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Analysis of Improper Material Management Affecting Cost in Construction Projects

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***Abstract*—The paper aims to fill a void created by the absence of proper materials management on construction sites. Research has shown that construction materials accounts for 50-60% of the total cost in construction projects. For a productive and cost efficiency, material management is very essential. Material mismanagement decrease the contractor's profit leading to huge losses, and leaving the project in big troubles, therefore the proper management of this single largest component can improve the productivity and cost efficiency of a project and help ensure its timely completion. The existing construction material management practices of contracting companies are investigated in this paper. The study was exclusively assessed through questionnaire survey, interviews, field visits and discussion with the concerned authorities. 26 factors were selected for the proper assessment of most critical factors. The factors are ranked according to the degree of significance as assessed by the respondents. The results obtained from the ranking factors shows that the top five major's causes of cost overruns are: design issues, market condition, store issues, contractor issues and external issues. Recommendations are given for reducing the material mismanagement in the construction industry.**

***Keywords*— material management, questionnaire, SPSS, mismanagement**

I. INTRODUCTION

Materials management is the system for planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of materials are properly specified in a timely manner, are obtained at a reasonable cost and most importantly are available at the point of use when required. Thus materials management is an important element in project management. The materials on a project can represent anything from 50% to 60% of the cost of the work, so minimizing procurement costs improves opportunities for reducing the overall project costs. Poor materials management can result in increased costs during construction. Efficient management of materials can result in substantial savings in project costs. If materials are purchased too early, capital may be held up and interest charges incurred on the excess inventory of materials. Materials may deteriorate during storage or get stolen unless special care is taken. Delays and extras expenses may be incurred if materials required for particular activities are unavailable. Ensuring a timely flow of materials is an important concern of material management.

II. OBJECTIVE AND SCOPE OF THE STUDY

The objective of the study is to identify the variables influencing material procurement and inventory which affects the construction time and causes cost overruns. The paper also aims at identifying the relative importance of the factors and to rank the factors according to their significance. The study provides recommendations for quality project delivery within stipulated time with proper material management system which helps timely project completion and cost savings.

III. METHODOLOGY

In order to identify the most frequent categories affecting performance of construction projects and investigate the causes of material waste in construction projects the following methodology is adopted. Flow chart of the methodology is given below in Fig .1. A proper background study is done for the identification of critical factors which causes material

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mismanagement. A questionnaire is designed based on the data collected form literature.

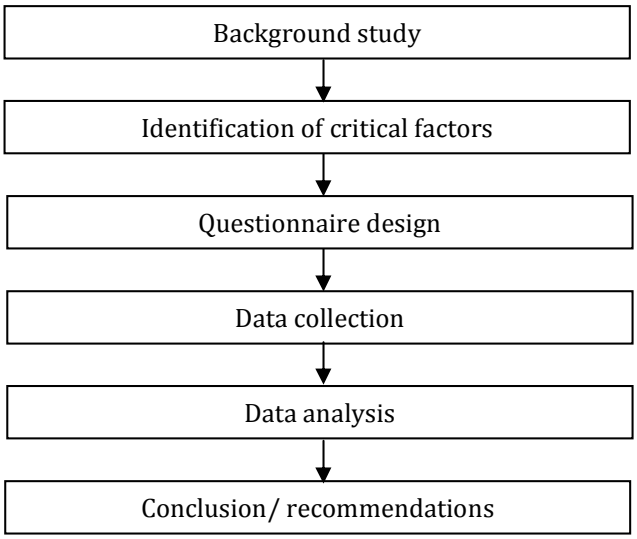

Fig. 1 Methodology of the study

IV. Major Categories Identified Related to Material Mismanagement

The factors that cause the cost overruns in building project are classified into 8 categories based on following issues:

- Design related issues: Improper study on material availability study and its source, inflated specification of item over specified codes, inadequate preconstruction survey on material.
- Client related issues: Poor cooperation of owner towards purchase, delay in supplier's payment and claim.
- Contractor related issues: Improper supervision at site and control, insufficient material handling instructions, engaging inadequate skill on labour, improper construction methods, improper planning and errors during construction, fraudulent activities of subcontractors.
- Site related issues: Waste control during material usage, lack of site storage space, operation limitation within site, stealing on site, unforeseen site condition, existence of unnecessary material.
- Labour and equipment related issues: Obsolete or unsuitable construction equipment, improper handling of materials at site.
- Store related issues: Improper procurement policy, improper inventory control, problem on logistics of materials.
- External issues: Problem with neighbours, weather condition.
- Market condition: Scarcity of materials in market, fluctuation of price of raw materials.

