information.
It was studied; these questions in the survey were of great important to the research by analyzing personal qualification concerns from a variety of different profiles from different regions
The set of questions was prepared and targeting the factors/sources affecting cost saved by using Ferro-cement on site. The responses were to be based on the understanding, knowledge and experience of the respondents and related to particular project.
This simple and straight method was selected to establish a means of developing a list of factors affecting cost. A Five-point scale of 1 to 5 was considered for evaluating the impact of each factor. Questions are attached in annexure page. These numerical impact values are assigned to the respondents' rating:

1) Strongly agree
2) Agree
3) Neutral
4) Disagree
5) Strongly Disagree

A. *Pilot Survey and Questionnaire Revisio*

To improve the questionnaire section, a pilot study was accompanied. This section contained identification of different causes, collection, and conclusions of data.
The application of this section benefited in better formation of the survey development.
Total 25 questionnaires, were sent to labourers, contractors, architectures, owners, project managers, valuators and project engineers of various building construction organizations.

1) Questionnaire should always start with the general information of the organization
2) Some factors are not related to construction. They should be removed or modified.

3) To get more suitable and consistence meaning some factors should be rearranged.
4) Some factors should be revised with additional information.
5) Factors repeated with similar meaning should be removed.
6) Some factors should be changed to give clearer importance and understanding.

B. SPSS Software

Analysis of the questionnaires survey was done using IBM SPSS Software. SPSS Statistics is a software package used for statistical analysis. The software name originally stood for Statistical Package for the Social Sciences (SPSS), reflecting the original market. It is a Windows based program that can be used to perform data entry and analysis and to create tables and graphs. It is capable of handling large amounts of data and can perform all of the analyses covered in the text and much more.

It is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations, data miners, and others. All the responses obtained from the questionnaires are entered in to the software. First, the variables or the questions are entered in the data view, then, the responses are entered into the software from the various data entered into the software, frequency can be found which is used to determine the relative importance factor.

C. Questions of Survey Which we Conducted

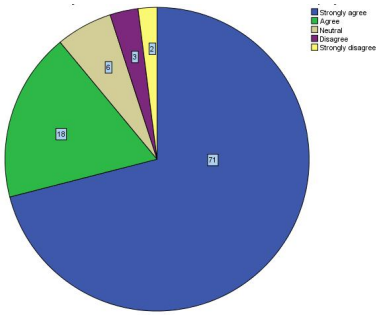
1) On a scale of 1 to 5, with 1 being the lowest and 5 being the highest, how would you rate the impact of weather conditions on construction time and cost?
2) Please rate the impact of regulations and permits on construction time and cost, with 1 being the lowest and 5 being the highest.
3) How would you rate the influence of geological and hydrological conditions on construction time and cost, using a scale of 1 to 5?
4) Please rate the significance of labor productivity and efficiency on reducing construction time and cost, with 1 being the lowest and 5 being the highest.
5) On a scale of 1 to 5, how important do you consider the planning and scheduling processes in optimizing construction timelines and minimizing costs?
6) Please rate the impact of technology and innovative construction methods on reducing construction time and cost, using a scale of 1 to 5.
7) How significant is the availability and quality of construction materials in relation to project timelines and costs, on a scale of 1 to 5?
8) Please rate the importance of communication and coordination among different stakeholders in ensuring efficient construction processes, with 1 being the lowest and 5 being the highest.
9) On a scale of 1 to 5, how crucial do you believe the use of best practices and strategies is in reducing construction time and cost?
10) Please rate the impact of project management practices on construction time and cost, using a scale of 1 to 5.
11) How would you rate the influence of skilled labor availability and expertise on construction time and cost, using a scale of 1 to 5?
12) On a scale of 1 to 5, please rate the impact of equipment and machinery reliability on reducing construction time and cost.
13) How significant is the accuracy and completeness of project specifications and drawings in relation to project timelines and costs, on a scale of 1 to 5?
14) Please rate the importance of effective project communication and coordination among different trades and subcontractors, with 1 being the lowest and 5 being the highest.
15) On a scale of 1 to 5, how important is effective risk management in minimizing delays and controlling costs during construction projects?
16) Please rate the impact of change orders and scope modifications on construction time and cost, using a scale of 1 to 5.
17) How significant is the availability and effectiveness of construction management software and tools in optimizing project timelines and reducing costs, on a scale of 1 to 5?

