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When Do Opportunity Costs Count?: Vague Opportunity Costs, the Completion Effect and Management Accounting Experience

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WHEN DO OPPORTUNITY COSTS COUNT? VAGUE OPPORTUNITY COSTS, THE COMPLETION EFFECT AND MANAGEMENT ACCOUNTING EXPERIENCE

By

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To my Mom and Bella
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ABSTRACT

Although prior research has established the importance of opportunity costs and identified factors influencing their inclusion in decisional analyses, researchers have overlooked several factors likely to be present in an actual managerial setting. In an experiment, I investigate how two situational factors, vagueness of opportunity cost presentation and stage of project completion, affect individuals’ tendency to attend to opportunity costs. I also investigate how attending to opportunity costs affects project continuance judgments and decisions. The two situational factors are examined across two groups of participants with varying levels of management accounting experience. I find that vagueness of opportunity cost presentation and a nearly complete project decrease inexperienced participants’ attention to opportunity costs. Experience moderates the effect of these factors as experienced participants attend to opportunity costs despite presence of the two situational factors. As well, the tendency to continue a project is influenced by both the number of opportunity costs attended to and decision-maker experience.

Keywords: Opportunity costs, vagueness, management accounting experience, completion effect, project completion stage.
CHAPTER 1

INTRODUCTION

1.1 Research Question

Although opportunity costs are incurred whenever a decision-maker must choose between two or more courses of action, they are commonly overlooked. The opportunity cost concept is a fundamental component of classical economic theory and is measured as the benefit forgone due to choosing an alternative course of action (Heymann and Bloom 1990). If opportunity costs are omnipresent to any decision involving alternatives and are inherently relevant to economic decision-making, what factors cause decision-makers to overlook this relevant piece of information? Does attending to opportunity costs influence judgments and decisions? The purpose of my dissertation is to investigate factors that influence decision-makers’ tendency to regard or disregard opportunity costs as relevant information when making resource allocation decisions. Additionally, I am interested in investigating whether attending to or ignoring these opportunity costs will influence subsequent judgments and decisions.

1.2 Contribution

A resource allocation decision can be defined as a decision about initiating or continuing a project and the amount or level of resources allocated to the project upon continuance. Prior research that investigates decision-makers’ tendency to regard or disregard opportunity costs when making resource allocation decisions has identified several influential factors. These factors relate to decision-maker characteristics (e.g. experience, Vera–Munoz 1998; Vera–Munoz, Kinney, and Bonner 2001), manner of opportunity cost presentation (e.g. explicitly vs. implicitly stated, Devine and O’Clock 1995; Hoskin 1983; Neumann and Friedman 1978; Northcraft and Neale 1986), and context (e.g. personal vs. business, Vera–Munoz 1998). Despite these studies, several influential factors that are present in an actual managerial setting remain uninvestigated.

The factors of interest to my study are opportunity cost vagueness, stage of project completion and decision-maker experience. Examining these factors is important as they are present in managerial decision-making settings and there is theory to suggest that they will individually and jointly influence decisions. Research has shown that individuals do not always incorporate opportunity costs when making decisions, especially when they are not explicitly
presented (Becker, Ronen and Sorter 1974; Neumann and Friedman 1978; Friedman and Neumann 1980; Hoskin 1983). However, individuals with management accounting experience are more likely to attend to opportunity costs despite the method of presentation format, such as a cash flow or accrual based earnings format (Vera–Munoz et al. 2001). Individuals in the management accounting domain should excel at identifying opportunity costs as a relevant decision input because they tend to participate in various forward looking resource allocation decisions (e.g. capital budgeting decisions). Investigations that take into account decision-makers’ experience are limited, and it remains unknown how management accounting experience will interact with other factors and influence the inclusion of opportunity costs when making a resource allocation decision.

Prior research has typically presented opportunity costs in a precise manner, which is inconsistent with how they would appear in a realistic setting. As put forth by Chenhall and Morris (1991, 40), “the fact remains that many managers are rarely presented with clear, unambiguous, economic alternatives to focus their attention on opportunity costs.” It remains unknown how decision-makers will react to opportunity costs when they are presented in a vague manner. For example, decision-makers are often confronted with the opportunity of selling project specific assets when making a decision to terminate a project. The disposal value of a fixed asset is typically an estimate (e.g. might sell for $10,000 ± 15%) rather than an absolute amount and a decision-maker will have to rely on this vague information. Research has shown that when making decisions individuals avoid (Camerer and Weber 1992) or discount (Van Dijk and Zeelenberg 2003) vague information. Since individuals exhibit aversion to vague information, they are likely to avoid including vague opportunity costs when making resource allocation decisions. Little is known with respect to how experience moderates the tendency to avoid or discount vague opportunity costs as relevant information. A study by Heath and Tversky (1991) suggests that domain experience and knowledge may mitigate individuals’ propensity to avoid vagueness. In their study they conclude that the effect of knowledge or competence is more important than vagueness in understanding how beliefs and preferences interact in making risky decisions.

Another significant factor that remains uninvestigated is whether individuals’ tendency to incorporate opportunity costs varies with stage of project completion. A project that is under consideration for future resources may be at an initial stage of completion (e.g. 10% complete) or
close to completion (e.g. 90% complete). Individuals presented with a project that is near to completion may be more likely to ignore opportunity costs than when presented with a project at an initial stage of completion. In other words, when faced with a project that is near completion individuals will focus on the goal of project completion and opportunity costs that may suggest the implausibility of project continuance will be ignored. In fact, the degree of project completion has been shown to affect individuals’ commitment to a course of action such that individuals are more likely to continue a project that is close to completion versus far from completion (Conlon and Garland 1993; Garland and Conlon 1998; Boehne and Paese 2000). This phenomenon is referred to as the “completion effect.” An important yet unexplored avenue of research is how attending to opportunity costs can be beneficial by improving the overall quality of judgments and decisions. I am specifically interested in whether the completion effect is mitigated when decision-makers incorporate opportunity costs as relevant information when making project continuance judgments and decisions.

1.3 Overview of Methodology

My study consists of a 2 x 2 x 2 between subjects experimental design with opportunity cost vagueness, project completion stage and management accounting experience as independent variables. Data was collected through the administration of a case involving a resource allocation task. Specifically, participants read a case describing the current progress and resources necessary to complete an internal logistics project. They were asked to perform an analysis and render a decision as to whether the logistics project should be continued. In order to isolate the effects of management accounting experience on the inclusion of opportunity costs, two distinct groups of participants were used. The first group of participants consisted of individuals with management accounting experience. This group was recruited from members of the Institute of Management Accountants (IMA). The second group of participants consisted of individuals who have been exposed to general economics and management accounting curriculum through college coursework but lack on-the-job management accounting experience. This group was recruited from a large state university and includes upper–level business students enrolled in a cost accounting course.

The first independent variable, opportunity cost vagueness, consists of opportunity costs presented in either a vague or precise manner. The second independent variable, project completion stage, was manipulated by presenting participants with a project that is at an early
stage of completion (10%) or late stage of completion (90%). The third independent variable, management accounting experience, was implemented by using two distinct groups of participants as discussed above.

The first dependent variable of interest in my study is the number of opportunity costs attended to when analyzing the ongoing logistics division project. The number of opportunity costs attended to was also a dependent variable in Vera–Munoz (1998) and Vera–Munoz et al. (2001). Each case contained six embedded opportunity costs relevant to the resource allocation analysis task, and data regarding the dependent variable was obtained by examining calculations associated with participants’ project continuance recommendation judgments and decisions. My second dependent variable is participants’ judgments and decisions regarding continuance of the project.

1.4 Organization of Dissertation

The remainder of this dissertation is organized as follows. Chapter 2 contains a review of relevant literature in accounting, organizational behavior and psychology including: opportunity costs and resource allocation decisions, the role of knowledge and experience in accounting, decision-making with vague information, the completion effect phenomenon and image theory. Chapter 3 develops the hypotheses. Chapter 4 describes the experimental design and the method used in testing the hypotheses. Chapter 5 discusses the study’s results and Chapter 6 provides a discussion of the study’s conclusions, limitations and suggestions for future research.
CHAPTER 2
REVIEW OF THE LITERATURE

2.0 Chapter Introduction

This chapter presents research relevant to the study of experience, vagueness, and project completion as factors influencing the inclusion of opportunity costs as decisional inputs. In presenting this research the chapter will be organized into five sections. The five main sections include opportunity costs and resource allocation decisions, experience and decision-making in accounting, vagueness, project completion, and image theory.

2.1 Opportunity Costs and Resource Allocation Decisions

2.1.1 Implicit vs. Explicit Opportunity Costs

Initial research on opportunity costs such as Becker, Ronen and Sorter (1974) and Neumann and Friedman (1978) stemmed from the concern that economics considers opportunity costs a relevant input to decisions and yet they are not included among the other useful information found in financial accounting reports. Built on generally accepted accounting principles (GAAP), financial accounting takes a historical standpoint and tends to only report outlay costs. Outlay costs can be defined as a negative cash flow expended for items such as direct materials, labor, and overhead. These initial studies were concerned with whether or not individuals would attend to a single opportunity cost in decision-making when it was explicitly or implicitly presented. In general, explicit presentation of opportunity costs includes specific information regarding alternative investments (e.g. funds from the sale of project specific equipment could be invested in a long term CD which typically returns 5%). Whereas an implicit presentation includes a general statement regarding alternative uses of funds (e.g. other investments exist which generally return 5%).

Becker, Ronen, and Sorter (1974), hereafter BRS, provided M.B.A. students with explicit opportunity cost information and asked them to choose between two investments with equal margins in order to determine the relevance of opportunity costs. Despite the equal margins, incorporation of opportunity costs would indicate that one investment was superior to the other. Explicit opportunity cost information was only provided with respect to one investment. As hypothesized, individuals either ignored the opportunity costs or placed more decisional relevance on outlay costs.
In a follow up study Neumann and Friedman (1978) were motivated by the claim that the participants of BRS may have chosen the investment with a lower margin even when incorporating opportunity costs. The key difference in the latter study is that M.B.A. student participants were provided with explicit opportunity cost information about both projects and unequal rather than equal margin choices were presented. Contrary to the results found by BRS, participants used opportunity costs when explicitly presented.

Friedman and Neumann (1980) attempted to explain the contradicting results of the prior two studies by implementing a three stage experiment. First, participants consisting of M.B.A. students and C.P.A.’s\(^1\) were asked to choose between two projects based on revenue and variable cost information. Second, participants were given information about opportunity costs excluding any numerical amounts and asked to choose again. Lastly, they were told that up to two more information items were available for no additional fee. This included one outlay cost, one opportunity cost, and three fixed costs. Results suggest that individuals use and request opportunity cost information if it is explicitly provided and there is no fee to obtain the information. There was no attempt to impute the amounts of opportunity costs when not explicitly provided. Thus, individuals will utilize opportunity cost information when it is explicitly provided but will disregard the information when it is implicitly presented.

Hoskin (1983) extended research on opportunity costs by determining why individuals disregard or discount opportunity costs relative to a normative standard. He focused on two explanations: the explicit availability of opportunity cost information and risk attitude. Graduate business students were asked to place newspaper orders for an upcoming week with uncertain demand and were provided with either implicit or explicit opportunity costs. The implicit opportunity cost manipulation was implemented by providing subjects with a standard historical income statement with no opportunity cost information while the explicit opportunity cost manipulation consisted of a modified income statement that included information about lost income due to over or under–ordering papers. Hoskin (1983) concluded that individuals’ tendency to ignore or underweight opportunity costs in prior studies was due to lack of salience with respect to the opportunity cost information. As well, the study found no effect of risk attitudes on individuals’ use of opportunity costs.

\(^1\) There was no significant difference between the results of the M.B.A students and C.P.A.’s, thus the results were combined into one group.
Northcraft and Neale (1986) manipulated the presentation of opportunity costs (explicit or implicit) and examined the effect of the manipulation on a decision to continue a project experiencing a major financial setback. This was motivated by the findings of BRS and Hoskin (1983) that since individuals ignore or discount implicit opportunity costs, lack of explicit opportunity costs will increase the salience of outlay costs causing individuals to erroneously frame decision alternatives. By failing to recognize the alternative uses of funds from disinvesting in the current project, the decision alternatives will be erroneously viewed as certain losses or the possibility of no losses. Undergraduate business students were presented with two cases and asked to make a resource allocation decision based on the case facts. As predicted, participants in the implicit opportunity cost condition were more likely to continue the project in order to avoid the certain loss. The explicit nature of opportunity cost presentation not only affects one’s tendency to attend to them when making decisions but also alters one’s decision frame. A decision frame refers to how an individual perceives the outcomes and contingencies associated with a specific choice (Tversky and Kahneman 1981). As described by prospect theory (Kahneman and Tversky 1979), participants’ decision frame of a certain loss or no loss will lead to incorrect cost-benefit analyses with respect to continuing or discontinuing a project.

Devine and O’Clock (1995) claimed that the explicit manipulation implemented in Northcraft and Neale (1986) was excessive and a further investigation of explicit versus implicit opportunity cost presentation was warranted. Specifically, participants were asked to create a list of alternative uses for the investment proceeds which might have served as a cue to disinvest. To mitigate this effect the explicit opportunity cost condition described a particular alternative investment project including information about expected revenues, expenses, and an annual rate of return. The study utilized a scenario similar to Northcraft and Neale (1986) such that participants were provided with historical cost information and asked whether to continue or sell an investment. Undergraduate students in the condition which mentioned an alternative investment opportunity and in the condition that did not mention an alternative investment opportunity were both more likely to continue than discontinue the current investment. In other words, the authors did not find any affect of exposing the participants to an alternative investment opportunity.
2.1.2 Decision-maker Characteristics

2.1.2.1 Project sponsorship and cognitive style. Chenhall and Morris (1991) made the first attempt to understand why decision-makers attend to or ignore opportunity costs by investigating two factors: cognitive style and project sponsorship. The first factor, cognitive style was thought to affect identification of opportunity costs on the basis that cognitive style shapes one’s frame of reference. The authors reasoned that individuals with an “intuitive” manner of analyzing data will attend to opportunity costs since they have a broad frame of reference enabling them to identify possible economic alternatives. To the contrary, “sensation” style individuals are apt to focus on precise, tangible information making them less likely to identify possible economic alternatives. To measure individuals’ cognitive style participants were asked to complete the Myers–Briggs (1977) cognitive style instrument.

The second factor investigated by Chenhall and Morris (1991), project sponsorship, was included because it would indirectly influence attention to opportunity costs by altering the effect of cognitive style. Even if an individual had an “intuitive” cognitive style, an intuitive manager responsible for a project is likely to exclude items that question the economic stability of a project. To introduce a sponsorship bias the sponsorship condition included statements such as: “their division was most excited about the potential launch of the product” or “they had been closely involved in its development.”

Chenhall and Morris’s (1991) participants included managers that were enrolled in an executive program. To deduce whether managers would attend to opportunity costs, they were asked whether to include or exclude a list of items when performing the resource allocation task as described in the case materials. As expected, in the absence of project responsibility, cognitive style affected the inclusion of opportunity cost information when making a resource allocation decision. Also there was an interaction between “sensation” cognitive style and project responsibility such that in the absence of project responsibility “sensation” style managers included opportunity costs but in the presence of project responsibility they excluded opportunity costs. This study points out that not only does the presentation of opportunity costs matter but decision-maker characteristics also influence the tendency to incorporate opportunity costs.

2.1.2.2 Knowledge and experience. Vera–Munoz (1998) identified decision-maker knowledge and decision context as two additional dynamics that influence inclusion of opportunity costs. She argued that individuals with general accounting knowledge in the absence of management
accounting experience will focus on historical costs since this is the primary focus of Generally Accepted Accounting Principles (GAAP). In turn, this GAAP knowledge base will interfere with individuals’ ability to attend to opportunity costs in a business context.

Anchoring on prior research that domain knowledge is only activated in a task that is common to a domain or contextually related (Butt 1988; Marchant 1989; Nelson 1993) Vera–Munoz (1998) argued that decision context will influence the performance of the high knowledge group. Thus, a business context case will activate high accounting knowledge individuals’ GAAP based knowledge store causing them to focus on historical costs and ignore opportunity costs. A personal context will not activate the knowledge store of the high knowledge individuals and as a result their GAAP knowledge base will not interfere with opportunity cost identification.

In Vera–Munoz (1998) high and low accounting knowledge participants were represented by masters of accounting (M.Acc.) and M.B.A. students, respectively. In the business context, participants were told to assume the role of a consultant and perform a financial analysis to determine if a retail store should be closed in the current or subsequent year. In the personal context an employee of an air force base inquired whether he should end his employment this year or next, due to closure of the base. Results suggested that high knowledge individuals ignored more opportunity costs than low knowledge individuals in a business context. As well, high knowledge individuals ignored more opportunity costs in a business context versus a personal context.

An important factor that was uninvestigated in Vera–Munoz (1998) was how actual accounting experience, both public and management, would influence identification of opportunity costs. Vera–Munoz, Kinney, and Bonner (2001) investigated the role of management accounting experience in decision-makers’ problem representations and identification of opportunity costs. The authors assert that different types of accounting experience create knowledge structures and these knowledge structures will influence the problem representation of a resource allocation task. The problem representation and type of experience will in turn influence the number of opportunity costs attended to when performing a resource allocation task.

In order to obtain individuals with accounting experience Vera–Munoz et al. recruited participants from the American Institute of Certified Public Accountants (AICPA) and an
Executive M.B.A. program. Management and public accounting experience was operationalized as the square root of experience in months. Participants were asked to assume the role of a consultant providing advice on whether a client should relocate their retail store in the current or subsequent year and were provided with one of two task presentation formats; historical accounting earnings or historical cash flow data. When provided with a historical earnings format, public and management accounting experience was positively related to representing the problem in a cash flow based format. This is because accounting experience in general creates a broad knowledge base that enables identification of a cash flow analysis as the proper problem representation. With respect to identification of opportunity costs, management accounting experience was positively related to identification of a greater number of opportunity costs, given that a cash flow problem representation was chosen. There was no relationship between the amount of public accounting experience and the identification of opportunity costs despite the identification of a cash flow problem representation. Overall this study suggests that accounting experience in general assists in developing a correct problem representation. Yet, accounting experience in general does not assist in identification of opportunity costs as there is only a positive relation between management accounting experience, not public accounting experience, and the ability to identify opportunity costs, given a correct problem representation.

