

Research on Life-cycle Process Management of Petroleum Geophysical Exploration Engineering Project in China

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ABSTRACT

In recent years, project management has been gradually implemented within China's petroleum geophysical exploration and development engineering. Recently, achievements have been made in the institutionalization, routinization and standardization of project management in petroleum industry. The sustainable development of petroleum enterprises has been ensured by process management, which based on the entire life-cycle of geophysical exploration project. In this paper, the relations between project life-cycle and project management process have been elaborated. Furthermore, the process management based on the entire life-cycle of geophysical exploration project has been established. The author believes that process management would be beneficial to the overall efficiency of petroleum geophysical exploration.

1. INTRODUCTION

In the process management of petroleum geophysical exploration engineering project, each district exploration engineering project is the integration of decision science, technical capacity and capital investment. In order to improve management level of petroleum geophysical exploration engineering, the process management has been implemented in China, in order to achieve with as less input with much output.

This article is organized as follows: In the next section, the project management process has been analyzed between its life-cycle and project management process. In the third section, process management innovation of petroleum geophysical exploration engineering based on Life-cycle in China has been illustrated. Furthermore, we conclude by discussing three key prospects.

2. PROJECT MANAGEMENT PROCESS

2.1 LIFE-CYCLE OF PROJECT

Project is a dynamic system, which changes over time. The life-cycle of project is very important in project management.

The life cycle of project mainly reflects that each project must experience from the beginning to the end of time, the project must experience the four phases which includes concept, planning, implementation and finish. In the different phases, there are different characteristics, content and focus of project. The relationship of the various phases of the lifecycle of the project has been shown in Figure 1.