V. Design of Questionnaire

The questionnaire was developed to identify the significance impact level of the factors that causes cost overruns in building construction projects from the specialist and experts in the construction industry. A preplanned survey was conducted through the questionnaire. The questionnaire was divided into two parts. The first part requested background information about the respondents. The second part of the questionnaire focused on causes of material mismanagement. Twenty six numbers of issues were selected initially for the proper assessment of most critical factors. The scale method of designing questionnaires was adopted that is five point scale which includes strongly disagree, disagree, agree, moderately agree, and strongly agree.

VI. Results and Discussions

After collection of sample, data analysis was conducted with research instruments such as the Statistical Package for Social Science (SPSS) software. The data from the questionnaires was fed into SPSS software version 20, and the results were analyzed to determine the major factors. The mean scores were calculated to rank mismanagement issues. The steps undergone for this analysis are given below

Step 1: Statistical analysis done for each attribute.

Step 2: Bar graph showing mean values were found out.

Step 3: Based on high mean, the ranking of issues found out.

A. Design Related Factors

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It is important to understand that projects are never completed without alterations to the starting documentation. More changes mean more expenses, especially as the project progresses. These problems will eventually cause construction cost overruns. The Fig. 2 shows the response of companies towards design factors.

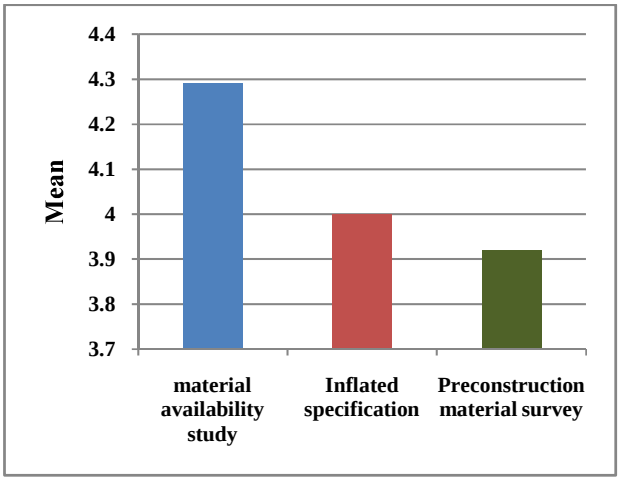

Fig. 2 Design factors

The results indicates that most of the respondents are strongly agree the improper material availability study and its source responsible for cost overrun in construction projects and moderately agree the remaining factors increases the cost, the result of ranking factors indicate that improper study on material availability and its source has the highest in the ranking of design related factor analysis, inflated specification of item ranked the second among the factors outline above, inadequate preconstruction survey that occupied third position in the above ranking material mismanagement factors of the cost overrun in construction projects.

B. *Client Related Factors*

According to the contractors surveyed, delayed progress payments would affect their project's cash flow as a result of delayed income. For example postponing payment to sub-contractors & suppliers, delay in supply of materials, etc., These multiple problems will eventually cause construction delays and cost overruns. The Fig. 3 shows the response of companies towards client factors.

The results indicates that most of the respondents are agreed that payment delay to suppliers factor will significantly increase the cost and the results indicates most of the respondents moderately agree the payment delay to suppliers factor is responsible for cost overrun in construction project and disagree the poor cooperation of owner factor increases the cost, the result of ranking factors indicate that payment delay to suppliers has the highest in the ranking of client related factor analysis.

