Moral Hazard, Ethical Considerations, and the Decision to Implement an Information System

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ABSTRACT: A decision-making study was conducted to examine the effects of moral hazard on information systems (IS) professionals' decisions whether or not to implement a system with quality problems. Moral hazard was defined as an incentive to act in one's self-interest in conflict with the organization's overall goals while being able to hide those actions through privately held information. Highly experienced IS professionals provided responses to a hypothetical decision case that revealed a tendency to implement a project with quality problems in a moral hazard situation. Their decisions, however, were strongly influenced by ethical considerations. These findings suggest that key economic constructs, such as moral hazard, apply to system implementation contexts. They also suggest that organizations can significantly moderate self-interested behavior by fostering an ethical climate.

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A LARGE NUMBER OF INFORMATION SYSTEMS ARE IMPLEMENTED when there are clear signs that quality problems exist and that the system will not perform up to expectations. Kull [26], for example, describes a large project involving the design and implementation of a complex information system. There were clear indications that the proposed system could not perform the tasks for which it was designed. The project's managers nevertheless elected to implement the system, at considerable cost and embarrassment to the large CPA firm responsible for the project. Jones [20] suggests that approximately 60 percent of all large software-development projects are at risk because of quality problems.

Although prior studies have identified factors that may lead to quality problems in information systems [e.g., 7, 9, 12, 29], relatively little research considers the impact of the organization's incentive system on the IS developer's actions. The importance of incentives, however, is noted by Runge [40] who describes how the leader of a systems project had a "window to hit." If she missed it, she would have to delay implementation for several months—at a cost of $200,000 for a six-month period—until the peak ordering season passed. She knew that the new system had quality problems and was not ready to go in, but if she delayed its implementation she would miss an important incentive bonus tied to meeting the schedule. Consequently, she implemented the system anyway. This resulted in an "error-ridden and failure-prone" system that was slow and highly inefficient.

Stories like this are descriptive of the moral-hazard construct from agency theory [2]. This suggests that agency theory may provide a conceptual explanation why IS professionals sometimes implement systems that have quality problems. Agency theory assumes individuals are motivated by their own economic interests, rather than by the interests of their firm. Two conditions, an incentive to shirk and privately held information, are used to define the moral-hazard construct. Shirking refers to behavior that is inconsistent with the organization's overall goals. It arises when performance incentives are based on an imperfect surrogate of the desired performance behavior. The individual is said to possess private information when he or she has information that is not available to senior management. Moral hazard exists when both of these conditions occur. When moral-hazard conditions are present, agency theory predicts that self-interest prevails over organizational goals.

Moral-hazard conditions have been observed in practice. For instance, imperfect surrogates of system quality, such as being "on time" and "within budget," sometimes serve as the basis for incentives to IS professionals [24]. When this happens and the IS developer also knows more than senior management about the system's actual level of quality, as is common, the circumstances for moral hazard exist. Agency theory predicts that when moral hazard exists, IS professionals will reach decisions that are in their own self-interest, even when this is contrary to the interests of their firm [2, 3].

No research has specifically examined the implementation decisions of IS professionals in a moral-hazard context. Accordingly, one objective of this paper is to investigate whether IS professionals who experience moral hazard will more frequently implement an IS project that has quality problems than will those who do not experience moral hazard.

Some research suggests, contrary to the predictions of agency theory, that individuals who experience moral hazard may not always act strictly in their own self-interest. In their examination of adverse selection, a related agency problem, Harrell and Harrison [14, 16] found indirect evidence that individuals may not act strictly in their own self-interest, as predicted by agency theory. Many of the participants in their studies reached decisions that favored their organization's interests over their own interests. Ethical considerations may explain these results. Individuals who have become socialized into their organizational role may come to believe they are ethically obligated to behave in accordance with their organization's interests, rather than in their own self-interest [21, 28]. Harrell and Harrison [14] and Noreen [31] suggest that ethical perceptions moderate individuals' tendency to pursue their own interests when their interests conflict with those of their organizations. Thus, a second objective of this study is to determine if IS professionals' ethical perceptions also influence their project-implementation decisions when the circumstances for moral hazard exist.

An examination of these issues is important for several reasons. It is difficult, perhaps impossible, for organizations to foresee all possible implications of their incentive systems. In addition, many organizations have a decentralized management approach, which makes it very difficult for senior managers to be fully informed of quality problems during the development of an information system. As a result, it is likely that the conditions for moral hazard will sometimes occur. Organizations need to know how IS professionals behave when moral hazard occurs. Collins et al. [6] state: "like other professionals, computer scientists are expected to make responsible judgments, even when their own self-interests are involved." It follows that organizations need to know the extent to which ethical considerations moderate the effects of self-interest on the behavior of IS professionals. In addition, it is important to examine the descriptive validity of important economic behavioral assumptions, such as those contained in agency theory, in contexts that may evoke ethical considerations by professional decision makers.

Theory and Hypothesis Development

Moral Hazard

MOST PRIOR RESEARCH DEALING WITH WHY SYSTEM DEVELOPERS implement information systems with quality problems has focused on issues of project management [9, 29], failure to include relevant participants such as the users during the analysis, design, and implementation phases of system development [4, 18, 23, 48, 49], and development of valid indicators for measuring system quality [7, 12, 22, 39, 46, 47].

