

# ORGANIZATION AND MANAGEMENT OF MAJOR PROJECTS<sup>1</sup>

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## Summary

New demands are dramatically changing the organization and management of major engineering/construction projects. The increased size of these projects and the increased complexity and the environment in which they are carried out are combining to force a degree of management specialization previously found only in major corporations.

## Background

Traditionally, the engineering/construction project organization, illustrated in Figure 1, was a relatively simple, short-lived structure within the context of a more permanent departmental arrangement. The project organization focused on the project objectives of cost and schedule and the departments provided people and professional standards.

Typically, as indicated in Figure 2, the project organization has consisted of the principal line functions of project engineering and project construction. A variety of support services were also provided on a project basis, as well as general or occasional support from the division or corporate organizations.

In this context, the project management was the principal contact with the owner and was personally concerned with such activities as:

- developing the contract with the owner,
- planning the project,
- developing project procedures and implementing project control systems,
- developing and administering construction contracts and subcontracts
- resolving project problems,
- securing timely approvals,
- monitoring procurement activities,
- supervising the project quality assurance program,
- conducting status reviews, and
- coordinating plant turnover.

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## MATRIX ORGANIZATION CONCEPT

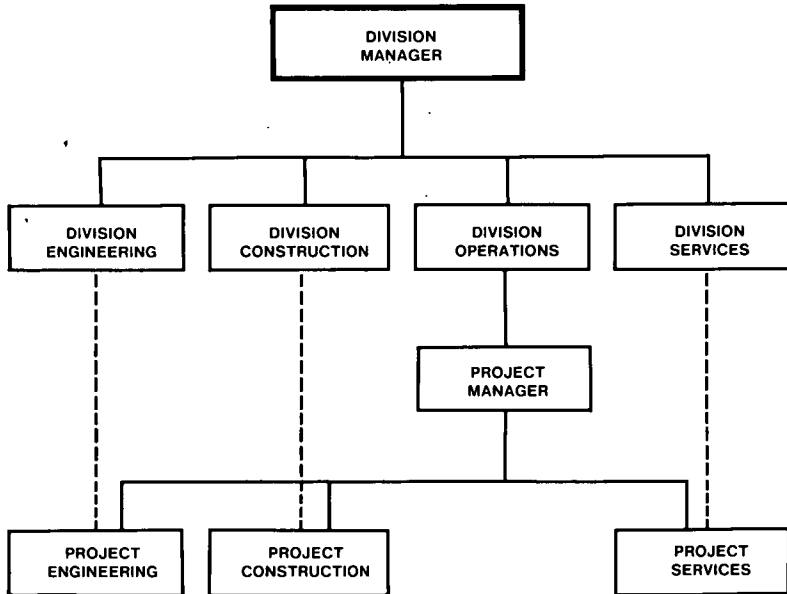


Figure 1.

### New Demands

In recent years, new demands have emerged which are having profound impact on the project organization and management which we can expect to continue, and to expand in the future. There are several driving forces behind these new demands:

- Economies of scale are creating a drive for ever larger projects, and the pace of technological development is allowing them to be practical.
- In the great game of national catch-up, the less developed countries have no technological barriers to developing their infrastructure and industries at revolutionary rates through gigantic projects.
- Growing scarcities of economic and conveniently located natural resources are forcing the use of expensive plants and/or large projects in remote locations.
- Finally, environmentalism is further increasing the cost and complexity of projects.

The result of these forces is an explosion in the number of major projects of a scale that was formerly seldom, if ever, seen. Because this phenomenon appears to be the trend of the future, it is important that there be a broader

## TYPICAL PROJECT ORGANIZATION

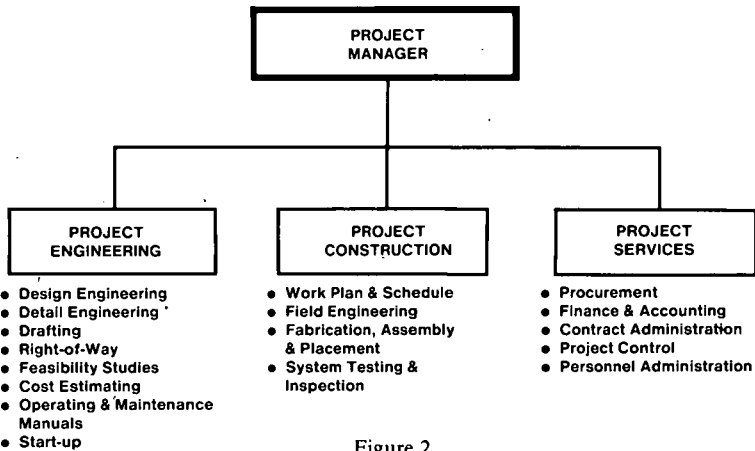


Figure 2.

understanding of the demands of these projects and the resulting implications for their organization and management.