2.2 Experience and Decision-making in Accounting

2.2.1 General Research

Much of the research on experience in accounting has been in an auditing context primarily because it is a domain with a hierarchical organization (i.e. staff, senior, manager, etc.) with a relatively universal and standardized job description (i.e. every firm must conduct an audit according to GAAS) and tasks (e.g. internal control evaluation). Although my study is not in an auditing setting nor does it focus on an auditing task, the theory is generalizable to other settings and tasks. I will begin by conducting a general review of experience effects in accounting and auditing. After this general review, I will narrow my focus to experience and its relationship to identifying relevant information in a particular task.

Initial expertise research in accounting sought to determine whether more experienced auditors excelled at a domain-specific task such as an internal control evaluation (see Ashton and Brown 1980; Hamilton and Wright 1982; Messier 1983). This early research operationalized experience as months or years of general audit experience and was often unsuccessful at finding
the hypothesized positive relationship between experience and superior performance. As pointed out in Bonner and Lewis (1990), early studies on experience effects in audit judgments failed to consider the role of task–specific knowledge in audit judgments. It is important to consider what knowledge is necessary in making a judgment and how and when this knowledge is gained. As well, decisional performance is not only affected by knowledge but is also a function of general ability, environment, and motivation (Einhorn 1980; Libby 1983; Libby and Luft 1993). Early expertise research in accounting was sometimes unsuccessful at finding a relationship between experience and performance because it examined a task that required basic knowledge that had been acquired by even novice auditors. This early research was not properly aligning the experimental task with its relational knowledge.

Recognizing the important role of knowledge on task performance, Frederick and Libby (1986) recommended three guidelines to follow when investigating experience effects. First, hypotheses should focus on the effects of specific knowledge (content or organization) on performance. Second, in order to properly demonstrate a knowledge difference or the effect of knowledge on performance, a researcher must use a task that clearly delineates the difference of having or not having the requisite knowledge. Third, the presence of a knowledge effect is best investigated by manipulating stimuli and/or context features and comparing individuals with varying levels of experience.

Davis and Solomon (1989) also commented on the methodological difficulties in accounting expertise research. They claimed these studies were characterized by a failure to differentiate between the constructs experience and expertise as well as a lack of a well defined research question. Like Frederick and Libby (1986) they put forth four prescriptions for accounting research on the effects of experience on performance. These prescriptions suggested researchers should better understand the relationship between cognitive differences and performance, develop tasks that enable differentiation of performance, consider the role of learning, and put more emphasis on characteristics of individuals that are designated firm experts.

Bonner (1990) was among the first to bridge the gap between previous “policy–capturing” studies and the recognition of the interactive effects of task and knowledge (Libby

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2 “Policy-capturing” research refers to studies using models such as the Brunswik Lens to provide statistical descriptions of auditors’ and accountants’ usage of information (Gibbins and Swieringa 1995).
Adhering to the methodological guidelines, Bonner investigated the role of task-specific knowledge in the cue selection and cue weighting components of an analytical and control risk assessment task. Auditors with more experience in years were expected to perform better when selecting and weighting cues related to an analytical procedure risk assessment than a control risk assessment. This difference was expected because control risk knowledge is obtained at a collegiate level and at the audit staff level. Analytical procedure risk knowledge is typically present only for more experienced auditors because it is a task performed by a senior level auditor. In the cue selection task participants were presented with relevant and irrelevant (distracter) cues and were asked to indicate whether they were relevant or not. In the cue weighting task participants were presented with five cues and asked to make a control or analytical procedure risk judgment on a 9 point scale with endpoints labeled low risk and high risk. As expected, the presence of task-specific knowledge resulted in improved performance when selecting and weighting cues in the analytical risk assessment task.

In the late eighties and early nineties research on experience in auditing expanded and many knowledge related effects were documented. In general, these studies found that experience resulted in task-specific knowledge which often leads to superior performance. Major types of knowledge included financial statement errors (Butt 1988; Marchant 1989; Libby and Frederick 1990; Bedard and Biggs 1991) internal control evaluation (Bonner and Lewis 1990; Frederick 1991; Brown and Solomon 1991), and going concern evaluation (Choo 1991; Choo and Trotman 1991).

Although much of this research was conducted in an auditing setting, the theoretical underpinnings of task-specific experience, a related knowledge base, and the resulting superior performance is generalizable to other accounting settings. In fact, a relationship between experience and performance has been documented in a tax planning context (Bonner, Davis, and Jackson 1992), financial analysis (Anderson 1988; Frederickson and Miller 2004) and managerial accounting context (Dearman and Shields 2001; Vera-Munoz et al. 2001). My reference to performance refers not only to superiority on a particular task but also differences in information search and identification of relevant information.
2.3 Vagueness: Outcome and probabilistic

2.3.1 Background and Definitions

In a perfect world, a decision-maker would have access to all desired information and each option evaluated would be a known outcome or certain state of nature. Options present in an actual managerial setting are often characterized by uncertainty or are said to be vague. The psychology literature contains several popular definitions of vagueness, including the following:

The quality depending on the amount, type, reliability, and ‘unanimity’ of information and giving rise to one’s degree of “confidence” in an estimate of relative likelihoods (Ellsberg 1961, 657).

The subjective experience of missing information relevant to a prediction (Frisch and Baron 1988, 152).

Uncertainty associated with specifying which of a set of distributions is appropriate in a given situation (Einhorn and Hogarth 1985, 435).

Uncertainty about the processes by which outcomes are determined, and have been characterized as uncertainty about the outcome probabilities themselves (Curley and Yates 1985, 274).

These definitions all have one common link—missing information or lack of knowledge that leads to uncertainty about a particular outcome. Uncertainty about an outcome can be due to probabilistic or outcome vagueness. According to probabilistic vagueness the outcome probability distributions are not known (Camerer and Weber 1992). If a manager was deciding to dispose of a fixed asset and there was a 90% to 99% chance that the asset could be sold at

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3 Although prior judgment and decision literature used vagueness and ambiguity interchangeably, in theory they are definitively different. The two can be distinguished by using the argument made in Budescu, Weinberg, and Wallsten (1988). Ambiguity means that a statement or event can be interpreted in two or more different yet precise ways. An ambiguous statement would consist of asking an individual to select a ‘light’ ball from an urn of black cork-filled balls and white lead-filled balls in which the probability of selecting a light ball is 80%. Vagueness occurs when a statement or event is not clearly identified or cannot be understood precisely. For example, vagueness exists when drawing a ball from an urn with an unidentified composition (the probability distributions are unknown).
salvage value, the manager would be making a decision in the face of probabilistic vagueness. According to outcome vagueness there is uncertainty about which outcome will occur but the probabilities about each possible outcome are known (Camerer and Weber 1992). For instance, a manager deciding to sell a fixed asset may know that there is a 100% chance that he can sell it between $10,000 ± 10%. Individuals have exhibited similar vague averse attitudes toward outcome and probabilistic vagueness (Ho, Keller, and Keltyka 2001, 2002; Kuhn and Budescu 1996).

2.3.2 Evidence: Decision-making and Vague Information

Initially studies modeling vagueness were operationalized by manipulating the proportion of red balls to black balls (Ellsberg 1961) or the range of red balls in an urn (Brownson 1964). The common finding of Ellsberg (1961) and Brownson (1964) was that participants were averse to vagueness and would pay a premium to avoid the vague urn or the urn with missing information. This type of uncertainty is but one type of missing information. “Feeling ignorant about football or politics, having doubts about which of several experts are right, wondering whether your child has a predisposition to the side effect of a vaccine, or being unsure about another country’s economy are all manifestations of missing information” (Camerer and Weber 1992, 360). Despite the source of vagueness, individuals exhibit vagueness aversion when presented with two options that differ in their degree of vagueness. This robust finding has been present in various contexts including experimental markets (Camerer and Kunreuther 1989; Sarin and Weber 1993), medicine and health (Hamm and Bursztajn 1979; Curley, Eraker, and Yates 1984; Ritov and Barton 1990), insurance liability and taxes (Hogarth and Kunreuther 1985, 1989; Hogarth 1989), marketing (Hoch and Ha 1986; Kahn and Meyer 1991) and management accounting (Ho, Keller, and Keltyka 2001, 2002). Even though each of these studies was successful at documenting vagueness aversion, they were constrained because they only examined individuals’ choices between a vague and precise option. My study does not focus on individuals’ choice between two options but rather focuses on their tendency to incorporate relevant but vague information into their decision-making process. More specifically, I focus on whether individuals will incorporate opportunity costs that are vague when making a resource allocation decision. Due to the focus of my study, I will limit my review to studies that investigate individuals’ attitude toward vague choices in a management accounting context. Next
I will focus on studies that examine individuals’ tendency to incorporate vague information into their decision-making process.

Ho, Keller, and Keltyka (2001) were the first to examine the effects of vagueness in a management accounting context. In particular, they presented managers with departmental expense variances that were vague with respect to probabilities or outcomes and were either above or below the benchmark. They were interested in how vagueness influences individuals’ decisions about whether to undertake or forgo a variance investigation. Graduate business students were told to assume the role of a departmental vice president and were asked to make a choice regarding a variance investigation. Specifically, they had to choose to investigate a variance from one of two divisions that was outside the normal benchmark. The two departments were communications and human resources and the departmental variances were related to communications expense and training and development expense, respectively. In each case there were two divisional variances from the same department and one division had a vague variance and the other was non–vague. Intervals were used in expressing both probabilistic (e.g. 0.63 chance of spending higher than 13%) and outcome (e.g. 14% ±15%) vagueness while non–vague variances were expressed as a precise number. Due to a lack of consistent theory in predicting whether individuals would choose to investigate the vague variance when it was above or below the benchmark, the authors used competing hypotheses. The first set of competing hypotheses stated that managers were likely to focus on the vague option in order to resolve uncertainty. The second set stated that a manager may decide to investigate the variance that does not meet the benchmark with certainty and they would exhibit uncertainty avoidance.

Results from the outcome vagueness experiment reflected the uncertainty resolution hypothesis such that participants were more likely to investigate the vague variance when it was either above or below the benchmark. Results from the probabilistic vagueness experiment were consistent with the outcome vagueness experiment. An additional analysis was performed to further investigate the study’s results by examining written protocols of participants’ reasoning when faced with outcome and probabilistic vagueness. This investigation suggested that participants displayed similar decision processes in the presence of probabilistic and outcome vagueness. As concluded by Ho, Keller and Keltyka (2001), “the presentation of information vagueness affects managers’ variance investigation decisions and their resource allocation” (276).
Ho, Keller, and Keltyka (2002) investigated managers’ decisions when presented with investment projects that were characterized by outcome and probabilistic vagueness in a gain or loss situation. They were motivated to determine if decision-makers’ judgments are affected by the frame of an outcome (i.e. gain or loss). Regarding probabilistic vagueness, when an individual is in a loss situation or below a goal and faces a precise and vague probability of outcome, they are likely to favor the vague option thinking that it gives them the best opportunity to meet their goal. This behavior is parallel to the “hope effect” in Viscusi and Chesson (1999). To the contrary, when individuals are above their goal and in a gain situation they prefer a precise probability because they know their outcome with certainty, as a vague probability allows more variation that could bring them below their goal. Thus, in a gain condition individuals exhibit a “fear effect.” Drawing on the hope effect and fear effect, the authors hypothesize that individuals will be risk seeking (averse) in the loss (gain) domain and prefer the vague (precise) option. These predictions are consistent with prospect theory (Kahneman and Tversky 1979).

Ho, Keller, and Keltyka (2001) argued that similar results are expected in the presence of outcome vagueness. According to Camerer and Weber (1992) probabilistic vagueness is not distinct from outcome vagueness and can be portrayed by an unknown probability distribution over a possible range of outcomes. Also, it is possible to portray outcome vagueness simply as decision-making under risk if there is a single probability distribution over the range of outcomes. Regardless of how outcome vagueness is conceptualized, assuming all else is held constant, more participants are expected to favor the vague option over a precise option in a loss situation than in a gain situation.

In each experiment of Ho et al. (2001), M.B.A. students were presented with an internal rate of return (IRR) and return on investment (ROI) case. Each stated their division’s benchmark in terms of IRR or ROI and had a gain and loss condition. In the gain (loss) condition the precise option (e.g. ROI = 14%) and the midpoint of the vague option (e.g. ROI = 14% ± 4) were greater (less than) than their division’s benchmark. In each case participants were asked to select either the vague or precise option. In both the outcome and probabilistic vagueness experiments participants in the loss condition favored the vague option and the precise option in the gain condition. This finding supported vagueness aversion and vagueness proneness in gain and loss.
situations, respectively. Overall, in the same decision context participants exhibited different choice patterns depending on whether the situation was framed as a gain or loss.

Van Dijk and Zeelenberg (2003) built on the previous finding that vague information influences individuals’ decisions and examined whether individuals discount vague cost and benefit information in an economic decision-making context. This paper is especially noteworthy because it examined individuals’ reliance on vague information (i.e. would you invest your money if there is a 5% ± 3% chance it will decrease in value) while prior studies on vagueness examined if people would avoid being in a situation that is vague (i.e. the choice of an investment with 5% return or return of 3% ± 3%). My study is interested in the former, making the Van Dijk and Zeelenberg (2003) study highly relevant.

Van Dijk and Zeelenberg (2003) argue that when given a choice between a vague and precise option, individuals prefer the precise option (Curley, Yates, and Abrams 1986; Camerer and Weber 1992, Fox and Weber 2002; Keren and Gerritsen 1999) or alternatively stated, people exhibit “vagueness avoidance.” However, in most realistic contexts individuals do not have the option between a vague and non–vague option, rather in many instances they will have to rely on vague information. Van Dijk and Zeelenberg (2003) pose the question, will decision-makers rely on this information or will they “treat inexact, incomplete, or vague information as insufficient information; information that will be discounted” (Van Dijk and Zeelenberg (2003, 342).

An instance when individuals discount vague information can be represented by the disjunction effect, which was initially documented in Tversky and Shafir (1992). The disjunction effect occurs when a decision-maker chooses the same option in two (or more) different states of the world, but picks a different option or pays to learn the state when it is unknown. Van Dijk and Zeelenberg (2003) used the disjunction effect to show that people discount vague information. In their study, participants were asked how willing they would be to buy a vacation under three conditions, passing an exam, failing an exam, or not knowing whether they passed or failed. Participants who passed or failed were willing to buy the vacation but those who did not know their results were not willing to buy the vacation. This suggests that people are unlikely to base their decisions on vague information.

Van Dijk and Zeelenberg (2003) argue that transaction decoupling is another phenomenon that illustrates discounting of vague information. In a study examining this phenomenon, Soman and Gourville (2001) told participants that they had purchased four one–
day tickets for $40 a piece or a four day pass for $160. Participants were then notified that warm rain in the area resulted in unfavorable weather conditions and then asked whether or not they would ski on the last day of vacation. Participants in the daily ski pass condition were more likely to ski than those in the four day pass, or bundled condition. Soman and Gourville (2001) claimed that the cost of skiing for one day was vague in the bundled condition and that this vagueness led to a dissociation or decoupling of the cost and benefits of skiing on the last day. Similar to the disjunction effect, transaction decoupling is due to decision-makers’ reluctance to rely on or discounting of vague information. This discounting of vague information may be due to both cognitive and motivational factors. Since vague situations are more cognitively complex, decision-makers may not be able to decipher the more compound information. As noted by Soman and Gourville (2001), when individuals are presented with a bundled four-day ski pass it is more cognitively complex to determine the cost of skiing per day versus being faced with simple per day cost of skiing. From a motivational standpoint, decision-makers may not want to exert the additional effort as it will require them to evaluate a range of possible outcomes.

To test whether individuals in fact discount vague information Van Dijk and Zeelenberg (2003) conducted three experiments with college students as participants. Each experiment investigated how participants reacted to vague presentation of information. Three types of information were investigated including past costs, future outcomes, and future benefits in dollars. Experiment 1 was in a research and development context and sunk costs were manipulated at four levels; high (Fl. 1.5 million$^4$), low (Fl. 500,000), vague (between Fl. 500,000 and Fl. 1.5 million) and zero (control condition). Participants were told that they were developing a new medicine for migraines and there was a possibility that its performance would be outperformed by a competitor. They were then asked whether or not they would stop or continue the project. Participants in the vague and zero sunk cost condition were more likely to terminate the project than those in the low or high sunk cost condition. The authors interpreted the results to indicate that participants discounted the sunk cost information which in turn kept them from exhibiting the “sunk cost effect.”

Experiment 2 examined the vagueness of future outcome information. Participants were told that the market potential for their product Chinese food was high (35%), low (15%), vague

$^4$ Amounts were given in Dutch Guilders because the experiment was conducted in the Netherlands. Translation of the high and low conditions into U.S. dollars would be equivalent to $300,000 and $600,000, respectively.
(15% according to one marketing survey and 35% according to a second marketing survey), or there was no mention of market potential (control condition). Similar to Experiment 1, participants were asked whether they would open a third restaurant or simply focus on their existing two restaurants. There was no significant difference in participants’ decisions to open the restaurant in the control and vague condition which suggests that they discounted the vague future outcome information.

Experiment 3 investigated the discounting of vague future cost information. In this experiment participants were told they purchased an annual pass to a local tennis club for €50 per month. After two months they developed tennis elbow and would have to decide to continue for €500 or cancel and pay less future costs due to a refund. Future costs were manipulated by varying the amount to be paid over the remaining 10 months at four levels: high (€400), low (€300), vague (between €300 and €400) and no future costs (control condition). Thus, instead of indicating a refund amount participants were told the amount to be paid for the remaining 10 months. The response of interest was whether participants would cancel or continue their membership and, as expected, there was no significant difference in decisions made by individuals in the vague and control condition. Drawing on the findings from each of the three experiments, the authors concluded that individuals have a tendency to discount vague information and this discounting is likely to have important consequences on economic decision-making.

2.4 Project Completion

2.4.1 The Sunk Cost Effect vs. the Completion Effect

Escalation of commitment refers to a decision-maker’s tendency to invest additional resources to a losing course of action because of prior investment. This phenomena was initially demonstrated in Staw (1976), Staw and Fox (1977), Staw and Ross (1978) and was explained as an individual’s attempt to “turn the situation around or to demonstrate the ultimate rationality of his or her original course of action” (Staw 1981, 579). Several studies have documented theoretical explanations for this phenomena including self–justification theory (Staw 1976), prospect theory (Thaler 1980), desire to avoid appearing wasteful (Arkes and Blumer 1985), reputation concerns (Fox and Staw 1979; Kanodia, Bushman and Dickhaut 1989), and agency

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5 Amounts were given in Euros since this experiment took place after the introduction of the Euro. Authors did not include a currency translation into U.S. dollars for experiment 3.
theory (Rutledge and Karim 1999; Harrell and Harrison 1994). These theoretical explanations can be categorized as one of four classes of determinants: project, psychological, social, and organizational (Staw and Ross 1989).