These studies have identified important factors associated with low-quality informa-
tion systems. Prior research, however, has largely ignored certain aspects of the IS
development environment, such as the organization's incentive system and internal
information system. The result may have been that some potentially important
solutions to the problem have been overlooked. Agency theory provides a conceptual
framework for investigating the impact of incentives and information on the decision
to implement information systems.

Agency theory [2, 3, 8] describes how incentives and information affect the
behavior of individuals in an organization in terms of the implied contractual
relationships that exist between principals (senior management in this study) and
agents (IS system developers in this study). Principals are considered to contract
with agents to perform certain activities such as the development and implemen-
tation of an information system. The interests of principals are assumed to be
consistent with the overall objectives of the organization. In most instances, the
interests of agents are also considered to be consistent with the organization's
objectives. Agency theory recognizes, however, that agents are sometimes moti-
vated to act contrary to the objectives of their organization [2]. This situation is
believed to occur when rewards and incentives are based on imperfect surrogates
for performance. For instance, consider an organization whose primary goal is to
achieve high system quality and that measures performance according to whether
it is on schedule and within budget. These measures can signal information to
upper management about system quality because many projects that go beyond
their scheduled implementation date and budget are experiencing quality prob-
lems. Being on time and within budget, however, is not a perfect surrogate for high
system quality. One way to achieve timely delivery and low cost is to reduce
quality. An incentive system based on such measures could motivate system
developers to spend less effort on quality in order to increase their compensation.
If the principal cannot directly verify the actions of an agent, the agent may be
able to reduce his or her effort, yet receive the same reward. When an agent pursues
his or her own goals rather than the primary goals of the organization, the agent is
said to be engaging in self-interested behavior.

Agency theory suggests that self-interested behavior is also affected by information.
When both the principal and the agent have complete knowledge of the agent's actions,
this condition is called information symmetry. When information symmetry exists,
agents cannot pursue their own interests without detection. When the principal cannot
completely monitor the actions of agents, the condition becomes one of information
asymmetry. When information asymmetry exists, agents can act in ways that are
inconsistent with their organization's objectives without being detected. In this case,
the agent is said to possess privately held information regarding his or her actions.

When information symmetry exists, system developers with an incentive to imple-
ment a project with quality problems in order to stay on schedule are unlikely to do
so because their senior management would immediately see that their actions are
contrary to the organization's primary goals. Information symmetry motivates devel-
opers to delay implementation until the quality problems are resolved. For various

reasons, however, principals often cannot or do not completely monitor the quality of projects under development. When this happens, system developers possess privately held information. According to agency theory, privately held information reduces an agent's motivation to pursue organizational goals and can provide system developers with opportunities to implement systems with quality problems that are unknown to senior management.

When an agent has both (1) economic incentives that are based on a poor surrogate of the desired behavior, and (2) privately held information, moral hazard exists. The moral-hazard construct is central to agency theory and provides the basis for agency theory's assertions regarding goal-incongruent behavior. When moral hazard exists, agency theory asserts that agents will pursue their own interests, even if their actions are contrary to the goals of the organization [2]. When moral hazard does not exist, agents are assumed to pursue organizational goals. Naturally, organizations would like to know whether or not information system developers actually behave as agency theory predicts. The current study provides a first investigation into this question within an IS context.

The professional literature provides anecdotal evidence that moral-hazard conditions exist in practice. For instance, King [24] describes a "pay-for-performance" system at Xerox in which 5 percent of an IS manager's base pay and up to 10 percent of the manager's bonus are tied to achieving "strict deadlines on projects that business management has classified as top priority." With this type of incentive, the developer of an information system that is experiencing quality problems must choose between two conflicting courses of action: (1) stay on schedule to avoid a significant loss in personal compensation, or (2) accept a significant loss in personal compensation in order to delay implementation while working out the system's quality problems. In such circumstances, IS professionals are motivated to implement their projects on the scheduled date, even if the projects have quality problems.

In addition, IS developers often have information about the quality of the systems they manage that is not available to senior management. The decentralized form of management adopted in many organizations means that responsibility for IS development is delegated to project managers. As a result, more senior management may have relatively little direct information about system quality. Further, in many organizations, the developer has primary responsibility for assessing the quality of the system he or she manages [17]. When this happens, the developer clearly has considerably more information than senior management about the quality of the IS system.

Agency theory, thus, implies that, when moral hazard exists, IS professionals will implement systems that have quality problems, rather than delay implementation until these problems are resolved. Anecdotal evidence is consistent with this prediction from agency theory. The following hypothesis formalizes this prediction:

H1: IS professionals who experience the conditions for moral hazard will exhibit a greater tendency to implement a system with quality problems than will those who do not experience the conditions for moral hazard.

