Identify and Evaluate the Issues in Document Management by Construction Industry

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Abstract:

Document management in construction industry is a system or process used to capture, store and track construction related documents such as pdfs, word processing files, daily reports, and any paper-based content. It became necessary to manage the documents and reports in order to save time and money. Also, to provide faster search and retrieval of documents, reduce the amount of space used to store documents and other records. In construction industry, any project success needs effective, consistent, completed and well documented communication among different stakeholders. In this study top most factor affecting or creating issues in construction documents management are identified and evaluate by using ANOVA method. ANOVA (Analysis of Variance) is a group of statistical models that is used to evaluate the differences between the means of two independent groups by dividing the variability into systematic and random variables. Finding the independent variable's influence on the dependent variable is helpful. It helps in determining the effect of various factors on the movement of stock fluctuation. So, with its assistance, statisticians, economists, or analysts carry out a thorough analysis of the security index under various market situations. The ANOVA test also aids in determining if an experiment's results are significant or random. Questionnaire survey was carried out to identified the factors affecting document management.

Keywords: Project Management, Document Management, Communication, Information Management, Construction Project, Documents, Records Keeping

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1. Introduction

The goal of the discipline of construction document management is to regulate the flow of papers. Document management refers to the storage, retrieval, alteration, and exchange of documents. While many firms are moving toward digital records management to better manage

the volume of material required for today's construction projects, construction document management is relevant to both physical and digital documents. Before any actual building work starts, all construction projects must have certain documentation in place, including bid documents, contractor agreements, scopes of work, timelines, and bills of quantities. Without effective document management, it can be difficult to keep track of all this paper, record changes, and inform the appropriate parties of revisions. However, developing a successful construction document management procedure is a feat unto itself. In the days when blueprints were still blue, documentation might have been as straightforward as a set of designs with marginal notations for exceptions and additions. Nowadays, even the smallest building projects begin with designs, specifications, budgets, reports from experts, BIM files, and more. You may give your team a single source of truth they can rely on by managing them, even if plans change. This Paper introduces the methodology which is applied in this research work to completion of paper. Data were gathered through a questionnaire. The questionnaire is divided into two main parts. Part I is related to general information for respondent. The contractors, architect, site engineer, consultant was requested to answer questions pertaining to their experience in the construction industry and their opinions about the factors affecting Phase Wise Required Construction Documents and Records. Part II includes the list of the identified the factors affecting Phase Wise Required Construction Documents and Records.

2. Criteria Framework for Phase wise Construction Documents and Records

Criteria for selection of benchmarking construction project Phase Wise Required Construction Documents and Records are described into Five major groups. 1.Concept Feasibility Phase, 2.Tendering, 3.Contracting, 4.Construction Work, 5.Completion + maintenance. These Five criteria further divided into 43 sub criteria.

Code	Criteria/Sub criteria	Code	Criteria/Sub criteria
A	**Concept Feasibility Phase**	**D**	**Construction Work**
A1	Pre planning notes about the project	D1	Architectural / structural / plumbing etc. drawings
A2	Planning about man, machine, material and money	D2	General instructions
A3	No Objection Certificates	D3	Safety schedule (manual)
A4	Permissions from local authorities	D4	Store records
B	**Tendering**	D5	Extra work records

B1	Tender notice	D6	Work Changes
B2	Specification	D7	Test report for quality
B3	Tender validity	D8	Remuneration / payments done+ payments received
B4	Tender award certificate	D9	Running accounts bills
B5	Quotations	D10	Work order
B6	Quantity calculation	D11	Work check certificates
B7	Work order	D12	RMC Checklists
B8	Time schedules	D13	Work permit
B9	Escalation conditions	D14	Delay Analysis
B10	Negotiation rates	D15	CPM/PERT/BAR Charts
C	**Contracting**	D16	Material record
C1	Special condition	D17	Project schedule
C2	Scope of work	D18	Request for Inspection
C3	price related documents	D19	Site Observation Report
C4	Conditions+ penalty	D20	Non-Conformance Report
C5	Conditions of subcontracting	**E**	**Completion+ Maintenance**
C6	Project budget	E1	Completion certificate
C7	Detailed budget with supportive calculation	E2	Repair/ maintenance schedule

