12-14-2009

A Comparison of Compensatory and Non-Compensatory Decision Making Strategies in IT Project Portfolio Management

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ABSTRACT

In IT project portfolio management, selecting and prioritizing the various projects can be viewed as a decision making task requiring input from various stakeholders in the organization. Based on theories from the psychology literature on compensatory and non-compensatory individual decision making, this study evaluates the effectiveness of both strategies in the context of IT project prioritization. We compare the results of a frugal and fast non-compensatory decision making strategy with a more cognitively intense, attribute-based compensatory strategy and hypothesize that both will generate similar results. In addition, we hypothesize that the additional cognitive effort associated with the compensatory strategy will result in the compensatory strategy as being perceived as more accurate by the evaluator. For the conference, the hypotheses will be tested, and the preliminary results reported.

Keywords

Project portfolio management; decision making; decision strategy.

INTRODUCTION

In project-driven, information technology (IT) organizations, project portfolio management is essential in effectively allocating resources to achieve organizational objectives. Project portfolio management is defined as a group of projects competing for resources that are under the sponsorship or management of a particular organization (Dye and Pennypacker 1999). Three primary objectives of portfolio management have been identified by Cooper, Edgett, and Kleinschmidt (1998) as 1) maximizing the value or return of the portfolio; 2) linking the portfolio to the organization's strategy; and 3) balancing the portfolio among the organization's objectives.

Based on these three primary objectives, the project portfolio management process is frequently conceptualized as a strategic decision-making activity that is based on a high-level understanding of the organization's strategies and objectives and undertaken by a project selection committee (Archer and Ghasemzadeh 1999). However, a potential deficiency in a strategy-focused, committee approach is that committee members are not knowledgeable about all areas of impact of a particular project.

The implementation of projects within organizations typically requires the application of many types of knowledge – knowledge that is not always located within one individual or able to be codified in a form interpretable by a committee. Because knowledge about the various projects may be embedded within many different individuals, a potential problem in project portfolio management is the extraction of this information from the relevant stakeholders in the organization. The problem therefore is finding an effective and concise method for obtaining the knowledge from the relevant stakeholders for project selection and prioritization.

Based on human decision making theory from the psychology literature, this paper compares two project prioritization strategies for obtaining knowledge from various individuals associated with the projects – one strategy that is based on compensatory decision making and the other based on non-compensatory decision making. The objectives of this paper are to (1) describe compensatory and non-compensatory strategies associated with decision making, and 2) to empirically test hypotheses associated with compensatory and non-compensatory decision making in the IT project portfolio management context. The results will provide evidence of the effectiveness of the two approaches (compensatory and non-compensatory decision-making) in providing input from various project stakeholders for use in project prioritization.

This paper is organized as follows. First, we describe compensatory and non-compensatory decision making theories from the psychology literature. Second, we develop hypotheses based on the decision making theories in the context of IT project prioritization. Third, we describe the research design of testing the hypotheses and what we propose to share at the conference.

COMPENSATORY AND NON-COMPENSATORY DECISION MAKING

The project evaluation phase of project portfolio management involves various decision makers evaluating each project's contribution to the overall portfolio with respect to various attributes (Archer and Ghasemzadeh 1999). The evaluation of each individual project may include attributes such as the economic return of the project (e.g. Net Present Value or Internal Rate of Return), the costs and benefits, risks, and market-specific attributes (Archer and Ghasemzadeh 1999).

With several attributes available for each project, the role of a project selection committee is to decide which of the projects should be included in the portfolio. Although a committee usually makes the final project selection as a group process, input to the committee can be at the individual level. As such, individual-level theories on human judgment and decision making can be applicable to project prioritization.