Ethical Considerations

In addition to knowing whether agency theory accurately describes the behavior of IS professionals in moral-hazard situations, organizations would like to know if behavior is conditioned by other considerations. Several agency-theory researchers have criticized agency theory's assumption of strict self-interest. Baiman [3] for example, acknowledges that "[t]he principal–agent model has been criticized as too narrow because it apparently leaves no room for trust and fairness, which are also claimed to affect behavior" (p. 345). In addition, Noreen [31] argues that, "while there may be some people who are unreservedly opportunistic, others do constrain their own behavior out of an ethical sensibility or conscience" (p. 359). These assertions suggest that, although agency theory might be a valid description of behavior, it may not be complete. Behavior in moral-hazard situations might be conditioned by ethical considerations.

It is commonly believed that the decisions reached by many individuals are influenced by ethical considerations. Jones [20] defines an ethical decision as one that is both legal and morally acceptable to the larger community, while an unethical one is either illegal or morally unacceptable to the larger community. He classifies the study of business ethics into two categories: normative and contextual studies. Normative studies describe how people should behave, given normative standards and justifications of morality [13, 35]. Contextual studies consider how individuals actually behave in different sets of circumstances. Issues that have been considered in prior contextual studies involve, for example, organizational climate [45], culture [25], organizational hierarchy [19], and role conflict [43]. The research described here examines a new context, the ethical considerations of IS professionals when they experience the conditions for moral hazard.

Professionals are likely to consider ethical dimensions in moral-hazard situations that result from the role they occupy within the organization. During a socialization process, which occurs when an individual initially assumes a role, appropriate behavior is "rewarded" and inappropriate behavior is "punished" through social cues provided by peers and superiors [21, 28, 30]. Through this socialization process, an individual who assumes an organizational role learns, accepts, and adopts the behavioral norms associated with that role. Norms are unwritten rules that define acceptable and unacceptable role behavior. The behavioral norms of organizational roles are believed to be derived from a broader, more abstract set of organizational and societal values (e.g., morality, fairness, and justice). These behavioral norms prescribe and standardize the behavior expected of individuals who occupy a professional role within an organization.

Individuals who accept and adopt the norms of their organizational role can develop a strong commitment to their organization that may transcend their own economic self-interest. Those who have become socialized into their organizational role may, therefore, feel that they have an ethical obligation to behave in accordance with their organization's goals, rather than to act in their own self-interest. Theories of ethical decision making also support this proposition. Ponemon [33], for example, posits that

the socialization process of U.S. public accounting firms influences the moral development of the firms' professional staff.

The approach used in this study to measure ethical considerations relies on the research of Reidenbach and Robin [36, 37], who developed and validated a three-factor, eight-item multidimensional ethics scale. Their measure assumes that individuals often use more than one rationale in making ethical judgments, and that the importance of a particular rationale is a function of the context of the situation. Thus, a multidimensional and multi-item measure is required. Reidenbach and Robin used several different scenarios to validate their ethics measure. These scenarios revealed three factor dimensions: a moral equity dimension, a relativism dimension, and a contractualism dimension.

The moral-equity dimension measures individuals' perceptions about whether behavior is fair, just, morally right, and acceptable. This dimension appears to provide a measure of altruistic ethical considerations. Its roots stem from Aristotle's principle of formal justice—equals ought to be treated equally, and unequals ought to be treated unequally. More recently, justice theory has recognized that fairness and justice require both equity in distribution as well as equity in process [5, 38].

The relativism dimension considers whether behavior is acceptable in relation to the guidelines, requirements, and parameters inherent in the individual's social or cultural system. Theories of ethical relativism assert that normative beliefs are derived from culture or individual experiences, and, therefore, there are no universal ethical rules that apply to everyone. For instance, differences in cultural taboos regarding bribery and kickbacks are frequently cited by corporations as justification for a relativistic approach to international trading practices.

The contractualism dimension considers whether behavior violates implied obligations, contracts, and duties. The concepts underlying the contractualism dimension are adapted from deontology, which proposes that individuals have an inherent duty to other individuals and to society as a whole. For instance, it is the duty of parents to care for their children and the duty of debtors to pay their debts. Rawls [35] extends these notions to the existence of social contracts, whether these contracts are explicit or implied.

Through the use of a multitrait–multicontext analysis, Reidenbach and Robin's [37] instrument was found to be very reliable and to have both convergent and discriminant validity. When analyzed against a behavioral intention measure, their multidimensional ethics scale also had predictive validity. Obtaining a behavioral intention measure is common in studies that ask subjects to evaluate the actions of others [11, 36, 37]. In general, subjects are asked what they would have done had they been in the situation described in the materials. These "behavioral intention" measures are then correlated with the subjects' responses to the multidimensional ethics scale. The findings from the prior studies show that individuals rely on patterns of criteria in evaluating situations that are similar to their patterns of criteria in estimating their own behavior [36, p. 877]. Flory, Phillips, Reidenbach, and Robin [11] used Reidenbach and Robin's [37] multivariate ethics measure to look at how accountants make ethical judgments. Their results were similar to Reidenbach and Robin's [37] further establishing the validity of the multidimensional ethics scale in a business setting.

Reidenbach and Robin's [37] ethics measure was initially validated for circumstances in which an individual evaluates the ethics of another persons' decisions. This approach does not allow one to directly determine the extent to which ethical considerations influence the actual decision maker (although high correlations with the behavioral intention measure are suggestive). Harrison and Harrell [16] recently remedied this limitation of the Reidenbach and Robin studies by demonstrating the measure's validity in circumstances where individuals who experience an agency problem initially reach a decision and then subsequently evaluate the ethical considerations associated with their own decision.

