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Expert/Novice Differences in IS Project Management Decision Making

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Introduction

Project management is a major component of productivity and innovation in our high-technology society (Zmud, McLaughlin, and Might 1984). Project managers administer the development of the information systems (IS) and information technologies (IT) critical to the survival of many firms (Marchewka and Keil 1995). With an estimated \$250 billion being spent on IS/IT applications annually (Johnson 1995), it is critical that IS development projects be effectively managed.

Prior research in IS project manager decision making used students as surrogates for project managers and manipulated sunk cost and alternatives to examine their influence on project management decisions (Keil and Mixon 1994; Keil, Truex, and Mixon 1995). The research design for this project uses working project managers as experimental subjects, rather than the student subjects used by Keil, Truex, and Mixon (1995). Keil, Truex, and Mixon's subjects were students who assumed the role of IS project managers. In the design used here, working IS project managers served as subjects in order to ascertain if actual practitioners react differently to the experimental manipulations.

Background Literature

Keil and associates (Keil and Mixon 1994; Keil, Mixon, Saarinen, and Tuunainen 1994-95; Keil, Truex, and Mixon 1995) reported on experiments to identify factors that contribute to runaway IT projects [projects which escalate beyond original projections]. They conducted the experiments to determine if escalation situations [a situation in which "things not only have gone wrong, but where potential actions aimed at curing the problem may actually deepen or compound the difficulty" (Staw and Ross 1987, 40)] exist in an IT context and to replicate and extend the work of Garland (1990) on sunk cost effects to IT project scenarios. The authors determined that making an escalating commitment to a failing course of action can occur in an IT context.

In 1992, Jeffrey wrote that "there are no published studies to date on the role of experience in escalation behavior" (1992, 808). A search of the research literature since 1992 revealed no additional studies dealing with the role of experience on behavior in escalating situations. There are, however, studies that address the role of experience on performance in other areas.

Abdolmohammadi and Wright (1987) found that experience is most beneficial when performing tasks that are poorly structured and complex. Hoch and Loewenstein (1989) showed that providing feedback increases the value of experience in performance. Tubbs (1992) illustrated, in an experiment using auditors, that as individuals gain experience, they: 1) have increased general awareness of errors, 2) understand more about errors, 3) are aware of more atypical errors, and 4) have increased knowledge of the causal relationships of errors.

Jeffrey (1992) performed an experiment to test the interaction between personal involvement and experience as they affect audit judgement and to identify any effect of experience on propensity to escalate a commitment. The study found evidence that experience may alleviate, if not eliminate escalation behavior.

Libby (1995) proposed a theoretical model, "Antecedents and Consequences of Knowledge," to depict the relationship between ability, experience, knowledge, and performance (See Figure 1). Libby (1995) defines knowledge as "information stored in memory" (181) and ability as "the capacity to complete information encoding, retrieval, and analysis tasks" (181). Ability is considered to be innate and may be lost due to abuse or accident, but normally is not subject to change. Ability constantly facilitates the acquisition of knowledge and the performance of tasks (Links 2 and 4, Figure 2). Knowledge "is an intermediate internal state"

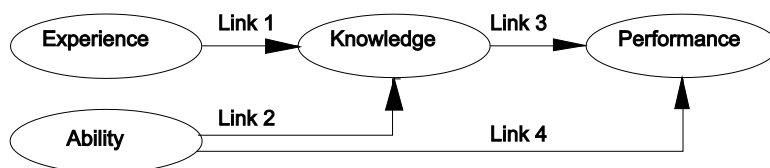


Figure 1. Antecedents and Consequences of Knowledge

(Source - Libby 1995, 178)

(Libby 1995, 182) used to store the information acquired through experience. Libby (1995) theorizes that additional applicable experience increases the amount of stored knowledge available for decision making. As the level of relevant, available knowledge increases, performance level also increases.

Research Hypotheses

Prior research in IS development escalation with student subjects manipulated the concept of a directly competing product in attempts to isolate escalation effects (Keil and Mixon 1994; Keil et al. 1994-95; Keil, Truex, and Mixon 1995). A focus of this research is the comparison of the results from the current project to those findings. The goal is to identify any differences between the current study using working project decision makers as subjects and the earlier studies using student subjects. The first hypothesis addresses that interest:

Hypothesis #1: There will be no significant difference between working project managers and student subjects on the decision to continue a project when there is a competing product.

The term sunk cost describes the resources previously expended in the pursuit of some goal. Current thinking in finance holds that sunk costs are not relevant when making future investment decisions. The only relevant cash flows are those in the future. Prior research in project escalation showed that decision makers find it difficult not to consider earlier expenditures and efforts when making future investment decisions. Research in IS project escalation (Keil et al. 1994, 1994-95, 1995) has looked at how student subjects deal with sunk costs when making project-related decisions in escalation situations. As stated earlier, the thrust of this research project is to identify if experienced practitioners deal differently with sunk cost information than student subjects in IS project escalation situations. The next hypothesis is a means of testing for similarities /differences between the Keil et al. findings and the current study using experienced project managers as subjects:

Hypothesis #2: There will be no significant difference between working project managers and student subjects in the consideration of sunk costs in the decision to continue a project.