Decision makers may use various decision rules and heuristics to find the best choice among alternatives. Decision rules are often described as either compensatory or non-compensatory. Compensatory decision making strategies are rational decision choices that are represented by multi-attribute utility models (Keeney and Raiffa 1976; Zeleney 1976). Compensatory decision making involves identifying a set of attributes applicable to the decision, assigning a relative importance or weight to each attribute, computing an overall score for each option based on the attribute weight, and selecting the option with the best score. Compensatory decision making is based on utility maximization since the option(s) with the highest sum of the weighted utilities are selected. In compensatory decisions, a negative value on one attribute can be compensated by an equal or higher value on another attribute. For example, high rent (negative attribute) for one apartment may be compensated by the better location (positive attribute) of that apartment.

In contrast, non-compensatory decision rules are those that shortcut or simplify the compensatory process by applying heuristics to quickly evaluate the alternatives with minimal effort. Non-compensatory decision rules can allow faster decisions with acceptable losses of accuracy. They are represented by decision strategies such as the "Elimination by Aspect" strategy (Tversky 1972) and the lexicographic rule (Svenson 1979). For example, in a non-compensatory strategy, a high rent for one apartment eliminates that option from the consideration set, with the better location unable to compensate for the negative high-rent attribute.

The traditional compensatory view of utility maximization and rational decision making has been challenged in the judgment and decision making literature. According to Payne, Bettman, and Johnson (1993), decision makers adaptively choose strategies in response to different task demands and often apply non-compensatory heuristics that allow quick decisions.

Compensatory versus non-compensatory models have been used in business research, primarily in the area of consumer research. For example, Johnson and Meyer (1984) develop a formal algebraic model of consumer behavior based on a compensatory choice model. More recently, Dieckmann, Dieppold, and Dietrich (2009) compare compensatory versus non-compensatory models for predicting consumer preferences.

Compensatory and non-compensatory strategies require different amount of cognitive effort, with compensatory strategies requiring more cognitive effort than non-compensatory strategies (Montgomery and Svenson 1976). For example, a simple "take-the-best" (TTB) heuristic has been shown under certain circumstances to be as effective as and sometimes even better than integrating across a variety of attributes (Gigerenzer and Goldstein 1996). According to Gigerenzer (2000), decisions are made through the selection and application of a variety of fast and frugal heuristics.

Simple heuristics have been shown to be at least as accurate as the more cognitive-intense evaluation of various attributes (Gigerenzer, Todd, and ABC Research Group1999). With simple heuristics, only the most important and reliable information from the data are evaluated, while with complex strategies, all the attributes are evaluated,

resulting in potential noise and measurement error. This overfitting of the data can result in inaccuracies in generalizability when making predictions for new data (Pitt and Myung 2002).

This study evaluates a compensatory decision strategy versus a non-compensatory decision strategy. Previous research has shown that a non-compensatory decision making strategy is quicker and requires less cognitive effort (e.g. Gigerenzer and Goldstein 1996). Therefore, we hypothesize that in a project portfolio selection context, the results of a quick and simple non-compensatory strategy will be comparable to a more time-consuming and rigorous compensatory strategy. More formally, we hypothesize:

H1: There is not a significant difference in project rankings that are based on a compensatory decision strategy versus the project rankings based on a non-compensatory decision strategy.

Even though we expect similar results between the two strategies, we also expect that the more cognitive-intense exercise of evaluating each attribute for each project reinforces the simple heuristics used in the non-compensatory strategy. Therefore, we expect that the user will perceive as more accurate the results from a compensatory decision strategy. More formally stated:

H2: Results from the compensatory decision strategy will be perceived by the evaluator as more accurate than the non-compensatory strategy.

RESEARCH DESIGN

To test our hypotheses in the context of IT project portfolio management, we are working with the IT department of a large university in the Southeast United States. This IT department has about 50 full-time employees and provides computing, telecommunications, networking, data security, video transport, information technology training, and other IT services to the university community. Participants will be the staff of the IT department.

The evaluations and ranking of the projects will occur in a 2-phase process – a non-compensatory prioritization followed by a compensatory prioritization.

