Title: Individual Research Paper – From Theory to Practice: Toward a Typology of Project-Management Style

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Abstract

This is an exploratory study examining the relationship between project type and project management practices within organizations. It proposes a two-dimensional model for classifying projects to determine the most effective management approach. The two dimensions consist of technological uncertainty (four levels) and system scope (three levels).

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PROJECT MANAGEMENT

From Theory to Practice: Toward a Typology of Project-Management Styles

SUMMARY

This is an exploratory study examining the relationship between project type and project management practices within organizations. It proposes a two-dimensional model for classifying projects to determine the most effective management approach. The two dimensions consist of technological uncertainty (four levels) and system scope (three levels).

TECHNOLOGICAL UNCERTAINTY

The four qualitative levels of technological uncertainty, which range from low, medium, high, or super high, accommodate varying mixtures of new and mature technologies (rather than only a simple low or high). *Low-tech* projects use only well known, mature technologies where uncertainty is practically nil. Project communications are typically, formal and low-frequency. Project administration is mostly cost focused.

Medium-tech projects are the most common type of industrial projects. They involve mostly mature technologies, but may contain up to as much as 50 percent new technology. They are essentially industrial projects of incremental innovation. These projects typically involve some development work and testing. Project communications requirements are more demanding, requiring frequent, regular meetings (a mix of formal & informal), and a moderately firm managerial hand to control changes and costs. Project administration requires technical and administrative skills.

High-tech projects are defined as projects in which more than 50 percent of the technology is new. This typically results in products that are new to the industry. These projects are characterized by long periods of development, testing and multiple redesign cycles. These projects require more flexibility initially, and slack time in the schedule to accommodate anticipated changes. Later, flexibility must be replaced with a more rigid approach, after design freeze, to minimize additional changes. They also typically involve a formal design review process and sometimes a change review board to aid in major decision making. Communications are highly intense and continuous. Project administration is flexible until design freeze, then more rigid cost control prevails. Project administration is highly technical and administrative.

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Super high-tech projects incorporate key technologies that do not exist at the time of initiation. These projects involve the development, testing and selection of new or emerging technologies and the evaluation of various alternatives typically in response to a far-reaching need. These are projects with exceptional risk and rewards. The major concern for managers of these types of projects is the extremely high level of uncertainty regarding technology selection. In addition to the intensification of the requirements for high-tech projects, considerably greater resources are required for the parallel development of the technology in addition to the product. There is a heightened need to inform management of the problems encountered, and to scrutinize for early signs of trouble. Communications for these types of projects are typically continuous and extremely intense. The project leadership usually consists of an elite team led by respected technical leaders. A highly flexible and technically adept management style is required, with a strong emphasis on change management.

SYSTEM SCOPE

The system scope is divided into three levels of complexity: assembly, system, and array. The lowest level of complexity is the *assembly level*, which typically consists of a single component or subassembly of a larger system. These projects are usually performed within a single organization or functional group due to their limited scope. Budget and schedule preparation are usually straight forward and communications are mostly informal.

The *system-level* is defined as a collection of interactive elements (subsystems) functioning together within a single product. Typically completion involves not only the product but also training, facilities, test equipment, spare parts, and documentation. Usually multiple organizations are responsible for the various subsystems, and one organization acts as the systems integrator. The integrator must provide considerable organizational and managerial effort to divide and coordinate the work of the various subcontractors. Frequently a project office is established and staffed with technical and administrative personnel to define needs, determine scope, define statements of work, plan resources, negotiate with subcontractors, and provide documentation control, coordination, and communications. The major challenges in this type of project are the problems associated with systems integration, especially as the level of technological uncertainty increases. Planning and scheduling requirements are complex, and

formalized procedures are required for all levels. Communications requirements are formal and frequent. Project administration requires a high degree of structure, formalized procedures, a bureaucratized management system, and a formal reporting structure. Documentation, planning, and change control requirements are significant. Technical and administrative skills combined with a systems approach are critical requirements for success.

