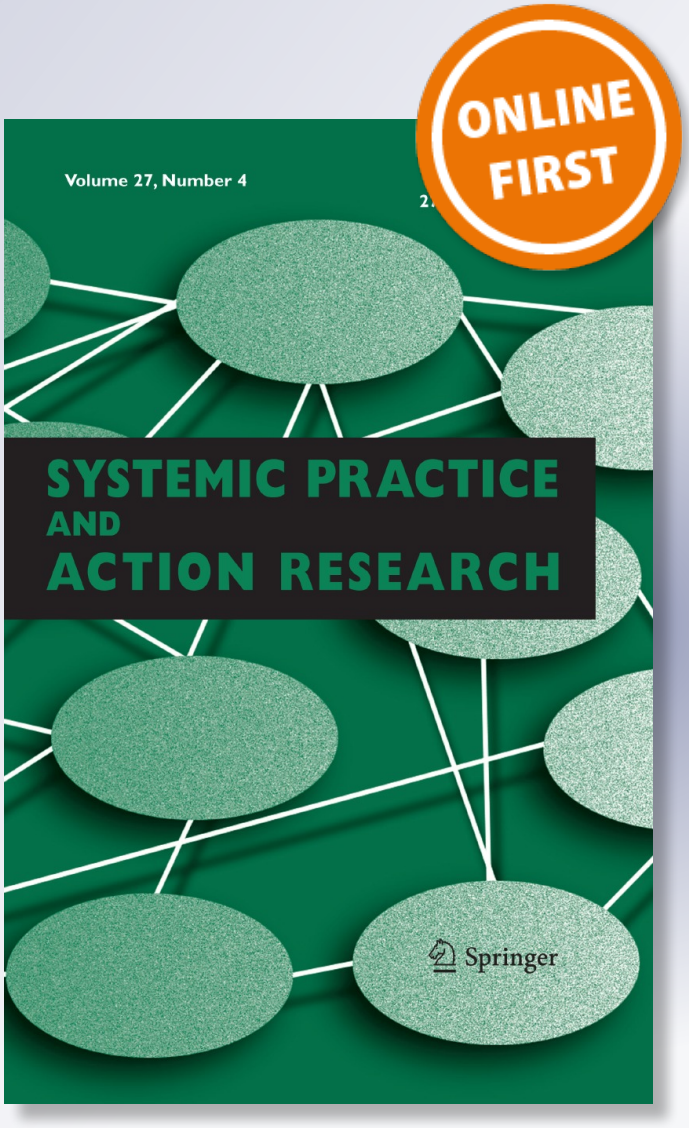
Attribution Theory: A Theoretical Framework for Understanding Information Systems Success

Ken C. Snead, Simha R. Magal, Linda F. Christensen & Atieno A. Ndede-Amadi

Systemic Practice and Action Research

ISSN 1094-429X

Syst Pract Action Res
DOI 10.1007/s11213-014-9328-x



Springer

Syst Pract Action Res
DOI 10.1007/s11213-014-9328-x

ORIGINAL PAPER

Attribution Theory: A Theoretical Framework for Understanding Information Systems Success

Ken C. Snead Jr. · Simha R. Magal · Linda F. Christensen · Atieno A. Ndede-Amadi

Abstract Information systems research often employs user satisfaction with, use of, and perceived organizational benefits of, newly-developed systems as measures of information system success. Further, this stream of research attempts to associate these measures of success with a myriad of hypothesized determinants involving organizational, personal, task, and system characteristics, as well as characteristics of the implementation process. Initial research in this area was criticized for the dearth of theoretical underpinning employed. Subsequent to these criticisms, underlying theory from a variety of disciplines now guides much of this research. Of particular interest to this research effort are the tenets of a well-established theory in the area of social psychology-attribution theory. While attribution theory has been employed in some of the more recent works investigating factors related to information system success, none of these works simultaneously consider the theory's information and motivational antecedents along with the success/failure nature of the system's outcomes, users' perceptions of the causes of the outcomes (attributions), and the reported level of user satisfaction with the system. In response, the current study develops a model for the simultaneous empirical examination of these issues by incorporating them into a behavioral decision making methodology administered to Professional MBA students. The study's results support the relevance of attribution theory as a theoretical framework for understanding those factors determining users' attributions for information system-related outcomes, as well as the influence of these attributions and the nature of the system outcome on the level of users' satisfaction with the system.