The first phase is the non-compensatory evaluation and represents an unstructured approach to the evaluation. In this phase, each of the potential IT projects will first be evaluated by the participants as a "high", "medium" or "low" priority without formal evaluation by attributes. Then, the participant will be asked to rank the projects. Finally, the participants will asked to specify what attribute(s) were used in their evaluation, which represents the non-compensatory attribute(s) used in their decision making process.

The second phase is the compensatory evaluation. In this phase, each of the projects is evaluated along the previously identified attributes. Based on weights determined by the executive project selection committee, each participant will have another set of rankings based on the compensatory analysis of the projects. To test H1, we will compare the rankings from the first phase with the calculated rankings of the second phase.

Finally, after completion of the non-compensatory and compensatory phases, H2 will be tested by asking the participant to re-rank the projects once again and to assess their perceptions of the accuracies of their ratings at phase 1 and phase 2. This self-reported measure will provide an indication of the added value in using a more rigorous, attribute-based compensatory evaluation strategy.

CONTRIBUTIONS

Our paper has two primary potential contributions. First, from a theoretical perspective, the paper incorporates decision making strategies from psychology into the IT project portfolio prioritization context. Second, from a managerial perspective, by using theory-driven decision making strategies, managers can potentially incorporate feedback from various stakeholders in a manner that is both fast and frugal. The research design provides guidance to practitioners on how to design the project selection process.

CURRENT STATUS OF THE PROJECT

This project is currently in the design phase. We are preparing for the data collection and working with the IT departments on an online survey to solicit input from the various employees for project prioritization.

Our goal is to have the data collected in October 2009 so we can present the preliminary results at the conference.

REFERENCES

Archer, N.P. and Ghasemzadeh, F. (1999). "An integrated framework for project portfolio selection," *International Journal of Project Management*, 17, 4, 207-216.

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J. *Portfolio Management for New Products*. (1998). New York: Perseus Books.

Dieckmann, A., Dippold, K., and Dietrich, H. (2009). Compensatory versus noncompensatory models for predicting consumer preferences. *Judgment and Decision Making*, 4,3, 200-213.

Dye, L.D., and Pennypacker, J.S. (1999). An introduction to project portfolio management. In Dye, L.D. and Pennypacker, J.S., editors. *Project Portfolio Management: Selecting and Prioritizing Projects for Competitive Advantage*. West Chester, PA, USA: Center for Business Practices, xi-xvi.

Johnson, E., and Meyer, R. (1984). Compensatory Choice Models of Noncompensatory Proceses: The Effect of Varying Context. *Journal of Consumer Research*. 11, 528-541.

Keeney, R.L. and Raiffa, H. (1976). *Decisions with multiple objectives: Preferences and value tradeoffs*. New York: Wiley.

Gigerenzer, G. (2000). *Adaptive thinking: Rationality in the real world*. Oxford, England: Oxford University Press.

Gigerenzer, G., and Goldstein, D.G. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review*. 103, 650-669.

Gigerenzer, G., Todd, P.M., and the ABC Research Group. (1999). *Simple Heuristics that Make Us Smart*. New York: Oxford University Press.

Montgomery, H., and Svenson, O. (1976). On decision rules and information processing strategies for choices among multiattribute alternatives. *Scandinavian Journal of Psychology*, 17, 283-291.

Payne, J.W., Bettman, J.R., and Johnson, E.J. (1993). *The Adaptive Decision Maker*. Cambridge University Press: New York.

Pitt, M.A., and Myung, I.J. (2002). "When a good fit can be bad." *Trends in Cognitive Sciences*, 6,10, 421-425.

Svenson, O. (1979). Process descriptions of decision making. *Organizational Behavior and Human Performance*, 23, 86-112.

Tversky, A. (1972). Elimination by aspects: A theory of choice. *Psychological Review*, 79, 281-299.

Zeleney, M. (1976). The attribute dynamic attitude model. *Management Sciences*, 23, 12-25.