Regardless of the theoretical explanation, escalation of commitment is an illustration of irrational behavior according to normative economic theory. According to economic theory, decision-makers should base decisions on future-oriented costs and benefits while ignoring historical or “sunk” costs. Several studies (see Arkes and Blumer 1981; Garland 1990; Garland and Newport 1991) documented that decision-makers irrationally focus on sunk costs which is known as the “sunk cost effect.” While demonstrating the sunk cost effect these studies confounded two project related factors, sunk costs and stage of project completion.

Arkes and Blumer (1985) conducted five experiments which successfully demonstrated the presence of the sunk cost effect, "a greater tendency to continue an endeavor once an investment in money, effort, or time has been made” (124). Thus, individuals are thought to escalate commitment due to prior investment. Although two of the five experiments conducted in the study made no mention of project completion and were fairly simple, experiments 3 through 5 were more economically complex and included project completion information in addition to sunk cost information. Experiments 3 through 5 included the same scenario and participants were presented with one of two questions. The first question told participants to envision they were the president of an airline company that has invested $10 million into a research project that is 90% complete. They were asked whether to invest the last 10% of the research capital to complete the investment. The second question made no mention of sunk costs or project completion percentage and participants were asked if they should invest the last million dollars to build the plane. As expected, participants in the sunk cost condition were prone to vote in accordance with continuing the project while the other group did not exhibit the same preference. Since both the amount of sunk costs and project completion were manipulated it is likely that both factors can be used to explain participants’ decisions.

In order to examine the functional relationship between sunk costs and escalation of commitment, Garland (1990) manipulated the percentage that was invested in a research and development project. There were five scenarios which were a modified version of the scenario used in Arkes and Blumer (1985). In each of the five scenarios both the dollar amount that had been spent on the project ($1, $3, $5, $7, or $9 million) and the stage of project completion...
(10%, 39%, 50%, 70%, or 90% complete) were manipulated. Participants consisting of undergraduate business students were asked one of three questions which were all some variation of the phrase “how likely is it that if faced with this situation you would decide to use the last million dollars to complete this project.” In accordance with expectations there was a positive and linear relationship between the amount spent and the tendency to escalate commitment.

Garland and Newport (1991) investigated whether the prospect theory value function served as an explanation for sunk cost effects. They argued that the influence of sunk costs on decision-making is at least partially due to the manner in which individuals organize and process information. There were two experiments and each included a manipulation of the context (personal vs. business), the amount of absolute sunk costs (i.e. amount spent) and the proportion of relative sunk costs (i.e. amount spent as a proportion of total project budget). After reading the case materials, participants were asked to indicate the probability that they would expend the remaining funds to complete the project. Sunk cost effects were only found in the relative sunk cost condition as the dollar amount previously spent had no effect on participants’ decisions. Thus, in congruence with prospect theory, it appears that participants evaluate their decisions with respect to a reference point. Specifically, they reference the money spent to the available budget. Regarding the manipulation of context, there was no significant effect of context on the likelihood of allocating more funds to the action previously initiated.

Similar to Arkes and Blumer (1985), both Garland (1990) and Garland and Newport (1991) manipulated the amount of sunk costs in relation to percentage of project completion. As recognized by Conlon and Garland (1993), each of these prior studies confounded the amount of sunk cost and project completion percentage. It is not possible to unequivocally attribute participants’ decisions to the amount of sunk cost or project completion percentage. The authors recognize that the two factors are positively correlated yet argue that they represent two distinct theoretical constructs that are likely to influence the decision to continue investment. The percentage of project completion is likely to individually influence a decision to continue investment as a project that is 90% complete is almost to the finish line or the completion goal. As stated in Conlon and Garland (1993), the incentive to achieve a goal increases as an individual gets closer to the goal (see also Katz and Kahn 1966; Ryan 1970).

Conlon and Garland (1993) conducted two experiments in order to parse out the individual and joint effects of sunk costs and project completion on the likelihood an individual
would allocate more funds to an ongoing project. In the first experiment the two independent variables of interest were manipulated at four levels. The amount of money previously spent on the project was $1 million, $5 million, $9 million, or no information was given with respect to sunk costs. The four project completion conditions were 10%, 50%, 90%, or no information about project completion. Undergraduate business students were asked on a 100 point scale the likelihood that they would authorize the next $1 million toward completing the project and would allocate all the money remaining in the budget. No main effect was found for sunk costs with respect to participants’ willingness to allocate the next $1 million to the project, but there was a significant main effect regarding project completion. For the second dependent measure, likelihood that participants would allocate the remaining money to finish the project, there was a significant main effect for sunk costs and project completion. The second experiment was almost identical to the first one but minor adjustments were made in an attempt to check the robustness of Experiment 1. This included two new manipulations, the presence of a budget and responsibility for the initial investment. The results of the second experiment were consistent with Experiment 1 in the presence of the two additional manipulations which led the authors to conclude that “information about project completion influences resource allocation intentions to a far greater extent than does information about sunk costs” (410). The authors interpreted this effect which is known as the completion effect to be indicative of goal substitution. This means that as time passed decision-makers’ initial goal of profit maximization was transformed to a goal of job completion.

2.5 Image Theory

2.5.1 The Value, Trajectory, and Strategic Images

Image theory was proposed by Beach (1990), Beach and Mitchell (1987), and Mitchell, Rediker and Beach (1986), as a compliment to classical decision theory such as subjective utility theory. The underlying objective of image theory was to describe the decision processes of classical theory while considering the social processes of decision-makers. It serves as an attempt to compliment classical theory rather than as an alternative.

According to Image theory (Beach 1990), a decision made by an individual is comprised of three cognitive structures or images which include the value image, the trajectory image, and the strategic image. Each image encompasses a unique part of the individual’s decision-related knowledge. The value image consists of a decision-maker’s notion of what is right or wrong
which includes personal beliefs, morals, ideals, ethical standards, etc. The purpose of the value image is to provide a foundation with respect to the ethical compliance of a decision.

The trajectory image is a representation of what a decision-maker hopes to achieve in terms of specific goals or objectives. An individual’s trajectory image might include a concrete goal such as achieving an 8% return on investment (ROI) for all projects that are undertaken. Achievement of concrete goals is measured by markers (i.e. ROI > 8%). Rather than aspiring to achieve a concrete goal an individual might focus on an abstract goal such as only taking on projects that are considered high quality. Achievement of these abstract goals is not as easily tracked due to a lack of a formal marker since there might be several factors that describe a high quality project.

The strategic image is a representation of how particular goals or objectives will be achieved. As described in Jungermann, von Ulardt, and Haumann (1983), image theory refers to these as plans which are created when a goal is selected. In carrying out these plans an individual carries out particular actions which are referred to as tactics. An innate component of a plan is a prediction of the particular courses of action that may result. For example, if project A is selected an 8% ROI is likely to be achieved.

2.5.2 Decision Types and the Compatibility Test

The use of images in decision-making pertains to two types of decisions: adoption and progress decisions (Beach and Mitchell 1990). An adoption decision consists of selecting a course of action from various alternatives that have not been undertaken. For example, an adoption decision would consist of choosing among investments A, B, and C in hope of obtaining an 8% ROI. A progress decision assesses whether a course of action or option that has been accepted is leading to achievement of goals and objectives (Mitchell and Beach 1990). For instance, a progress decision might evaluate a project to ensure that it generates at least an 8% ROI.

When making decisions, the alternative that is most compatible with the value, trajectory and strategic images (Beach, Mitchell, Paluchowski, and van Zee 1992) is selected. To the contrary, an alternative that has a high degree of incompatibility is not likely to be chosen. This procedure is formally called the compatibility test (Beach 1990). The compatibility test consists of violations, the rejection threshold and the decision rule. Violations determine the degree of inconsistency of a particular decision option in conjunction with the various images. When the
number and degree of violations exceeds the rejection threshold, the individual will eliminate an option for adoption or determine that an ongoing option is not making acceptable progress. According to the decision rule, if the weighted sum of violations exceeds the rejection threshold, the option is not selected or is discontinued.

The compatibility test serves as a screening tool for an adoption decision (Beach 1990). Those options that pass the compatibility test are forwarded to the profitability test. The profitability test is unlike the compatibility test because it consists of whatever metric an individual decides to use in evaluating and selecting the best alternative. It might consist of flipping a coin or a more formal decision analysis such as a forecasted cash flow analysis. For a progress decision, the compatibility test examines the number of violations or inconsistencies of the trajectory image with the strategic image. If the violations exceed the rejection threshold, the existing option is aborted. The profitability test is not used in making progress decisions.

2.5.3 Applications and Empirical Tests

Image theory has been applied to various types of decisions including personal, political, and auditing (Beach 1990). According to Beach and Frederickson (1989), in an auditing context an auditor must decide whether or not a firm’s financial statements adhere to Generally Accepted Accounting Principles (GAAP). An auditor’s value image would include acceptable accounting principles and auditing standards. An auditor’s trajectory image would be to issue a correct opinion for each client’s financial statements. The strategic image used in meeting the goal of issuing a correct opinion would include a successful understanding of the client’s business, a correct risk assessment and a well-planned audit. If evidence gathered during an audit does not exceed the rejection threshold an unqualified opinion will not be issued.

Application of image theory in an auditing context has not been subject to empirical testing. However, Dunegan (1995) empirically tested the basic proposition of Image Theory, namely the role of image compatibility in making resource allocation project continuance decisions. In the study’s first experiment, business students were asked to assume the role of a decision-maker who had been given authority over an advertising project and a computer software project. Depending on the experimental condition, participants were faced with an advertising project that was making satisfactory progress and a computer software project that was not making satisfactory progress or vice versa. Participants were asked whether they would continue the project and increase the level of resources committed to the project on 9 point
scales. To create a measure of image compatibility participants answered a series of questions about their current image and target image. As expected, participants’ image compatibility was significantly correlated with continuance and resource allocation judgments.

Dunegan (1995) conducted a second experiment in which participants were asked to assume the role of a Research and Development manager that must decide whether to provide $100,000 which was requested by a team. Each participant was given the same scenario; however, the last sentence was framed differently. Half of the cases told participants that 30 of the team’s last 50 projects were successful and the other told participants that 20 of the last 50 projects were unsuccessful. The same image compatibility measures used in the first experiment were also used in the second experiment. Lastly, participants were asked how much of the $100,000 they would allocate to the team. Dunegan (1995) concluded that framing results in variation of image compatibility which in turn affects resource allocation decisions.

Dunegan, Duchon, and Ashmos (1995) took a step beyond the role of image compatibility in decision-making and showed that image compatibility results in variation of information usage. Klein (1989) asserted that when information is positive cognitive processing of information is more automatic and when information is negative it is more systematic. Dunegan et al. (1995) extended Klein (1989) by suggesting that when information indicates progress toward a goal, there is compatibility between the trajectory and strategic image. When information is more negative and suggests lack of progress there is a lack of compatibility between the two images.

In testing the role of image compatibility in information usage business students were asked to assume the role of a manager responsible for making resource allocation decisions. The same framing technique that was employed in Dunegan (1995) was used to create different perceptions among participants. Additionally, a measure of participants’ problem space perceptions and image compatibility was obtained with responses to questions which were made on a 9 point scale. As progress was made toward participants’ trajectory image, the relationship between their problem space and resource allocation decisions decreased. When progress was not being made toward the trajectory image, the relationship between problem space and resource allocation decisions increased. Assuming that information use is measured by the relationship between information and decision outcomes, Dunegan et al. (1995) concluded that information use decreases as image compatibility increases.
CHAPTER 3

THEORY AND HYPOTHESES

3.0 Chapter Introduction

This chapter develops the hypotheses to be investigated in my dissertation. The literature and background related to my hypotheses was extensively reviewed in Chapter 2. This chapter uses this literature and background to develop four hypotheses examining the influence of opportunity cost vagueness and project completion on individuals’ tendency to attend to opportunity costs when performing a resource allocation analysis. A fifth hypothesis is also developed which is concerned with the influence of management accounting experience on the tendency to continue a nearly complete project.

3.1 Vague Opportunity Costs

According to Statement of Financial Accounting Concepts (SFAC) No. 1, the basic objective of financial accounting and reporting is to provide useful information for investors, creditors, analysts, government, and other financial statement users. This information, which is compiled according to Generally Accepted Accounting Principles (GAAP), tends to have a historical orientation. In fact, the four major financial accounting reports primarily provide users with historical information. Due to their historical emphasis, it is not surprising that these reports do not report future-oriented opportunity cost information. Although opportunity costs are not included in the calculation of accounting profits, opportunity costs are an intrinsic component of economic profits. Unlike accounting profits which include only explicit costs (e.g. wages paid to skilled production workers), economic profits include both explicit and implicit costs. Implicit costs might include the value of the personal resources firm owners make available (e.g. their labor and capital contributions) or opportunity costs associated with taking a particular course of action (e.g. if a firm produces only product A they forgo the ability to generate cash flow from product B).

Are opportunity costs important to individuals when making financial decisions, or do accounting based outlay costs prevail? This was the research question of Becker et al. (1974), the seminal accounting study that investigated whether individuals used this normatively relevant information in decision-making. Individuals placed more weight on outlay costs as a decision input than on opportunity costs, despite the economic significance of opportunity costs. This was
disconcerting since normative economic models posit that opportunity and outlay costs are equally important. Subsequent studies found that individuals tended to attend to an opportunity cost in a decision analysis only if it was presented in an explicit rather than non-explicit manner (Neumann and Friedman 1978; Friedman and Neuman 1980; Hoskin 1983; Northcraft and Neale 1986). This means that individuals would attend to the opportunity cost if it was spelled out to them (e.g. an alternative investment pays a 5% return) and did not try to impute an opportunity cost amount.

These early studies were the first to identify the fact that despite their economic importance, decision-makers may overlook opportunity costs. In each study, the explicit opportunity cost was presented in a precise manner which is likely inconsistent with how it would appear in a real world decision-making setting. Although there is a lack of consensus with respect to a single operational definition of vagueness, commonly cited definitions refer to vagueness as the result of missing information or lack of knowledge which leads to uncertainty regarding a particular outcome (see Einhorn and Hogarth 1985; Frisch and Baron 1988; Curley and Yates 1985). Vagueness is inherently important as a common pitfall of real world situations in that decision-makers do not have access to precise information about the costs and benefits of all available options. Instead, decision-makers must rely on imprecise information regarding the costs and benefits of alternative courses of action. The effect of opportunity costs characterized by vagueness has not been investigated, and it remains unknown whether individuals in early studies (i.e. Neumann and Friedman 1978; Friedman and Neuman 1980; Hoskin 1983; Northcraft and Neale 1986) would have attended to the explicit opportunity costs in their decision-making process if presented in a vague manner.

Vagueness has been shown to have a direct effect on decision-making as well as on the tendency to incorporate information in a decision-making process. Ellsberg (1961) established the well known Ellsberg Paradox by demonstrating that given the choice between a vague and precise gamble, most individuals prefer the precise option. This vagueness aversion has been found to persist in a variety of contexts (see Camerer and Weber 1992). Various theoretical explanations regarding the observed responses to avoid vagueness exist. Some of the popular explanations include self evaluation (Hamm and Bursztajn 1979; Roberts 1963), evaluation by others (Ellsberg 1963; Gardensfors 1979; Toda and Shuford 1965), uncertainty avoidance
(Curley, Yates, and Abrams 1986) and of interest to my study, the competence hypothesis (Heath and Tversky 1991).

The competence hypothesis states that the willingness to bet on an uncertain event is a function of both the precision of a likelihood estimate and one’s general skill, knowledge or understanding of the relevant context (Heath and Tversky 1991). In a gambling context, this proved to be a viable explanation for decisions, as in their area of competence, individuals showed a preference to bet on their vague beliefs versus a lottery with a probability equal to their stated confidence. Based on these findings, it is likely that vagueness aversion will be mitigated or amplified depending on individuals’ decision-making experience and feeling of competence in a particular area. The feeling of competence is the result of decision-making experience in the related area.

Although the competence hypothesis was developed and applied to the typical Ellsberg (1961) setting in which individuals choose between two gambles with varying amounts of vagueness, it can be extended to other types of decisions and used to explain why individuals may avoid using vague information. As found in Heath and Tversky (1991), individuals who feel that they lack competence in a contextual situation are less likely to rely on imprecise information when making decisions. In realistic settings, decision-makers may not be faced with vagueness when choosing between options but rather relevant information is likely to be characterized as vague. Vague information will receive a varying amount of decisional weight depending both on the degree of vagueness and individuals’ experience with the particular contextual decision-making.

Van Dijk and Zeelenberg (2003) found that decision-makers discounted vague information such that they treated the vague information as insufficient or non–existent when making resource allocation decisions. An important aspect of their study is that the participants were not making decisions that they had repeatedly made in the past. As a result, they lacked practice integrating the situational specific information that was characterized as vague. The authors attributed the discounting of the vague information to its cognitive complexity and the resulting difficulty in interpreting the information.

Another factor that might contribute to the avoidance of vague information is the heightened importance of vagueness by individuals who lack domain-related decision-making experience. This is because inexperienced participants in a particular domain typically focus on
the more superficial aspects of a problem (Chi, Feltovich, and Glaser 1981; Gagne, Yekovich, and Yekovich 1993; Van De Wiel, Schmidt, and Boshuizen 2000) instead of focusing on the relevant information that is necessary to solve the problem. For example, when solving a problem novice physicists focused on unimportant details such as whether the problem concerned cars or pulleys (Wenk, Dufresne, Gerace, Leonard, and Mestre 1997). In a resource allocation decision, individuals might focus on the vagueness of the available alternatives and will overlook the underlying importance of the alternatives to the decision being made.

These findings can be generalized to a management accounting context which tends to include decision-making that is future-oriented. For example, management accountants typically engage in future-oriented, resource allocation decision-making tasks such as capital budgeting, forecasting, and financial planning (Roehl-Anderson and Bragg 2005). Individuals who lack experience making these future-oriented decisions will discount vague opportunity costs for several reasons. First, due to their lack of experience they are not likely to feel competent when faced with decisions of this sort and will be inclined to avoid vague information. Second, inexperienced individuals will focus on vagueness of the opportunity costs and perceive them to be cognitively complex, which will even further lead to discounting the vague opportunity costs as relevant information. Thus, fewer opportunity costs will be attended to by inexperienced decision-makers when they are presented in a vague manner rather than in a precise manner.