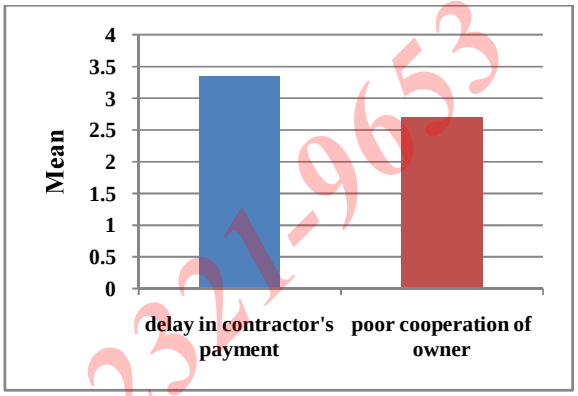

Fig. 3 Client related factors

C. *Contractor Related Factors*

According to the project managers interviewed, defective works were caused by unskilled labour, lack of supervision, incorrect construction methods and unordered sequences of work. These defective works required extra budgets to complete or repair them. Clearly, this factor would cause construction cost overrun. The Fig. 4 shows the response of companies towards contractor related factors.

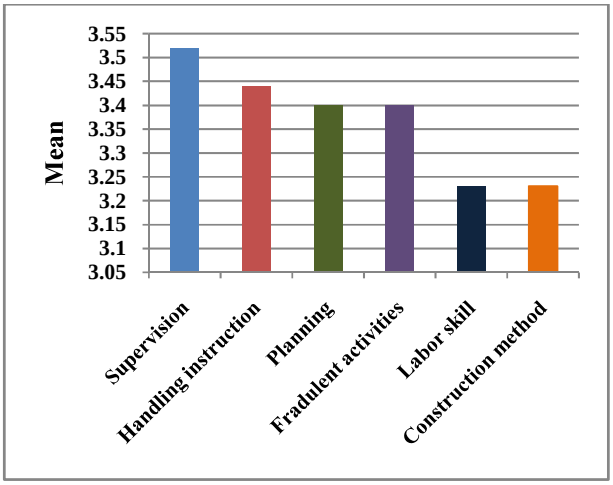

Fig. 4 Contractor related factors

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The results indicates that most of the respondents are moderately agree that all contractor related factors will significantly increase the cost, and the result of ranking factors indicate that improper supervision has the highest in the ranking of contractor related factor analysis, insufficient handling instruction ranked the second among the factors outline above, improper planning and fraudulent activities of subcontractor both are occupied third position, construction method and inadequate labour skill both are stands at fourth rank respectively**.**

D. *Site Related Factors*

A major risk in civil engineering project is that the construction may encounter physical conditions on the project site which were unexpected and unforeseeable at the time of making the decision to build the project and which may delay work or cause increased cost. Building construction industry reflects various problems ranging from delays in project execution/delivery, to cost and time overrun as a result of wastages on sites, theft and displacement of materials on sites. The Fig. 5 shows the response of companies towards site related factors.

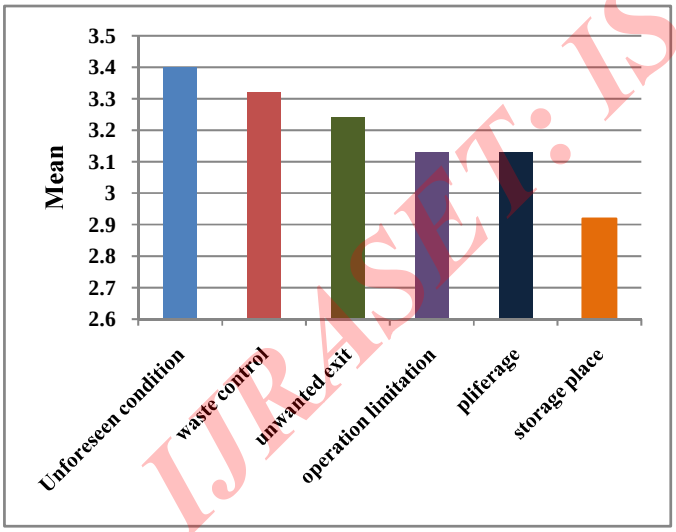

Fig. 5 Site related factors

The results indicates that most of the respondents are moderately agree that all site factors except lack of site storage space is responsible for cost overrun in building construction projects., the result of ranking factors indicate that unforeseen site condition has the highest in the ranking of site related factor analysis, waste control ranked the second among the issues outline above, existence of unnecessary material that occupied third position, operation limitation within the site and pilferage both are occupied fourth position, lack of storage space lie at fifth position.