- Because these projects frequently have a major impact on society, the project management must deal with:
  - Client involvement
  - Government involvement
  - Public/media involvement
  - Community involvement
  - Environmental impact
- Because these projects are frequently beyond the capability of existing institutions, the project management must be able to deal with:
  - Government as client
  - Consortium as client
  - Financing - a new constraint
  - Infrastructure constraints
  - Multi-contractor construction
- Because these projects frequently have long duration, the project management must be prepared to confront problems involving:
  - Inflation/escalation in cost control
  - Labor relations commitments
  - Personnel management
  - Government changes

## POSSIBLE PROJECT ORGANIZATION OF THE FUTURE

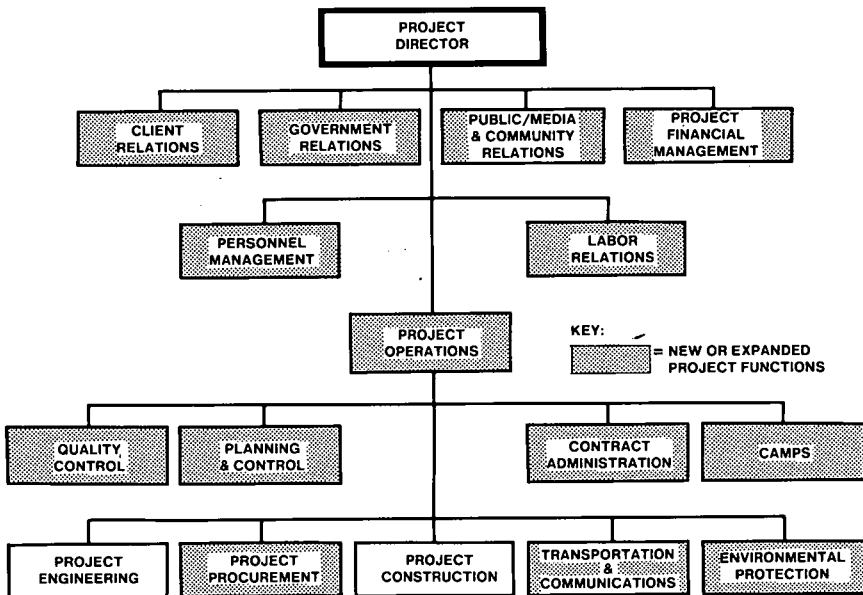


Figure 3.

- Because of risk and liability implications, the project management must be competent in:
  - Quality assurance and safety
  - Contractual and other legal matters
  - Insurance administration
  
- When these projects are in remote locations, the project management will be required to deal with particularly acute problems:
  - Problems with inadequate infrastructure will require the ability to design and develop utilities, transportation and communications systems.
  - Isolation from headquarters support will require local decision-making.
  - Dealing with extraordinary people-problems will be the order of the day, including such matters as adapting to local laws and customs, working with local employees and contractors, training local personnel, selecting and motivating personnel for assignments far from home, and establishing an entire living system for all project personnel including, food, lodging, health care, recreation, crime prevention, etc.

## FUTURE REQUIREMENTS FOR PROJECT MANAGEMENT

### Due to Remote Locations

- Utilities, transportation and communications systems design
- Local decision making
- Adaptability
- Training systems
- Personnel selection and motivation
- Living systems development

### Due to Project Impact

- Co-management with clients
- Government relations
- Public/Media relations
- Community relations
- Environmental protection

### Due to Institutional Limitations

- Government contracting
- Consortium contracting
- Project financing
- Infrastructure development
- Multi-Constructor contracting

### Due to Long Project Duration

- Dynamic cost control systems
- Labor/union relations
- Personnel management
- Responsiveness to government changes

### Due to Risk/Liability

- Quality Assurance/Safety
- Contract and other legal
- Insurance

Figure 4.

### Conclusion

The new demands on the project organization are increasingly requiring changes in the project organization as more and more of the functions once dealt with by the project manager and his staff on a part-time basis now require full time attention. As a consequence, the project organization is expanding, becoming more articulated and is less dependent on supporting divisional or corporate organizations. The general directions seen to date are indicated in Figure 3. The former project manager is replaced by a project operations manager with responsibility for expanded and new functions. He reports to a project director who has his own extensive staff.

The new demands on the management of major projects is also changing the skills required for project management, as illustrated in Figure 4. The need for middle management and staff of the variety previously only associated with corporate management is growing rapidly. In particular, project management must attend to many concerns of relating to the major project's many "publics." In summary, the engineering/construction industry will no longer be able to develop its project management teams solely from the ranks of its engineers, superintendents, etc., but will require a broad range of disciplines, many non-technical, and the project managers themselves will require broader educational and experience backgrounds than in the past.