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ANNEXURE-I

NUCLEAR ELECTRICITY PRODUCTION AND SHARE

A. NUCLEAR ELECTRICITY PRODUCTION FROM 1985 TO 2013

Country	Nuclear capacity (TWE-h) of reactors connected to the grid at at 31 Dec. of given year							
	1985	1990	1995	2000	2005	2010	2012	2013
ARGENTENIA	5.25	6.72	6.57	5.74	6.37	6.69	5.90	5.74
ARMENIA				1.84	2.50	2.29	2.12	2.17
BELGUIM	29.25	40.59	39.30	45.81	45.34	45.73	38.46	40.63
BRAZIL	3.17	2.06	2.33	5.59	9.20	13.77	15.17	13.78
BULGARIA	12.17	13.51	16.22	16.79	17.38	14.24	14.86	13.32
CANADA	59.47	69.87	93.98	69.12	86.83	85.50	89.06	94.29
CHINA			12.13	16.02	50.33	70.96	92.65	104.8
C ZECH REP.	1.99	11.77	12.23	12.71	23.25	26.44	28.60	29.01
FINLAND	17.98	18.13	18.13	21.58	22.36	21.89	22.06	22.67
FRANCE	231.2	297.6	358.7	395.3	431.18	410.0	407.4	405.9
GERMANY	119.5	139.3	146.1	160.6	154.61	133.0	94.10	92.14
HUNGARY	6.10	12.89	13.20	13.35	13.02	14.66	14.76	14.54
INDIA	3.87	5.29	6.99	14.23	15.73	20.48	29.66	30.01
IRAN.ISL.REP							1.33	3.89
ITALY	6.46							
JAPAN	145.3	187.1	275.5	306.2	280.50	280.2	17.23	13.95
KAZAKHSTAN			0.08					

Country	Nuclear capacity (TWE-h) of reactors connected to the grid at at 31 Dec. of given year							
	1985	**1990**	**1995**	**2000**	**2005**	**2010**	**2012**	**2013**
KOREA	12.36	50.26	60.21	103.5	137.59	141.8	143.5	132.4
LITHUANIA	8.75	15.70	10.64	7.42	9.54			
MEXICO		2.78	7.53	7.92	10.32	5.59	8.41	11.38
NETHERLANDS	3.59	3.29	3.78	3.70	3.77	3.75	3.71	2.74
PAKISTAN	0.26	0.38	0.46	0.90	2.41	2.56	5.27	4.37
ROMANIA				5.05	5.11	10.70	10.55	10.70
RUSSIA	88.26	109.6	91.59	120.1	137.64	159.4	166.2	161.7
SLOVAKIA	8.70	11.16	11.35	15.17	16.34	20.54	14.41	14.62
SLOVENIA	3.85	4.39	4.57	4.55	5.61	5.38	5.24	5.04
SOUTH AFRICA	5.39	8.47	11.29	13.00	12.24	12.90	12.40	13.64
SPAIN	26.83	51.98	53.49	59.49	54.99	59.26	58.70	54.31
SWEDEN	55.89	65.27	67.17	51.88	69.58	55.73	61.47	63.72
SWITZERLAND	21.28	22.40	23.58	25.05	22.11	25.37	24.45	24.99
UK	53.73	58.77	70.64	72.99	75.34	56.85	63.96	64.13
UKRAINE	35.81	71.26	65.78	72.56	83.40	83.95	84.89	78.17
USA	378.9	578.0	673.5	755.5	783.35	807.0	770.7	790.1
WORLD	1327.63	1890.35	2190.94	2440.92	2626.34	2629.82	2346.19	2358.86