**H1:** Inexperienced decision-makers will attend to fewer opportunity costs when they are vague rather than precise.

### 3.2 Project Completion and Opportunity Costs

Another factor that is likely to influence attention to opportunity costs is the completion effect which was discovered while testing the sunk cost effect as an explanation for escalation of commitment. Escalation of commitment is defined as a situation where a decision-maker commits additional resources to a losing course of action because of prior investment (Staw 1976; Staw and Fox 1977; Staw and Ross 1978). A closely related phenomenon which has been used in explaining escalation of commitment is the sunk cost effect, which is described as an increase in the tendency to continue a course of action after an investment in money, effort, or time has been made (Arkes and Blumer 1985). Garland (1990) and Garland and Newport (1991) demonstrated that there was a positive relationship between the amount of sunk costs and the tendency to continue a current course of action. A caveat among these studies is that the amount
of sunk costs was confounded with the stage of project completion. Conlon and Garland (1993) identified the confounding of these two factors and investigated their joint and individual effect on project continuance decisions. Conlon and Garland’s results suggest the presence of a completion effect in that individuals were more likely to continue a project when it was close to completion (90% complete) versus at an initial stage of completion (10% complete). The completion effect was more pronounced than the sunk cost effect, as information about project completion was more influential than sunk cost information on individuals’ project continuance decisions.

As stated by Conlon and Garland (1993, 411), “exploration of the consequences of project completion information on decisions in organizations seems warranted. For example, researchers might investigate how project completion information affects the degree to which decision-makers consider opportunity costs more carefully and are more likely to shift funds to a new project when project completion is low. When project completion is high, however opportunity costs may receive less consideration.” Despite the suggestion by Conlon and Garland (1993) and a few subsequent studies (such as Garland and Conlon 1998; Boehne and Paese 2000; Chang and Ho 2004) that provide further support about the strength of the completion effect in project continuance decisions, no studies have gained a better understanding of the influence of project completion stage on related decisions. It is not known whether a nearly complete project decreases individuals’ inclusion of opportunity costs as decision relevant information and whether attending to opportunity costs negates the tendency to continue a nearly complete project.

Conlon and Garland (1993) argue that the completion effect is influential on project continuance decisions due to goal substitution, such that project completion replaces the initial goal of profit maximization. This desire to continue a course of action can be further explained by approach avoidance theory, the attainment of the goal which promotes persistence outweighs restraining forces that promote abandonment (Brockner and Rubin 1985). Despite presence of a factor that reduces the probability of the project’s future success (e.g. presence of a competitor), individuals focus on the more salient goal of project completion which influences the decision to continue. The desire to meet this goal becomes stronger as the goal becomes closer to being attained. This is parallel to research by Katz and Kahn (1966) that suggests the desire to attain task closure or completion can have a profound influence on behavior.
To better understand the completion effect, image theory can be used to disentangle how goal attainment outweighs conflicting factors. According to image theory, individuals construct and utilize images to guide their thinking (Beach 1990). An image is a visual and mental representation of information that is pertinent for a particular decision problem. Information usage is hypothesized to vary with image compatibility. According to image theory, there are three images; the value image, the trajectory image, and the strategic image. The value image includes a decision-maker’s beliefs, morals, and ethics which provide direction as to the rightness or wrongness regarding a particular decision. The trajectory image represents the decision-maker’s future objectives or targets which are goals to be attained. These goals are typically concrete and specific indicators that signify progress toward goal attainment and are called markers. The strategic image consists of the courses of action taken to attain the current goals that are being pursued. These images are used in making decisions which can be segregated into adoption decisions involving selection of new projects and progress decisions involving assessments of ongoing projects.

The role of image compatibility is such that when information is positive and supports goal attainment, compatibility is high, and the decision-maker is motivated to continue the current plan (Dunegan, Duchon, and Ashmos 1995). In the case of high compatibility, decision-makers are not inclined to deeply process all available information. However, presence of negative or inconsistent information will lead to incompatibility between the strategic and trajectory image and the decision-maker will be motivated to revise or reject the current plan or modify the goal. This will influence the decision-maker to more carefully review and process available information. In fact, Dunegan, et al. (1995) demonstrated that image compatibility moderates the degree to which information is used by a decision-maker when making a resource allocation decision. Participants assumed the role of vice-president for a large consulting company and were asked whether additional funds should be assigned to an existing project. In the case of incompatibility, information use increased and in the case of compatibility information use decreased.

When inexperienced individuals are faced with a project that is far from completion, progress toward the goal is not as vivid, image compatibility will be lower, and as a result they will attend to more of the available information. By attending to more of the available information processing they are likely to be more receptive to relevant information and as a
result will identify more opportunity costs. Conversely, inexperienced individuals faced with a project that is near completion will not only have a strong aspiration to attain the goal of project completion but a nearly complete project will signify strong progress toward the trajectory image of project completion. The high amount of progress will lead to shallow processing, less information will be attended to, and fewer opportunity costs will be identified.

H₂: Inexperienced decision-makers will attend to fewer opportunity costs when project completion is high rather than low.

3.3 Management Accounting Experience, Vagueness, and Opportunity Costs

In addition to information characteristics (e.g. vague opportunity costs) and environmental characteristics (e.g. stage of project completion), decision-maker knowledge and experience have been shown to be influential on the tendency to attend to opportunity costs (Vera-Munoz 1998; Vera-Munoz et al. 2001). Vera–Munoz et al. (2001) reasoned that different types of accounting experience create knowledge structures, and these knowledge structures will influence the problem representation of a resource allocation task and the number of opportunity costs identified. The authors investigated the role of accounting experience (public or managerial) and task presentation format (historical accounting earnings or historical cash flow) in the identification and integration of opportunity costs in a decisional analysis. Results of this study indicate that accounting experience in general does not assist in identification of opportunity costs. Specifically, there was only a positive relation between management accounting experience, not public accounting experience, and the ability to identify opportunity costs, given a correct problem representation. In this study, historical cash flow was considered a correct problem representation.

The key finding of Vera-Munoz et al. (2001) is that experience is an important decision-maker characteristic that facilitates identification and integration of opportunity costs as a piece of information relevant to resource allocation decisions. More specifically, Vera-Munoz et al. (2001) concluded that domain-specific, management accounting experience assists in opportunity cost identification because management accountants engage in tasks that are forward looking. Drawing on this conclusion, management accounting experience will enable individuals to identify and incorporate opportunity costs as relevant information.

Lending further credence that management accounting will enable identification of opportunity costs, Bedard and Chi (1993) noted that experienced individuals are better able to
differentiate between information that is relevant and irrelevant. This is because experienced individuals exhibit a top down approach to information acquisition using rules of thumb and structured mental checklists. This relevant information might include future-oriented outlay costs, cash inflows, expected returns, and opportunity costs. Consistent with these expectations, analysts performing a financial analysis task in Biggs (1984) demonstrated a highly structured search for information. Davis (1996) found that particular situational experience improves auditors’ ability to select relevant information for making efficient, appropriate control risk assessments.

Individuals with management accounting experience will have developed the specific knowledge structure that is necessary to identify opportunity costs as relevant information. To the contrary, individuals who lack this experience will not have the sufficient knowledge structure and will lack proficiency in identifying opportunity costs as relevant information. I argue that in situations where individuals have previous decision-making experience, they will attend to both vague and precise opportunity costs. Repeated decision-making in a management accounting context not only increases their awareness of relevant information but also increases their feeling of competence in an area. Both the awareness of opportunity costs as relevant information and the feeling of competence will decrease the affect of vague opportunity costs. Thus, management accounting experience will moderate the influence of opportunity cost vagueness such that unlike inexperienced decision-makers, experienced decisions-makers are likely to exhibit the same tendency to incorporate vague and precise opportunity costs.

H$_3$: The difference between the number of vague and precise opportunity costs attended to will be significantly less for experienced decision-makers than for inexperienced decision-makers.

3.4 Management Accounting Experience, Project Completion, and Opportunity Costs

While image theory explains the information search behavior of inexperienced individuals in the face of a nearly complete project, prior management accounting decision-making experience is likely to counteract the tendency to superficially process relevant information when a project is near to completion. Experienced decision-makers should have been faced with a wide variety of projects in terms of completion stage as part of their on-the-job-experience making resource allocation decisions. Progress toward completion should not
interfere with the tendency to identify opportunity costs as relevant information by experienced decision-makers for several reasons.

Management accountants are often required to perform analyses (e.g. capital project analyses) which require identification of relevant cash inflows and outflows such as increases in revenue, maintenance costs, and the salvage value of project specific assets (Roehl-Anderson and Bragg 2005). Identification of relevant information by experienced individuals is likely to be well structured (Biggs 1984) and part of a mental checklist (Bedard and Chi 1993). The content of this mental checklist is independent of whether a project is near to or far from completion. As a result, management accountants are not likely to omit relevant information such as opportunity costs because a project is at a particular stage of completion. As well, when faced with a problem the reasoning process of experienced decision-makers tends to be automated (Shiffrin and Schneider 1977; Shanteau 1992), and they will be less likely to get hung up on surface features of a problem such as stage of project completion.

Additionally, decision-makers with experience in a particular domain represent a problem at a deeper level and do not focus on superficial characteristics of the problem (Schmidt and Boshuizen 1993; Bedard and Chi 1993). Individuals experienced in the domain of management accounting should focus on aspects that are important to a resource allocation decision such as the expected profitability or cost savings of a project. Experienced decision-makers also tend to use forward reasoning by coming up with a strategy and identifying how the given information can be used to solve a problem with the strategy (Bedard and Chi 1993; Patel, Evans and Groen 1989; Patel and Groen 1991) which would likely result in identifying opportunity costs as relevant information.

Based on the above discussion, the presence of a nearly complete project is not likely to interfere with experienced decision-makers’ tendency to attend to opportunity costs. This suggests that management accounting experience will moderate the effect of a highly complete project on the tendency to attend to opportunity costs. Specifically, unlike inexperienced decision-makers, experienced decisions-makers are likely to exhibit the same tendency to incorporate opportunity costs when project completion is high or low.

**H₄:** The difference between the number of opportunity costs attended to when project completion is high rather than low will be significantly less for experienced decision-makers than for inexperienced decision-makers.
3.5 Management Accounting Experience and Project Continuance

Identification of opportunity costs as relevant information is important because their inclusion in a decisional analysis is likely to influence judgments and decisions. Particularly, identification of opportunity costs as relevant information is likely to mitigate the perseverance of the completion effect, which has been shown to persist even in the presence of a strong competitor producing a similar product (Conlon and Garland 1993), accountability, and availability of a project’s economic value (Boehne and Paese 2000). The robustness of the completion effect is primarily due to the fact that information that would negate completion is ignored. As individuals get over-involved in the goal of completion, information that brings continuance of the project into question becomes progressively more insignificant.

Of interest to my study is whether the completion effect, namely the tendency to continue a project that is near to completion, perseveres when individuals identify opportunity costs as information relevant to the decision being made. Several studies have documented the robustness of the completion effect (Conlon and Garland 1993; Garland and Conlon 1998; Boehne and Paese 2000), however, prior literature has not addressed what decision-maker or environmental characteristics assist in mitigating it. This is important because like the sunk cost effect, the completion effect can cause individuals to continue projects that from an economic standpoint should be discontinued.

As previously argued, the completion effect is theorized to result from substituting the original goal of profitability with the goal of project completion when completion is high. Inclusion of opportunity costs will increase awareness of alternative courses of action that will boost profitability and the tendency to continue the project will decrease. Individuals that do not attend to opportunity costs will remain focused on the current project as the key vehicle for profitability and will remain invested. Since more opportunity costs should be identified by experienced decision-makers, they will be less likely to continue a project with a high completion percentage.

H₅: Experienced decision-makers will be less likely than inexperienced decision-makers to continue a project that is near to completion.
CHAPTER 4
EXPERIMENT AND METHODOLOGY

4.0 Introduction

This chapter will discuss the experimental procedures employed to test the hypotheses developed in the previous section. It will include a discussion of the participants, administration of the experimental instrument, the experimental design, and case materials. As well, it will discuss the study’s independent, dependent, and covariate variables.

4.1 Participants and Administration of Experiment

The two participant groups in this study operationalize experience at two levels. The first group referred to as “experienced,” consists of practicing accountants which were recruited based on their membership to the Institute of Management Accountants (IMA). The domain of management accounting is unlike the auditing domain because it is not possible to identify a task that individuals at a particular rank regularly perform (e.g. an audit senior performing an internal control evaluation). Due to this characteristic of the management accounting domain, members of the IMA were identified as a group of professional participants that are expected to have engaged in the forward looking resource allocation experience of interest.

One hundred and four IMA members voluntarily participated in the study based on their attendance to various IMA sponsored events. Five responses were not usable because participants did not perform a cash flow analysis and/or did not provide complete responses to questions resulting in a total of 99 usable responses. Eighty-six usable responses were obtained via on site administration of the experimental case by the researcher at one regional conference, two monthly chapter meetings and one CPE education session. All of these events were located in the Southeast United States. Participants were not given any time constraints and were simply told to complete the case. The remaining 13 responses were not obtained via onsite administration. Since there was not enough time available at a monthly IMA chapter meeting in the Southeast United States to formally conduct the experiment, 30 packets were handed out by the chapter’s president. The packets contained the experimental instrument and stamped envelopes addressed to the researcher. Approximately one week after the meeting a reminder e-mail was sent to the recipients to encourage participation. Of the 30 packets, fourteen responses were received for a response rate of 47%. One packet was deemed unusable because the
participant did not provide a cash flow analysis. The case took the experienced participants a mean time of 44 minutes (σ = 4.02 minutes) to complete. This mean time is for a subset of the participants (n = 69) since completion time was not recorded at the regional conference. The regional conference was the first instance of data collection and at this time the researcher was not aware that completion time would be used as a covariate in the study.

The second group of participants referred to as “inexperienced,” consists of 116 individuals without accounting work experience and were recruited from a large state university. This group included upper-level accounting major students enrolled in a cost accounting course. These participants were selected because they had completed several economics and accounting courses. This coursework is believed to provide them with an educational background that is sufficient to perform the experimental task. The case was administered to the inexperienced group during regular class time and they were given extra credit for participation. As with the experienced participants, inexperienced participants were not given any time constraints and were simply told to complete the case. The inexperienced participants completed the case in a mean time of 57 minutes (σ = 10.9 minutes).

4.2 Experimental Design

A 2 x 2 x 2 (vagueness of opportunity cost presentation x project completion stage x management accounting experience) between subjects experiment (see Figure 1 for an illustration of the experimental design) was employed to test the study’s hypotheses. The first factor is vagueness of opportunity cost presentation (vague or precise). The second factor is project completion stage (10% or 90%). Participants were randomly assigned to the vagueness and project completion experimental conditions. The third factor is experience (experienced or inexperienced). IMA members were categorized as experienced and students as inexperienced.

4.3 Case Materials

The study’s experiment consisted of a single case based scenario in which a regional grocery store (Fresh Foods, Inc.) was developing an internal logistics project. Participants were asked to assume the role of the company’s recently appointed Internal Investment Project Supervisor and perform a cash flow analysis to determine whether the logistics project should be continued or discontinued. The recently appointed verbiage was used to avoid creation of a project sponsorship bias toward the logistics project (see Chenhall and Morris 1991).
As described in Table 1, the experiment had two phases: an experimental phase (Phase I) and a post-experimental phase (Phase II). See Appendix A for the experimental instrument. Phase I materials consisted of introductory instructions, background information, an internal memorandum, a summary report, and participant responses.

<table>
<thead>
<tr>
<th>Precise</th>
<th>10% Complete</th>
<th>90% Complete</th>
<th>10% Complete</th>
<th>90% Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Vague</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
</table>

**FIGURE 1. Experiment Design (Treatments 1 – 8).**

Phase II materials included three parts. Part A included a manipulation check to ensure participants were receptive to the project completion manipulation. Part B consisted of questions used to gather background information on participants such as age, work experience, and professional certifications. As well, Part B included two questions regarding participants’ perceived difficulty and realism of the cash flow analysis task. Responses to these questions were provided on 11 point Likert scales.

Part C consisted of sixteen multiple choice questions used to measure participants’ analytical ability and knowledge of the opportunity cost concept. Eight of the multiple choice questions, which were used in Vera-Munoz (1998) and Vera-Munoz et al. (2001), consisted of questions from prior Graduate Record Examinations (GRE) and were used to measure participants’ analytical ability. Analytical ability was measured due to the possibility that it is correlated with the tendency to attend to opportunity costs when performing a cash flow analysis (see Vera-Munoz 1998 and Vera-Munoz et al. 2001). The remaining eight multiple choice questions were used to measure participants’ knowledge of the opportunity cost concept. The questions were written specifically for the study using questions from various managerial and cost accounting textbook test banks as examples.
### TABLE 1
Overview of Experimental Phases

<table>
<thead>
<tr>
<th><strong>Phase I: Experimental</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Instructions (pp. 1 – 2)</td>
<td>Details about assumed role, task, company, and table of contents.</td>
</tr>
<tr>
<td>Background Information (p. 3)</td>
<td>Description of company, logistics project, and resource allocation request.</td>
</tr>
<tr>
<td>Internal Memorandum (p. 4)</td>
<td>Request from company’s CEO to make a continuance decision.</td>
</tr>
<tr>
<td>Summary Report (pp. 5 – 6)</td>
<td>Financial and non-financial information about project funding, current progress, additional outlay, third party logistics costs, and in-house logistics costs.</td>
</tr>
<tr>
<td>Participant Responses (pp. 7 – 8)</td>
<td>Asked to perform cash flow analysis, continuation judgment and decision, and summary of any non-financial factors considered.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Phase II: Post-Experimental</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Manipulation Check (p. 1)</td>
<td>Indicate project completion condition.</td>
</tr>
<tr>
<td>Background Questionnaire (pp. 1 – 2)</td>
<td>Demographic, academic, work experience, difficulty, and realism questions.</td>
</tr>
<tr>
<td>Multiple Choice Questions (pp. 3 – 8)</td>
<td>Opportunity cost knowledge and analytical ability questions.</td>
</tr>
</tbody>
</table>

Prior to use in the study’s final experiment, the analytical ability questions were assessed for reliability as part of the pilot test and the opportunity cost questions were assessed on a group of 52 undergraduate students enrolled in an introductory financial accounting course at a large state university. Achieving a level of acceptable reliability is important because it allows the inference that each time the questions are administered they will successfully capture individuals’ analytical ability and knowledge of the opportunity cost concept rather than some other construct or error variance (Black and Duhon 2003). Reliability was assessed with the
Kuder-Richardson 20 test statistic which is an appropriate index for testing the reliability of multiple choice examinations (Ebel and Frisbie 1991). The Kuder-Richardson 20 test statistic is a measure of how well an exam measures a single factor. The statistic ranges from 0 (measuring several unknown factors) to 1.0 (measuring one factor). An exam with a test statistic in the range of 0.60 to 1.0 is considered to yield reliable scores (Ebel and Frisbie 1991). The test statistic for the initial tests of reliability for analytical ability and opportunity cost questions was 0.65 ($\mu = 5.0, \sigma = 2.0$) and 0.61 ($\mu = 4.8, \sigma = 1.9$), respectively. Responses to the analytical ability and opportunity cost questions from participants used in the actual study were also assessed for reliability using the Kuder-Richardson test statistic. These also indicated acceptable levels of reliability as the test statistics for the analytical ability and opportunity cost questions were 0.64 ($\mu = 5.15, \sigma = 2.10$) and 0.63 ($\mu = 5.69, \sigma = 1.79$), respectively.

