**The Effect of Uncertainty and Structure on Project Team Performance**

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Abstract submitted to the 10th Annual Workshop on
Computational and Mathematical Organization Theory

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How does uncertainty affect organizational performance with respect to different organizational structures? The effects of uncertainty and structure on organizational performance have been a popular topic of research on organization design and strategic management (Galbraith, 1973; Lawrence and Lorsch, 1967). Researchers have argued that organizations that change their strcutures to changing environments would perform better than other organizations. Galbraith (1973) suggested that the fit between organizational structure and task uncertainty would lead to higher performance. Viewing an organization as an information processing system, Galbraith (1973) proposed that the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers. When task uncertainty is high, a person who needs to complete the task faces an uncertain situation and will want to exchange more information with others people to solve problems. However, little study has examined how uncertainty affects different dimensions of organizational performance in different organizational structures. Addressing this issue may explain why the empirical results of research on the effect of uncertainty on performance are mixed.

In this paper, we reexamine the relationships among task uncertainty, structure, and performance using a simulation study. We add new insights to current literature by investigating the effects of uncertainty on different dimensions of performance and possible trade-offs (Carley, 1995) among the performance dimensions. We argue that effects of task uncertainty on the performance of a project team depend on the structure of the team and there are trade-offs between the costs and quality of the overall project.

**Theory and Hypotheses**

We view an organization as an information processing system which is structured to achieve a specific set of tasks, and comprised of information processors such as individuals or subteams (Galbraith, 1973; Levitt et al., 1994). Contingency theory argues that the best way to organize is contingent upon the uncertainty and diversity of the basic task being performed by the organizational unit (Lawrence and Lorsch, 1967). Applying contingency theory to a project team, one would expect that, with low level of task uncertainty, a centralized team would perform better because it can make preplanned or fast decisions, and controlling and coordinating is easy and less costly. However, with high level of task uncertainty, one would expect that a decentralized team would perform better because it can make flexible and fast decisions at lower levels within the team so that it can adapt to a change. With increasing uncertainty, overall performance of the team will decrease, but the rate of decrease in performance may depend on the level of centralization of the team.

The above discussion implicitly views performance as the speed of decision making or costs of the project, but does not explicitly consider what aspects of performance are compared. Performance can be measured in different ways. For a project team, in

general, the duration of the project, the costs incurred during the project, and the quality of the final output can be three major performance aspects. Using the three dimensions of performance, we will investigate the tradeoffs among different performance measures.

We expect that the effects of uncertainty and structure on the different dimensions of performance will be different. We hypothesize that, under high task uncertainty, a decentralized structure may help a project team finish their project quicker than a team with centralized structure because the team can make more flexible and faster decisions when unexpected things occur due to high uncertainty. However, under low task uncertainty, a centralized team may finish the project quicker than a decentralized team because the decision making is controlled and coordinated by an experienced project manager and the project will be processed as planned.

H1a: Under high task uncertainty, the project duration will be shorter in a decentralized team than in a centralized team

H1b: Under low task uncertainty, the project duration will be shorter in a centralized team than in a decentralized team

We also hypothesize that, under high task uncertainty, a decentralized team will finish the project with lower costs than a centralized team because the former will need less information processing than the latter when unexpected things occur due to high task uncertainty, and information processing incurs costs. However, under low task uncertainty, a centralized team may finish the project with lower costs than a decentralized team because it can get am economies of scale with the centralized decions and information processing may not be a problem due to fewer exceptions.

H2a: Under high task uncertainty, the project costs will be lower in a decentralized team than in a centralized team.

H2b: Under low task uncertainty, the project costs will be lower in a centralized team than in a decentralized team.

Under high task uncertainty, the quality of the project may suffer due to more exceptions. We expect that a decentralized team, under high uncertainty, will have lower quality than a centralized team because of less control and coordination. Each team member facing high task uncertainty may experience more exceptions and errors that have to be corrected than when they are under low task uncertainty. They will spend more time on fixing the errors and redoing the tasks, and because of less experiences and responsibilities compared to the project manager, the team member will end up with less satisfactory results. A centralized team could deal with the problem of neglecting errors better than a decentralized team because decisions are made at the project manager level who is more experienced and responsible than team members. We hypothesize that, under high task uncertainty, a centralized team may help a project team to obtain higher quality by making sure that all the errors are corrected and reworks are done. Under low task uncertainty, a decentralized team may have a higher quality because team members become confident on what they are doing and they can

handle the exceptions, whereas in a centralized team, team member leave all the exceptions to the project manager and may become less responsible for the quality of their tasks.

H3a: Under high task uncertainty, the project quality will be higher in a centralized team than in a decentralized team.

H3b: Under low task uncertainty, the project quality will be higher in a decentralized team than in a centralized team.

**Methods and Variables**

We use a simulation study method to find out the relationships among task uncertainty, structure, and performance. We used the Vite program-model for the study. Vite is designed to simulate a project-based team or organization and incorporates numerous situational variables including structure, uncertainty, and performance. The project used in this study is a typical strategic planning consulting project. The consulting project is chosen because it is a popular form of project and it fits our definition of organization as an information processing system.

Dependent variables. The dependent variables will include three performance meaures of a project team: project duration, project costs, and project quality. In the Vite program, the duration and costs can be obtained directly from a project report. The project quality will be indirectly measured from "activity verification risk." High activity verification risk indicates low subsequent project quality.

Independent variables. Independent variables will include the centralization of the project team and the task uncertainty of the project. The centralization of the project team will have two levels: high centralization and low centralization. The task uncertainty will also have two levels: high task uncertainty and low task uncertainty.

The three performance measures at each level of task uncertainty and centralization will be recorded and compared. The results will show how uncertainty affects team performance differentially depending on the centralization of the team and whether there are trade-offs between performance variables.

## Refernce

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