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### DOCUMENTATION AND RECORDKEEPING ASSESSMENT SURVEY AND REVIEW STUDY IN CONSTRUCTION INDUSTRY

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**Abstract:** Construction project undergoes various stages and each stage has its own demand in itself. With infrastructural development it develops demand for close monitoring and control which is done by documents framed and records so developed. Study was conducted for assessment of impact of construction documents and records on project completion and risk management. An online survey was conducted having respondents spread over 26 places at same time R.I.I. Method was opted for data analysis. Study clears that documentation is back bone of any project and can assist the project stakeholders for enhancing their respective role. Documents and records so used prove helpful to for risk management primarily, Legal, Construction, Management risks. Study was also done to understand the present practices regarding document management and record keeping and same is discussed. It will not be exaggerated to conclude that documents and records can be used as tool for efficient project management.

**Keywords:** R.I.I. method, construction, document management, record keeping

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**INTRODUCTION**

Civil Engineering is noble field as it fulfills one of the basic needs of shelter. However, being a noble job, in this era of depleting natural resources, increasing demand of infrastructure at global level this industry has to undergo various phases filled of risks. Eventually all the stages of project demands to be well defined and planned which is assisted by project documents and records. Thus understanding the tone of construction documents and records in the industry, present study is to understand influence of documents and records on construction project management focusing primarily on the time management and risk management.

**Research Methodology:**



Study is fortified at each step of project like, literature review with pilot survey at same time results were shared and recommendations were also forwarded to the respondents. Data collection was done by opting online survey for which “Google Forms” were floated via email. Total 66 responses were noted from 26 Places viz. USA, UAE, Nepal, Kenya, Qatar and from 21 cities in India viz.

<b>New Delhi</b>	<b>Vadodra</b>	<b>Bhubhaneshwar</b>	<b>Nagpur</b>	<b>Vijaywada</b>	<b>Solapur</b>	<b>Guwahati</b>
<b>Mumbai</b>	<b>Parbhani</b>	<b>Hyderabad</b>	<b>Bharatpur</b>	<b>Akola</b>	<b>Nanded</b>	<b>Gurgaon</b>
<b>Ahemadnagar</b>	<b>Amravati</b>	<b>Pusad</b>	<b>Jalgaon</b>	<b>Washim</b>	<b>Pune</b>	<b>Aurangabad</b>

**Details of Respondents**

Table below shows the details of respondents who participated in the study. Respondents are from both private and government sector educational level ranging from Diploma to PhD in Civil Engineering and so on, thus giving overall and complete idea from study.

<b>Sector Wise Respondent Involvement</b>			
<b>Sr. No.</b>	<b>Sector</b>	<b>Number Of Respondent</b>	<b>Percentage</b>
1.	Government (India)	11	16.67
2.	Private	55	83.33
<b>Total</b>		66	100

<b>Respondents Qualification</b>			
<b>Sr. No.</b>	<b>Respondents Qualification</b>	<b>Number of Respondents</b>	<b>Percentage</b>

1.	M. Tech. TRE & Mgmt	1	1.5
2.	M. Tech. Environment	1	1.5
3.	PhD.	2	3.03
4.	D.C.E.	4	6.06
5.	PMP	4	6.06
6.	M. Tech. Structures	8	12.12
7.	B.E. / B. Tech. Civil	19	28.78
8.	M. Tech. Const. Mgmt.	27	40.90
<b>Total</b>		<b>66</b>	<b>100</b>

**Industry Wise Respondent's Involvement**

Sr. No.	Sector	Number of Respondents	Percentage
1.	Irrigation	6	9.09
2.	Roads/ Bridges	12	18.18
3.	Buildings	39	59.09
4.	Others	9	13.63
<b>Total</b>		<b>66</b>	<b>100</b>

**Method used for Study**

Relative Importance Index (R.I.I.) Method was opted for survey.

$$R.I.I. = \frac{\sum W}{A.N.} = \frac{1 \times N1 + 2 \times N2 + 3 \times N3 + 4 \times N4 + 5 \times N5}{5 \times N}$$

Where:

W = Weighting given to each factor by the Respondents (from 1 - 5)

A = Highest Weight (Here 5)