3. Method

A statistical approach for analysing variations in means is called analysis of variance (ANOVA). It includes several statistical models and the corresponding estimating methods (such as the "variation" within and between groups). ANOVA was developed by statistician Ronald Fisher. The observed variance in a particular variable is divided into components due to different causes of variation according to the rule of total variance, on which the ANOVA is based. By providing a statistical test to evaluate whether two or more population means are equal, ANOVA extends the t-test beyond two means. To determine if two or more means differ from one another, the ANOVA is used, in other words. ANOVA is a statistical technique that analysts use to compare the means of two independent groups. It can be calculated by deducting the mean squares of errors from the mean sum of squares between groups. In an analysis of variance, there are three fundamental premises: homogeneous variance, normally distributed population, and randomly chosen samples. Analysts reject the ANOVA test and vice versa if the p-value is less than 0.05. The Analysis of Variance test is only used by statisticians and economists when there is either one category of the independent variable that has more than one kind or when data pertaining to the dependent variable have been gathered.

4. Results and Discussions

Top 10 factors affecting phase wise required construction document and records analysed by ANOVA Method:

Sr. No.	Groups	Average
1	Architectural / structural / plumbing etc. drawings	1.25
2	Pre planning notes about the project	1.36
3	Tender Notice	1.50
4	Project budget	1.51
5	Specifications	1.58
6	General instructions	1.63
7	Time schedules	1.65
8	RMC Checklists	1.68
9	Running accounts bills	1.70
10	CPM/PERT/BAR Charts	1.70

Table 1: Top 10 Factor Affecting the Document Management by Construction Industry

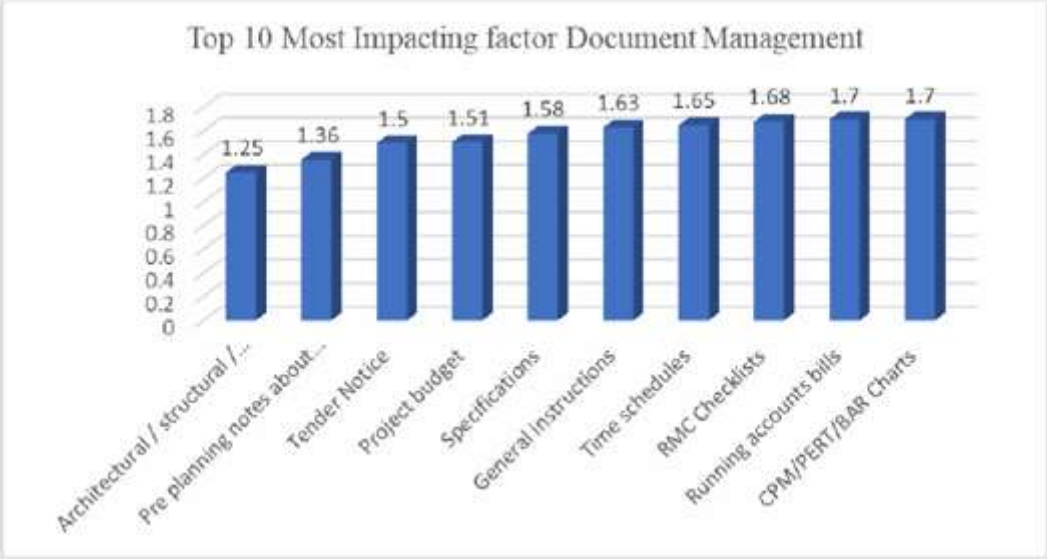

Chart 1: Top 10 factors affecting phase wise required construction document and records