The particular ethical dimensions that a decision maker considers depend on the situation. In some circumstances, individuals might consider only one dimension, whereas in other situations they consider all three dimensions. This is why Reidenbach and Robin developed a multidimensional measure rather than relying on a single-item scale. Reidenbach and Robin explain [37, p. 639]: "A reasonable beginning assumption is that individuals use more than one rationale in making ethical judgments, and that the importance of those rationales is a function of the problem situation." The existing literature, however, is not sufficient to predict when a particular dimension will or will not be considered. Although our current understanding limits our ability to make these types of specific predictions, an important benefit of using the multidimensional ethics scale is that it enables us to better describe the participants' implementation decisions. Based on the preceding discussion, the following hypothesis is presented:

H2: When moral hazard exists, the decisions by IS developers of whether or not to implement an information system with quality problems will be influenced by one or more ethical dimensions.

Method

A DECISION-MAKING EXPERIMENT WAS CONDUCTED TO EXAMINE (1) the effects of moral hazard (i.e., privately held information together with an incentive to shirk) and (2) the ethical dimensions that IS professionals consider when deciding whether or not to implement a system with quality problems.

The Participants

Research instruments were mailed to 364 information systems professionals at companies with 500 or more employees throughout the United States. Potential participants were identified from a pool of 5,000 names[1] by first eliminating those whose job titles suggested that they were not involved in system development, such as Manager of Data Operations, or if the job title was ambiguous.[2] The final random selection was made using a process that uniformly selected candidates from the approximately 2,000 names remaining. The mailing list contained 3 percent ($n = 11$) control addresses, and thirteen were estimated as undeliverable.[3] Thus, 340 instru-

ments were available to participants. To induce participation, the participants were asked to indicate a charity to which the experimenters would donate $2.00. Second and third requests were mailed at one-week intervals reminding participants to complete and return the survey. The first mailing produced 80 responses, the second 49, and the third brought 18 responses for a total of 147 completed instruments, yielding an overall response rate of 43.2 percent.

Table 1 presents subject demographics. In general, the participants were highly experienced, averaging 18.8 years in the information systems profession. The participants were predominantly male, had a college education, and had been at their present position for at least five years. Over half of the respondents worked for manufacturing companies. Participants were classified as an IS executive if "vice president," "director," or "deputy" appeared in their job description. Those with "manager," "lead," "senior," or "chief" were classified as IS management. This resulted in 21 (14.5 percent) participants being classified as IS executives, 101 (70.3 percent) as IS management, 4 (2.9 percent) as consultants, and 18 (12.3 percent) as other IS positions. Two participants did not indicate a job title. Together, these data are impressive and underscore the superb qualifications of the participants to understand the implementation issues in the case.

We used demographic data to analyze the responses for a nonresponse bias according to a recommended approach for mail surveys [1, 27, 42]. Surveys returned as a result of the second and third requests were separated from those that were received as a result of the original mailing. Respondents to the original mailing do not differ significantly ($p > 0.10$) from respondents to the second and third requests in terms of gender, education level, education area, industry of employment, or years of experience. Furthermore, the groups do not differ significantly in their responses to the decision case ($F = 1.12$, $p = 0.291$). There is nothing in the data to suggest that nonresponse bias affected the results.

The Decision Task

The participants completed a decision case in which they were asked to assume the role of the manager of an information systems development project in a large consulting firm (see appendix A). The overall goal of the consulting firm was represented to be implementing "excellent quality systems that result in high user satisfaction after the project is complete." The particular project described in the case involved the total reengineering of the inventory order system for an important client who was pressing that the system be implemented as scheduled. The participants were informed, however, that the order system might not be ready to implement and that they should expect to have quality problems if the project were implemented now as scheduled. They were specifically told that the quality problems were likely to result in lower user satisfaction after the project was complete. To delay the project in order to work out the quality problems, however, required waiting until after the client's peak order season, thereby causing the project to fall substantially behind schedule and seriously over budget.

Table 1.   Demographic Statistics

Variable	N
Gender:	
Female	10
Male	136
Education level:	
Less than four years of college	35
Four year college degree	68
Graduate degree	43
Education area:	
Accounting or business information systems	86
Other business	17
Nonbusiness	39
Employing industry:	
Manufacturing	75
Insurance or real estate	30
Wholesaler/distributor/retailer	16
Finance/banking/accounting	15
Transportation	6
Other	4
Job title:	
IS executive (vice president, director, deputy)	21
IS management (manager, lead, senior, chief)	101
Consultant	4
Other IS positions	18

Within the framework of this basic implementation problem, the participants made a decision whether to implement the system now or to delay implementation until the quality problems were resolved. Their responses were provided using an eight-point scale with the endpoints labeled 1 = definitely implement now as scheduled and 8 = definitely delay implementing nine months. A vertical bar between the 4 and 5 responses separated the "implement now" side from the "definitely delay" side to allow treating the response as a dichotomous decision.