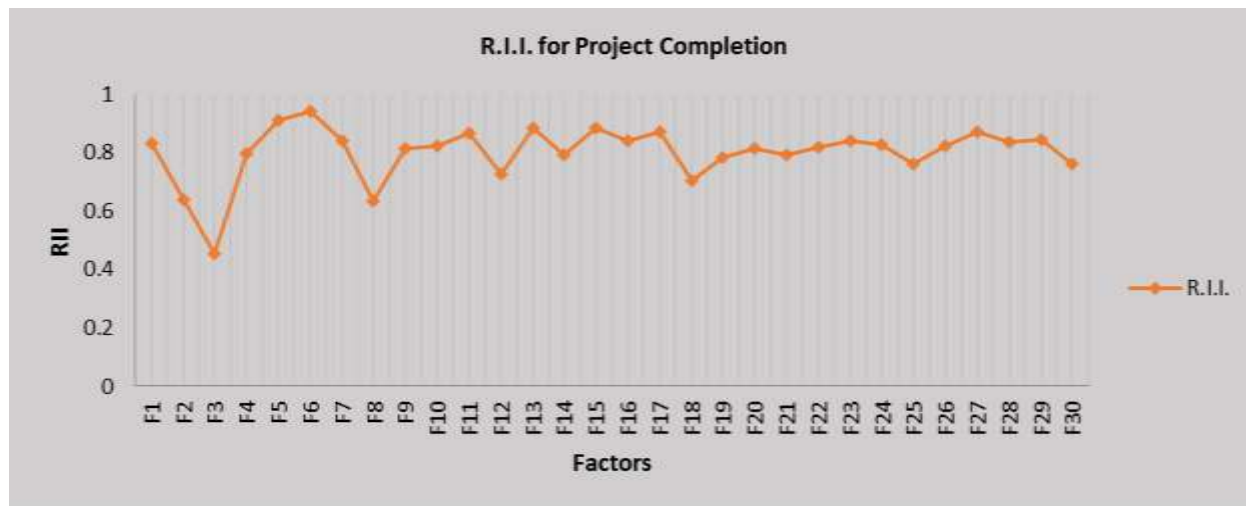
N = Total number of Respondents (Here 66).

**Responses for Project Completion**

Following table gives details regarding the responses from the online survey especially for Project Completion. The rank was derived using R.I.I. Method, and is described in table.

Sr. No.	Project Completion	Relative Importance					Total (N)	Σ W	R.I.I.	Rank
		1	2	3	4	5				
F1	Does lack of proper documentation frustrate team members	2	3	3	3	2	66	274	0.83	13
F2	Does documentation need lot of time for preparing them	3	1	2	2	5	66	211	0.63	28
F3	Will you prefer to get them made from outsider	2	1	1	7	5	66	150	0.45	30
F4	Does assigning special employee will speed up the documentation work	4	0	1	2	2	66	263	0.79	20
F5	Does up to date records and documents improves office staff work	1	2	2	1	4	66	301	0.91	2
F6	Does documentation help for good management	0	0	3	1	5	66	311	0.94	1
F7	Does documentation reduces re work	1	2	1	2	3	66	278	0.84	9
F8	Do you have any software for documentation?	1	8	1	1	1	66	210	0.63	29
F9	Do you think use of such software for documentation will be helpful	1	3	1	2	2	66	268	0.81	18
F10	Is the work done fast if documentation is error less	1	3	1	2	2	66	271	0.82	16
F11	Does documentation help in better decision making	0	2	9	2	3	66	286	0.86	7
F12	Does complicated language in contracts makes it difficult to execute	3	1	1	2	1	66	239	0.72	26
F13	Will incomplete drawing slow work speed	1	3	4	1	4	66	292	0.88	3
F14	Does land possession document affect work speed	3	1	1	2	2	66	261	0.79	21
F15	Does permission from competent authority effect work speed	1	1	3	2	3	66	292	0.88	3
F16	Does CPM/PERT/Bar chart prove helpful	0	2	8	3	2	66	277	0.83	10
F17	Does legal permissions delay the work	2	1	8	1	3	66	287	0.87	6
F18	Does lack of proper records stop project	5	5	2	2	1	66	232	0.70	27
F19	Does poor records and document delay the project	1	7	9	2	2	66	259	0.78	23
F20	Do you think construction records be used as Dispute resolution if any?	3	0	1	2	2	66	268	0.81	18
F21	Do you think construction records be used as tool for error detection?	2	3	1	2	2	66	261	0.79	21
F22	Does up to date records reduce time to response queries/errors	1	2	1	2	2	66	270	0.81	17
F23	Are previous records helpful in preparing bills	2	0	1	2	2	66	277	0.83	10
F24	Does delay in approval of bills impact the project time	1	3	1	2	2	66	273	0.82	14
F25	Is quantity surveying speeded up with handy records	2	5	1	2	1	66	251	0.76	24
F26	Are records helpful to draft (R.A) bills	1	1	1	2	2	66	272	0.82	15
F27	Are records of payment important	2	0	6	2	3	66	288	0.87	5
F28	Does late sanction of bills impact work speed	1	3	8	2	2	66	276	0.83	12
F29	Is material records helpful for time management	2	0	7	2	2	66	279	0.84	8