E. *Labor and Equipment Related Factors*

Unsuitable construction equipment affects the productivity which causes delay in project and resulting in cost overrun. The Fig.6 shows the response of companies towards labour and equipment factors.

The results indicates that most of the respondents are moderately agree that these two labour and equipment factors are responsible for cost overrun in building construction projects, the result of ranking factors indicate that obsolete or unsuitable equipment has the highest in the ranking of labour and equipment related factor analysis, improper material handling ranked the second the above ranking material mismanagement factors of the cost overrun in construction projects.

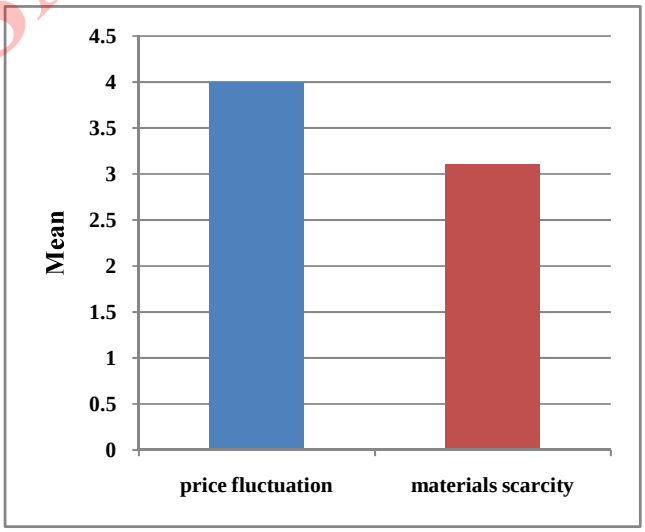

Fig. 6 Labour and equipment related factors

F. *Store Related Factors*

Material stock control practice by construction firms on construction sites becomes imperative so that projects can be executed and completed within planned time, cost and to the required quality standard, thereby ensuring value for money

for the client. Contractor should give careful consideration to the procurement method and proper inventory control to be adopted on the project as this can cause cost increase. The Fig. 7 shows the response of companies towards store factors.

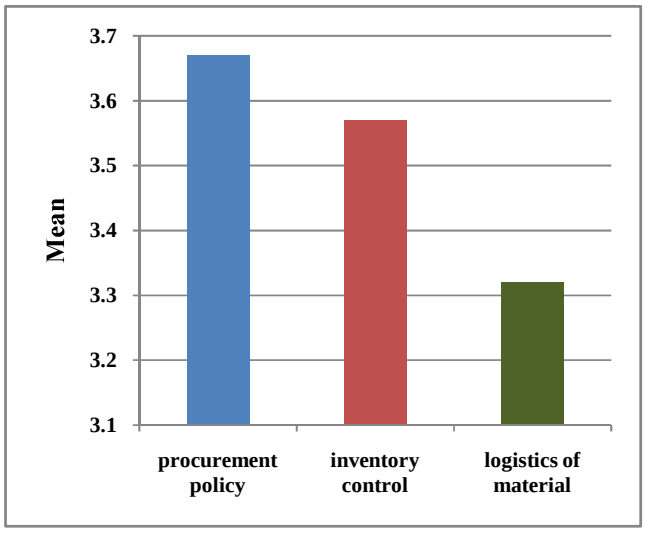

Fig. 7 Store related factors

The results indicates that most of the respondents are moderately agree the above said store related factors are responsible for cost overrun in building construction projects, the result of ranking factors indicate that improper procurement policy has the highest in the ranking of store related factor analysis, improper inventory control ranked the second among the factors outline above, problem on logistics of materials that occupied third position in the above ranking material mismanagement factors of the cost overrun in construction projects.