Some respondents provided spontaneous comments regarding how they arrived at their decisions. These comments indicate that the participants believed the task to be realistic and engaging. A typical comment from the moral-hazard condition reads, "This case presents a very real situation frequently encountered." Another participant, also in the moral-hazard condition, wrote, "The case represents one in which I am highly qualified to answer having been in this situation many times!" These provide evidence that the case and the issues it investigates are important to practicing IS professionals.

Research Design

Participants were randomly assigned to one of two groups. The participants in the experimental group (Yes-Moral-Hazard) experienced the conditions associated with

moral hazard. In order to induce privately held information, their instructions indicated that the management process of their firm is highly decentralized and that their superiors were unaware of the project's difficulties. To induce the presence of an incentive to shirk (on quality), they were told that a large portion of their compensation is contingent on implementing the projects they manage on schedule and within budget. In order to provide a realistic context, the decision case contains a number of issues in addition to private information and incentive to shirk. Within this rich decision context, we wanted to ensure that the participants attended to the information relating to the moral-hazard manipulation. It is important, in this regard, to note that the manipulation is between subjects and that individual participants were unaware of alternative versions of the case. These conditions eliminate, or at least substantially mitigate, the potential for "demand effects" [41].

The control group (No-Moral-Hazard) experienced neither of the conditions associated with moral hazard. Their instructions indicated that (1) the management process in their firm is highly centralized and that their superiors plainly knew of Project Y's difficulties (public information), and (2) a large portion of their compensation is contingent on implementing excellent quality systems that result in higher user satisfaction when the project is complete (no incentive to shirk).

Manipulation Checks

After the participants read the case and made their decision, they answered two manipulation check questions. To ensure that the participants completed their decisions before going on, the words, "DO NOT TURN THIS PAGE UNTIL YOU HAVE ANSWERED THE DECISION CASE" appeared in 50-point (almost one-inch) type, in upper-case bold letters in the center of the page following the decision case and preceding the manipulation check. Responses to both manipulation checks were provided using seven-point Likert scales, and participants were asked to respond in relation to the case that they had just read. The first manipulation check question dealt with whether they had a contractual incentive to implement the project now or whether their incentives had been to delay implementation. Specifically, the participants indicated whether a substantial part of their case-based compensation was contingent on (1) being on schedule and within budget or (7) creating high-quality systems with high user satisfaction. Consistent with expectations, a t-test showed that the mean rating in the No-Moral-Hazard group (6.31) was significantly higher ($t = 17.55, p = 0.0001$) than the mean rating in the Yes-Moral-Hazard) group (2.08). The second manipulation check question dealt with whether or not the respondents had private information. The participants indicated whether their superiors (1) were unaware of Project Y's difficulties or (7) plainly knew of Project Y's difficulties. A t-test indicated that the mean rating in the No-Moral-Hazard group (6.49) was significantly higher ($t = 18.64, p = 0.0001$) than the mean rating in the Yes-Moral-Hazard group (1.90). The data are consistent with the intended manipulation of both incentives and privately held information.

Ethical Considerations

After responding to the manipulation check questions, the participants completed Reidenbach and Robin's [37] multidimensional ethics scale. The items that comprise the Reidenbach and Robin ethics measure are presented in appendix B. The first construct is a broad-based Moral Equity Dimension composed of four items. The Relativism Dimension consists of two items concerned with the guidelines, requirements, and parameters inherent in the social/cultural system. The Contractualism Dimension considers notions of implied obligation, contracts, duties, and rules, and consists of two items. The order of the items was randomized in the instrument, and responses were obtained using seven-point Likert scales. The two items in the Contractualism Dimension were reverse-coded for analysis purposes to be consistent with the other items. The participants were asked to indicate their feelings about a decision to implement the project that was presented in the decision case, regardless of their own decision.

Supplemental Information

Finally, the participants provided demographic data, answered two questions about how their own compensation was determined, and indicated the charity to which they wanted their $2.00 donation sent. The instruments were prefolded and preaddressed with the return postage paid so that participants needed only to staple them shut and place them in the mail. Seventy-five No-Moral-Hazard responses and seventy-two Yes-Moral-Hazard responses were received.

Results

THE FIRST HYPOTHESIS PREDICTED THAT IS PROFESSIONALS who experience the conditions for moral hazard will exhibit a greater tendency to implement a system with quality problems than will those who do not experience the conditions for moral hazard. In the experiment, this implies that participants in the Yes-Moral-Hazard condition will tend to implement the system now rather than delay when compared with those in the No-Moral-Hazard condition. The two-sample t-test was used to compare the decisions reached by the members of the two groups. Since directional relationships are predicted, one-tailed probabilities are reported. As expected, there was a significant difference between the means of the Yes-Moral-Hazard and those of the No-Moral-Hazard Groups (4.20 versus 5.40; $t = 3.37$, $p < 0.0005$).[4] Individuals in the Yes-Moral-Hazard Group exhibited a greater tendency to implement the project than did those in the No-Moral-Hazard Group.