F30	Are records useful to meet desired quality of work	3	3	1	2	1	66	251	0.76	24
				7	4	9			1	

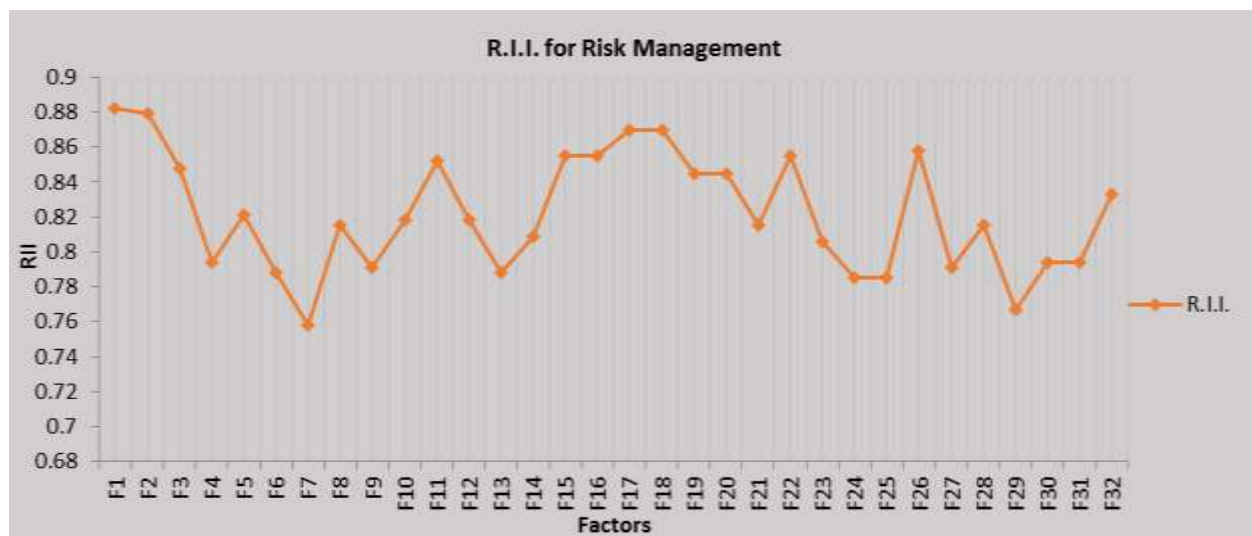


**Responses for Risk Management**

In same way, responses were taken regarding impact of documents and records on risk management. The rank was derived using R.I.I. Method and is as shown in table