G. *External Factors*

Most of the projects surveyed were in the early stages and this means that the works being undertaken were foundation work or construction of the building structure. Such activities would undoubtedly be affected by rain. Project managers whose buildings included basements said that their basements were flooded and they needed extra time and equipment to dewater them. Most of the concreting works for the structures were also affected by heavy rain and occasionally, concreting was postponed. Another impact of weather was that rivers with sand quarries were flooded and affecting the availability of sand. The Fig. 8 shows the response of companies towards external issues.

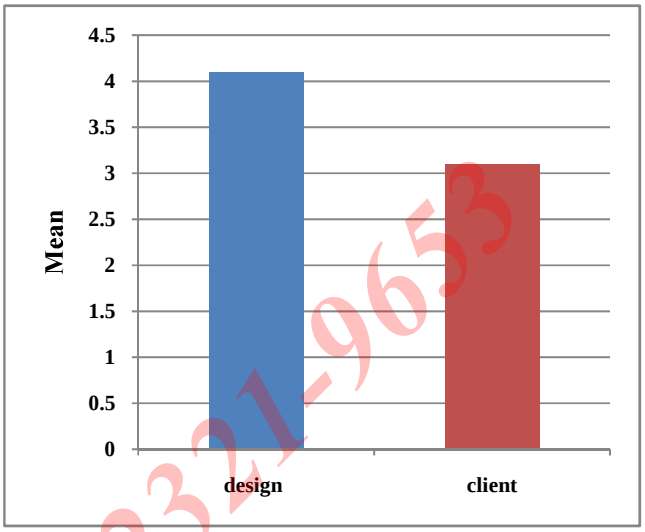

Fig. 8 External factors

The results indicates that most of the respondents are agreed that above said two external factors will significantly increase the cost and the results indicates most of the respondents moderately agree that these two external factors are responsible for cost overrun in building construction projects, the result of ranking factors indicate that problem with neighbours has the highest in the ranking of external factor analysis, weather condition ranked the second the above ranking material mismanagement factors of the cost overrun in construction projects.

H. *Market Condition Factors*

Increased price was recognized as the top critical risk factor affecting both project time and cost. On the projects surveyed, the prices of steel, cement and timber had increased dramatically over a few years. As indicated, most of the activities were affected by these unwelcome effects. The Fig. 9 shows the response of companies towards market condition factors.

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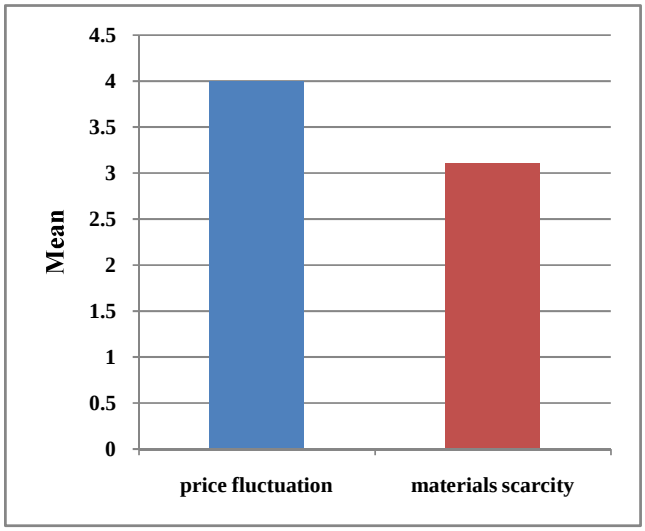


Fig. 9 Market condition factors

The results indicates that most of the respondents are strongly agree price fluctuation of materials is responsible for cost overrun in construction projects at the same time they moderately agree that scarcity of materials in market increases the cost., the result of ranking factors indicate that price fluctuation of materials has the highest in the ranking of market condition related factor analysis, scarcity of materials in market ranked the second the above ranking material mismanagement factors of the cost overrun in construction projects.

I. *Overall Material Mismanagement Factors*

Many researchers have discovered reasons for the disparity between the tender sum and the final cost of construction cost. The following were identified as the factors that influence cost overruns. Such as design related factors, client related factors, contractor related factors, site related factors, labour and equipment related factors, store related factors, external factors, market condition related factors. The Fig. 10 shows the response of companies towards overall material mismanagement issues.

