

CHAPTER- 1

INTRODUCTION

- 1.1 OVERVIEW
- 1.2 RESEARCH MOTIVATION
- 1.3 BUSINESS PROBLEM
- 1.4 RESEARCH QUESTION
- 1.5 RESEARCH OBJECTIVE
- 1.6 RESEARCH APPROACH
- 1.7 CONTRIBUTION OF RESEARCH
- 1.8 OUTLINE OF THESIS

1.1 OVERVIEW:-

The chapter covers the research motivation and business problem. The research question and research objectives are defined. Path to achieve the objectives and steps to solve the business problem is described under the research approach.

1.2 RESEARCH MOTIVATION:-

The projects are being executed in power and infrastructure sectors worldwide in contract mode involving expert professionals and specialized & professional agencies. Executions of projects are inherently very complex and dynamic. Multiple agencies along with multiple feedback process and nonlinear relationship are involved during project execution. The problems encountered during the execution right from project conceive, planning, design, construction to commission of the projects are dynamic. As a result, schedule delays and cost overruns are occurred in execution of projects in spite of advancements in design, construction and management techniques. (Sang, Feniosky & Moonseo, 2006).

Engineering Procurement Construction (EPC) and Engineering Procurement Construction Management (EPCM) modes are in practice worldwide for execution of the projects in power sector including nuclear and infrastructure sectors. These models were tried in past to execute the projects in Indian nuclear sector but schedule delays and costs overrun has been found. It was noticed that these contract strategies/models could not be directly adopted in Indian Nuclear sectors because of a number of constraints & limitations. Very specialized professionals' expertise is required to manage the project especially in nuclear components of the project.

Day to day sharp incremental demand of power in India is forcing the power sector to reduce the project construction time.

Updated project execution strategies and professional approaches are required to be developed to solve the power shortage. Over and above,

Indian Nuclear sector has own constraints & limitations. There is an urgent need to evolve a new model to address the issues related to Indian nuclear energy sector in addition to construction sector projects.

1.3 BUSINESS PROBLEM:-

EPC & EPCM models were tried in past to execute the projects in Indian nuclear sector but successful rate was not satisfactory. The project schedule delays and cost overruns have been noticed in execution.

1.4 RESEARCH QUESTION:-

If EPC & EPCM models are not workable in nuclear sector, why not a new project execution model shall be developed for Indian nuclear sector projects to controls the schedule delay& the cost.

1.5 RESEARCH OBJECTIVE:-

Government of India has not yet open the nuclear sector projects/plants to private firms fully. Participation of the other public sectors and private sector are limited. Till now all projects have been executed by Government of India (GOI) institutions. In present also, the projects are being executed by GOI institutions only with limited private/public partnership. GOI has planned 15 units out of 55 units to open to private firm with some special conditions in future. GOI is in the process of amendments in laws to consider the active participation of private firms. Shortage of energy mix, coal, oil & gas and increase in import price of energy mix are main concern for India. GOI is now concentrating on nuclear energy in addition to other non-conventional sector. Time completion of nuclear projects is on priority.

Project delay is directly related to the cost. Delay from target schedule causes rise in project target cost. The project schedule delay is identified as a key element in project execution strategies/ models.

Considering the GOI as project executing authority and research problem as stated above, the following two research objectives are framed to carry out the research:

- a. To analyse the applicability of in-practice project execution models in infrastructure & power sector for Indian nuclear sector projects.
- b. To develop a project execution model for Indian nuclear sector and validate.

1.6 RESEARCH APPROACH :-

Path is defined in the beginning of the research in order to converse the research timely.

The following steps are planned and followed to achieve the two objectives:

Path for objective-1:- “To analyse the applicability of in-practice project execution models in infrastructure & power sector for Indian nuclear sector projects”.

