

## Impact of Construction Documents and Records on Project Management

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### ABSTRACT

Globalisation, urbanisation and construction are unstoppable in nature and so are the risks associated with construction. Construction in 21<sup>st</sup> century demand timely completion and has pressure on the stakeholders to mitigate the risks during and after the construction project. Survey was conducted globally for the assessment of impact of construction documents and records on project management. 103 responses were recorded from Qatar, U.A.E., U.S., Kenya and many cities of India. It can be briefed that documentation and record keeping should be an integrated part of the respective firm in order to avoid time overrun, and cost overrun. Efficient recordkeeping and documentation help for management of risk related to process, legal, material, quality and at same time are supportive for better decision making leading sustainability in project management.

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### Introduction

Construction projects are unique and dynamic in nature, having their own demands of quality, time, and resources and so on. In today's era where urbanisation and construction cannot be stopped demand for sustainable structures on various grounds. Construction documentation plays a vital role from planning until the demolition. In order to overcome geographical constrains and legal regulations survey was carried out where 103 respondents were surveyed to understand the impact of documents and records or construction project. Respondents are from construction industries of Qatar, U.A.E., U.S., Kenya and many cities of India viz. Mumbai, New Delhi, Pune, Vadodra, Bhubhaneshwar, Gurugram etc. details regarding respondents is as below.

### Need of Study

Construction documents are helpful for execution of the project and later too. With dynamic nature of construction, there is always a risk of disputes due to which records play key role during dispute resolution and claim management. However, when dispute resolution comes to reality the parties lack various important documents and records and fail to safeguard themselves from harsh consequences like loss of money, loss of good will in market, hampering their status in industry and so on.

### Research Method

With the literature review and pilot survey questionnaire was designed in three parts to understand impact of construction documents and records on project completion and risk management and to sketch present situation within the construction industry regarding record management. Relative Importance Index Method then tested the data collected. Participants were asked to rank the respective question/ situation within the scale of 1 to 5 where 1 = Not Significant, 2= Slightly Significant, 3= Moderately Significant, 4 = Very Significant, 5 = Extremely Significant Similarly, to understand the present situation, questions with Yes or No replies were asked.

Impact of construction documents and records on project completion 30 questions/ situations were drafted and forward to scale of which top results are discussed.

**Table 1. Respondents Details.**

Sector Wise Respondent Involvement			
Sr. No.	Sector	Number of Respondent	Percentage
1	Government (India)	25	24.27
2	Private	78	75.73
Total		103	100
Respondents Qualification			
Sr. No.	Respondents Qualification	Number of Respondents	Percentage
1	B.E. / Btech. Civil	49	47.57
2	Mtech Structures	11	10.67
3	Mtech Const. Mgmt.	28	27.18
4	MTech. (Others)	2	1.94
5	Architecture	3	2.91
6	PhD.	2	1.94
7	D.C.E	4	3.88
8	PMP	4	3.88
Total		103	100
Industry Wise Respondent's Involvement			
Sr. No.	Sector	Number of Respondents	Percentage
1	Irrigation	7	6.79
2	Roads/ Bridges	18	17.47
3	Buildings	65	63.10
4	Others	13	12.62
Total		103	100

### Risk Management

Total 30 questions were asked to understand the impact of construction documents and records on project completion and are as described in table and figure below.

R.I.I. 0.93 state documentation help for good management ranked one clearing that documentation is very important to and be maintained as work progresses. Records of payment ranked 2 with R.I.I. 0.897 stating how records of payment are important and be filled properly.

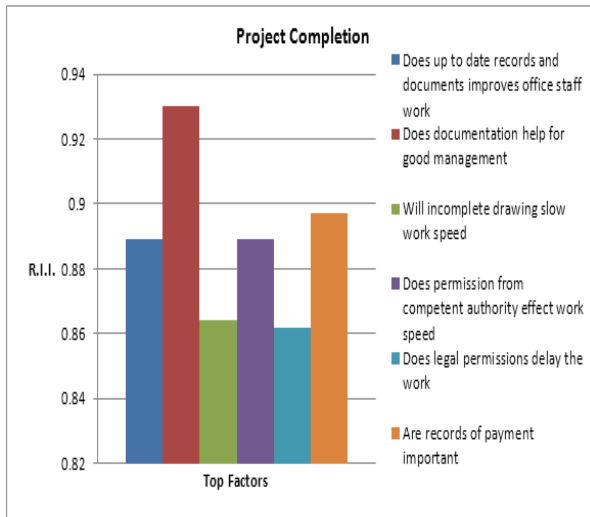
Table 2 . Impact on Project Completion.