The results indicates that most of the respondents are strongly agree the design related factor is responsible for cost overrun in building construction projects at the same time they moderately agree that remaining factors increases the cost, the result of ranking factors indicate that design related factors has the highest in the ranking of factor analysis, market condition related factors ranked the second among the factors outline above, store related factors that occupied third position, contractor related factors that occupied fourth position, external factors occupied fifth position labour and equipment related factors occupied sixth position, site related factors occupied seventh position, client related factors are lie at eighth rank in the above ranking material mismanagement issues of the cost overrun in construction projects.

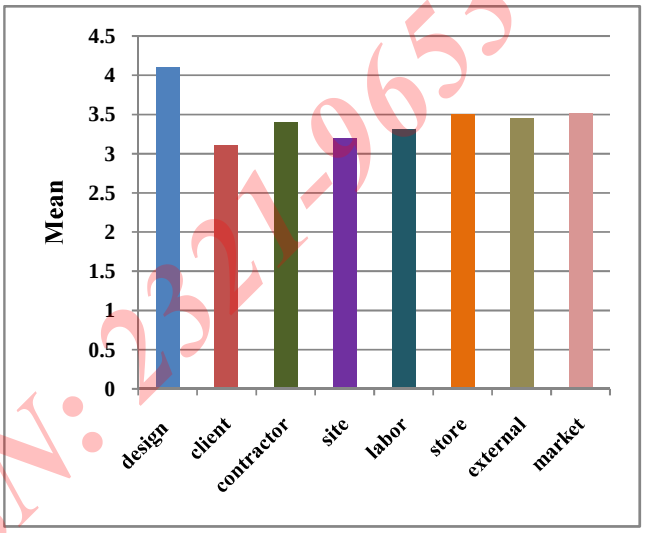


Fig. 9 Overall Factors

VII. CONCLUSION

Based on the analysis, obtained conclusions are given below

- Identifying variables influencing construction time and cost overruns shows that, design issues, client issues, contractor issues, site issues, labour and equipment issues, store issues, external issues, market condition issues are responsible for cost overrun of building construction projects are described.
- Rank of the top factors of each scenario is listed by means of questionnaire survey. The results obtained from the ranking analysis shows that the followings, design issues, market condition issues as the major significant factors that causes the cost overruns in construction projects in India.

REFERENCES

[1] Abdul-Rahman, H. and Alidrisyi, M. N. (1994) *"A Perspective of Material Management Practices in a Fast Developing Economy: the case of Malaysia."* Journal of Construction Management and Economics. 12. pp.412-422.

[2] Akintoye, A (1995) *"Just-in-time application and implementation for building material management"* Journal of Construction Management and Economics.13, pp.105-113.

[3] Andel,T.(1993*) "Automatic Data Identification: For your own good." Transportation and Distribution.* 34 (10). pp.76-88.

[4] Bell, L C. and Stukhart, G. (1986) *"Attributes of materials management systems." Journal of building industry: Main causes and prevention."* Journal of Construction Engineering and Management. 112(1),pp.14-22.

[5] Dey, P. K. (2001), *"Re-engineering materials management: A case study on an Indian refinery."* Business Process Management Journal. 7,pp. 394-408.

[6] Faniran, O.O. and Oluwoye, O.O. and Lenard, D. (1994) *"Effective construction planning"*Construction Management and Economics, 12, pp.485-499.

[7] Navon, R and Berkovich, O (2006*) "An automated model for materials management and control"* Journal of Construction Management and Economics, 24, pp.635-646.