The Phase I case scenario includes six embedded opportunity costs that will be present if the logistics project is continued (see Table 2). The case scenario was developed on the basis of feedback from doctoral students and professors which was obtained after they read preliminary versions of the case scenario and completed the experimental task. Two of the opportunity costs in the case scenario were similar to those used in Vera-Munoz et al. (2001) and the other four were developed based on discussions of opportunity costs in managerial accounting books (Heymann and Bloom 1990; Horngren, Foster, and Datar 2006).

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>Opportunity Costs Embedded in Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Profit from internal product line</td>
<td></td>
</tr>
<tr>
<td>2. Return on marketable securities</td>
<td></td>
</tr>
<tr>
<td>3. Disposal proceeds of semi-trucks *</td>
<td></td>
</tr>
<tr>
<td>4. Sublease revenue on warehouse *</td>
<td></td>
</tr>
<tr>
<td>5. Staffing revenue from manager</td>
<td></td>
</tr>
<tr>
<td>6. Cost of goods sold savings.</td>
<td></td>
</tr>
</tbody>
</table>

* Opportunity costs similar to those in Vera–Munoz et al. (2001).

After the case was created, it was pilot tested with 50 students enrolled in a cost-accounting course at a large state university. Minor revisions were made after the pilot test. These revisions primarily consisted of an attempt to remove unnecessary verbiage to reduce the time necessary to complete the experimental task and improve the clarity of various sentences.
Students participating in the pilot test were able to complete the task and the post experimental questionnaire in approximately 60 minutes.

4.4 Independent Variables

The first independent variable, vagueness of opportunity costs, was manipulated at two levels (vague and precise) and included both probabilistic and outcome vagueness. Outcome vagueness was manipulated by describing opportunity costs as an interval (e.g. annual return on marketable securities will be 8% ± 4%) versus an absolute amount (e.g. annual return on marketable securities will be 8%). Probabilistic vagueness manipulations describe opportunity costs as having a likelihood of occurrence (e.g. there is a 0.85 to 0.90 chance that fixed assets will have a current re-sale value of $170,000) versus an absolute occurrence (e.g. fixed assets will have a current re-sale value of $170,000). Opportunity costs that exhibited outcome vagueness and probabilistic vagueness were attended to by 62% and 59.5% of the study’s participants, respectively. The difference was not statistically significant (t = 0.81, p = 0.42, two-tailed) suggesting that there was no difference in the tendency to attend to opportunity costs that are probabilistic or outcome vague. This is consistent with related research that has found individuals respond similarly to both types of vagueness (Ho, Keller, and Keltyka 2001, 2002; Kuhn and Budescu 1996). Both types of vagueness were included in the study for completeness purposes as prior research has identified them as equally important.

The second independent variable, project completion stage which is depicted with a completion percentage, was manipulated at two levels (low = 10% complete and high = 90% complete). Manipulating project completion stage with these percentages is consistent with previous completion effect studies (see Conlon and Garland 1993; Garland and Conlon 1998; Boehne and Paese 2000). As discussed previously, the third independent variable, management accounting experience was operationalized with two groups of participants, students and IMA members, that have varying amounts of management accounting experience.

4.5 Dependent Variables

There are two dependent variables of interest: the number of opportunity costs attended to in participants’ cash flow analyses and their project continuance judgments and decisions. The number of opportunity costs varies from zero to six and were identified by the researcher and another accounting graduate student who served as an independent coder. Participants’ completed cash flow analyses were photocopied and provided to the independent coder prior to
being coded by the researcher. Both the researcher and independent coder were responsible for individually identifying the number of opportunity costs. The number of opportunity costs identified was then compared for each participant and any discrepancies were resolved.

For the project continuance judgment, participants were asked to place an X on the number of the 11 point scale that best represents the likelihood they would continue the in-house logistics project. To obtain a yes or no response in regards to continuing the project, participants were also asked to make an absolute decision to continue or discontinue the logistics project by marking an X next to their favored course of action.

4.6 Covariates

In addition to the independent and dependent variables, data was collected on five covariates that could affect participants’ performance on the study’s experimental task. The first covariate was analytical ability and was included because prior accounting studies have found a positive relationship between analytical ability and performance on accounting related tasks (Bonner and Lewis 1990; Libby 1992). As previously discussed, analytical ability was measured using 8 questions from prior GRE exams which were also used in Vera-Munoz (1998) and Vera-Munoz et al. (2001). Since analytical ability is an innate characteristic that is not expected to differ across experience level, analytical ability knowledge scores are not expected to differ between the inexperienced and experienced participant groups.

The second covariate, knowledge of the opportunity cost concept is also likely to influence participants’ performance on the study’s experimental task. In fact, knowledge of the opportunity cost concept was found to be positively related to participants’ performance in Vera-Munoz (1998) and Vera-Munoz et al. (2001). As discussed previously, knowledge of the opportunity cost concept was measured using 8 multiple choice questions. Since the opportunity cost concept is typically introduced as part of general business education through economics and managerial accounting courses, opportunity cost knowledge scores are not expected to differ among the inexperienced and experienced participant groups. Inexperienced participants were accounting majors currently enrolled in a cost accounting course and had taken several economics courses prior to entering the college of business. All except two of the experienced participants reported having at least one undergraduate degree in accounting, finance, economics, management, or business administration.
The third and fourth covariates are participants’ perceived difficulty and realism of the task which were measured on 11 point Likert scales. The endpoints for perceived difficulty of the task were labeled extremely easy and extremely difficult. The endpoints for perceived realism of the task were labeled very unrealistic and very realistic. Perceived difficulty of the task was measured because it is logical that those who felt the task was easy versus difficult may have prior experience performing a similar task and excel in terms of incorporating opportunity costs. As well, those who felt the task was realistic versus unrealistic may have been in a similar situation and have experience identifying relevant information such as opportunity costs. This covariate was also measured in Vera-Munoz (1998) and Vera-Munoz et al. (2001). Although inclusion as a covariate variable did not impact the prior studies’ results, it is possible it may impact the results of my study since participants differ on the basis of management accounting experience. My study’s task was developed to be as realistic as possible. As a result, it is likely that experienced participants have had prior experience completing a similar task and will perceive the task to be more realistic and less difficult than the inexperienced participant group.

The fifth covariate, time to complete the task, is also likely to be associated with identifying opportunity costs. Participants’ time in minutes was recorded when their packets were handed into the researcher. Participants who did not complete the task in the presence of the researcher were asked to record their time. The inexperienced participant group lacks management accounting experience and as a result it is likely that it will take them longer than the experienced participant group to complete the experimental task.
CHAPTER 5

RESULTS

5.0 Chapter Introduction

Chapter 5 describes the statistical analysis performed to test the hypotheses developed in Chapter 4. This includes results of the manipulation check and detailed descriptive statistics about the study’s participants and variables. This chapter will also present results of the study’s five hypotheses.

5.1 Manipulation Check

To ensure participants were aware of the percentage of completion manipulation, they were asked to indicate whether the logistics project was 10% or 90% complete in the post-experimental questionnaire. All of the participants correctly identified their experimental condition suggesting that the project completion manipulation was successful.

5.2 Descriptive Statistics

5.2.1 Participants

The inexperienced participants used in the study were undergraduate business students enrolled in a cost accounting course with a mean age of 22.1 years (σ = 3.7 years). Sixty-one (52%) of the inexperienced participants were male and 55 (48%) were female. The experienced participants were members of the Institute of Management Accountants (IMA) with a mean age of 40.2 years (σ = 10.7 years). Fifty (51%) of the experienced participants were male and 49 (49%) were female.

Panel A of Table 3 reports the descriptive statistics for the study’s participants with respect to professional accounting experience. Experienced participants reported having an average of 3.7 years of public accounting experience (σ = 5.0 years), 8.6 years of management accounting experience (σ = 8.1 years), 7.6 years of general resource allocation experience (σ = 6.8 years), 6.3 years of capital budgeting experience (σ = 6.5 years), 4.0 years of analyzing capital projects (σ = 5.6 years) and 5.3 years of project management experience (σ = 6.4 years). As expected, inexperienced participants reported minimal amounts of professional experience (see Panel A of Table 3 for detailed statistics).

Additionally, 50 (51%) of the experienced participants were Certified Public Accountants and 63 (64%) were Certified Management Accountants. Participants were also asked to provide
their current position at their company. Detailed statistics on current positions reported by participants is provided in Panel B of Table 3.

### TABLE 3
Descriptive Statistics: Participants

**Panel A: Mean Experience (in years)**
*Standard Deviations in Parentheses*

<table>
<thead>
<tr>
<th></th>
<th>Experienced (n = 99)</th>
<th>Inexperienced (n = 116)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Accounting</td>
<td>3.74 (5.01)</td>
<td>0.02 (0.07)</td>
</tr>
<tr>
<td>Management Accounting</td>
<td>8.56 (8.10)</td>
<td>0.01 (0.02)</td>
</tr>
<tr>
<td>Resource Allocation</td>
<td>7.60 (6.77)</td>
<td>None reported</td>
</tr>
<tr>
<td>Capital Budgeting</td>
<td>6.29 (6.46)</td>
<td>None reported</td>
</tr>
<tr>
<td>Analysis of Capital Projects</td>
<td>3.98 (5.59)</td>
<td>None reported</td>
</tr>
<tr>
<td>Project Management</td>
<td>5.32 (6.40)</td>
<td>0.01 (0.14)</td>
</tr>
</tbody>
</table>

**Panel B: Experienced Participants’ Job Titles (n = 99)**

<table>
<thead>
<tr>
<th>Job Title</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller(^a)</td>
<td>17 (18%)</td>
</tr>
<tr>
<td>Executive(^b)</td>
<td>15 (15%)</td>
</tr>
<tr>
<td>Staff/Corporate Accountant</td>
<td>13 (13%)</td>
</tr>
<tr>
<td>Accounting Manager</td>
<td>10 (10%)</td>
</tr>
<tr>
<td>Consultant</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Analyst(^c)</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Public</td>
<td>7 (7%)</td>
</tr>
<tr>
<td>Business Owner</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Director/Head of Finance</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Government</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Other(^d)</td>
<td>12 (12%)</td>
</tr>
</tbody>
</table>

\(^a\) Includes Head Controller, Assistant Controller, Plant Controller, and Regional Controller.
\(^b\) Executive job titles included Chief Financial Officer (CFO), Chief Financial Executive (CFE), Chief Accounting Officer (CAO), President, and Vice President (VP).
\(^d\) Includes job titles with less than two reported frequencies.
TABLE 4
Descriptive Statistics: Dependent Variable
(Mean Number of Opportunity Costs Attended to) a b

Panel A: Vagueness and Experience
(Standard Deviations in parentheses)

<table>
<thead>
<tr>
<th>Participant Type</th>
<th>Precise</th>
<th>Vague</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inexperienced</td>
<td>3.33</td>
<td>1.79</td>
</tr>
<tr>
<td></td>
<td>(2.08)</td>
<td>(1.87)</td>
</tr>
<tr>
<td></td>
<td>n=58</td>
<td>n=58</td>
</tr>
<tr>
<td>Experienced</td>
<td>4.98</td>
<td>4.98</td>
</tr>
<tr>
<td></td>
<td>(1.13)</td>
<td>(1.20)</td>
</tr>
<tr>
<td></td>
<td>n=49</td>
<td>n=50</td>
</tr>
<tr>
<td></td>
<td>4.08</td>
<td>3.27</td>
</tr>
<tr>
<td></td>
<td>(1.89)</td>
<td>(2.25)</td>
</tr>
<tr>
<td></td>
<td>n=107</td>
<td>n=108</td>
</tr>
</tbody>
</table>

5.2.2 Dependent Variables

Descriptive statistics regarding the first dependent variable, number of opportunity costs attended to, is reported in Table 4. As reported in Panel A, the mean number of opportunity costs attended to by participants was 3.67. Experienced participants attended to more opportunity costs than inexperienced participants in the precise condition (4.98 vs. 3.33, respectively, t = 5.21, p < 0.01, one-tailed). Experienced participants attended to significantly more opportunity costs than the inexperienced participants in the vague condition (4.98 vs. 1.79, respectively, t = 10.7, p < 0.01, one-tailed).
### TABLE 4 (continued)  
(Mean Number of Opportunity Costs Attended to)

#### Panel B: Project Completion and Experience  
(Standard Deviations in parentheses)

<table>
<thead>
<tr>
<th>Participant Type</th>
<th>Project Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>Inexperienced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.18 (2.20)</td>
</tr>
<tr>
<td></td>
<td>n=56</td>
</tr>
<tr>
<td></td>
<td>2.56 (2.12)</td>
</tr>
<tr>
<td></td>
<td>n=116</td>
</tr>
<tr>
<td>Experienced</td>
<td>5.08 (1.14)</td>
</tr>
<tr>
<td></td>
<td>n=50</td>
</tr>
<tr>
<td></td>
<td>4.98 (1.16)</td>
</tr>
<tr>
<td></td>
<td>n=99</td>
</tr>
<tr>
<td></td>
<td>4.08 (2.01)</td>
</tr>
<tr>
<td></td>
<td>n=106</td>
</tr>
<tr>
<td></td>
<td>3.67 (2.11)</td>
</tr>
<tr>
<td></td>
<td>n=116</td>
</tr>
</tbody>
</table>

As reported in Panel B, experienced participants attended to more opportunity costs than inexperienced participants in the 10% complete condition (5.08 vs. 3.18, respectively, t = 5.69, p < 0.01, one-tailed). Experienced participants attended to significantly more opportunity costs in the 90% condition than the inexperienced participants (4.88 vs. 1.98, respectively, t = 9.75, p < 0.05, one-tailed).

---

*a* Mean number of opportunity costs participants attended to when performing project continuance cash flow analysis (minimum possible is zero and maximum is six).

*b* Means reported are unadjusted for the marginally significant covariate opportunity cost knowledge score. Means adjusted for this covariate were qualitatively similar to the means reported above.
Table 5 presents detailed statistics for each of the six opportunity costs items embedded in the case. These items comprised the first dependent variable which was the number of opportunity costs attended to by participants when performing the project continuance analyses. Statistics reported include both the percentage and number of each of the six opportunity costs that were attended to when participants performed their analyses. More specifically, Panel A reports the percentage and number of opportunity costs attended to in the experience and vagueness conditions. As indicated, the opportunity cost item with the lowest frequency of inclusion by inexperienced participants in both the precise and vague condition was the return on marketable securities. Only 28 of the inexperienced participants (48%, n = 58) in the precise condition and 11 in the vague condition (19%, n = 58) attended to this item. The return on marketable securities was also the item with the lowest frequency of inclusion by experienced participants with 33 of the experienced participants in the precise condition (67%, n = 49) and 39 in the vague condition (78%, n = 50) attending to this item. The staffing revenue from the manager was another opportunity cost item with a notably low frequency of inclusion by inexperienced participants with 34 (59%, n = 58) and 12 (21%, n = 58) attending to the item in the precise and vague conditions, respectively. There was a relatively constant rate of inclusion of opportunity cost items, other than the return on marketable securities, by the experienced participants across the precise and vague conditions.

Panel B of Table 5 reports detailed statistics on the percentage and number of opportunity costs attended to in the experience and project completion conditions. A similar pattern was exhibited in the 10% and 90% project completion conditions regarding the return on marketable securities as the item with the lowest frequency of inclusion. Specifically, 21 (36%, n = 58) of the inexperienced participants in the 10% condition and 14 (24%, n = 58) in the 90% condition attended to this item. This item also had the lowest frequency of inclusion for the experienced participants with 39 (78%, n = 50) and 33 (67%, n = 49) including this item in the 10% and 90% completion conditions, respectively. As in the precise and vague conditions, the staffing revenue from the manager also had a notably low rate of inclusion by the inexperienced participants as only 25 in the 10% condition (43%, n = 58) and 15 in the 90% condition (26%, n = 58) attended to this item. There was a relatively constant rate of inclusion, other than the return on marketable securities, by the experienced participants across the 10% and 90% completion conditions.
Table 6 presents descriptive statistics concerning the dependent and independent variables. Panel A reports participants’ project continuance judgments and decisions. The overall mean project continuance judgment was 4.86 out of 11 with a standard deviation of 2.60. The mean project continuance judgment for inexperienced and experienced participants was 5.48 ($\sigma = 2.85$) and 4.13 ($\sigma = 2.07$), respectively. Assuming that the midpoint of the 11 point scale represents neutrality toward continuing the project, inexperienced participants’ mean continuance judgment of 5.48 suggests the group was more neutral toward continuing the project. With a mean of 4.13, experienced participants were less in favor of continuing the project. Overall, 87 (40%) chose to continue the project and 128 (60%) chose to discontinue the project. Sixty-nine (59%) inexperienced participants chose to continue the project and 47 (41%) chose to discontinue the project. In comparison to inexperienced participants, experienced participants were less in favor of continuing the project as only 18 (18%) experienced participants chose to continue the project and 81 (82%) chose to discontinue the project ($t = 6.87, p < 0.01$, two-tailed).