Sr. No.	Risk Management	Relative Importance					Total (N)	ΣW	R.I.I.	Rank
		1	2	3	4	5				
F1	Are records helpful during disputes	1	0	10	15	40	66	291	0.882	1
F2	Can records used during Arbitration	1	0	9	18	38	66	290	0.879	2
F3	To handle severe changes in contract	1	0	12	22	31	66	280	0.848	10
F4	Handling ambiguous terms and conditions	1	1	20	21	23	66	262	0.794	22
F5	Contracts	1	3	12	22	28	66	271	0.821	14
F6	Are records useful to curtail cost	3	2	14	24	23	66	260	0.788	27
F7	Unmanaged cash flow	4	6	13	20	23	66	250	0.758	32
F8	Faulty cost calculations	4	4	6	21	31	66	269	0.815	17
F9	Incomplete / inaccurate cost estimates	6	1	12	18	29	66	261	0.791	25
F10	Material payment receipt	4	2	7	24	29	66	270	0.818	15
F11	Bill of Quantities	2	1	7	24	32	66	281	0.852	9
F12	Payroll	2	4	8	24	28	66	270	0.818	15
F13	Incomplete site records	4	3	11	23	25	66	260	0.788	27
F14	Faulty drawings	6	2	5	23	30	66	267	0.809	20
F15	Undocumented change orders	2	3	6	19	36	66	282	0.855	6
F16	Design changes	2	3	6	19	36	66	282	0.855	6
F17	Account of extra work	1	1	8	20	36	66	287	0.870	3
F18	Updated specifications	1	1	8	20	36	66	287	0.870	3

F19	Site investigation reports	0	4	9	21	32	66	279	0.845	11
F20	Soil investigation reports	0	4	9	21	32	66	279	0.845	11
F21	Test reports	2	2	13	21	28	66	269	0.815	17
F22	Audits	1	1	10	21	33	66	282	0.855	6
F23	Subcontracting	1	1	15	27	22	66	266	0.806	21
F24	Quality certificates	3	4	11	25	23	66	259	0.785	29
F25	CPM/PERT Charts	3	4	11	25	23	66	259	0.785	29
F26	Standards/Codes	1	4	4	23	34	66	283	0.858	5
F27	Equipment records	4	1	14	22	25	66	261	0.791	25
F28	Tax receipts	2	2	12	23	27	66	269	0.815	17
F29	Miscellaneous certification	4	2	15	25	20	66	253	0.767	31
F30	Minutes	2	4	12	24	24	66	262	0.794	22
F31	E-Mails	2	4	16	16	28	66	262	0.794	22
F32	Quantity Survey Sheet	2	1	10	24	29	66	275	0.833	13



**Present Scenario**

In order to know the present practices in industry, questions were asked and table gives details regarding the responses from the online survey especially for Present Scenario

Sr. No.	Questions	Yes	No	Total (N)	Yes %	No%
1	Do you depend on any peculiar Electronic Record Management tool (Any Software)?	35	31	66	53.03	46.97
2	Do you have assigned special employee for record management?	32	34	66	48.48	51.52
3	Does your firm organised any training session for better records management?	36	30	66	54.55	45.45
4	Do you use photos during construction or to analyse workmanship?	59	7	66	89.39	10.61
5	Can records be used for risk management	63	3	66	95.45	4.55

**Result Discussion**

**Impact of Construction Documents and Records on Project Completion**

Out of 30 factors, top factors are described below in the table and are discussed.

Sr. No.	Question	Relative Importance					Total (N)	ΣW	R.I.I.	Rank
		1	2	3	4	5				
1	Does documentation help for good management	0	0	3	13	50	66	311	0.942	1
2	Does up to date records and documents improves office staff work	1	2	2	15	46	66	301	0.912	2
3	Will incomplete drawing slow work speed	1	3	4	17	41	66	292	0.885	3
4	Does permission from competent authority effect work speed	1	1	3	25	36	66	292	0.885	3
5	Are records of payment important	2	0	6	22	36	66	288	0.873	5

Rank 1, R.I.I. 0.942, is secured by statement documentation help in good management, R.I.I. 0.912 documentation boosts office staff work rank 2<sup>nd</sup> position. With R.I.I. 0.885 shows that incomplete drawings and delay in gaining permissions from competent authority slow the work speed ranked third. R.I.I. 0.873 records f payment are important is ranked fifth.

**Impact of Construction Documents and Records on Risk Management**

Various risks were identified which can be handled/ mitigated with help of documents and records, or which are related to risks. These questions were categorized among Legal, Cost, Construction, Management and Material risks with total of 32 in number.

Out of 32 factors, top factors are described below in the table. Results for the same are also discussed.