Sample Frequency table of questioneaire survey:

Graphical representation of above tables:

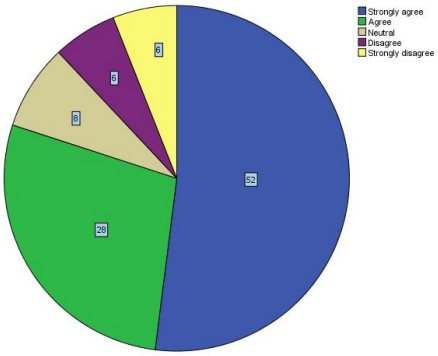
Do you think use of ferrocement reduce total cost of project?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	71	71.0	71.0	71.0
	Agree	18	18.0	18.0	89.0
	Neutral	6	6.0	6.0	95.0
	Disagree	3	3.0	3.0	98.0
	Strongly disagree	2	2.0	2.0	100.0
	Total	100	100.0	100.0	



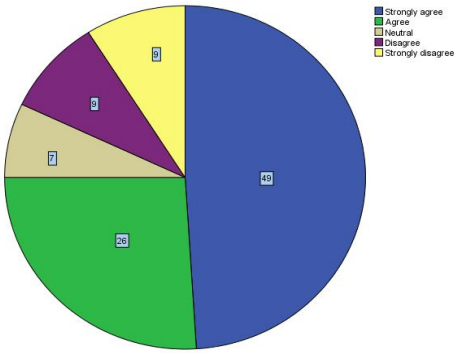
Please rate the impact of regulations and permits on construction time and cost, with 1 being the lowest and 5 being the highest.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	52	52.0	52.0	52.0
	Agree	28	28.0	28.0	80.0
	Neutral	8	8.0	8.0	88.0
	Disagree	6	6.0	6.0	94.0
	Strongly disagree	6	6.0	6.0	100.0
	Total	100	100.0	100.0	



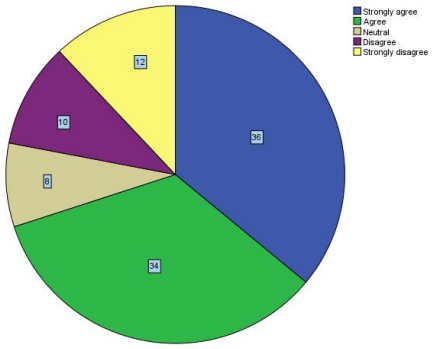
Will the tensile strength of ferrocement is more than usual concrete used for construction?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	36	36.0	36.0	36.0
	Agree	34	34.0	34.0	70.0
	Neutral	8	8.0	8.0	78.0
	Disagree	10	10.0	10.0	88.0
	Strongly disagree	12	12.0	12.0	100.0
	Total	100	100.0	100.0	



Please rate the significance of labor productivity and efficiency on reducing construction time and cost, with 1 being the lowest and 5 being the highest.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	49	49.0	49.0	49.0
	Agree	26	26.0	26.0	75.0
	Neutral	7	7.0	7.0	82.0
	Disagree	9	9.0	9.0	91.0
	Strongly disagree	9	9.0	9.0	100.0
	Total	100	100.0	100.0	



D. Output Implimentation

The SPSS output, presented in graphical form, is shared with the top management, including managers and senior engineers of the company responsible for the site. This enables them to assess the magnitude and impact of the identified problems. Through the graphical analysis, they gain insights into the areas requiring improvement and can determine the extent to which these issues affect their operations. This comprehensive understanding helps them make informed decisions on various aspects of the construction site, ultimately increasing the overall construction speed. Additionally, the SPSS analysis provides a quantitative basis for prioritizing and implementing measures to overcome the identified challenges effectively.

IV. CONCLUSIONS

In conclusion, our project has successfully utilized a questionnaire survey conducted on construction sites and employed the Statistical Package for the Social Sciences (SPSS) software to address the challenges of reducing construction duration and minimizing costs. Through the comprehensive data collection process and advanced statistical analysis, we have gained valuable insights into the factors impacting construction timelines and expenses, enabling us to develop strategies for improvement.