Panel B of Table 6 presents the correlations between each of the study’s independent and dependent variables; opportunity cost vagueness, project completion stage, experience, number of opportunity costs attended to, project continuance judgments and project continuance decisions. The study’s first dependent variable, number of opportunity costs attended to, is negatively correlated with vagueness ($r = -0.19, p < 0.05$, two-tailed) and project completion stage ($r = -0.18, p < 0.05$, two-tailed), and positively correlated with experience ($r = 0.57, p < 0.05$, two-tailed). These correlations are consistent with expectations. The study’s second dependent variable was participants’ judgments and decisions regarding continuance of the logistics project. Experience was negatively correlated with project continuance judgments ($r = -0.26, p < 0.05$, two-tailed) and decisions are negatively correlated with experience ($r = -0.42, p < 0.05$, two-tailed). Participants’ judgments were negatively related to the number of opportunity costs attended to when performing their decision analyses ($r = -0.28, p < 0.01$, two-tailed). The relationship between the number of opportunity costs identified and participants’ absolute decisions to continue the project was also negative and significant ($r = -0.429, p < 0.01$, two-tailed). This suggests that as the number of opportunity costs identified increase, the tendency to recommend continuance of the logistics project decreases.
### TABLE 5
Descriptive Statistics: Opportunity Costs Attended to
Percentage (Number)\(^a\)

**Panel A: Vagueness and Experience**

<table>
<thead>
<tr>
<th>Opportunity Cost</th>
<th>Condition</th>
<th>Inexperienced</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit from internal product line.</td>
<td>Precise</td>
<td>86% (50)</td>
<td>82% (40)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>33% (19)</td>
<td>82% (41)</td>
</tr>
<tr>
<td>Return on marketable securities</td>
<td>Precise</td>
<td>48% (28)</td>
<td>67% (33)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>19% (11)</td>
<td>78% (39)</td>
</tr>
<tr>
<td>Disposal proceeds of semi-trucks</td>
<td>Precise</td>
<td>64% (37)</td>
<td>84% (41)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>28% (16)</td>
<td>90% (45)</td>
</tr>
<tr>
<td>Sublease revenue on warehouse</td>
<td>Precise</td>
<td>81% (47)</td>
<td>92% (45)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>29% (17)</td>
<td>96% (48)</td>
</tr>
<tr>
<td>Staffing revenue from manager</td>
<td>Precise</td>
<td>59% (34)</td>
<td>80% (39)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>21% (12)</td>
<td>90% (45)</td>
</tr>
<tr>
<td>Cost of goods sold savings</td>
<td>Precise</td>
<td>79% (46)</td>
<td>86% (42)</td>
</tr>
<tr>
<td></td>
<td>Vague</td>
<td>43% (25)</td>
<td>80% (40)</td>
</tr>
</tbody>
</table>

**Panel B: Project Completion and Experience**

<table>
<thead>
<tr>
<th>Opportunity Cost</th>
<th>Condition</th>
<th>Inexperienced</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit from internal product line.</td>
<td>10%</td>
<td>55% (32)</td>
<td>84% (42)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>50% (29)</td>
<td>80% (39)</td>
</tr>
<tr>
<td>Return on marketable securities</td>
<td>10%</td>
<td>36% (21)</td>
<td>78% (39)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>24% (14)</td>
<td>67% (33)</td>
</tr>
<tr>
<td>Disposal proceeds of semi-trucks</td>
<td>10%</td>
<td>50% (29)</td>
<td>80% (40)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>29% (17)</td>
<td>94% (46)</td>
</tr>
<tr>
<td>Sublease revenue on warehouse</td>
<td>10%</td>
<td>59% (34)</td>
<td>94% (47)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>41% (24)</td>
<td>94% (46)</td>
</tr>
<tr>
<td>Staffing revenue from manager</td>
<td>10%</td>
<td>43% (25)</td>
<td>84% (42)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>26% (15)</td>
<td>86% (42)</td>
</tr>
<tr>
<td>Cost of goods sold savings</td>
<td>10%</td>
<td>55% (32)</td>
<td>86% (43)</td>
</tr>
<tr>
<td></td>
<td>90%</td>
<td>48% (28)</td>
<td>80% (39)</td>
</tr>
</tbody>
</table>

\(^a\) Percentages were calculated by dividing the number of participants that attended to the particular opportunity cost by the total number of participants in each condition.

\(^b\) The number of participants in each condition were: Inexperienced/Precise (n = 58), Inexperienced/Vague (n = 58), Experienced/Precise (n = 49), Experienced/Vague (n = 50), Inexperienced/10% (n = 58), Inexperienced/90% (n = 58), Experienced/10% (n = 50), Experienced/90% (n = 49).
## TABLE 6
Descriptive Statistics: Dependent and Independent Variables

### Panel A: Dependent Variable (Project Continuance)
#### Means and Percentages

<table>
<thead>
<tr>
<th></th>
<th>Inexperienced</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 116)</td>
<td>(n = 99)</td>
</tr>
</tbody>
</table>

**Continuance Judgment (11 point scale)**

- Mean
- Standard Deviation

**Continuance Decision**

- Continue
- Discontinue

### Panel B: Bivariate Correlations between Dependent and Independent Variables

<table>
<thead>
<tr>
<th></th>
<th>Vagueness</th>
<th>Percent Completion</th>
<th>Experience</th>
<th>Number of Opportunity Costs (attended to)</th>
<th>Project Continuance Judgment</th>
<th>Project Continuance Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vagueness</td>
<td>1.0</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.19*</td>
<td>0.10</td>
<td>0.14*</td>
</tr>
<tr>
<td>Percent Completion</td>
<td>-0.01</td>
<td>1.0</td>
<td>-0.02</td>
<td>-0.18*</td>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>Experience</td>
<td>0.01</td>
<td>-0.02</td>
<td>1.0</td>
<td>0.57*</td>
<td>-0.26*</td>
<td>-0.42*</td>
</tr>
<tr>
<td>Number of Opportunity Costs (attended to)</td>
<td>-0.17**</td>
<td>-0.19**</td>
<td>0.55**</td>
<td>1.0</td>
<td>-0.28*</td>
<td>-0.43*</td>
</tr>
<tr>
<td>Project Continuance Judgment</td>
<td>0.10</td>
<td>0.02</td>
<td>-0.25**</td>
<td>-0.26**</td>
<td>1.0</td>
<td>0.68*</td>
</tr>
<tr>
<td>Project Continuance Decision</td>
<td>0.14*</td>
<td>0.04</td>
<td>-0.42**</td>
<td>-0.38**</td>
<td>0.66**</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* Pearson correlation significant at the 0.05 level (two-tailed), ** Spearman rank correlation significant at the 0.05 level (two-tailed).
5.2.3 Covariates

Descriptive statistics about the five covariates which were used in the ANCOVA model to test hypotheses regarding the first dependent variable, number of opportunity costs attended to, are shown in Table 7. Data on the first covariate, participants’ analytical ability test score indicates mean scores of 5.21 (σ = 1.98) and 5.13 (σ = 2.20) for inexperienced and experienced participants, respectively. The mean scores for the second covariate, participants’ opportunity cost knowledge score were 5.85 (σ = 2.09) and 5.60 (σ = 1.51) for inexperienced and experienced participants, respectively. Means for the analytical ability and opportunity cost knowledge scores did not differ by participant type which was consistent with expectations.

The third covariate was participants’ perceived difficulty of the experimental task. On an 11 point scale inexperienced participants rated the task a difficulty level of 6.84 (σ = 1.72) and experienced participants rated the task a difficulty level of 4.95 (σ = 1.95). This difference was statistically significant (t = 7.07, p < 0.01, two-tailed) and consistent with expectations regarding the inexperienced and experienced participant groups’ perceived difficulty of the task.

The fourth covariate was participants’ perceived realism of the task which was measured on an 11 point scale. Inexperienced and experienced participants’ perceived realism of the task was a 6.66 (σ = 2.19) and 5.56 (σ = 1.68), respectively. This difference was statistically significant (t = 3.92, p < 0.01, two-tailed) and was inconsistent with expectations regarding the inexperienced and experienced participant groups’ perceived difficulty of the task.

The final covariate was the amount of time it took participants to complete the task in minutes. As noted previously, completion time data is only available for 69 of the 99 experienced participants. As a result, descriptive statistics reported are based only on the subset of participants that reported their time. It took inexperienced participants a mean time of 53 minutes (σ = 10.09) and experienced participants 44 minutes (σ = 4.02) to complete the case and answer all related questions. Consistent with expectations, it took inexperienced participants longer to complete the case. This difference was statistically significant (t = 7.57, p < 0.01, one-tailed).
TABLE 7
Descriptive Statistics: Covariates
Means (Standards Deviations in Parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Inexperienced (n=116)</th>
<th>Experienced (n=99)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analytical Ability Score(^a)</strong></td>
<td>5.21 (1.98)</td>
<td>5.13 (2.20)</td>
</tr>
<tr>
<td><strong>Opportunity Cost Score(^a)</strong></td>
<td>5.85 (2.09)</td>
<td>5.60 (1.51)</td>
</tr>
<tr>
<td><strong>Perceived Difficulty of Task(^b)(^d)</strong></td>
<td>6.84 (1.72)</td>
<td>4.95 (1.95)</td>
</tr>
<tr>
<td><strong>Perceived Realism of Task(^b)(^d)</strong></td>
<td>6.66 (2.19)</td>
<td>5.56 (1.68)</td>
</tr>
<tr>
<td><strong>Time(^c)(^d)</strong></td>
<td>53.01 (10.09)</td>
<td>43.68 (4.02)</td>
</tr>
</tbody>
</table>

\(^a\) The possible range of analytical ability and opportunity cost knowledge score is from 0 to 8.
\(^b\) The possible range of perceived difficulty and realism of task is from 0 to 10.
\(^c\) Completion time is only available for 69 of the experienced participants.
\(^d\) Difference is significant at the .01 level (one-tailed).

5.3 Tests of Hypotheses

Hypotheses 1 through 4 are concerned with the study’s first dependent variable: number of opportunity costs attended to by participants when performing their decision analyses. These hypotheses were analyzed with a 2 (vagueness) x 2 (project completion stage) x 2 (experience) between subjects ANCOVA\(^6\)\(^7\). Hypotheses 1 through 4 will primarily be tested using planned comparisons. Hypothesis five is concerned with the study’s second dependent variable: participants’ project continuance judgments and decisions. ANOVA and Logistic regression will be used to examine the influence of experience and project completion on participants’ continuance judgments and decisions as it relates to hypothesis 5.

\(^6\) Homogeneity of slope assumption was tested by examining the interaction between each of the five covariates and the three independent variables (Keppel and Wickens 2004). The interaction terms were not significant; therefore, the null hypothesis that the slopes for the covariates are homogeneous is not rejected.

\(^7\) Linearity of regression assumption was tested by adding a quadratic covariate term for each covariate and examining the statistical significance of the quadratic term for improvement of model fit (Keppel and Wickens 2004). None of the quadratic terms improved the fit of the model; therefore, the null hypothesis presence of a linear relationship between the dependent variable and covariates is not rejected.
5.3.1 Hypothesis 1

Hypothesis 1 predicts that in the presence of opportunity cost vagueness, inexperienced participants will attend to significantly fewer opportunity costs when performing the project continuance cash flow analysis. An ANCOVA was performed to examine the effect of vagueness on the number of opportunity costs attended to by inexperienced participants. The results of this ANCOVA are reported in Table 8. As shown in Panel A, there is a significant main effect of vagueness on the number of opportunity costs attended to by participants (F = 12.95, p < 0.01). Since hypothesis 1 concerns only inexperienced participants, a planned comparison was performed between the vague and precise cells for inexperienced participants. As shown in Panel C, inexperienced participants attended to significantly fewer opportunity costs in the presence of vagueness (t = 3.04, p < 0.01, one-tailed). Results of this test support the prediction of hypothesis 1, namely that vagueness of opportunity costs decreases inexperienced participants’ tendency to attend to opportunity costs (see Panel A of Figure 2).

5.3.2 Hypothesis 2

Hypothesis 2 predicts that in the presence of a nearly (90%) complete project, inexperienced participants will attend to significantly fewer opportunity costs when performing a project continuance cash flow analysis. Panel A of Table 8 indicates a significant main effect of project completion stage on the number of opportunity costs attended to by participants (F = 11.43, p < 0.01). Since hypothesis 2 concerns only inexperienced participants, a planned comparison was performed between the far from complete (10%) and nearly complete (90%) cells for this group. As indicated in Panel C of Table 8, the planned comparison for the difference in number of opportunity costs attended to by inexperienced participants in the 10% versus 90% complete condition was significant (t = 3.95, p < 0.01, one-tailed). This supports the prediction that a highly complete project decreases inexperienced participants’ tendency to incorporate opportunity costs (see Panel A of Figure 3).

5.3.2 Hypothesis 3

Hypothesis 3 predicts that management accounting experience will moderate the effect of opportunity cost vagueness on decision-makers’ tendency to incorporate opportunity costs when performing a project continuance cash flow analysis. The interaction between vagueness and experience in the ANCOVA model was examined for significance. As shown in Panel A of Table 8, the interaction between vagueness and experience was significant (F = 9.15, p < 0.01)
suggesting that experience moderates the effect of opportunity cost vagueness. The planned comparison between the inexperienced and experienced participants in the vague condition is significant \((t = 7.84, p < 0.01, \text{one-tailed})\). In testing hypothesis 3, the planned comparison between the experienced participants in the vague and non-vague condition was examined. It was insignificant \((t = 0.02, p = 0.49, \text{one-tailed})\) which suggests the presence of vagueness does not impact attention to opportunity costs when a decision-maker is experienced. This finding supports hypothesis 3 (See Figure 2).

### TABLE 8

**Results: Dependent Variable (Number of Opportunity Costs Attended to)**

(Vagueness x Project Completion x Experience)

**Panel A: ANCOVA**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F-statistic</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>46.48</td>
<td>1</td>
<td>46.48</td>
<td>18.52</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Vagueness</td>
<td>32.43</td>
<td>1</td>
<td>32.43</td>
<td>12.92</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Project Completion</td>
<td>28.68</td>
<td>1</td>
<td>28.68</td>
<td>11.43</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Experience</td>
<td>215.40</td>
<td>1</td>
<td>215.40</td>
<td>85.83</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Vagueness * Experience</td>
<td>22.97</td>
<td>1</td>
<td>22.97</td>
<td>9.15</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Project Completion * Experience</td>
<td>10.40</td>
<td>1</td>
<td>10.40</td>
<td>4.10</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Vagueness * Project Completion</td>
<td>0.43</td>
<td>1</td>
<td>0.43</td>
<td>0.17</td>
<td>0.68</td>
</tr>
<tr>
<td>Vagueness * Project Completion * Experience</td>
<td>5.51</td>
<td>1</td>
<td>5.51</td>
<td>2.20</td>
<td>0.14</td>
</tr>
</tbody>
</table>

*Covariates*

<table>
<thead>
<tr>
<th>Analytical Ability Score</th>
<th>4.45</th>
<th>1</th>
<th>4.45</th>
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<td>203</td>
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Table 8 (Continued)
Panel B: ANCOVA

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<td>0.18</td>
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<tr>
<td>Experience</td>
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<td>4.84</td>
<td>1.81</td>
<td>0.18</td>
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Panel C: Planned Comparisons

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<th>Comparison</th>
<th>Mean Difference</th>
<th>t-statistic</th>
<th>Probability (one-tailed)</th>
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</thead>
<tbody>
<tr>
<td>Inexperienced: Vague vs. Precise (H1)</td>
<td>1.54</td>
<td>4.19</td>
<td>&lt; 0.01</td>
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<td>Inexperienced: 90% vs. 10% (H2)</td>
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<td>3.15</td>
<td>&lt; 0.01</td>
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<td>Vague: Inexperienced vs. Experienced (H3)</td>
<td>3.19</td>
<td>10.70</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>90%: Inexperienced vs. Experienced (H4)</td>
<td>2.89</td>
<td>9.75</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

5.3.3 Hypothesis 4

Hypothesis 4 predicts that management accounting experience will moderate the influence of a nearly complete project on decision-makers' tendency to incorporate opportunity costs when performing a project continuance cash flow analysis. The significance of the interaction between

---

8 The results of this ANCOVA include the time (in minutes) it took participants to complete the task included as a covariate. This analysis was performed with a subset of the experienced sample (n=69), since it was unavailable for 29 participants. Hypothesis tests are based on the full sample ANCOVA in Table 8, Panel A.
project completion and experience in the ANCOVA model was examined. As shown in Panel A of Table 8, the interaction between project completion and experience was significant ($F = 4.10$, $p < 0.05$). The planned comparison between the inexperienced and experienced participants in the 90% complete condition was significant ($t = 9.22$, $p < 0.01$, one-tailed). In testing hypothesis 4, the planned comparison between the experienced participants in the 10% and 90% complete conditions was examined and was found to be insignificant ($t = 0.20$, $p = 0.19$, one-tailed). This finding supports hypothesis 5 suggesting that the presence of a nearly complete project does not impact attention to opportunity costs when a decision-maker is experienced (See Figure 3).

5.3.4 Hypothesis 5

Hypothesis 5 is concerned with the effect of experience and project completion stage on participants’ project continuance decisions which is a different dependent variable than tested in hypotheses 1 through 4. Hypothesis 5 predicts that experienced decision-makers will be less likely to continue a nearly complete project than inexperienced decision-makers. Participants were asked to indicate how likely they were to continue the project on an 11 point scale and to make a yes or no decision regarding continuance of the project.

An ANOVA was performed to test the effect of experience, number of opportunity costs attended to, and project completion on participants’ continuance judgments. As shown in Table 9, number of opportunity costs attended to ($F = 0.88$, $p = 0.51$) and project completion ($F = 0.21$, $p = 0.65$) had no significant affect on participants’ project continuance judgments. Experience did have a significant affect on participants’ project continuance judgments ($F = 4.27$, $p < 0.05$). The significance of the interaction term (project completion * experience) was examined to investigate whether experienced moderated participants’ judgments regarding project continuance. The term was not significant which suggests that experience does not moderate the effect of project completion stage on participants’ continuance judgments.