The *array-level* program is defined as a dispersed collection of systems that function together to achieve a common purpose. Arrays are typically large in scale, usually a program consisting of a number of individual projects. Frequently arrays do not pose as great an integration problem as the systems level projects because they are usually phased progressively rather than deployed simultaneously. Typically, array programs are managed by a central umbrella organization which coordinates the work of other organizations on the subprojects. Usually the umbrella organization is small, and focuses on finance, cash-flow, and control issues while the technical issues are dealt with at the subproject level. Typically array program management requires a legal and contractual approach which is remote and highly formal in nature. Managers responsible for array programs must shift their emphasis from the technical aspects to a broader industry-wide perspective as they deal with the legal, environmental, and political issues.

METHODOLOGY

This paper employs a multiple-case-study approach using a combination of qualitative and quantitative methods. Forty-four (44) single cases were accumulated and processed through a method of cross-case comparative analysis. Projects were selected from the military or commercial sectors in a variety of industries, sizes, and durations. Data collection included review of project documents and archives, and interviews of project participants by the researchers using open-ended questions. A report was prepared for each project. A qualitative analysis of the data was performed using an iterative method of cross-case comparative analysis until patterns clearly emerged and further iterations no longer contributed to refinement of the concepts. Quantitative data were used to obtain descriptive statistics of each variable in order to observe the emerging trends along the hypothesized dimensions.

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CONTRIBUTION

This is an exploratory study, which provides a ground breaking conceptual framework for classifying projects and selecting an appropriate management style. The implication is that correct project classification and application of the appropriate management style will result in better implementation and greater project success.

Previous research literature on project management has been mostly anecdotal, based on single case studies, and lacking a conceptual framework. This watershed study provides an extremely useful typology of management styles that can be used to develop a project-specific contingency approach for project management that can be adapted to the widely varying needs of individual projects. This all encompassing view of projects and their management offers a clarifying view that allows us to see the project management "forest" as well as the individual trees.

OTHER RESEARCH

Other research on project management success factors have focused on the skills of the project manager: temporal leadership [1], leadership profiles [2], strategic style [3], and cultural awareness [4]; on organizational policies [5]; or metrics for project performance [6]. This is the first paper to propose a typology of project management styles based on the project classification type.

This paper proposes a contingency approach to project management style based on the complexity of project scope, and the degree of uncertainty in regard to the technology employed. This research builds upon prior work in the area of innovation theory and applies it to the technology content of projects. This work also employs a synthesis of the hierarchical systems approach in defining project scope. While taking inspiration from research in these other areas, the author breaks new ground by creatively associating these concepts with a new application to projects and project management. This linking of research in technology innovation and systems innovation to projects and project management styles is a brilliant extension of previous research and offers a powerful framework for matching project management style with project needs.

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STRENGTHS & WEAKNESSES

The paper presents an extremely well thought out typology of projects based on a very rich source of supporting research. The statistical rigor and depth of analysis are both persuasive and impressive. The concepts, methodology employed, and the resulting conclusions provide the tentative beginnings of comprehensive structural framework for the categorization of project typology and a offers a new direction for selection of the appropriate project management style with a theoretical model based on empirical validation.

REFERENCES

The references are extremely comprehensive. I did not find any other research that should be included. The references at the end of this paper identify important research in other aspects of project management success that serve to underscore the unique focus of Dr. Shenhar's paper.

CONCLUSIONS

Dr. Shenhar's conclusions are well stated, and thoroughly supported by the research presented. Although no strengthening is needed, further research is warranted to test the empirical validity of the model, especially in regard to additional contingencies.

FURTHER RESEARCH

Future research possibilities include:

1) A more statistically comprehensive analysis of case studies to improve the empirical validation of the two-dimensional model.
2) An analysis of the impact of project management style on project effectiveness.
3) A conceptual framework for project effectiveness metrics.
4) Industry specific analysis of the two dimensions and their impact on project success.

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