B. NUCLEAR ELECTRICITY SHARE, FROM 1985 TO 2013

Country	% of Share							
	1985	1990	1995	2000	2005	2010	2012	2013
ARGENTENIA	11.7	19.8	11.	7.3	6.9	5.9	4.7	4.4
ARMENIA				33.0	42.7	39.4	26.6	29.2
BELGUIM	59.8	60.1	55.5	56.8	55.6	51.2	51.0	52.1
BRAZIL	1.7	1.0	1.0	1.9	2.5	3.1	3.1	2.8
BULGARIA	31.6	35.7	46.4	45.0	44.1	33.1	31.7	30.7
CANADA	12.7	14.6	17.3	11.8	14.5	15.1	15.3	16.0
CHINA			1.2	1.2	2.0	1.8	2.0	2.1
C ZECH REP.	NA	NA	20.0	18.7	30.5	33.3	35.3	35.9
FINLAND	38.2	35.1	29.9	32.2	32.9	28.4	32.6	33.3
FRANCE	64.8	74.5	76.1	76.4	78.5	74.1	74.8	73.3
GERMANY	31.2	33.1	29.6	30.6	26.6	22.6	16.1	15.5
HUNGARY	23.6	51.4	42.3	40.6	37.2	42.1	5.9	50.7
INDIA	2.2	2.2	1.9	3.1	2.8	2.9	3.6	3.5
IRAN.ISL.REP							0.6	1.5
ITALY	3.8							
JAPAN	22.7	27.1	33.4	33.8	29.3	29.2	2.1	1.7
KAZAKHSTAN			0.1					
KOREA, REP OF	23.2	49.1	36.1	40.7	44.7	32.2	30.4	27.6
LITHUANIA	NA	NA	86.1	73.9	70.3			
MEXICO		2.6	6.0	3.9	5.0	3.6	4.7	4.6
NETHERLANDS		4.9	4.9	4.3	3.9	3.4	4.4	2.8
PAKISTAN		1.1	0.9	1.7	2.8	2.6	5.3	4.4
ROMANIA				10.9	8.6	19.5	19.4	19.8
RUSSIA		NA	11.8	15.0	15.8	17.1	17.8	17.5
SLOVAKIA		NA	44.1	53.4	56.1	51.8	53.8	51.7
SLOVENIA		NA	39.5	37.4	42.4	37.3	36.0	33.6
SOUTH AFRICA		5.6	6.5	6.6	5.5	5.2	5.1	5.7

Country	% of Share							
	1985	1990	1995	2000	2005	2010	2012	2013
SPAIN		35.9	34.1	27.6	19.6	20.1	20.5	19.7
SWEDEN		45.9	46.6	39.0	44.9	38.1	38.1	42.7
SWITZERLAND	39.8	42.6	39.9	38.2	38.0	38.0	35.9	36.4
UK	19.6	19.7	25.4	21.9	20.0	15.5	18.7	18.3
UKRAINE	NA	NA	37.8	47.3	48.5	48.1	46.2	43.6
USA	15.5	20.6	22.5	19.8	19.3	19.6	19.0	19.4

ANNEXURE- II

CRONBACH'S ALPHA

Reliability Statistics

Cronbach's Alpha	N of Items
.967	20

Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded[a]	0	.0
	Total	20	100.0

ANNEXURE- III

QUESTIONNAIRES

COVERING LETTER:

Dear Sir/Madam

I am pursuing Ph.D. in project management. My topic is " Development of execution model for nuclear energy sector projects executed by Government of India institutions" under the guidance of Shri S. Basu, Director, BARC and Dr. K. Bhargawa, AGM, NRB, BARC.

As an experienced project practitioner, your answers to this short questionnaire would be greatly appreciated. All responses will be kept confidential.

Dear respondent you may also download the questionnaires from link; https://sites.google.com/site/chauhanrkupes/my-forms and send to me on rkchphd@rediffmail.com .

Communication detail: R.K. Chauhan, SO/G, NRB, BARC, NRB Building Anushaktinagar, Mumbai-94.

Tel.: (O) 25597970, (M) 9869865152.

Regards

Chauhan R K

QUESTIONNAIRES FORMAT:

A. INTRODUCTION:

A.1 Experience: (pl. mark in any one column)

Year of experience	**0-5 years**	**6 to 10 Years**	**10 to 20 years**	**20 + years**

A.2 Area of expertise : (pl. mark in appropriate column/ s)

Design & analyses	Construction (civil/mech/E &I/EE etc)	project management & coordination	Purchase & procurement	Quality Assurance

A.3 Responding as : (pl. mark "any one column)

Project authority/ owner	Engineering consultant/ contractor	project management consultant agency	Site contractor/ sub-contractor	Quality Assurance team

B. ATTRIBUTES

These attributes are related to the nuclear energy sector projects.