Methodology

This empirical research aimed to identify differences between student surrogates and experienced project managers when making decisions in an escalation situation. This research is experimental. To be comparable to Keil et al. (1994, 1994-95, 1995), a similar experimental design is required. Consequently, the design for this experiment is a 2 x 2 factorial. The manipulation involves two levels of two levels of competing product (with or without) and two levels of sunk cost (90% of budget and 200% of budget). All experimental cells were given identical situational information on which to base their decisions, except for the manipulations mentioned above.

An additional requirement for comparability with the Keil et al. (1994, 1994-95, 1995) studies was the use of case scenarios. This research requires that the experimental subjects make a decision based on a set of facts, but facts alone do not describe a decision situation. It is necessary to put the facts in context to provide the subjects with sufficient information to make an informed decision and case scenarios provide the means to meet that requirement. The scenario used here is an extension of the sunk cost scenario used in the Keil et al. (1994, 1994-95, 1995) experiments.

The target population for this research is all IS project managers. The population includes project managers from all industries and sections of the economy. The decisions to which this research is relevant are any that meet the general parameters of a project, i.e., "a task with a beginning, a defined scope, and an end" (Stewart 1995, 179).

The subjects in this experiment consisted of working decision makers. All were experienced project managers and decision makers from one firm in the information systems consulting industry. Several factors precipitated the use of a single company. First, the source firm is one of the premier firms in the information systems industry, with a world-wide employment of over 90,000. The firm supplies information services in a broad range of industries and the subjects' experience reflects this diversity. Second, the large number of subjects promised to provide a sufficient and significant sample size. Third, the firm volunteered to participate.

The researchers collected the data for this project by mailing the data collection instrument to the subjects. The sponsoring firm provided the names and work addresses for each subject on printed labels. The subjects comprised all domestic members of the project management consulting and technology architecture groups of the firm. They were geographically distributed throughout the continental United States, with work locations both at major company facilities and numerous client sites. A total of 1,287 instruments were distributed. The experimental aspect of the project was accomplished by random assignment of subjects to the experimental groups. The subjects returned the instrument via surface mail, with postage paid by the firm. Four hundred sixty-six subjects elected to participate and returned usable instruments, a response rate of 36.2%. The respondents were 75% male and 25% female. The subjects' mean age was 42.589 years and their average work experience was 20.796 years (See Table 1).

Findings

To evaluate Hypothesis #1, the ideal situation would be to have similar data derived from similar experimental treatments, administered both to the students and the experienced decision makers. The authors here did not have access to the Keil et al. original data. Consequently, the evaluation for Hypothesis #1 consists of observing differences in reported values.

Table 1. Descriptive Attributes of Respondents

Attribute	Mean	Standard Deviation	Minimum	Maximum
Age	42.589	8.329	28	67
Years of Work Experience	20.796	8.433	5	52
Years of Project Management Experience	9.237	5.617	0	30
Education	4.912	.892	2	6

Key (Number, Percentage): 2 - High School Graduate (7, 1.4), 3 - Some College (47, 10.1), 4 - Associate Degree (24, 5.2), 5 - Bachelors Degree (289, 62.2), Graduate Degree (98, 21.1)

Experiment 5 of the Keil, Mixon, Saarinen, and Tuunainen (1994-95) exploration of the effect of sunk costs on continuation decisions involved a scenario with a competing product. The student group in that experiment presented with the 90% sunk cost scenario and a competing product reported an ~57% mean likelihood of continuing with the project. As a comparison, the likelihood of continuing with the project measured during the present experiment, for subjects also exposed to a competing product and a 90% sunk cost scenario, showed a mean of 45.2%.

At a face validity level, the observed difference between the responses of the students and the experienced project decision makers is significant. Based on this evidence, it is plausible to cautiously reject Hypothesis #1 due to the apparent significant difference noted. Further research, or the actual data from the student group, is required to make an accurate determination.

Hypothesis #2 tests for significant differences in the continuation decision between the student subjects of the Keil et al. (1994, 1994-95, 1995) studies and the subjects of the current experiment, when both are exposed to similar sunk cost scenarios. Unlike the effort on Hypothesis #2, data is available to execute a test for significant differences between the groups. In the Keil, Truex, and Mixon (1995) article on sunk cost and project completion effects, the authors present information on an experimental group exposed to a 90% sunk cost and given no alternative investment information. That group matches very well to the 90% cost subgroup not exposed to the competing product manipulation in the current exercise. Therefore, it is possible to conduct a matched pair t-test between the two subgroups.

The average mean for the student surrogates in the Keil et al. (1994, 1994-95, 1995) studies was 74.872. The average for the experienced project managers in the current experiment was 46.25. The matched pair t-test between these means yielded a t-statistic of 5.89, which is highly significant at the .005 level. This evidence supports earlier research (Tubbs 1992, Jeffrey 1992) which evidenced that individuals with relevant experience make different decisions based upon the insights gained through their experience. The highly significant nature of the t-test results suggests that Hypothesis #2 is invalid and should be rejected.

Conclusion

The findings of this project, that there are significant differences between the project continuation decisions of student surrogates and experienced software project managers, suggest caution is advised when designing experiments exploring the project management decision-making process, depending upon the nature of the decisions being made. It should be noted, however, that the differences identified may be attributable to factors other than the experience of the experimental subjects, i.e age of the subjects or differences in the case scenarios themselves.

References

References and supporting data available on request from first author.