K. C. Snead Jr. (✉)
College of Business, Bowling Green State University, Bowling Green, OH 43403-0262, USA
e-mail: ksnead@bgsu.edu

S. R. Magal
Seidman College of Business, Grand Valley State University, Grand Rapids, MI, USA

L. F. Christensen
School of Business, Christian Brothers University, Memphis, TN, USA

A. A. Ndede-Amadi
School of Business and Management Studies, Kenya Polytechnic University College, Nairobi, Kenya

Published online: 24 July 2014

Keywords Attribution theory · Causal attributions · Information system success

Introduction

The incomparability/inconsistency of early information system success (ISS) studies was due their lack of incorporating underlying psychological, motivational, and cognitive factors that potentially mediate or moderate the relationship between measures related to, and determinants of, system success. Further, they did not consider/control either the nature of the outcomes resulting from using the system (such as the quality of the resulting decision or task completion) or the user perceptions of the causes of these outcomes. Such an approach did not consider that users'/subjects' responses may have been influenced by the ultimate success or failure of the system. It seems logical that both the success/failure nature of the outcome of system use, and the user perceptions of factors causing the nature of the outcome, would influence user evaluation of the system. For example, greater system satisfaction is likely to be reported by a user who experiences success (successfully completes a task or makes a good decision) upon using a supporting system. Further, the extent to which the user feels personally responsible for bringing about the outcome, as opposed to the feeling that something external was primarily responsible for that outcome, will likely also impact his/her reported satisfaction with the system.

Attribution theory addresses these issues by modeling psychological and motivational factors presumed to influence ISS, doing so by taking into account the impact of the success/failure nature of system-related outcomes and user perceptions of the causes of these outcomes. This theory is employed here to provide a conceptual framework to examine the impact of both the success/failure nature of system-related outcomes and user information related to other system-related experiences, on user perceptions of the causes of these outcomes. Further, both the causal perception and other system-related experiences are examined to determine if either impact user system satisfaction.

The next section of this paper provides a discussion of the ISS literature pertinent to this study. This is followed by a presentation of attribution theory and accompanying hypotheses, followed by a more detailed discussion of the theory's elements incorporated into this study (antecedents and consequences). In addition, discussion of the literature employing attribution theory in the ISS context and this study's incremental contribution will be presented. Sections presenting methodology, results, implications, and limitations will then follow.

Information System Success

Early research in the ISS arena identified various organizational, personal, task, and system characteristics, as well as characteristics of the implementation process, associated with ISS (e.g., Swanson 1974; DeBrabander and Edstrom 1977; Ginzberg 1979; Swanson 1982; Ives and Olson 1984; Franz and Robey 1986; Tait and Vessey 1988; Barki and Hartwick 1989; Wastell 1999). Organizational characteristics involve structure and top management support issues, while personal characteristics relate to beliefs, attitudes, and experience issues. Task characteristics refer to degree of structure, system characteristics deal with accuracy and reliability issues, while characteristics of the implementation process involve user participation, training methods, etc. Of concern, was the observation that results

across these ISS studies were often inconsistent and incomparable due to a myriad of measures being employed to measure "success" (e.g., user satisfaction, actual use, intentions to use, information quality, individual/organizational impacts), and to the atheoretical research designs used. This concern motivated ISS researchers to examine more reliable and valid ways to operationalize the notion of system "success" (e.g., DeLone and McClean 1992; Goodhue 1995; Goodhue et al. 2000; Abdinnour-Helm et al. 2005), as well as employ theoretical models to underpin the research designs used (e.g., Davis et al. 1989—"Technology Acceptance Model"; Snead and Harrell 1994—"Expectancy Theory"; Eccles and Wigfield 2002—"Motivational Beliefs"; DeLone and McClean 2003—"DeLone and McClean IS Success Model"; Venkatesh et al. 2003—"Unified Theory of Acceptance and Use of Technology"; Yi et al. 2006—"Technology Acceptance Model/Theory of Planned Behavior/Innovation Diffusion Theory"; Khayun et al. 2012—"The Delphi Technique").

Noteworthy to this study are the ongoing acknowledgments in the ISS literature that the phenomena related to the human/computer interactions in the information technology (IT) arena involves organizational issues and complex roles that "social actors" engage in while adopting, adapting, and using information systems (Reeves and Nass 1996; Marakas et al. 2000; Bebebasat and Zmud 2003; Lamb and Kling 2003; Standing et al. 2006; Wang and Benasat 2008; Sykes et al. 2009). Those acknowledging this social aspect of IT argue that the tenets of attribution theory, a prominent theory within the domain of social psychology, are relevant for the study of ISS. In fact, the social influence component of the unified theory of acceptance and use of technology (Venkahesh et al. 2003) considers concerns of system users about how they will be viewed by others as a result of their system use, particularly in the early stages when system use is mandatory. This notion is quite similar to the "social actor" dynamics subsumed by the motivations antecedent of attribution theory. Accordingly, a description of those tenets of attribution theory pertaining to this study (as developed by the seminal works formulating it) and corresponding hypotheses are presented.

Attribution Theory & Corresponding Hypotheses

Attribution theory is the study of the process by which people associate causes to events and outcomes that they experience (Jones and Davis 1965; Kelley and Michela 1980; Swanson and Kelley 2001). A major goal of the attributional process is to understand, organize, and form meaningful perspectives about outcomes and to predict and control them. This propensity to understand and control events and outcomes is more evident in situations with unexpected or negative outcomes, when outcome dependency is high, when involvement in the outcome is high, and when faced with an experience of lack of control (Kelley 1967; Weary et al. 1989; Bogumil 2001). It is noteworthy that these situations describe the circumstances/context surrounding system use (Standing et al. 2006). For purposes of this study, the "outcome" is the successful or unsuccessful completion of a task that was aided by a newly-developed information system.