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree
		1	2	3	4	5
R01	Delay due to lack of commitment among project authority/owner.					

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree
R02	Delay due to lack of commitment among contractor/ consultant professionals.					
R03	Delay due to lack of clarity in project scope/process/ technology					
R04	Delay due to inefficient site management					
R05	Delay due to poor site coordination with other agencies					
R06	Delay due to lack of communication among the involved agencies					
R07	Delay due to poor / backward project planning & scheduling.					

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree
R08	Delay due to improper selection of contractor.					
R09	Delay due to inefficient purchase &procurement system.					
R10	Delay due to external social & political factors.					
R11	Delay in schedule causes increase project cost.					
R12	Lack of project coordination among the different agencies involved in the project life cycle is a one of major hurdle in execution.					
R13	Involving an independent coordinating agency to take care of coordination, will help to meet the target cost & schedule.					
R14	MIS (Management Information System) can play a great role for coordinating & controlling the project schedule.					

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree
R15	Use of professional management tools & practices (in house) will help to meet project cost & schedule in addition to MIS.					
R16	Involving a professional management agency (third part) to take care of project monitoring & control will help in project execution.					
R17	Quality Assurance shall be kept as independence agency to meet the stringent safety requirement.					
R18	There is need to create the agency to carry out the awareness activities among the society to address the social issues .					
R19	Professional management training shall be must for all engineers &staffs involved in project.					
R20	Research & development dept. shall be kept away during execution of project. They have to play role before project starting.					

ANNEXURE-IV

RESPONSES

A. RESPONSE AS PROJECT AUTHORITY/ OWNER

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
		1	2	3	4	5	
R01	Delay due to lack of commitment among project authority/owner.	51	61	26	76	11	0.658
R02	Delay due to lack of commitment among contractor/ consultant professionals.	31	81	61	46	6	0.676
R03	Delay due to lack of clarity in project scope/process/ technology	36	97	36	51	5	0.696
R04	Delay due to inefficient site management	46	66	51	50	12	0.675
R05	Delay due to poor site coordination with other agencies	36	110	36	36	7	0.717
R06	Delay due to lack of communication among the involved agencies	46	111	20	46	2	0.736
R07	Delay due to poor / backward project planning & scheduling.	36	99	40	32	18	0.692

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R08	Delay due to improper selection of contractor.	31	124	26	42	2	0.724
R09	Delay due to inefficient purchase &procurement system.	66	87	30	35	7	0.751
R10	Delay due to external social & political factors.	41	67	66	46	5	0.683
R11	Delay in schedule causes increase project cost.	106	101	11	7	0	0.872
R12	Lack of project coordination among the different agencies involved in the project life cycle is a one of major hurdle in execution.	56	117	16	36	0	0.772
R13	Involving an independent coordinating agency to take care of coordination, will help to meet the target cost & schedule.	26	61	61	56	21	0.613
R14	MIS (Management Information System) can play a great role for coordinating & controlling the project schedule.	46	106	41	16	16	0.733

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R15	Use of professional management tools & practices (in house) will help to meet project cost & schedule in addition to MIS.	36	121	36	16	16	0.729
R16	Involving a professional management agency (third part) to take care of project monitoring & control will help in project execution.	36	56	61	51	21	0.631
R17	Quality Assurance shall be kept as independence agency to meet the stringent safety requirement.	76	122	21	0	6	0.833
R18	There is need to create the agency to carry out the awareness activities among the society to address the social issues .	73	126	26	0	0	0.842
R19	Professional management training shall be must for all engineers &staffs involved in project.	95	125	5	0	0	0.880
R20	Research & development dept. shall be kept away during execution of project. They have to play role before project starting.	81	46	21	61	16	0.702