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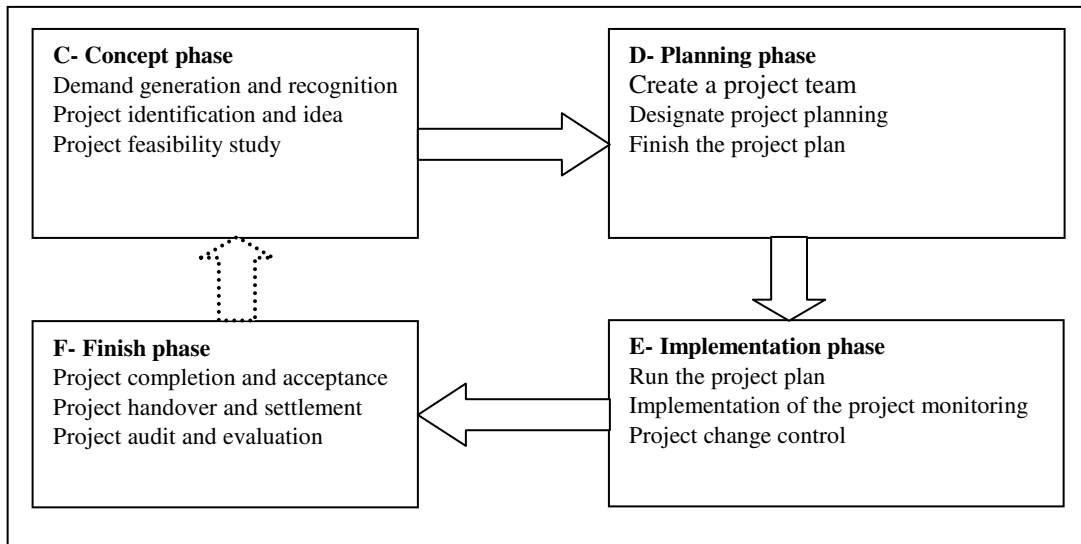
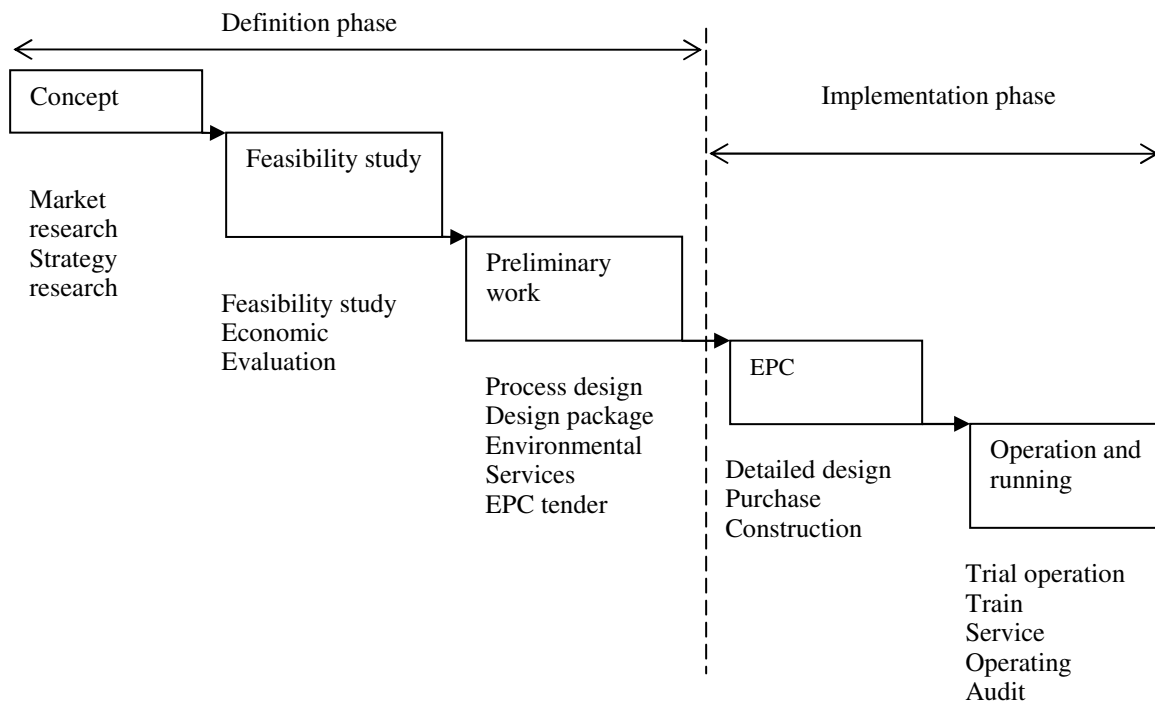
Figure 1. Four phases of the lifecycle of project^[1,2].

Figure 2. Life cycle of the large-scale petroleum engineering project.

2.2 LIFE-CYCLE OF LARGE-SCALE PETROLEUM ENGINEERING PROJECT

At present, the international petroleum enterprise generally use PMC+EPC (Project Management Contractor and Engineering Procurement Construct) project management mode to organize large-scale petroleum engineering construction project. Therefore, the life cycle of construction project of large petrochemical project is divided into the following phases: concept, feasibility study, preliminary work, EPC, operation. Among them, the concept, feasibility study and preliminary work can be incorporated into the project definition phase, EPC and the operational phase into the implementation phase of the project. The main task of each phase has been shown in Figure 2.

2.3 RELATIONS BETWEEN PROJECT LIFE-CYCLE AND PROJECT MANAGEMENT PROCESS

Project life cycle can be seen as the linkages between the four phases (concept, planning, implementation, finish) and five processes (start, planning, execution, control and closeout) of the project management, and the entire project

management can be broken down into five process groups, which run through the lifecycle of the project. There is overlap, cohesion and interaction between the life cycle and process management of project^[3,4].

3. LIFE-CYCLE PROCESS MANAGEMENT OF PETROLEUM GEOPHYSICAL EXPLORATION ENGINEERING PROJECT IN CHINA

3.1 ENTIRE PROCESS OF PETROLEUM EXPLORATION AND DEVELOPMENT PROJECT

The entire process of exploration and development of oil and gas consists of geophysical prospecting, well drilling, logging, testing oil and gas, geological research, oil and gas reservoir evaluation, drilling, surface construction, commissioning etc. According to the characteristics of the project, type of project to be involved in this process includes geophysical projects, drilling and completion projects, oil and gas reservoir evaluation projects and ground construction projects, in which the ground construction project belongs to the basic construction project.