Sr. No.	Questions / Risks	Relative Importance					Total (N)	ΣW	R.I.I.	Rank
		1	2	3	4	5				
<b>Legal Risk</b>										
1	Are records helpful during disputes	1	0	10	15	40	66	291	0.882	1
2	Can records used during Arbitration	1	0	9	18	38	66	290	0.879	2
<b>Construction Risk</b>										
3	Account of extra work	1	1	8	20	36	66	287	0.870	3

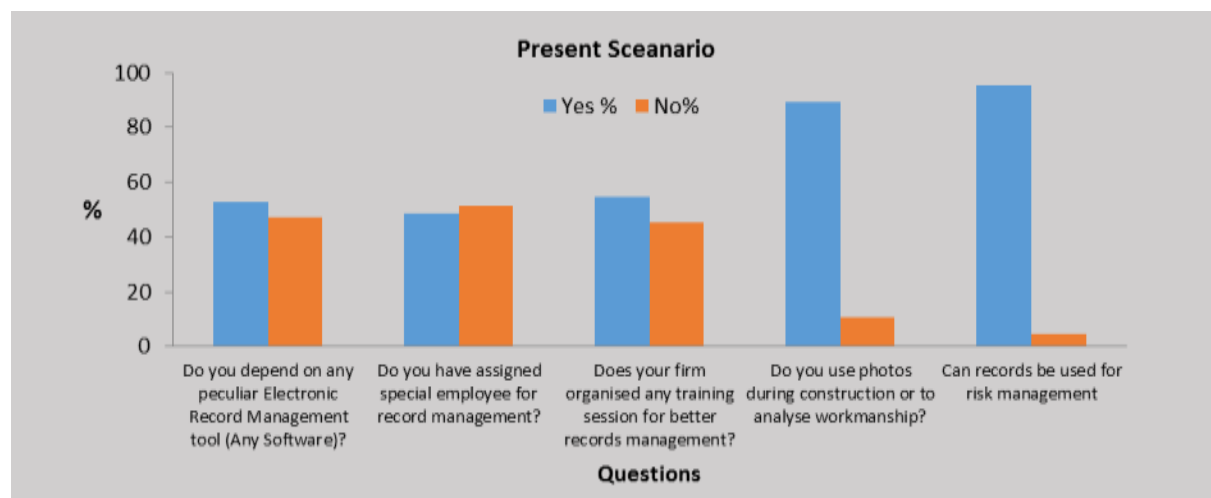
4	Updated specifications	1	1	8	20	36	66	287	0.870	3
5	Undocumented change orders	2	3	6	19	36	66	282	0.855	6
6	Design changes	2	3	6	19	36	66	282	0.855	6
<b>Management Risk</b>										
7	Standards/Codes	1	4	4	23	34	66	283	0.858	5
8	Audits	1	1	10	21	33	66	282	0.855	6

With relative index 0.882 records are important rank 1<sup>st</sup> shows us to be the most important factor and to be maintained during and after project life. With R.I.I. 0.879 rank Rank 2 records helps in dispute resolution. R.I.I. 0.870 theirs tie for tank 3 in account of extra work and updated specification promotes both to be maintained regularly. For rank 6 with R.I.I 0.855 undocumented change orders, designs changes and audits clears that it helps in justifying fluctuation in cost and time overrun.

**Present Scenario**

Result of present scenario for online survey is as in table and discussed below.

Sr. No.	Questions	Yes	No	Total (N)	Yes %	No %
1.	Do you depend on any peculiar Electronic Record Management tool (Any Software)?	35	31	66	53.03	46.97
2.	Do you have assigned special employee for record management?	32	34	66	48.48	51.52
3.	Does your firm organised any training session for better records management?	36	30	66	54.55	45.45
4.	Do you use photos during construction or to analyse workmanship?	59	7	66	89.39	10.61
5.	Can records be used for risk management	63	3	66	95.45	4.55





About 95% agree records are the tool for risk management. It also shows, 53.03% respondents uses electronic record management tools, and 54.55% firms conducts training sessions implicating a positive trend. Industry about 83.39% overwhelmingly uses photographs to manage sites.

### Conclusion

It will hold true to state that construction documents and records play a vital role in every phase of project. Firms who practice proper documentation system can overcome various risks enabling the project to become sustainable in regards of various regards. Project speed and quality control can be maintained with use of relevant documents and records. Study shows the direct connection of document type and risk associated depicting the role of it for efficient project management. At same time study, it highlights the need of standardization of project documentation system and record keeping methodology.

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