To test hypothesis 5, a planned comparison was performed for inexperienced and experienced participants’ mean likelihood project continuance judgments when the project is 90% complete. The means for inexperienced and experienced participants’ judgments in this cell were 5.61 ($\sigma = 2.83$, $n = 60$), and 4.10 ($\sigma =1.98$, $n = 49$), respectively. This difference is statistically significant ($t = 3.15$, $p < 0.01$, one-tailed), thereby suggesting that experienced participants were less in favor of project continuance than the inexperienced participants. This finding is consistent with hypothesis 5.
FIGURE 2. Number of Opportunity Costs Attended to (Vagueness x Experience)

Panel A: Bar graph of mean number of opportunity costs by experience by vagueness (0 = precise, 1 = vague), (with standard error bars). Panel B: Line graph of mean number of opportunity costs by experience by vagueness.
FIGURE 3. Number of Opportunity Costs Attended to (Project Completion x Experience)

Panel A: Bar graph of mean number of opportunity costs by experience by project completion (0 = 10%, 1 = 90%), (with standard error bars). Panel B: Line graph of mean number of opportunity costs by project completion by vagueness.
Additionally, the mean likelihood project continuance judgments of the inexperienced and experienced participants were compared to the midpoint of the 11 point scale which was 6. The midpoint of the scale can be interpreted as neutrality toward continuing or discontinuing the project. The difference between the inexperienced participants’ mean judgments (5.61) and the midpoint of the scale (6.0) was not significant (t = 1.04, p = 0.30, two-tailed). This suggests that the inexperienced decision-makers were neutral towards continuing the project. To the contrary, the difference between the experienced participants’ mean judgments (4.10) and the midpoint (6.0) was significant (t = 6.63, p < 0.01, two-tailed). This suggests that the experienced participants were not neutral toward continuing the project but rather preferred to discontinue the project.

Logistic regression analysis (see equation 1) is used to further investigate whether experienced participants were less likely to continue the nearly complete project. Logistic

<table>
<thead>
<tr>
<th>Model</th>
<th>R-square</th>
<th>Adjusted R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
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<th>Mean Square</th>
<th>F-statistic</th>
<th>Significance</th>
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<td>5.61</td>
<td>0.88</td>
<td>0.51</td>
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<td>1.33</td>
<td>0.21</td>
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<td>27.31</td>
<td>4.27</td>
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<td>3.52</td>
<td>0.55</td>
<td>0.77</td>
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<td>6.66</td>
<td>1.04</td>
<td>0.40</td>
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<td>Percent Completion * Experience</td>
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<td>3.15</td>
<td>0.49</td>
<td>0.48</td>
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<tr>
<td>Number of Opportunity Costs * Project Completion * Experience</td>
<td>5.63</td>
<td>3</td>
<td>1.88</td>
<td>0.29</td>
<td>0.83</td>
</tr>
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</table>
regression was appropriate because the dependent variable is dichotomous with the decision to continue set equal to 1 and not continue set equal to 0. The underlying assumptions of logistic regression were checked and no violations were discovered.

Variables included in the logistic regression equation were based on the model-building strategy discussed in Hosmer and Lemeshow (1989). The basis of the strategy is to perform a univariate logistic regression with each independent variable. Any variables with a p-value < 0.25 in the univariate tests should be included in the multivariate model. Interactions should be formed on the basis that there is prior theory to believe an interaction might be present. In order to test hypothesis 5, the model shown in equation (1) includes an interaction between the project completion and experience variables. As displayed in Panel A of Table 10, the logistic regression model had an R-square value of 0.29, and the model chi-square test indicated that the model is statistically significant (p < 0.05).

Equation (1):

\[
\text{CONT}_i = \beta_0 + \beta_1 (\text{NUMB_OC}_i) + \beta_2 (\text{EXP}_i) + \beta_3 (\text{PER_COMP}_i) + \beta_4 (\text{EXP} \times \%\text{COMP}_i) + \varepsilon_i
\]

(1) where:

\( \text{CONT}_i \) = Continuance decision (set = 1 if continue, set = 0 if discontinue) made by participant i.

\( \text{NUMB_OC}_i \) = Number of opportunity costs attended to by participants.

\( \text{EXP}_i \) = Participant experience group (set = 0 if inexperienced, set = 1 if experienced).

\( \%\text{COMP}_i \) = Project completion stage (set = 0 if 10% complete, set = 1 if 90% complete).

\( \varepsilon_i \) = Random error term.

9 Classical linear regression assumptions of independence, constant variance, and normality are not required by logistic regression, and as a result assumptions are less stringent. However, logistic regression does assume a linear relationship between the dependent and independent variables. This assumption was tested by adding a term of the form \((x)\ln(x)\) for each independent variable \(x\) to the regression equation and examining the statistical significance of the term (Hosemer and Lemeshow 2000). The null hypothesis of a linear relationship between the dependent and independent variables was not rejected on the basis the added terms were insignificant.

10 The R-value is a goodness-of-fit measure for the logistic regression model and is similar to the correlation coefficient used in linear regression. However, it should be noted that lower R-Values are normally obtained in logistic regression than in linear regression (Hosmer & Lemeshow 2000).
As shown in Table 10, the first independent variable, number of opportunity costs (NUMB_OC) was negative and significant (p < 0.01) with an odds ratio of 0.74. The odds ratio is a measure of the relationship (effect size) between two variables. The magnitude of the odds ratio represents the strength of the relationship between the two variables (Menard 1995). The parameter estimate is the natural log of the odds ratio or alternatively \( e^{\text{coefficient estimate}} \) equals the odds ratio. The odds ratio on the number of opportunity costs attended to (NUMB_OC) suggests that each additional opportunity cost included in participant’s cash flow analysis decreases the odds of deciding to continue the project by 0.74 times. The second independent variable, experience group (EXP) was also negative and significant (p < 0.05) with an odds ratio of 0.34. This suggests that shifting from an inexperienced participant to an experienced participant decreases the odds of continuing the project by 34%\(^{11}\).

The coefficient on the percent completion variable (%COMP) is not significant suggesting that there is no effect of project completion stage on participants’ project continuance decisions. This finding is inconsistent with prior completion effect research (see Conlon and Garland 1993; Garland and Conlon 1998; Boehne and Paese 2000) which found that individuals were more likely to complete a project that was near to completion (90% complete) than far from completion (10% complete). The interaction term between experience and project completion stage (EXP * %COMP) was not statistically significant. This suggests that experience does not moderate the effect of project completion stage on participants’ continuance decisions.

An interesting result of the logistic regression is the significance of the experience variable (EXP) even after controlling for the number of opportunity costs attended to by participants. This suggests that experience lowers the likelihood of continuing the project regardless of the number of opportunity costs attended to. One interpretation of this finding could be that experienced decision-makers have made faulty decisions in the past or have been confronted with risky situations that have gone sour. For example, an experienced loan officer is likely to be more skeptical of clients’ loan requests due previous experience of loan defaults. To the contrary, a less experienced loan officer is likely to have less experience with loan defaults and may be less skeptical of clients’ requests at the start of their career as a loan officer.

\[^{11}\] Logistic regression requires different interpretations of independent categorical variables and continuous variables (Hosmer and Lemshow 1989).
**TABLE 10**  
Results: Dependent Variable (Project Continuance Decision)  
Logistic Regression

<table>
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<th>df</th>
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<td>&lt; 0.01</td>
<td>0.74</td>
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<td>Project Completion (%COMP)</td>
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<td>0.99</td>
<td>1.0</td>
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<td>Experience (EXP)</td>
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<td>1.40</td>
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<td>EXP*%COMP</td>
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CHAPTER 6
SUMMARY, LIMITATIONS, AND FUTURE RESEARCH

6.0 Introduction
This chapter provides a brief summary of my study’s key findings and contributions. This is followed by a discussion of my study’s limitations and suggestions for future research.

6.1 Discussion of Results
The results of my study suggest that vague presentation of opportunity costs and stage of project completion influence the tendency to incorporate opportunity costs as relevant information when decision-makers without management accounting experience perform a project continuation cash flow analysis. These factors were chosen because they are often present in a typical managerial decision-making setting and were investigated across two groups of decision-makers with different levels of experience in the domain of management accounting.

When decision-makers that lack management accounting experience were faced with vague opportunity costs their tendency to attend to the opportunity costs significantly decreased. This suggests that the effect of vagueness overshadowed the relevance of the opportunity cost information to the project continuation decision being made. Decision-makers with management accounting experience exhibited the same tendency to incorporate opportunity costs as relevant information given vague or precise opportunity costs. This suggests that management accounting experience enables decision-makers to overlook the vagueness of the opportunity cost information and focus on the relevance of the information to the project continuation decision being made.

There was also a decreased tendency for decision-makers without management accounting experience to attend to opportunity costs when faced with a project that is nearly complete. This suggests that the proximity of a project to completion interfered with decision-makers’ search for relevant information. When inexperienced decision-makers were faced with a project that is near to completion they exhibited a shallower search of the available information which in turn decreased inclusion of opportunity costs as relevant information. A shallow information search is characterized as a less thorough and haphazard search of available information. The proximity of a project to completion did not interfere with experienced decision-makers’ tendency to attend to opportunity costs. This suggests that management
accounting experience facilitates a deeper information search regardless of a project’s proximity to completion. A decision-maker performing a deeper information search is likely to engage in a deliberate and careful analysis of the available information.

My study also provides insight to the role of including opportunity costs as relevant information and the perseverance of the completion effect. The completion effect has been shown to be a robust effect and perseveres even in the presence of a conflicting factor such as a strong competitor that is in the process of producing a similar product (Conlon and Garland 1993). Although the effect of a conflicting factor has been examined, no study has investigated whether the completion effect is mitigated by decision-maker experience or attending to alternative courses of action, namely opportunity costs.

Results of my study suggest that the decision to continue a project is influenced by the number of opportunity costs attended to when performing a project continuance cash flow analysis and decision-maker experience. The stage of project completion did not influence the likelihood that decision-makers would choose to continue a project, which is inconsistent with prior completion effect research. This suggests that when decision-makers attend to opportunity cost information they become aware of alternative avenues for profitability or increased cash flows. Awareness of these alternative courses of action in turn mitigates the completion effect. The presence of management accounting experience was shown to decrease the likelihood of deciding to continue a nearly complete project.

6.2 Contributions

This dissertation contributes to understanding the influence of management accounting experience on the identification of opportunity costs as relevant information in decision-making. Specifically, it investigates the influence of management accounting experience in the presence of factors that are commonly present in managerial decision-making settings. First, consistent with research on information vagueness, this dissertation provides evidence that inexperienced decision-makers discount or avoid vague opportunity costs. This tendency to discount or avoid vague information is mitigated by management accounting experience.

Second, this dissertation finds that decision-makers attend to fewer opportunity costs when making a decision regarding a project that is near to completion. This tendency to attend to fewer opportunity costs is also mitigated by decision-maker experience in the domain of management accounting. This evidence suggests that management accounting experience assists decision-
makers in identifying opportunity costs in the face of vagueness and a nearly complete project. These findings should be of interest to managerial accounting instructors. Lessons in the area of relevant information for decision-making often present students with opportunity cost information that is precise, which is inconsistent with how the information would likely appear in an actual decision-making setting. Students are also rarely presented with situations in which they must overlook decision setting characteristics (e.g. nearly complete project) and focus on how the information provided can be used to make a particular decision. Instructors might consider use of realistic cases which would provide students with practice on how to search for and process relevant information for decision-making.

This dissertation also provides an understanding of how identification of opportunity costs as relevant information affects the outcome of subsequent judgments and decisions. As decision-makers attend to more opportunity costs, the tendency to continue a project that is near to completion decreases. This suggests that inclusion of relevant information regarding alternative courses of action mitigates the completion effect. Therefore, the completion effect can be overcome when decision-makers utilize opportunity cost information when making a decision about an ongoing project.

Management accounting experience was another factor that decreased the tendency to continue a nearly complete project. This contributes to the argument that student participants are not always the best proxies for decision-makers. A majority of the completion effect research (see Conlon and Garland 1993, Garland and Conlon 1998, Boehne and Paese 2000) used students as surrogates for real world decision-makers. Given information about alternative courses of action and management accounting experience the completion effect might not be as robust after all.

6.3 Limitations

This dissertation is subject to several limitations. First, although the case materials were developed to be as realistic as possible, the task and information presentation may differ from what participants are faced with in the “real world.” For example, all relevant information might not be available in summarized form. Further, in order to obtain strong internal validity the case was absent various qualitative factors (e.g. current economic conditions).

A second limitation that is inherent to a study that compares the differential performance of two groups of individuals that vary on the basis of experience is that other external factors
may be correlated with experience, which may drive the results. I have included several covariates in an attempt to control for these factors. However, it is impossible to control for every factor and/or to develop a perfectly reliable covariate. For instance, performance on a set of GRE questions may be an acceptable measure of analytical ability however it probably is not the best measure of analytical ability. Of course a researcher must consider the cost-benefit analysis in terms of time when collecting data from human subjects. In other words, does the cost in terms of participant completion time from using a more reliable measure outweigh the benefit of the increased reliability of the measure? This cost-benefit analysis is even more important when using professional participants.

A third limitation of the study is that I did not measure knowledge in areas other than the opportunity cost concept which might be important in searching for and processing relevant information when making a resource allocation decision (e.g. industry-specific knowledge or cash flow forecasting knowledge).

6.4 Suggestions for Future Research

Although my study investigated opportunity cost vagueness and project completion stage in light of decision-maker management accounting experience, several factors remain uninvestigated. For instance, both the presence and type (e.g. outcome versus process) of performance evaluation may influence individuals’ tendency to incorporate opportunity costs and/or continue a project that is near completion. Additionally, it would be interesting to investigate how individuals’ behavior might change in a multi-period setting such that they are able to learn the consequences of ignoring opportunity costs.

The study could also be extended to investigate how case-based instruction improves the ability of inexperienced decision-makers to search for and attend to opportunity costs in the face of vagueness and project completion stage. The case-based instruction could incorporate other types of resource allocation decisions (e.g. whether to acquire another company), relevant information (e.g. future benefits) and irrelevant information (e.g. sunk costs).
APPENDIX A

EXPERIMENTAL INSTRUMENT – PART 1

PART I

STUDY ON DECISION MAKING IN A RESOURCE ALLOCATION CONTEXT
INSTRUCTIONS FOR PART I

You are to assume the role of a senior accounting associate at Fresh Foods, Inc., a specialty grocery store located in the Southeast United States. After reading information to familiarize you with a project concerning the implementation of a logistics division, you will be asked to perform a cash flow analysis to determine whether the logistics project should be continued or discontinued. You will then be asked to make judgments and decisions about the continuance of the logistics division based on your cash flow analysis. Assume that all information provided is accurate, complete, and estimates are the best available. Please review the table of contents provided below before proceeding with the task.

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BACKGROUND INFORMATION – FRESH FOODS, INC

Fresh Foods, Inc. is a mid-sized grocery store chain with locations throughout the Southeast United States. The Company’s headquarters are located in Orlando, FL. Although they carry non-perishable foods, they are known for their large variety of organic and non-organic fresh fruit, vegetables, and healthy baked goods.

Fresh Foods has decided to implement an in-house logistics division which would completely replace their third party distributor. The logistics division project was initiated by Mr. James London, Fresh Foods’ prior Internal Investment Project Supervisor. Unfortunately, Mr. London was diagnosed with a serious illness and had to resign. After much careful consideration, the Board of Directors has appointed you as Mr. London’s successor. Since the logistics division project has not been given adequate attention in the last few weeks, it is imperative that you review the progress of the project and ensure it will be beneficial to Fresh Foods.
Due to the recent resignation of Mr. James London who served as our Company’s Internal Investment Project Supervisor, you are being appointed to this position on the basis of your excellent job performance. As you may know, James was heavily involved in developing an in-house logistics division which still requires additional capital resources. Furthermore, several strategic decisions must be made concerning this logistics division project as soon as possible. The primary decision of interest is whether this logistic project should be continued or discontinued.

In order to ensure that you are fully informed regarding the logistics project, Mr. London’s assistant has gathered and summarized information related to the project for use when making your continuance decision. You will find the information attached to this memo. Since your input is very valuable to the Board of Directors, please provide us with a recommendation regarding the continuance of this logistics project along with your supporting calculations. Please make your calculations over a 5 year horizon.

Thank you,

Mark E. Wilson
Project Funding:

In order to fund the logistics division project Fresh Foods issued 500,000 shares of $2 par value common stock for $3.6 million. If the logistics project is discontinued, the proceeds from the stock issuance can be used to initiate an internal product line which will include all natural, low sodium canned vegetables, whole grain pastas, and snack foods. Due to the higher margin on internal products, the product line is expected to increase operating cash flows by $90,000 a year ($460,000 over a five year period).

Also, to fund the logistics project Fresh Foods is planning to liquidate $750,000 in marketable securities. According to the Smith Barney investment statement, the securities average an 8% annual return which includes dividend income. If the logistic project is not continued there are no plans to liquidate the securities.

Current Progress:

According to a recent engineering progress report, the logistics project is far from completion as 10% of the project has been completed. The logistics project will be considered complete when it is operational.

Numerous semi-trucks were purchased to enable ground transportation. The trucks have a total current resale value of $415,000, a 10 year useful life and an expected disposal value of $45,000.

For storage purposes, a 5 year non-cancelable lease for two 20,000 square feet warehouses has been signed and will cost $600,000 annually for both warehouses ($3 million over a five year period). The current lessee is renting them month to month and they will be ready for Fresh Foods subsequent to a 60 day notice. Due to the recent hike in interest rates and the scarcity of available land in Orlando, Florida both warehouses can be sublet for a total of $720,000 annually ($3.6 million over a 5 year period).

In order to support an in-house logistics division, one of Fresh Foods’ top managers was sent to a logistics program at Harvard University. The nationally acclaimed program teaches managers the skills necessary to effectively and efficiently operate a logistics division. Since tuition was paid by Fresh Foods, the manager signed a 5 year contract and will be paid $225,000 per year ($1.125 million over 5 years) starting on the completion date of the logistics division. The market salary for this individual is $300,000 per year. A major national managerial-executive staffing agency has contacted Fresh Foods regarding the availability of this manager to assist other companies implement a logistics division. If contracted out to other companies, the staffing agency would pay Fresh Foods the market salary. This demand is expected to persist over the life of the manager’s contract.

Additional Outlay Requirements for logistic project completion:

For expedited transit of perishable goods, one 757 Cargo plane will be leased for $650,000 per year ($3.25 million over a 5 year period). The lease is cancelable if notice is given 30 days prior to
commencement. At the termination of the lease, Fresh Foods has the option to purchase the plane for the lower of $500,000 or fair market value.

To enable the semi-trucks to be used for ground transportation, 20 cargo trailers must be purchased for a total amount of $375,000. The trailers have a useful life of 10 years and an estimated disposal value of $20,000.