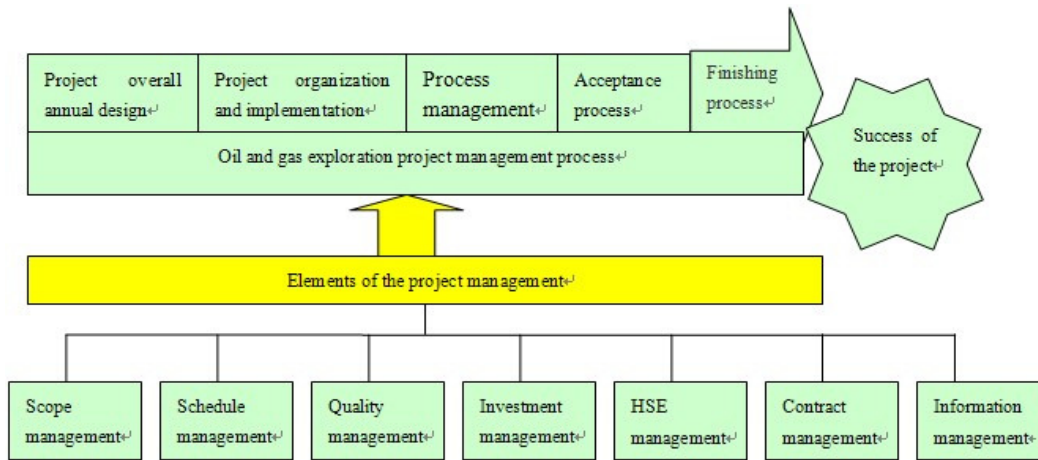


Figure 3. Integration of project management process and elements of the project management.

Exploration project management should be based on project management process as the main line, and let the elements of the project management integrate into it, in order to achieve the combination of project management process and management elements and achieve the project objectives, as shown in Figure 3.

3.2 LIFE-CYCLE OF PETROLEUM GEOPHYSICAL EXPLORATION ENGINEERING PROJECT

3.2.1 VARIOUS STAGES OF LIFE-CYCLE OF PETROLEUM GEOPHYSICAL EXPLORATION ENGINEERING PROJECT

Geophysical exploration engineering project mainly includes geophysical exploration, exploratory well (drilling, logging, oil testing) project. Process management of geophysical exploration project mainly includes annual geophysical exploration deployment, geophysical exploration design, preparation of project startup, site supervision, review and acceptance of geophysical exploration results, post-project evaluation, etc. The project life-cycle has been shown in Figure 4.

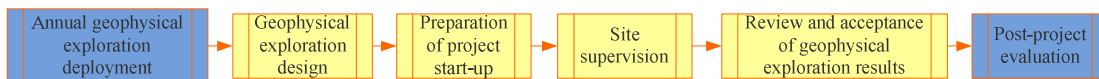


Figure 4. Life-cycle of geophysical exploration.