In practice, the implementation choice as presented to the participants is dichotomous. A stronger test of H1 was conducted by treating the choice as a dichotomy between implement now or delay. Accordingly, responses left of the center line on the scale (1 through 4) were coded as 0 = implement. Responses to the right of the center line (5 through 8) were coded as 1 = delay implementation. This yielded a 2 × 2

classification table with the decision (implement now versus delay) and moral-hazard condition (yes versus no) as factors. A chi-square test was used to determine if the decision to implement was independent of moral-hazard condition [10]. The likelihood of reaching a decision to go ahead and implement a system with low quality is significantly greater when moral hazard is present than when it is not ($\chi^2 = 13.74$, $p < 0.001$). The typical individual in the Yes-Moral-Hazard group implemented the project now (63.8 percent) compared with the typical member of the No-Moral-Hazard group (33.3 percent). In the experiment, implementing the system now despite its quality problems favors the manager's self-interest and is contrary to the stated objective of their firm. These results clearly support the first hypothesis.

The second hypothesis predicted that one or more ethical considerations will influence the participants' decisions. Initially, the eight items in Reidenbach and Robin's multidimensional ethics scale were subjected to a principal components factor analysis using varimax rotation. The same three factors emerged as reported by Reidenbach and Robin [37] and Flory et al. [11]. The summated item scores show a high degree of reliability. Coefficient alpha was 0.88 for the Moral Equity Dimension, 0.68 for the Relativism Dimension, and 0.89 for the Contractualism Dimension. Coefficients of this magnitude are generally considered sufficient for measuring a multifaceted construct [32, 44]. Table 2 contains the factor scores for the three ethical dimensions.

As in tests of H1, H2 was analyzed using the raw responses on the eight-point Likert scale, and again by treating the response as a dichotomous decision. In the first analysis, multiple regression was used in which the dependent variable consisted of the participant's implementation decisions on the eight-point response scale. The three ethical dimensions, Moral Equity, Relativism, and Contractualism, served as independent variables. Following the prior literature [37, p. 647], the total score on each ethics dimension was computed by weighting the items belonging to it by their factor loading, summing the individual items for that dimension, and then dividing by the number of items in the dimension. The regression results are shown in Table 3. Moral Equity was significant ($t = 2.20, p = 0.016$) as well as the Relativism Dimension ($t = 4.14$, $p < 0.0001$). The effect for Contractualism was not significant ($t = 0.72, p = 0.239$). This latter result is consistent with previous studies using the multidimensional ethics scale that argue that individuals use different ethical rationales depending on the problem situation [37]. In the moral-hazard context of the decision case, the contractual relationships in the compensation system were explicit. Hence, it is likely that the participants did not see a decision to implement now as a violation of an implied contract because there was an explicit contract that sanctioned this decision. All parameter signs were in the predicted direction and the regression model explains a substantial amount (51.6 percent) of the variability in the IS professionals' decisions. The results of the regression analysis show that ethical considerations influenced the participants who experienced moral hazard to delay the implementation.

Further evidence that the implementation decision was influenced by ethical considerations was obtained by treating the decision as a dichotomous variable to

Table 2.   Factor Pattern for Ethics Measure

Item	Moral-equity dimension	Contractualism dimension	Relativism dimension
Fair	**0.879**	0.215	0.206
Just	**0.849**	0.317	0.188
Acceptable to family	**0.683**	0.261	0.199
Morally right	**0.672**	0.595	0.103
Violates unwritten contract	0.278	**0.865**	0.222
Violates unspoken promise	0.353	**0.852**	0.206
Traditionally acceptable	0.070	0.292	**0.845**
Culturally acceptable	0.363	0.069	**0.797**
Variance explained by rotated factors	2.750	2.133	1.570

Table 3.   Regression of the Implementation Response on the Three Ethical Dimensions in the Moral-Hazard Cell

Variable	Parameter estimate	T-statistic	p
Intercept	-0.0704	-0.117	0.9071
Moral-equity dimension	0.5239	2.195	0.0160
Relativism dimension	0.8740	4.138	0.0001
Contractualism dimension	0.1195	0.715	0.2388

$R^2 = 0.516; F_{3,62} = 22.061; p < 0.0001.$

implement now (responses 1 through 4) versus delay implementation (responses 5 through 8). The data were analyzed using discriminant analysis to determine how well the three ethical dimensions discriminate between the two decisions in the presence of moral hazard. The resulting classification table produced 84.5 percent correct predictions, a substantial improvement over the chance probability of 50 percent. This level of accuracy suggests that ethical considerations are good predictors of IS professional behavior when moral hazard exists. Logistic regression resulted in the same two significant ethics dimensions: Moral Equity ($\chi^2 = 6.128$, $p = 0.007$) and Relativism ($\chi^2 = 2.692$, $p = 0.05$). Parameter estimates for both dimensions have the predicted sign in that participants who considered it unethical to implement now tended to delay.

In summary, both hypotheses are supported by the results of the experiment. The participants who experienced the conditions of moral hazard tended to implement an IS system with quality problems rather than delay its implementation until the problems could be resolved. This decision, however, was influenced by two ethical considerations: a Moral Equity Dimension and a Relativism Dimension. The Moral Equity Dimension measures individuals' perceptions about whether behavior is fair, just, morally right, and acceptable. This dimension appears to provide a measure of

altruistic ethical considerations. The Relativism Dimension considers whether behavior is acceptable in relation to the guidelines, requirements, and parameters inherent in the individual's social or cultural system. Individuals who perceived a decision to implement an IS system with quality problems as a violation of these ethical dimensions tended to delay implementation.