Top 5 Variability Factors:

Sr. No.	Groups	Variance
1	No Objections Certifiactes	1.053955
2	Conditions of subcontracting	0.927684
3	General instructions	0.846328
4	Store records	0.775141
5	Conditions+ penalty	0.728531

Table 2 : Top 5 Variability Factors

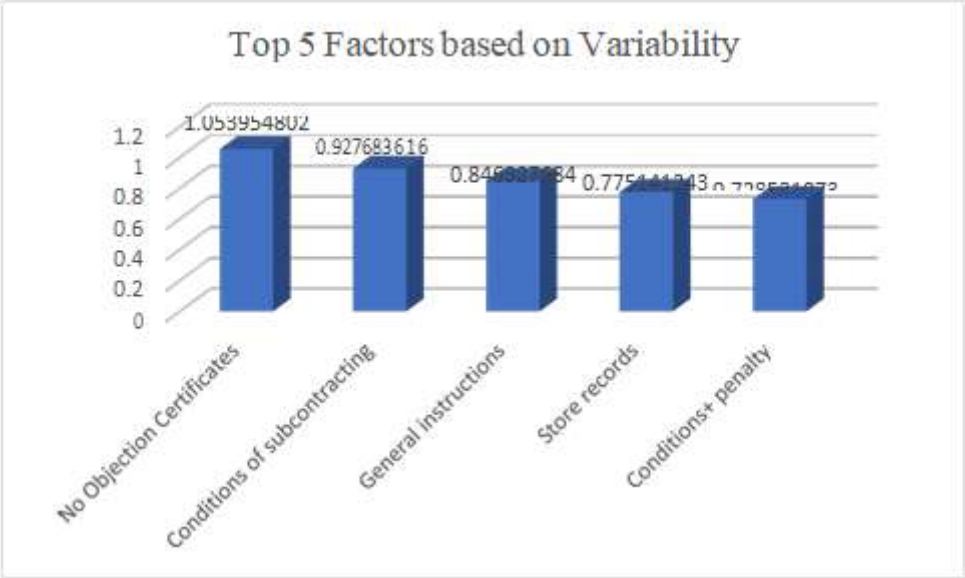

Chart 2: Top 5 Factors based on Variability

The Result Presented in chart 2 shows that top 5 factors based on variability. No Objections Certificate shows that higher value and Conditions + Penalty is leasted value. Top 5 parameters variability are 1.053, 0.927, 0.846, 0.775, 0.728 respectively. The first topmost factor affecting the least in document management in construction industry is No objection certificate identified by ANOVA METHOD Variance. No objection certificate refer as legal documents doesn' t affect least in document management. Second factor is conditions of subcontracting, subcontracting is the practice of contractual parties delegating of their responsibilities to a third party so its conditions are not much important in document management. Further General Instructions and store records are also included in top five factors which are least affecting the document management in construction industry. General instructions are instructions given by contractors

to coworkers and others team members and store records is a thorough listing of all construction products, these two factors also affect less in document. Lastly conditions +penalty are included in contract which are not of much important in document management.

Bottom Five Variability Factor:

Sr. No.	Groups	Variance
1	Repair/ maintenance schedule	0.285593
2	Planning about man, machine, material and money	0.274294
3	Completion certificate	0.274294
4	Pre planning notes about the project	0.270056
5	Architectural / structural / plumbing etc. drawings	0.261835