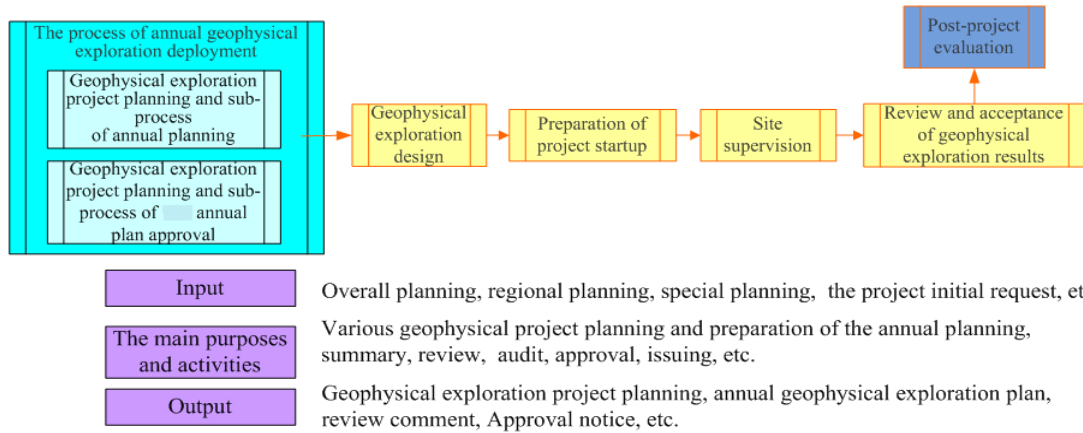


Figure 5. Overall process management of geophysical exploration project.

Process management of geophysical exploration project includes annual geophysical exploration deployment and geophysical exploration design, preparation of project startup, site supervision, review and acceptance of geophysical exploration results, etc. The process of project management has been shown in Figure 5.

3.2.2 PROCESS MANAGEMENT OF PETROLEUM GEOPHYSICAL EXPLORATION ENGINEERING PROJECT BASED ON LIFE-CYCLE

(1) Process management of annual geophysical exploration deployment and geophysical exploration design

The process management of annual geophysical exploration is based on the sub-process of planning and approval of general and annual plan of geophysical exploration as shown in Figure 5. Furthermore, that of geophysical exploration design has been included by the sub-process of project management team building, the sub-process of design & compiling and design & approval of geophysical methods, as shown in Figure 6.

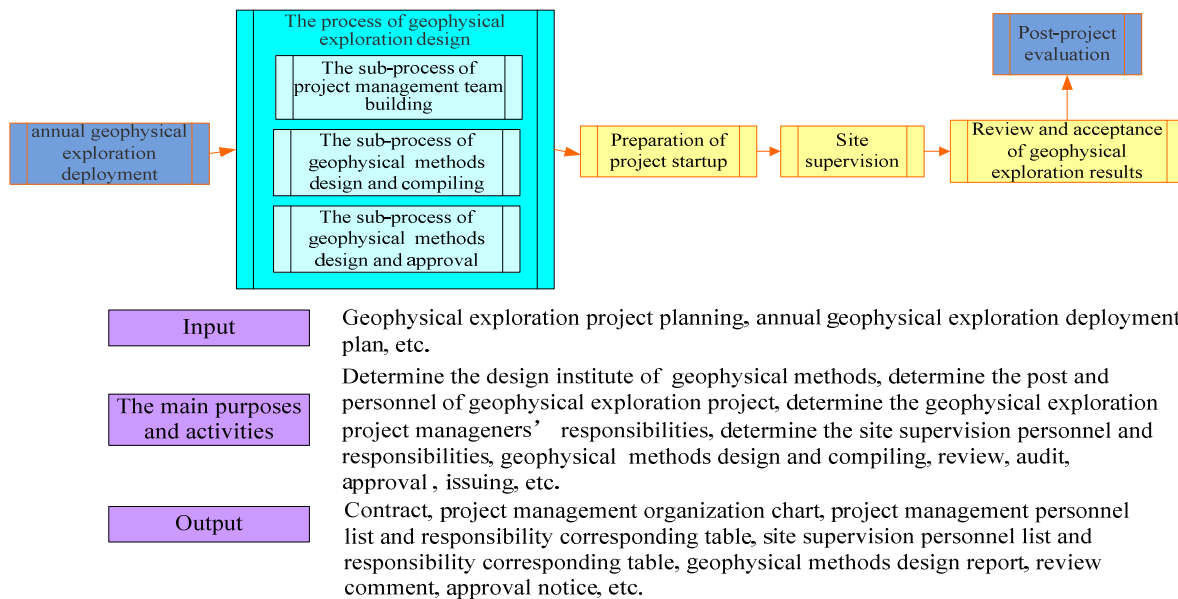
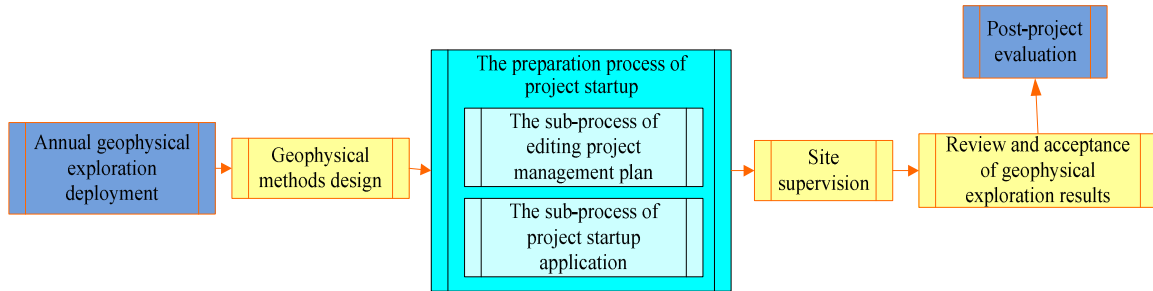