B. RESPONSE AS CONSULTANT

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
		1	2	3	4	5	
R01	Delay due to lack of commitment among project authority/owner.	12	109	0	66	0	0.672
R02	Delay due to lack of commitment among contractor/ consultant professionals.	34	87	33	33	0	0.730
R03	Delay due to lack of clarity in project scope/process/ technology	2	132	45	8	0	0.737
R04	Delay due to inefficient site management	11	123	53	0	0	0.755
R05	Delay due to poor site coordination with other agencies	12	109	54	12	0	0.729
R06	Delay due to lack of communication among the involved agencies	11	133	32	11	0	0.754
R07	Delay due to poor / backward project planning & scheduling.	56	88	31	12	0	0.801

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R08	Delay due to improper selection of contractor.	11	88	45	43	0	0.672
R09	Delay due to inefficient purchase &procurement system.	0	67	120	0	0	0.672
R10	Delay due to external social & political factors.	11	143	33	0	0	0.776
R11	Delay in schedule causes increase project cost.	45	132	10	0	0	0.837
R12	Lack of project coordination among the different agencies involved in the project life cycle is a one of major hurdle in execution.	55	66	56	10	0	0.778
R13	Involving an independent coordinating agency to take care of coordination, will help to meet the target cost & schedule.	45	54	44	32	12	0.694
R14	MIS (Management Information System) can play a great role for coordinating & controlling the project schedule.	22	143	11	11	0	0.788

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R15	Use of professional management tools & practices (in house) will help to meet project cost & schedule in addition to MIS.	33	125	15	14	0	0.789
R16	Involving a professional management agency (third part) to take care of project monitoring & control will help in project execution.	23	110	54	0	0	0.767
R17	Quality Assurance shall be kept as independence agency to meet the stringent safety requirement.	33	66	56	32	0	0.707
R18	There is need to create the agency to carry out the awareness activities among the society to address the social issues .	56	66	65	0	0	0.790
R19	Professional management training shall be must for all engineers &staffs involved in project.	23	142	22	0	0	0.801
R20	Research & development dept. shall be kept away during execution of project. They have to play role before project starting.	33	99	23	32	0	0.742

C. RESPONSE AS CONTRACTOR :

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
		1	2	3	4	5	
R01	Delay due to lack of commitment among project authority/owner.	0	92	20	31	0	0.685
R02	Delay due to lack of commitment among contractor/ consultant professionals.	0	101	11	31	0	0.698
R03	Delay due to lack of clarity in project scope/process/ technology	0	102	20	21	0	0.713
R04	Delay due to inefficient site management	0	111	11	21	0	0.726
R05	Delay due to poor site coordination with other agencies	0	112	20	11	0	0.741
R06	Delay due to lack of communication among the involved agencies	0	121	11	11	0	0.754
R07	Delay due to poor / backward project planning & scheduling.	12	98	33	0	0	0.771

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R08	Delay due to improper selection of contractor.	0	91	41	11	0	0.712
R09	Delay due to inefficient purchase &procurement system.	0	91	52	0	0	0.727
R10	Delay due to external social & political factors.	0	92	31	20	0	0.701
R11	Delay in schedule causes increase project cost.	21	80	12	30	0	0.729
R12	Lack of project coordination among the different agencies involved in the project life cycle is a one of major hurdle in execution.	11	99	22	11	0	0.754
R13	Involving an independent coordinating agency to take care of coordination, will help to meet the target cost & schedule.	0	101	21	20	1	0.710
R14	MIS (Management Information System) can play a great role for coordinating & controlling the project schedule.	11	111	18	3	0	0.782

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R15	Use of professional management tools & practices (in house) will help to meet project cost & schedule in addition to MIS.	12	98	32	1	0	0.769
R16	Involving a professional management agency (third part) to take care of project monitoring & control will help in project execution.	0	120	22	1	0	0.766
R17	Quality Assurance shall be kept as independence agency to meet the stringent safety requirement.	0	91	10	42	0	0.669
R18	There is need to create the agency to carry out the awareness activities among the society to address the social issues .	11	101	0	31	0	0.729
R19	Professional management training shall be must for all engineers &staffs involved in project.	11	110	11	11	0	0.769
R20	Research & development dept. shall be kept away during execution of project. They have to play role before project starting.	12	81	10	40	0	0.691