Sr. No.	Project completion	Relative Importance					Total (N)	ΣW	R.I.I.	Rank
		1	2	3	4	5				
1	Does lack of proper documentation frustrate team members	2	6	11	45	39	103	422	0.819	17
2	Does documentation need lot of time for preparing them	4	17	39	34	9	103	336	0.652	28
3	Will you prefer to get them made from outsider	36	23	21	11	12	103	249	0.483	30
4	Does assigning special employee will speed up the documentation work	7	4	17	38	37	103	403	0.783	21
5	Does up to date records and documents improves office staff work	1	3	6	32	61	103	458	0.889	3
6	Does documentation help for good management	0	0	5	26	72	103	479	0.930	1
7	Does documentation reduces re work	3	5	16	32	47	103	424	0.823	15
8	Do you have any software for documentation?	19	12	22	24	26	103	335	0.650	29
9	Do you think use of such software for documentation will be helpful	4	4	15	40	40	103	417	0.810	19
10	Is the work done fast if documentation is error less	1	6	17	31	48	103	428	0.831	10
11	Does documentation help in better decision making	0	5	14	33	51	103	439	0.852	8
12	Does complicated language in contracts makes it difficult to execute	3	13	29	31	27	103	375	0.728	26
13	Will incomplete drawing slow work speed	1	6	8	32	56	103	445	0.864	5
14	Does land possession document affect work speed	3	2	19	36	43	103	423	0.821	16
15	Does permission from competent authority effect work speed	1	1	7	36	58	103	458	0.889	3
16	Does CPM/PERT/Bar chart prove helpful	6	6	16	39	36	103	402	0.781	22
17	Does legal permissions delay the work	3	1	14	28	57	103	444	0.862	6
18	Does lack of proper records stop project	5	10	29	32	27	103	375	0.728	26
19	Does poor records and document delay the project	1	12	17	39	34	103	402	0.781	22
20	Do you think construction records be used as Dispute resolution if any?	3	3	20	33	44	103	421	0.817	18
21	Do you think construction records be used as tool for error detection?	2	4	26	29	42	103	414	0.804	20
22	Does up to date records reduce time to response queries/errors	1	2	18	41	41	103	428	0.831	10
23	Are previous records helpful in preparing bills	2	1	13	35	52	103	443	0.860	7
24	Does delay in approval of bills impact the project time	1	4	18	36	44	103	427	0.829	12
25	Is quantity surveying speeded up with handy records	2	7	20	45	29	103	401	0.779	24
26	Are records helpful to draft (R.A) bills	1	1	18	45	38	103	427	0.829	12
27	Are records of payment important	3	0	7	27	66	103	462	0.897	2
28	Does late sanction of bills impact work speed	1	5	17	36	44	103	426	0.827	14
29	Is material records helpful for time management	2	2	13	39	47	103	436	0.847	9
30	Are records useful to meet desired quality of work	3	6	23	38	33	103	401	0.779	24

With R.I.I. 0.889 up to date records improves office staff work and permission from competent authority ranked 3<sup>rd</sup>, this shows efficient office works and permission from competent help for mitigating loss of project time. Incomplete drawings have R.I.I. of 0.864 and ranked 5<sup>th</sup> clearing that, time loss if any is controllable if drawings are complete. Rank six legal permission for works and R.I.I. 0.862 imply legal permissions should be obtained for avoiding halting the project.

### Risk Management

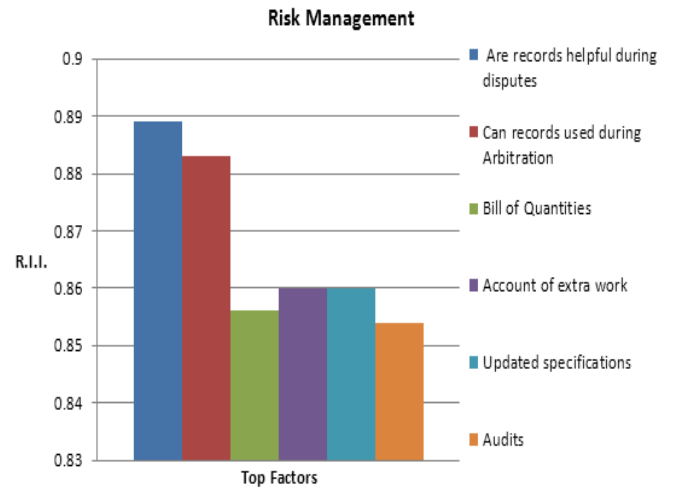
Total 32 questions were asked to understand the impact of construction documents and records on risk management and are as described in table and figure below.



**Figure 1. Top factors for Project Completion.**

Considering records and documents for risk management, records are helpful for dispute resolution and in arbitration, ranking 1 and 2 with R.I.I. of 0.889 and 0.883 respectively. Rank 3 has tie within account of extra work and updated specification with R.I.I. of 0.860 clearing updated works and their specifications be recorded and maintained flawlessly.

Bill of quantities ranks 5 with R.I.I. of 0.856, forwarding that cost risks would be mitigated. audits conducted in firm ranks 6 with R.I.I. of 0.854, however audits help for quality management uplifting various profits.