The outcomes of our analysis have led to the development of effective strategies aimed at minimizing construction duration and cost. These strategies encompass various aspects, including optimizing project planning processes, enhancing resource allocation and utilization, streamlining communication channels, improving procurement practices, and implementing cost-saving measures. By implementing these strategies, construction projects can benefit from reduced construction duration, resulting in savings in labor, equipment, and overhead costs.

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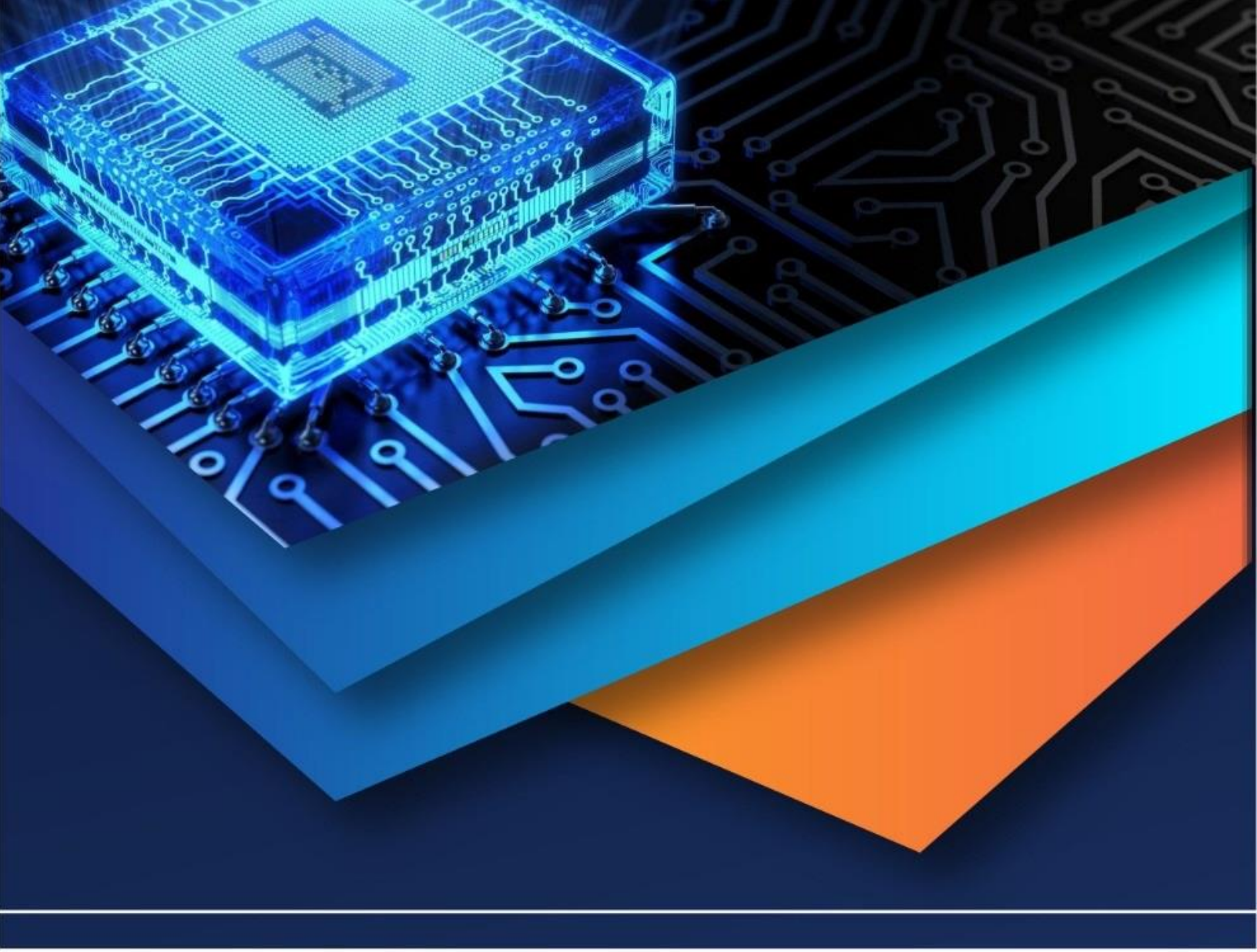

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