Figure 6. Process management of annual geophysical exploration deployment and geophysical exploration design.

(2) Process management of preparation process of project startup

The process management of preparation process of project startup is based on the sub-process of editing plan and its application as shown in Figure 7.

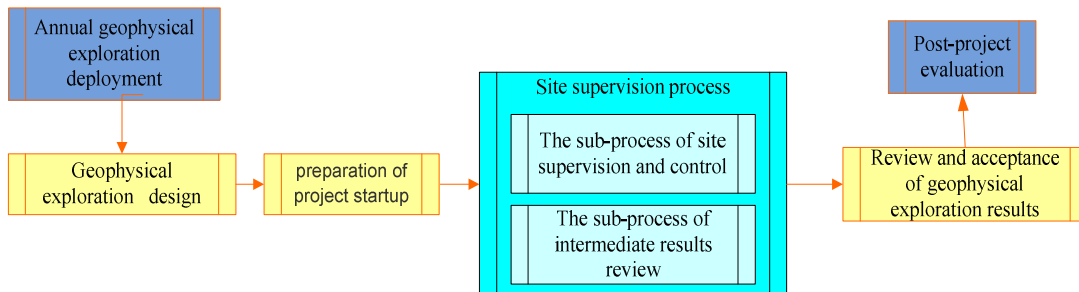


Input	Geophysical exploration project planning, annual geophysical exploration deployment plan, geophysical methods design report, contract or agreement, etc.
The main purposes and activities	Compiling of project implementation plan, check the starting conditions, project startup application and approval, etc.
Output	Project implementation plan, rectification opinions of starting conditions check, starting application and approval notice, etc.

Figure 7. Process management of preparation process of project startup.

(3) Process management of site supervision

The process management of site supervision is based on the sub-process of site supervision & control and intermediate results review as shown in Figure 8.