Discussion

SOME LIMITATIONS AND STRENGTHS OF THIS STUDY SHOULD BE CONSIDERED before we discuss the implications of the results. One limitation is that the list of IS professionals from which the participants were randomly selected did not, of course, include all members of the overall population of IS professionals to which it might be desirable to generalize results. In addition, we used a specialized decision-making task to obtain the data. Accordingly, the study results should only be extended to other groups and settings with caution. One also cannot be certain that subjects always follow instructions in a study administered through the mail. Great care was taken, however, to design the case materials to encourage compliance with the instructions as far as possible. A strength of this study is that the research design provides a sufficient level of internal validity to examine its theoretical issues. In addition, a relatively high response rate was obtained from sophisticated IS professionals who are well qualified by their work experience to complete the decision task used in the experiment.

Agency theory predicts that IS professionals who experience the conditions for moral hazard will reach decisions that are strictly in their own self-interest, even when such decisions are contrary to the interests of their firm [2, 3, 8]. Others argue that individuals adopt the ethical behavior associated with their organizational role and would predict that the decisions of IS professionals will be influenced by ethical considerations [21, 34]. Accordingly, a decision-making experiment was performed to examine these issues.

The IS professionals in this study tended to behave as agency theory predicts. The typical participant who experienced conditions of moral hazard chose to implement a system with quality problems. Conversely, the typical participant who did not experience these conditions elected to delay implementation. These results indicate that incentive to shirk and privately held information motivate many participants to behave in their own interests over the interests of their organization, as agency theory predicts.

The finding that the behavior of IS professionals can conflict with organizational goals in a moral-hazard situation is important to both theory and practice. From a theoretical perspective, the findings support the assertions of agency theory and indicate that the behavior of IS professionals is influenced by self-interest. From a practical standpoint, the results are important because the conditions for moral hazard probably do occur in the real world. The current IS literature suggests that organizations sometimes use incentive systems that could motivate IS professionals toward behavior contrary to the firm's interests. In addition, some firms employ a decentralized management philosophy that give IS developers more information about the

quality of information systems than is available to senior management [24]. These observations suggest that agency theory might be useful for addressing practical IS issues in a real-world context.

Although the findings suggest that agency theory is a valid description of the behavior of IS professionals in this context, the ethics data also suggest that agency theory is not a complete explanation. As predicted, the decisions of the IS professionals who experienced moral hazard were influenced by ethical dimensions. Specifically, participants considered two dimensions: one of moral equity and one of relativism. Moral equity dimension involves whether behavior is considered fair, just, and morally right and acceptable to one's family. Relativism involves whether behavior is considered traditionally acceptable within the individual's social or cultural system.

The important finding that the behavior of IS professionals who experience moral hazard is influenced by ethical considerations has theoretical implications for both agency theory and ethics theory. First, the agency-theory assumption that individuals will act strictly in accordance with their own self-interest must be conditioned by ethical considerations. In the context of the present study, the influence of ethics on the participants' implementation decisions is quite strong. If this finding is supported by further research, agency theorists may wish to extend the principal–agent model to include a provision for ethical behavior. The results also have theoretical implications for ethics theory, as the findings are consistent with the argument that IS professionals become socialized into adopting the behavioral (ethical) norms of their organizational role and, therefore, reach decisions that are influenced by ethical considerations [21, 34].

The ethics results also have important practical implications. They support Collins et al.'s [6] assertion that the behavior of working IS professionals is significantly influenced by ethical considerations. By creating a corporate culture that places a genuine emphasis on ethical behavior at all levels, it may be possible to moderate self-interested behavior toward behavior that is more consistent with the overall objectives of the organization. In some circumstances, it may be easier for an organization to foster a corporate culture that strongly supports its goals than to ensure that conditions of moral hazard never occur.

Some issues that might be addressed in future research should be mentioned. As noted earlier, the participants in this study responded to hypothetical circumstances that did not involve actual monetary rewards. This raises the question of how they might respond in circumstances that involve actual monetary rewards. Would the motivational impact of actual monetary rewards be sufficient to overcome ethical considerations? Do individuals perform a type of cost–benefit analysis in terms of personal interest versus organizational interests? It is hoped that this research will stimulate others to examine these issues further.

NOTES

1. The mailing list consisted of subscribers to *Information Week*, published by CMP Publications, Inc., New York.

2. The original mailing list was computer-sorted by job title and then manually culled by one of the authors who has over twelve years of IS experience. In addition, a cover letter preceded the instrument requesting anyone not employed as an "information systems professional" not to complete the study. This provided a second check on the experimenter's classification.

3. Control addresses are owned by the company that supplied the mailing list in order to monitor the mailings of their clients. Some of the instruments (148) were mailed "bulk rate" which does not provide for the return of undeliverable items. To estimate the percentage of undeliverable addresses, 216 instruments were mailed at the first-class rate using addresses that were evenly distributed throughout the mailing list. Of these, eight (3.8 percent) were returned as undeliverable.