Table 3: Bottom 5 Variability Factor

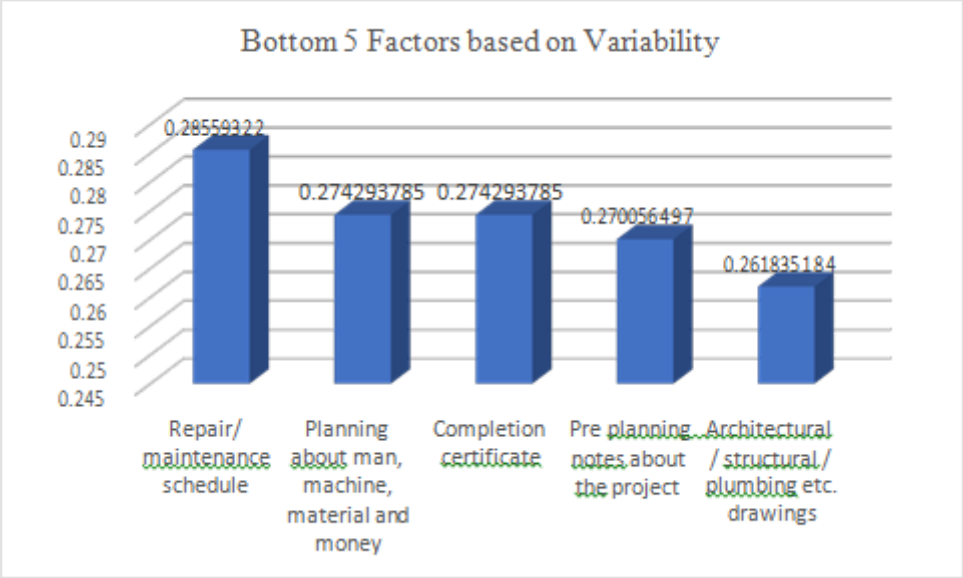

Chart 3: Bottom 5 Factors based on Variability

The Result Presented in chart 4 shows that bottom 5 factors based on variability. Repair/Maintenance Schedule shows that higher value and Architectural / structural / plumbing etc. drawings is leasted value. Bottom 5 parameters variability are 0.285, 0.274, 0.274, 0.270, 0.261 respectively.

Repair/ maintenance species who will carry out specific maintenance activities at right time, this factor affect the most in document management. Others factors such as Planning about man, machine, material and money and completion certificate are included in bottom five factors along with pre planning notes about the project, all these factors affect the document management. Bottom most factors is Architectural/structural/plumbing, etc. drawings. All these drawings is a representation of a building or structure made during the design phase by a architect, this factor affect the most important in document management as it included all the structure information required to carry out construction.

5. Conclusions

In Conclusion, The requirement for current and accurate database and information in the construction business is quite difficult. Any building project associated with construction required proper records and paperwork. They vary from one project to another and from one stage of the particular project to another. There are an interesting variety of methods for documenting and record keeping that can be employed depending on the usage, requirement, resources available, and type of work to be done. This aids in continual learning from prior errors, serves as proof in court, improves work procedures, and quality control ultimately resulting in customer happiness. Records and documentation are crucial instruments for timely project completion with effective utilisation of labour, equipment, materials, and finances, which results in a project that is ultimately sustainable. An attempt has been made in this study to identify and evaluate the issues in document management by construction industries. The questionnaire survey was conducted to analyse the most affecting factors of the project. Criteria for selection of construction project phase wise required construction documents and records is classified into five major category and further subdivided into 43 sub criteria. Total of 60 respondents comprises of engineers, contractors, etc. has participated in this survey.

After implementing ANOVA Method has been used to the listed factors, top 10 factors affecting document management were identified such as Architectural/structural and plumbing drawings, pre planning notes about the project, tender notice, project budget, specifications, general instructions, time schedules, RMC Checklists, running account bills and CPM/PERT/BAR charts. All this factors if not handled systematically creates issues in document management.

6. Recommendations:

To avoid Constraints like inavailability of Manpower, Machine, Material and money company must use planning/scheduling software' s which includes resource management tools and should closely Monitor the project. Right now, planning and scheduling tools generaly used for projects like, Metro, Bullet Train, Airport Projects only. All the General Instruction should be included in Detail project Report or in Tender Notice to avoid Disputes.

The factors identified could be validated by applying at Construction site while means of any Mathematical Model, AHP and Regression Analysis.

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