**Figure 2. Top factors for Risk Management.**

**Table 3. Impact on Risk Management.**

Sr. No.	Risk Management	Relative Importance					Total (N)	ΣW	R.I.I.	Rank
		1	2	3	4	5				
1	Are records helpful during disputes	1	0	14	25	63	103	458	0.889	1
2	Can records used during Arbitration	1	0	12	32	58	103	455	0.883	2
3	To handle severe changes in contract	1	2	18	37	45	103	432	0.839	14
4	Handling ambiguous terms and conditions	2	1	31	33	36	103	409	0.794	24
5	Contracts	1	5	14	32	51	103	436	0.847	11
6	Are records useful to curtail cost	4	2	22	40	35	103	409	0.794	24
7	Unmanaged cash flow	4	9	21	29	40	103	401	0.779	28
8	Faulty cost calculations	5	5	9	31	53	103	431	0.837	16
9	Incomplete / inaccurate cost estimates	6	2	17	27	51	103	424	0.823	18
10	Material payment receipt	4	6	12	34	47	103	423	0.821	19
11	Bill of Quantities	2	3	10	37	51	103	441	0.856	5
12	Payroll	2	8	15	32	46	103	421	0.817	21
13	Incomplete site records	5	4	14	39	41	103	416	0.808	22
14	Faulty drawings	6	4	8	31	54	103	432	0.839	14
15	Undocumented change orders	2	4	15	28	54	103	437	0.849	9
16	Design changes	2	4	15	28	54	103	437	0.849	9
17	Account of extra work	2	2	11	36	52	103	443	0.860	3
18	Updated specifications	2	2	11	36	52	103	443	0.860	3
19	Site investigation reports	0	6	14	30	53	103	439	0.852	7
20	Soil investigation reports	0	6	14	30	53	103	439	0.852	7
21	Test reports	3	4	15	28	53	103	433	0.841	12
22	Audits	1	3	14	34	51	103	440	0.854	6
23	Subcontracting	2	3	21	40	37	103	416	0.808	22
24	Quality certificates	7	8	21	38	29	103	383	0.744	31
25	CPM/PERT Charts	7	8	21	38	29	103	383	0.744	31
26	Standards/Codes	1	8	10	39	45	103	428	0.831	17
27	Equipment records	5	6	20	33	39	103	404	0.784	26
28	Tax receipts	2	3	22	31	45	103	423	0.821	19
29	Miscellaneous certification	5	3	30	32	33	103	394	0.765	30
30	Minutes	3	7	20	38	35	103	404	0.784	26
31	E-Mails	3	9	26	26	39	103	398	0.773	29
32	Quantity Survey Sheet	2	3	14	37	47	103	433	0.841	12

Table 4. Present Scenario.

Sr. No.	Questions	Yes	No	Yes %	No %
1	Do you depend on any peculiar Electronic Record Management tool (Any Software)?	57	46	55.34	44.66
2	Do you have assigned special employee for record management?	52	50	50.49	48.54
3	Does your firm organised any training session for better records management?	46	56	44.66	54.37
4	Do you use photos during construction or to analyse workmanship?	90	13	87.38	12.62
5	Can records be used for risk management	100	3	97.09	2.91

### Present Scenario

To understand the actual and present use record management system in industry question in table below were asked.



Figure 3. Present Scenario

55.34% of respondents rely on electronic record management tool, and 50% respondents define that their firms hire employee for record management. 87.38 respondents said yes for use of photos for analysing workmanship. 44.66% respondents concluded they/ their firms do not conduct any training sessions for better record management that should have been more for sure. Almost all i.e. 97.09% respondents convinced that records could be used for risk management, fortifying importance of records regarding risk management.

### Conclusion

• Research work was conducted to have a global idea and remove the geographical constraints regarding the project theme. Results drawn are reliable because, 103 respondents from various nations were surveyed by the best possible means; that are highly skilled, educated, and experienced. Due care was taken to involve people from government sector, private sector, rural area, urban area, developed/developing cities etc.

• Research result break the stereotype that records/documents are limited up to bills or permissions but they are helpful for project controlling and good management. Role played by documents and records in construction industry is extensive in nature; they act independently when considered especially for risk management and project completion.

• Proper documentation, record keeping helps to improve office staff work because every activity of the project is properly organised and clearly discussed, but during it is also observed that those who don't have proper documentation, drawings efficiency of work goes on decreasing

• For field survey and online survey, it was observed number of construction companies and professionals depend on proper documentation for labour payment and other financial aspects that helps to complete the project within the time limit and avoid cost overrun for project.

• Industry depend on ERM (Electronic Record Management) but do not engage themselves for innovative training in that regards; also industry promote outsourcing documentation, which will welcome various risks in future.

### Recommendations

• Documents/ records should be handy to all stakeholders (engineers, architects, site supervisors, etc.) as per relevance.

This can be done using simple applications like Drop Box, Google Drive, One Drive, Team Drive etc.

• Drawings should be supervised before they reach site, and checked for architectural, structural feasibility. BIM and similar softwares can be used for the purpose.

• Permission/ Certifications etc should be available before hand, or at least be available before dead line.

• Checklists for the respective project be drafted and checked with work progresses. Project staff meeting should be conducted regularly for optimising the project.

• Staff should participate in hands on programmes, training courses to elevate respective skills. Staff employed should have desired qualification, beneficial to dedicate a personnel who is certified in project management.

• Government should also work for having rotating funds as industry people can overcome the financial pressure, focus on better project management, and not just finance management. Government policies should head towards digitalisation, which will not only be easy to deal with but also enhance project speed, workability and transparency.

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