4. As far as can be determined, the assumptions of the t-test were met. The t-tests were conducted using SAS's PROC TTEST, which tests for violations of the homogeneity of variance assumption ($F_{70,74} = 1.02, p = 0.940$). Responses from the two samples can safely be assumed to be independent since less than 2 percent of the responses are from individuals in the same company. The t-test is also robust with regard to many of its assumptions, including normality and the type of scale.

Since the data are not necessarily interval, nonparametric analyses were conducted by treating the responses as ordinal data. We reject the null hypothesis that all responses are drawn from the same population using the Wilcoxin-Mann-Whitney test ($z = -19.287, p < 0.001$). Treating the responses as nominal data, this null hypothesis is once again rejected ($\chi^2 = 23.397, p = 0.002$).

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APPENDIX A: Project Implementation Decision Case

Yes-Moral-Hazard Condition

You are a system development project manager in a large consulting firm. The overall goal of your firm is to implement excellent quality systems that result in high user satisfaction after the project is complete.

Presently, you manage Project Y, the total reengineering of the inventory order system for an important client. The client is pressing you to implement the system now, as scheduled, so that it will be operational prior to the peak order season six months from now. Project Y is, however, experiencing some difficulties. You are concerned that the order system may not be ready to implement and expect to have some quality problems if Project Y is implemented now as scheduled.

If you implement now, as scheduled, these quality problems are likely to result in lower user satisfaction after the project is complete. A delay, however, requires you to postpone implementation for at least nine months until after the client's peak order season. This means Project Y will fall substantially behind schedule and will be seriously over budget due to considerable extra expenses associated with the delay. Thus, the only way to stay within budget and on schedule is by implementing Project Y now and working through the quality problems later.

To motivate performance, your firm makes a large portion of your compensation contingent upon your implementing the projects you manage on schedule and within budget. Therefore, **you will lose a substantial portion of your usual compensation unless you implement Project Y now, as scheduled**.

The management process in your firm is highly decentralized and your superiors are currently unaware of Project Y's difficulties. Although your superiors periodically review the performance of all projects, Project Y is not scheduled to be reviewed for another seven months. You believe the quality problems can be overcome prior to Project Y's review. Therefore, **if you implement the system now, as scheduled, your superiors will never know that Project Y had unresolved quality problems**.

Circle a number below to indicate whether you would implement the order system:

		Now					Delay			
Definitely implement now as scheduled	1	2	3	4	5	6	7	8	Definitely delay implementing nine months

No-Moral-Hazard Condition

You are a system development project manager in a large consulting firm. The overall goal of your firm is to implement excellent quality systems that result in high user satisfaction after the project is complete.

Presently, you manage Project Y, the total reengineering of the inventory order system for an important client. The client is pressing you to implement the system now, as scheduled, so that it will be operational prior to the peak order season six months from now. Project Y is, however, experiencing some difficulties. You are concerned that the order system may not be ready to implement and expect to have some quality problems if Project Y is implemented now as scheduled.

If you implement now, as scheduled, these quality problems are likely to result in lower user satisfaction after the project is complete. A delay, however, requires you to postpone implementation for at least nine months until after the client's peak order season. This means Project Y will fall substantially behind schedule and will be seriously over budget due to considerable extra expenses associated with the delay. Thus, the only way to stay within budget and on schedule is by implementing Project Y now and working through the quality problems later.

To motivate performance, your firm makes a large portion of your compensation contingent upon your implementing excellent quality systems that result in high user satisfaction after the project is complete. Therefore, **you will lose a substantial portion of your usual compensation unless you delay implementation of Project Y until the quality problems are worked out**.

The management process in your firm is highly centralized, so that your superiors plainly know of Project Y's difficulties. In addition, your superiors periodically review the performance of all projects, and Project Y is under review at this moment. Therefore, **unless you delay implementation, your superiors will immediately know that you implemented a project with unresolved quality problems that will result in lower user satisfaction after the project is complete.**

Circle a number below to indicate whether you would implement the order system:

		Now					Delay			
Definitely implement now as scheduled	1	2	3	4	5	6	7	8	Definitely delay implementing nine months

Cover Letter Instructions to Participants

You will assume the role of an information systems project manager who must decide whether to implement a new system now or whether to delay. You have been selected to complete this case because we believe you have personal insights into this type of decision. Therefore, your response is important. If you are not employed as an information systems professional, please indicate not I.S.P. on the face of this letter and return it straightaway. In total, the survey takes about 11 minutes to complete. I urge you to do so now and to return the case promptly.

APPENDIX B: Multidimensional Ethics Scale

Moral-Equity Dimension

Fair	1	2	3	4	5	6	7	Unfair
Just	1	2	3	4	5	6	7	Unjust
Morally right	1	2	3	4	5	6	7	Not morally right
Acceptable to my family	1	2	3	4	5	6	7	Unacceptable to my family

Relativism Dimension

Culturally acceptable	1	2	3	4	5	6	7	Culturally unacceptable
Traditionally acceptable	1	2	3	4	5	6	7	Traditionally unacceptable

Contractualism Dimension

Violates an unwritten contract	1	2	3	4	5	6	7	Does not violate an unwritten contract
Violates an unspoken promise	1	2	3	4	5	6	7	Does not violate an unspoken promise

Study items appeared in randomized order and participants were not given the dimension headings.