Third Party Logistics - Annual Costs

Fresh Foods currently uses Isis USA, Ltd as a third party distributor which includes, ground transportation, air transportation, and offsite warehousing. This service is provided on a contractual basis for a flat fee of $2.8 million (this would amount to $14 million over a 5 year period). Isis is aware of the possibility that Fresh Foods may not renew the contract and has offered to provide a custom Isis JIT (Just-in-Time) inventory system free of charge upon signing a five year renewal contract. Isis will also implement the system and train employees free of charge. The JIT inventory system is estimated to decrease normal spoilage, reducing cost of goods sold by 5% which approximates $1.5 million over a 5 year horizon.

Fresh Foods has been renting protective containers at a cost of $100,000 per year for use by Isis to keep organic produce separate while in transit. This avoids pesticide cross-contamination from non-organic produce. Improper transportation of organic produce can result in a fine up to $500,000 by the United States Department of Agriculture (USDA). Since Fresh Foods will be able to separately transport organic goods with an internal logistics division these containers will no longer be necessary.

In House Logistics - Annual Costs

The following average five year operating cost projections have been made. The incurrence of these amounts will begin on the date the division becomes operational.

<table>
<thead>
<tr>
<th></th>
<th>Average Annual Amount</th>
<th>Five Year Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehouse employees</td>
<td>$310,000</td>
<td>$1,550,000</td>
</tr>
<tr>
<td>General &amp; administrative</td>
<td>230,000</td>
<td>1,150,000</td>
</tr>
<tr>
<td>Transportation employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>220,000</td>
<td>1,100,000</td>
</tr>
<tr>
<td>Air</td>
<td>180,000</td>
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<tr>
<td>Fuel cost</td>
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<tr>
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<td>590,000</td>
</tr>
<tr>
<td>Electric</td>
<td>48,000</td>
<td>240,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,200,000</strong></td>
<td><strong>$6,000,000</strong></td>
</tr>
</tbody>
</table>
INSTRUCTIONS

Step 1:
As Fresh Foods’ Internal Investment Project Supervisor you must perform a cash flow analysis regarding the logistics division project. If the project is continued it will be allocated additional funds required for completion. Please carefully consider all of the previous information presented to you when performing your analysis and when making your judgments and decisions.

YOU MUST PERFORM THIS ANALYSIS ON THE YELLOW PAPER PROVIDED TO YOU LABELED “PARTICIPANT ANALYSIS.” BE SURE TO PUT THIS PAPER BACK IN THE ENVELOPE.

Step 2:
Please provide answers to the following while referring to your cash flow analysis.

PARTICIPANT RESPONSES

When responding to questions with a scale, please mark an X on one number which best represents your judgment. For example, if after reading a statement you believe the likelihood is neutral that you would perform a particular action, you might respond by marking an X on 5, as shown below.

1. On the scale below please place a mark on the number that best represents the likelihood that you would continue the in-house logistics project.

2. If you had to make an absolute decision you would decide to (Please mark an X next to your decision).

   _______ Discontinue logistics project
   _______ Continue the logistics project
3. Please provide a summary of any non-financial factors that were important in making your judgments and decisions. (Note: you should have prepared a financial cash-flow analysis on the yellow paper provided to you labeled “PARTICIPANT ANALYSIS”).

PLEASE PLACE PART I AND YOUR ANALYSIS BACK INTO THE ENVELOPE PROVIDED AND COMPLETE PART II.
APPENDIX B

EXPERIMENTAL INSTRUMENT – PART II

PART II

STUDY ON DECISION MAKING IN A RESOURCE ALLOCATION CONTEXT
POST EXPERIMENTAL QUESTIONNAIRE - PART A.

PLEASE ANSWER THE FOLLOWING QUESTIONS. **DO NOT REFER BACK TO THE PART I CASE MATERIALS.**

1. Fresh Foods logistics division project was what percent complete?
   ________ 10% ________ 90%

2. Was any information **not** included in your analysis because it was a point estimate (e.g. $10,000 ± $2,000)?
   ________ Yes ________ No

3. Was any information **not** included in your analysis because the probability of occurrence was uncertain (e.g. there is a 75% to 85% chance an asset can be sold for $2,000)?
   ________ Yes ________ No

POST EXPERIMENTAL QUESTIONNAIRE – PART B.

PLEASE PROVIDE THE FOLLOWING INFORMATION ABOUT YOURSELF AND THE TASK YOU PERFORMED IN PART I. **THIS INFORMATION WILL BE VERY USEFUL TO THE STUDY. ALL INFORMATION PROVIDED WILL BE KEPT COMPLETELY CONFIDENTIAL.**

1. Your age ________.

2. Your gender. F______. M______.

3. How much full time business work experience do you have? _______years and _______ months.

4. What is your current position or rank at your Company?

5. Please indicate the extent of your education. Bachelors Degree ____ Masters Degree ____ Other ___

6. Please specify your degrees (e.g. accounting, management, M.B.A.)

7. Are you a Certified Public Accountant (CPA)? Yes _____ No _____.

8. Are you a Certified Management Accountant (CMA)? Yes_____ No _____.

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9. How much public accounting work experience do you have? ______ years and ______ months.

10. How much management accounting work experience do you have? ______ years and ______ months.

11. How much resource allocation experience (e.g. capital budgeting) do you have? _____ years and ____ months.

12. Your resource allocation work experience includes which of the following? (Please mark an X next to all that apply and indicate the amount of experience/frequency).

   ______ Capital budgeting (i.e. preparing a budget of the planned expenditures for facilities, equipment, new products, and other long-term investments).

   ______ years and ______ months.

   How frequently do you perform this task each year?
   ______ times per year

   ______ Analysis of Capital Projects (i.e. passing judgment and/or giving approval on the acceptability and continuance of capital projects).

   ______ years and ______ months.

   How frequently do you perform this task each year?
   ______ times per year

   ______ Project Management (i.e. analyzing and keeping track of ongoing capital projects).

   ______ years and ______ months.

   How frequently do you perform this task each year?
   ______ times per year

   ______ Other (Please specify below).

   ______ years and ______ months.

13. Please indicate on the scale below what best represents the difficulty of the cash flow analysis task (this includes your analysis and subsequent judgments and decisions).

<table>
<thead>
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<th>Extremely Difficult</th>
<th>Extremely Easy</th>
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<tbody>
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<td>0</td>
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<td>8</td>
<td>9</td>
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<td>10</td>
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</tbody>
</table>

Neutral

78
14. Please indicate on the scale below what best represents the how realistic you found the cash flow analysis task.

<table>
<thead>
<tr>
<th>Very Unrealistic</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10 Very Realistic</th>
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**POST EXPERIMENTAL QUESTIONAIRRE - PART C.**

**PLEASE CIRCLE ONE ANSWER TO THE FOLLOWING QUESTIONS.**

1. If deciding whether to retire now or one year from now, you should NOT consider.
   a. The alternative uses of the time you spend working.
   b. The cost of the food that you consume while you are working.

2. You won a free ticket to see an Eric Clapton concert (which has no resale value). Bob Dylan is performing on the same night and is your next-best alternative activity. Tickets to see Dylan cost $40. On any given day, you would be willing to pay up to $50 to see Dylan. Assume there are no other costs of seeing either performer. Based on this information, what is the opportunity cost of seeing Eric Clapton?
   a. $10
   b. $50

3. A corporation's net income as presented on its income statement is usually
   a. More than its economic profits because opportunity costs are not considered in calculating net income.
   b. More than its economic profits because economists do not consider interest payments to be costs.

4. Your business currently produces Product X and your factory is at full capacity. Factory rent is $120,000 annually. You are considering decreasing production of Product X by 25% and producing a new product Y. Which of the following is the most relevant when making this decision? (Assume there is constant demand for product X and Y).
   a. The profit of making Product Y.
   b. The accumulated profits of Product X.
5. Which of the following does NOT illustrate the concept of an “opportunity cost”?

   a. “If the U.S. government decides to spend $1 million annually to subsidize education they may or may not improve the education system.”

   b. “Increased government spending on the military will force a reduction in spending on welfare programs.”

6. In deciding whether to contact your broker and invest in a public company’s bond offering and earn a taxable return of 8% or invest in a non-taxable municipal bond and earn a 5% return, you should consider which of the following?

   a. The possibility that there will be a large hike in interest rates in the near future.

   b. The taxes you can save if you invest in the municipal bond.

7. Maria decides to spend an additional hour working overtime rather than watching a video with her friends. She earns $9 per hour at her job. Her opportunity cost of working this extra hour is:

   a. The enjoyment she would have received had she watched the video.

   b. Nothing, since she would have received less than $9 of enjoyment from the video.

8. Suppose you’re eating a meal at a restaurant. If you order steak, what is forgone benefit if you have the steak meal?

   a. The price of the steak dinner.

   b. The lost opportunity to have the grilled chicken instead.

9. Athletic director: "Members of our sports teams included, for the fall season, 80 football players and 40 cross-country runners; for the winter season, 20 wrestlers and 40 swimmers; for the spring season, 50 track-team members and 20 lacrosse players. Each team athlete participates in his or her sport five days a week for the whole three-month season, and no athlete is on two teams during any one season. Therefore, adding these figures, we find that our team sports program serves 250 different individual athletes."

   In drawing the conclusion above, the athletic director fails to consider the relevant possibility that

   a. Athletes can be on more than one team in a single season.

   b. Athletes can be on teams in more than one season.

   c. Some of the team sports require a larger number of athletes on the team than do others.

   d. More athletes participate in team sports during one season than during another.
An athlete might not participate in every one of the practice sessions and athletic contests in his or her sport.

10. The average after-tax income for a household was 2.4 percent higher in 1983 than in 1982. At the same time, average after-tax income declined for households at the lower- and middle-income levels.

Which of the following can be most reasonably inferred from the information above?

a. There were more households overall in 1983 than in 1982.

b. There were fewer households at the upper-income level in 1983 than in 1982.

c. Total after-tax income for all households at the lower- and middle-income levels was higher in 1983 than in 1982.

d. Average after-tax income for households at the upper-income level rose by more than 2.4 percent between 1982 and 1983.

e. Average after-tax income for households at the lower- and middle-income levels was declining prior to 1982.

11. Six products - U, V, W, X, Y, and Z - are to be placed in the display window of a vending machine with six compartments, numbered 1 through 6 from left to right. The products must be placed in the window, one product in each compartment, according to the following conditions:

- U cannot be immediately to the left or immediately to the right of V.
- W must be immediately to the left of X.
- Z cannot be in compartment 6.

Which of the following products CANNOT be placed in compartment 1?

a. U

b. V

c. W

d. X

e. Z
12. Existing United States landfills are rapidly approaching the limits of their capacity. Landfills can leach toxins into groundwater, polluting it. Instead of creating more landfills, solid-waste managers should recycle as much trash as possible and then incinerate the remainder. This will keep future environmental damage to a minimum.

Which of the following is an assumption on which the argument made above is based?

a. Future landfills will pollute the environment more than do those that already exist.

b. After existing landfills reach the limit of their capacity, they are closed, and the leaching of toxins from these sites decreases.

c. Reducing the volume of trash through recycling will not lessen future environmental danger unless the remaining trash is subsequently incinerated.

d. The environmental damage caused by the proposed incineration of trash would be less than that caused by the leaching of toxins from new landfills into groundwater.

e. No new landfill sites can be found in order to increase the total capacity of landfills in the United States.

13. A dog hears higher pitches than a human hears; a cat has a greater capacity to see in dim light than a human normally has; a platypus picks up weak electric signals to which a human is normally insensitive.

Which of the following conclusions can be properly drawn from the statements above?

a. Most animals have sensory capacities superior to those demonstrated by humans.

b. Some animals have sensory capacities that are different from those of humans.

c. During evolution the eyes and ears of human beings were modified to make human sense perception less acute.

d. Researchers should not be surprised to find that all the sensory capacities of platypuses are greater than any of those demonstrated by humans.

e. Any human who can see in dim light does so less well than any cat.
14. Nonprescription sunglasses shield the wearer’s eyes from damaging ultraviolet sunlight. Squinting, however, provides protection from ultraviolet rays that is at least as good as the protection from nonprescription sunglasses. There is, therefore, no health advantage to be gained by wearing nonprescription sunglasses rather than squinting.

Which of the following, if true, most seriously weakens support for the conclusion above?

a. Many opticians offer prescription sunglasses that not only screen out ultraviolet sunlight but also provide corrective vision.

b. Some nonprescription sunglasses provide less protection from ultraviolet sunlight than does squinting.

c. Squinting strains facial muscles and causes headaches and fatigue.

d. Many people buy sunglasses because they feel that sunglasses are fashionable.

e. Some people squint even when they are wearing sunglasses.

15. A study of attitudes toward new cars showed that cars that were identical in every respect except color received widely differing ratings for quality from potential buyers. Therefore, in future advertisements for cars of high quality, we can expect to see no variety in the color of car featured. Which of the following is an assumption made in the passage above?

a. If a car in a preferred color is not available, a buyer is usually willing to accept the car in another color.

b. New cars differ significantly from each other with respect to quality.

c. There is a single color generally associated with the highest quality rating in the study.

d. An advertisement for a particular car should display all of its significant advantages.

e. Potential buyers give more weight to color than to price in making a decision about a car.
16. A gardener has to plant exactly four varieties of flowers in a flower bed, one variety in each of
four rows in an ascending order of height from the first row to the fourth row. The seven varieties
available to the gardener are, in ascending order of height, red begonias, pink petunias, orange
marigolds, red geraniums, white snapdragons, yellow zinnias, and pink cosmos. The following
restrictions on color arrangements apply:

No two varieties of the same color can be planted. Also, Orange flowers cannot be planted in a
row immediately adjacent to a row of yellow flowers.

Which of the following is a color arrangement, from first row to fourth row, which the gardener
can select for the flower bed?

a. Pink, red, white, pink
b. Pink, orange, white, red
c. Red, orange, yellow, pink
d. Red, white, yellow, pink
e. Red, pink yellow, white

PLEASE BE SURE TO PUT ALL CONTENTS BACK INTO THE ENVELOPE.

THANK YOU FOR YOUR PARTICIPATION! ☺
APPENDIX C

PARTICIPANT ANALYSIS

Directions:

- When complete please be sure to put this section in the envelope provided.
- **Ignore** income taxes and the time value of money.
- **Assume all amounts affect cash in the year of occurrence.**
- Prepare your analysis over a 5 year horizon.
- Prepare your analysis for continue vs. discontinue under their respective section.

**Discontinue logistics project**
(Stay with third party provider)

Total net cash outflows (cost) = $________________
Continue logistics project
(Dismiss third party provider)
PARTICIPANT ANALYSIS (continued)

Total net cash outflows (cost) = $______________
APPENDIX D
HUMAN SUBJECTS APPROVAL LETTER

Office of the Vice President For Research
Human Subjects Committee
Tallahassee, Florida 32306-2742
(850) 644-8673 - FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 9/14/2006

To: Lisa Victoravich
3334 Argonaut Drive
Tallahassee, FL 32312

Dept.: ACCOUNTING

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Exempt per 45 CFR § 46.101(b) 2 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by 9/13/2007 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: Martin Fennema
HSC Nr. 21099 9639
APPENDIX E

INFORMED CONSENT FORM

INFORMED CONSENT FORM

I freely and voluntarily and without element of force or coercion, consent to be a participant in the research project entitled “Decision Making in a Capital Project Evaluation Context.”

This research is being conducted by Lisa M. Victoravich who is under the direction of Bud Fennema, Associate Professor of Accounting at Florida State University. I understand the purpose of the research project is to better understand individuals’ decision making when performing a capital project analysis.

I understand I will be asked to read information about a company that is implanting a logistics division and analyze the cash flows associated with continuing the project. After analyzing the project I will be asked to make judgments and decisions based on my analysis. The total time commitment will be about 45 minutes. Any questions that I may have will be answered by the investigator, Lisa M. Victoravich.

I understand my participation is totally voluntary and I may stop participation at any time. All my answers to the questions will be kept confidential to the extent allowed by law and identified solely by a subject code number. My name will not appear on any of the results. No individual responses will be reported. Only group findings will be reported. Data will be stored in the investigator’s home office and only the investigator will have access. There are no plans to destroy data and as such it will be held in a secure place for perpetuity.

I understand that participation in this study does not involve greater than minimal risk, whereas “minimal risk” means that the risks of harm anticipated in the proposed research are not greater, considering probability and magnitude, than those ordinarily encountered in daily life or during the performance of routine or physical psychological examinations or tests. As well, I will not be exposed to any form of risks (physical or otherwise) as a result of their participation in this study.

I understand there are benefits for participating in this research project. By participating I will enable accounting researchers to obtain a better understanding of what factors are important when individuals perform a capital project analysis. Specifically, it will provide insight into the beneficial role of college coursework and on the job task specific experience when analyzing capital projects.

I understand that this consent may be withdrawn at any time without prejudice, penalty or loss of benefits to which I am otherwise entitled. I have been given the right to ask and have answered any inquiry concerning the study. Questions, if any, have been answered to my satisfaction.

I understand that I may contact Investigator Lisa M. Victoravich, Florida State University, College of Business, Department of Accounting, at (850) 644-3869 or lmv3385@fsu.edu, or her major Professor Bud Fennema at (850) 644-8234 or bfennema@cob.fsu.edu for answers to questions about this research or my rights. Group results will be sent to me upon my request.

If I have any questions about my rights as a subject/participant in this research, or if I feel I have been placed at risk, I can contact the Chair of the Human Subjects Committee, Institutional Review Board, through the Vice President for the Office of Research at (850) 644-8633.

I have read and understand this consent form.

(Signature) (Date)

(Name – please print)
REFERENCES


**BIOGRAPHICAL SKETCH**

Lisa Marie Victoravich was born in Chicago, IL and grew up in Colorado and Florida. She earned a Bachelor of Science in Accounting in 1999 and a Master of Accounting in 2000 from Florida State University. After achieving her Master of Accounting degree Lisa gained professional audit and assurance services experience at Ernst & Young in West Palm Beach Florida. Lisa left Ernst & Young in 2002 to pursue a career in academia and entered the Ph.D. program at Florida State University.

Lisa will begin her career in academia as an assistant professor at the University of Denver. She will be teaching in the areas of managerial and cost accounting. She has also taught in the areas of financial accounting and auditing. Lisa’s research interests include the role of experience in judgment and decision making in accounting.

Lisa is an active licensed Certified Public Accountant in the State of Florida and a member of the American Accounting Association, Society of Judgment and Decision making, the Institute of Management Accountants and the American Institute of Certified Public Accountants.