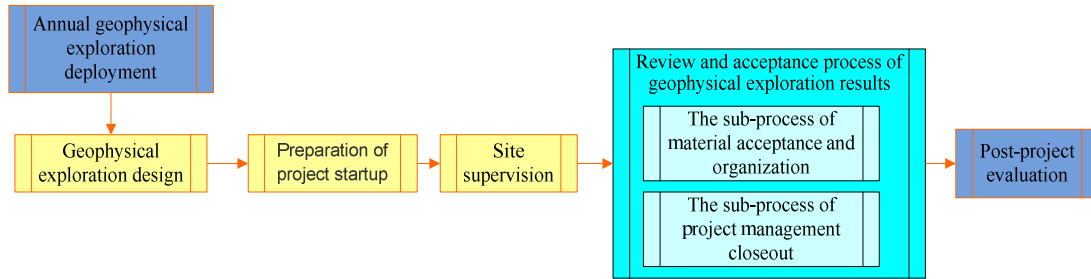


Input	Geophysical exploration project planning, annual geophysical exploration deployment plan, geophysical methods design report, contract or agreement, project management organization chart, project management personnel list and responsibility corresponding table, site supervision personnel list and responsibility corresponding table, project implementation plan, starting application and approval notice, etc.
The main purposes and activities	The sub-process of site supervision and control: monitoring the progress, investment, quality, security process and other aspects of the project team and collaborators, managing alteration, subcontracts, payment of the contract price, outreach, etc. The sub-process of intermediate results review: including results analysis and check of field experiments, results analysis and check of research test, etc.
Output	Process documentation, intermediate results report and review comment, alteration application, etc.

Figure 8. Process management of site supervision.

(4) Process management of review and acceptance of geophysical exploration results

The process management of review and acceptance of geophysical exploration results is based on the sub-process of material acceptance & organization and project management closeout as shown in Figure 9.

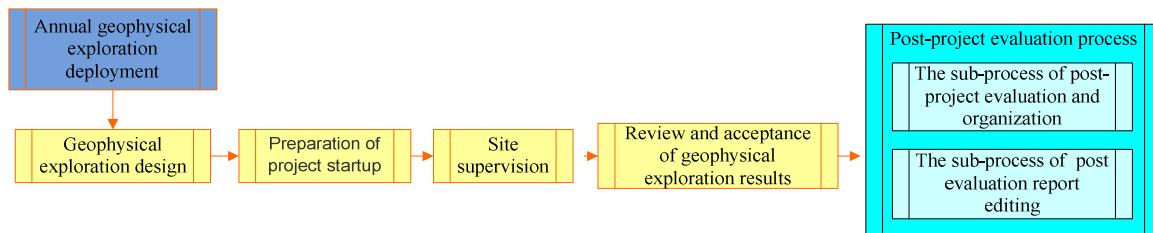


Input	Geophysical exploration project planning, annual geophysical exploration deployment plan, geophysical methods design report, contract or agreement, starting application and approval notice, project results report, etc.
The main purposes and activities	The sub-process of material acceptance and organization: including acceptance applications, basic information checking organized, acceptance meeting organized, signing acceptance comments, archiving data compilation, etc. The sub-process of project management closeout: including project settlement, payment of payables, retention money management, project management summary, project management team assessment, in accordance with the provisions of rewards and punishments and dissolution, etc.
Output	Project acceptance application, data acceptance, submission acceptance, statement, application and proof of payment, etc.

Figure 9. Process management of review and acceptance of geophysical exploration results.

(5) Process management of post-project evaluation

Post project evaluation is a comprehensive evaluation of the overall process of petroleum geophysical exploration engineering project implementation and its effect. It is the process of evaluation project experiences and lessons, as shown in Figure 10.



Input	Geophysical exploration project planning, annual geophysical exploration deployment plan, geophysical methods design report, contract or agreement, starting application and approval notice, process documentation, project results report, data acceptance, submission acceptance, etc.
The main purposes and activities	The sub-process of post-project evaluation and organization: including determining the scope of the evaluation, the establishment of evaluation team and determination of personnel, evaluation work plan, methods and procedures to determine, etc. The sub-process of post evaluation report editing: including the compiling of post evaluation report and process of organization and review. Post evaluation report should include the evaluation of project overview, annual geophysical exploration deployment, acquisition engineering, data processing, interpretation.
Output	Collaboration contract of post-project evaluation, evaluation work plan, post-project evaluation report and review comments, etc.

Figure 10. Process management of post-project evaluation.

4. SUMMARY

In the processing of project management, there are three key prospects which shall be concern about, as following: ①How to systematically identify, management, check, change and optimize the project process ; ②How to effectively use method and system of project management, and to be continuous improvement ; ③How to hold the project experience documentation.

ACKNOWLEDGEMENTS

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