- a. Literature review of published journal papers, articles and national& international reports are carried out. Internal reports and documents are studied. Official web sites are visited. Findings and gaps are noted.
- b. Test questionnaires based on “delay in project schedule” which are key elements of project execution model, are framed. Responses on test questionnaires are compiled, discussed and tested on SPSS. Final questionnaires are framed and circulated to respondents. The responses are collected and compiled on Likert scale.
- c. Compiled data are analysed quantitatively& qualitatively. Data of nuclear sector projects are compared with construction sector projects.
- d. Interpretation of data and applicability of existing models of construction sector in Indian nuclear sector is carried out.

Path for Objective -2:- “To develop the execution model for Indian nuclear energy sector and validate”.

- a. Questionnaires based on literature review are framed on strategic factors and responses are collected.
- b. Analyses and interpretation of strategic factors attributes are carried out.
- c. Project execution model for Indian nuclear sector project is developed.
- d. The model is tested and validated.

1.7 CONTRIBUTION OF RESEARCH :-

Department of Atomic Energy (DAE) planned to achieve 20,000 MWe by the year 2020. The XI Plan proposals has firmed up setting up of 8 700 MWe Pressurized Heavy Water Reactor (PHWRs) , indigenously designed and 10 Light Water Reactors (LWR) of about 1000 MWe each, based on imports. In addition to this, construction of 4 FBRs and an Advanced Heavy Water Reactor (AHWR) are also planned.

Government of India estimates share of nuclear power in the total primary energy mix to be between 4.0 to 6.4% in the year 2031-32. Department of Atomic Energy (DAE) estimates the nuclear share to be about 8.6% by the year 2032 and further enhanced to 16.6% by the year 2052.

The application of this research will be used to execute the planned project in future. In economical term the applicable market for this research will be more than Rs. 60000 Cr by year 2025.

1.8 OUTLINE OF THESIS:-

The thesis was written in line of synopsis and abstract. The outline of the thesis is follows as:

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- 1.2 Research Motivation
- 1.3 Business Problem
- 1.4 Research Question
- 1.5 Research Objective
- 1.6 Research Approach
- 1.7 Contribution of Research
- 1.8 Outline of Thesis

2. CHAPTER-2 :-LITERATURE REVIEW

- 2.1 Overview
- 2.2 Literature Review
- 2.3 Review of Indian Nuclear Sector
- 2.4 Summary on Literature Review

3. CHAPTER 3:- NUCLEAR ENERGY SECTOR

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4. CHAPTER 4:-EXISTING PROJECT EXECUTION MODELS

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 - 4.2.2 Management Information System
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- 4.4 Mathematical Equation for Execution Model
- 4.5 Graphical Analysis of Execution Model

5. CHAPTER-5:-RESEARCH METHODOLOGY

- 5.1 Overview
- 5.2 Sampling
- 5.3 Data Collection
 - 5.3.1 Questionnaires Formation
 - 5.3.2 Reliability Testing
 - 5.3.3 List of Variables
- 5.4 Data Analysis Tools
- 5.5 Respondents Profile
- 5.6 Data Analysis for Delay Factors
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- 5.7 Conclusion on Research Methodology

6. CHAPTER-6:-PROJECT EXECUTION MODEL

- 6.1 Overview
- 6.2 Basis & Assumption for Model
- 6.3 Analyses for Strategic Factors
 - 6.3.1 Interpretation of Analysis
 - 6.3.2 Conclusion on Interpretation
- 6.4 Development of Model
 - 6.4.1 Description of Project Execution Model
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- 6.6 Validation of Model
 - 6.6.1 Empirical Testing
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- 6.7 Conclusion on Project Execution Model

7. CHAPTER-7:- CONCLUSIONAND FUTURE RESEARCH

- 7.1 Overview
- 7.2 Summary of Research Finding
- 7.3 Contributions of the Research
- 7.4 Implications for Practice
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8. CHAPTER-8:- REFERENCE

9. APPENDIX

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Annexure-II	:	Questionnaires
Annexure-III	:	Responses
Annexure –IV	:	Frequency Table
Annexure –V	:	Test for Normality
Annexure-VI	:	Test for Significance
Annexure-VII	:	Paper Publication
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