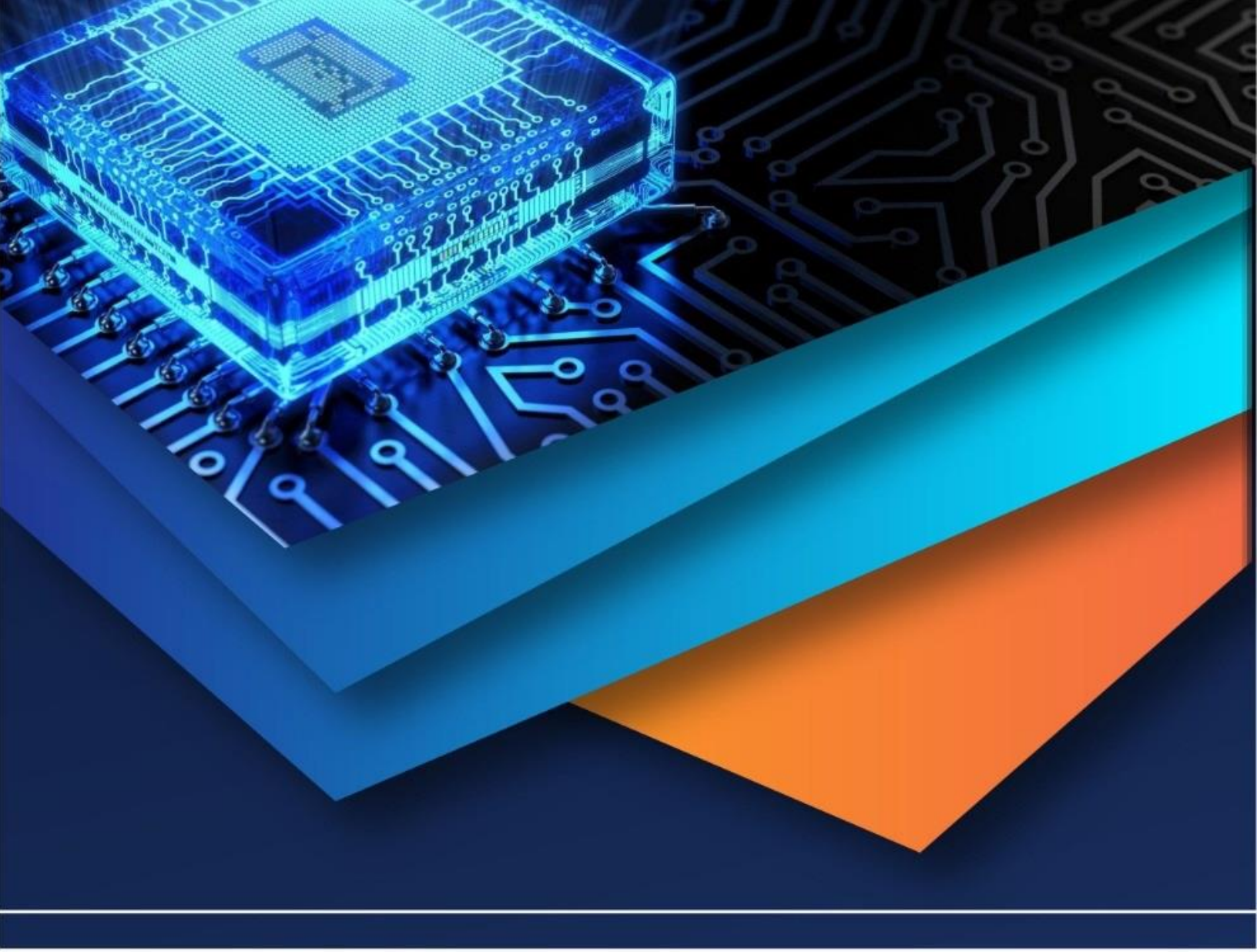
[8] Ofori, G (2000) *"Greening the construction supply chain in Singapore"* European Journal of Purchasing and Supply Management, 6, pp.195-206.

[9] Prabu, V. and Baker, M. (1986) *"Materials Management."* UK: McGraw-Hill, Journal of Construction Management and Economics. 19(7), pp.741-751.

[10] Tan, K (2001) *"A framework of supply chain management" literature, European Journal of Purchasing and Supply Management,* 7, pp.39-48.

[11] Wong, E T T and Norman, G (1997) *"Economic evaluation of materials planning systems for construction"* Journal of Construction Management and Economics, 15, pp.39-47.

[12] Zakeri, M, Olomolaiye, P, Holt, G D and Harris, F C (1996*) A survey of constraints on Iranian construction operatives' productivity.* Construction Management and Economics, 14, pp.417-426.



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