D. COMBINED RESPONSE:

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
		1	2	3	4	5	
R01	Delay due to lack of commitment among project authority/owner.	63	262	46	173	11	0.670
R02	Delay due to lack of commitment among contractor/ consultant professionals.	65	269	105	110	6	0.700
R03	Delay due to lack of clarity in project scope/process/ technology	38	331	101	80	5	0.714
R04	Delay due to inefficient site management	57	300	115	71	12	0.715
R05	Delay due to poor site coordination with other agencies	48	331	110	59	7	0.728
R06	Delay due to lack of communication among the involved agencies	57	365	63	68	2	0.747
R07	Delay due to poor / backward project planning & scheduling.	104	285	104	44	18	0.749

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R08	Delay due to improper selection of contractor.	42	303	112	96	2	0.703
R09	Delay due to inefficient purchase &procurement system.	66	245	202	35	7	0.718
R10	Delay due to external social & political factors.	52	302	130	66	5	0.719
R11	Delay in schedule causes increase project cost.	172	313	33	37	0	0.823
R12	Lack of project coordination among the different agencies involved in the project life cycle is a one of major hurdle in execution.	122	282	94	57	0	0.769
R13	Involving an independent coordinating agency to take care of coordination, will help to meet the target cost & schedule.	71	216	126	108	34	0.666
R14	MIS (Management Information System) can play a great role for coordinating & controlling the project schedule.	79	360	70	30	16	0.764

Sr. no	Attribute name	Strongly agree	Agree	Uncertain/ neutral	Disagree	Strongly disagree	RII
R15	Use of professional management tools & practices (in house) will help to meet project cost & schedule in addition to MIS.	81	344	83	31	16	0.760
R16	Involving a professional management agency (third part) to take care of project monitoring & control will help in project execution.	59	286	137	52	21	0.712
R17	Quality Assurance shall be kept as independence agency to meet the stringent safety requirement.	109	279	87	74	6	0.748
R18	There is need to create the agency to carry out the awareness activities among the society to address the social issues .	140	293	91	31	0	0.795
R19	Professional management training shall be must for all engineers &staffs involved in project.	129	377	38	11	0	0.825
R20	Research & development dept. shall be kept away during execution of project. They have to play role before project starting.	126	226	54	133	16	0.713

ANNEXURE-V

TEST FOR NORMALITY

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
VAR00001	27	100.0%	0	.0%	27	100.0%

Descriptive

			Statistic	Std. Error
VAR00001	Mean		72.2222	2.77778
	95% Confidence Interval for Mean	Lower Bound	66.5124	
		Upper Bound	77.9320	
	5% Trimmed Mean		72.1914	
	Median		75.0000	
	Variance		208.333	
	Std. Deviation		14.43376	
	Minimum		45.00	
	Maximum		100.00	
	Range		55.00	
	Interquartile Range		15.00	
	Skewness		-.244	.448
	Kurtosis		-.408	.872

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VAR00001	.143	27	.169	.951	27	.233

a. Lilliefors Significance Correction

ANNEXURE-VI

TEST FOR SIGNIFICANCE

“

Respondent Sr no.	Response Rating (%)
1	50
2	75
3	90
4	70
5	80
6	75
7	70
8	50
9	50
10	80
11	65
12	80
13	100
14	75
15	95
16	75
17	80
18	45
19	50
20	80
21	70
22	60
23	85
24	90
25	70
26	65
27	75

ANNEXURE-VII

PAPER PUBLICATION

1. Paper-1 : "Contract execution strategies & methodologies for mega projects" presented in International Conference on Management of Infrastructure (ICMI-13) at UPES, Dehradun.

2. Paper-2 : "Causes of delay in Indian nuclear energy sector projects" is submitted as term paper in UPES and accepted.

3. Paper-3 : "Contract execution strategies in Indian nuclear sector projects-application & constraints" presented in International Conference on Management of Infrastructure (ICMI-14) at UPES, Dehradun.

4. Paper-4 : "Attributes to control schedule delays in Indian nuclear energy sector projects" is submitted in International Journal of Project management (abstract accepted, paper under review).