Attribution theory suggests that certain factors, or *"antecedents,"* will influence or lead a person to infer the cause of an outcome in a particular way; these causal inferences are referred to as *"attributions."* Two of these antecedents purported to influence one's attributions are *"information"* and *"motivation."* The theory further suggests that there are *"consequences"* of causal attributions on an individual's affective, or emotional reaction, to the outcome. These elements of attribution theory are discussed in turn.

Attributions

Attributions are the inferences of causation of a particular event or outcome. A common dimension of attributions for outcomes involving success or failure is locus of control (Jones and Davis 1965; Kelley 1967; Stajkovic and Sommer 2000), which is the degree to which a cause is thought to be related to factors within the person (internal) or to the environment (external). Other dimensions of attributions, not germane to this study, relate to the stability and controllability of the cause. Based upon the work of Heider (1958), four causal factors have been identified and determined to be relevant to the interpretation of achievement related outcomes. These are ability, effort, task difficulty, and luck. Ability is the characteristics of a person that describe his/her task related capabilities. Effort is the personal characteristics related to the degree of persistence a person brings to bear upon a specific task. Task difficulty refers to the environmental characteristics related to the degree of challenge associated with task accomplishment, while luck has to do with the influence of random (chance) environmental conditions. Relating these causal factors to the locus of control dimension of attributions results in cataloging ability and effort as *internal* causes, and luck and task difficulty as environmental or *external* causes.

Antecedents

Antecedents are those factors impacting an individual's inference of the cause of an outcome. The classes of antecedents relevant to this study are *"information"* and *"motivations."* These antecedents highlight important ways in which the nature of an outcome impacts an individual's perception of the cause of that outcome.

Information

Kelley's (1967) information ANOVA model suggests that causal attributions will be associated with those factors perceived to vary systematically with outcomes. Further, the model identifies three characteristics of information that are thought to influence causal attributions-*consistency, distinctiveness, and consensus.* Each is illustrated using the following supposition:

$$\text{A } \textit{person}\,(P) \text{responds to a } \textit{stimulus}\,(S) \text{at a point in } \textit{time}\,(T)$$

A causal attribution or explanation of P's (user's) reaction to S (system-related outcome) depends on the three information characteristics: consistency has to do with this P's response to S at *other T's;* distinctiveness refers to P's response to *other S's*; and consensus is concerned with *other P's* responses to S. In an ISS context, these information characteristics represent specific aspects of user perceptions of past system experiences in three dimensions: a user's own experiences with similar systems at different times (consistency), a user's own experiences with different systems (distinctiveness), and other users' past experiences with similar systems (consensus). These aspects of information are particularly relevant for understanding a user's causal attributions for system related outcomes, since past system experiences are commonly believed to influence user expectations related to continued system use (e.g., Kim and Malhotra 2005). The theory purports the nature of these past experiences will influence a user's attributions for a system-related success or failure. For example, if a user's past experiences with other systems have been successful

whereas current efforts result in failure, the user is likely to blame the system, and vice versa. On the other hand, if a user knows that others have not been successful in using similar systems, he/she will likely take credit for any successes with the current system.

The literature suggests that particular combinations of these information characteristics systematically influence the internal/external orientation of the causal attribution (Kelley and Michela 1980; Dixon 2001). Specifically, information revealing *high consistency*, *high distinctiveness,* and *high consensus* will evoke external attributions. So, a user experiencing a system-related outcome that is similar to his/her own experiences with similar systems (high consistency), different from his/her own experiences with dissimilar systems (high distinctiveness), and similar to other users' experiences with similar systems (high consensus) will likely attribute the cause of the outcome to the externally oriented factors of task difficulty and luck. On the other hand, internal attributions are typically linked to an information profile consisting of *high consistency*, *low distinctiveness*, and *low consensus* (Kelley and Michela 1980). So, a user experiencing a system-related outcome that is similar to his/her own experiences with similar systems (high consistency), similar to his/her own experiences with dissimilar systems (low distinctiveness), and dissimilar to other users' experiences with similar systems (low consensus) will likely attribute causation to the internally oriented factors of ability and effort.

Based upon these theoretical tenets, we advance the following hypotheses:

H1a: The causal attributions of users for system-related outcomes will be *external* when the system-related outcome is:

similar to their experiences with similar systems—consistent;
different from their experiences with dissimilar systems—distinctive;
similar to other users' experiences with similar systems—in consensus

H1b: The causal attributions of users for system-related outcomes will be *internal* when the system-related outcome is:

similar to their experiences with similar systems—consistent;
similar to their experiences with dissimilar systems—not distinctive;
different from other users' experiences with similar systems—not in consensus

Motivation

Motivations associated with concerns for protection of self image will affect the process of assigning causality. In a social context, attributions are said to be motivationally prompted since society requires an account for behavior that is deviant from social norms (Zuckerman 1979). A classic, motivationally-driven pattern of attributions is the *self-serving bias*, which predicts the predisposition of individuals to attribute failures to external causes and successes to internal causes (Miller 1976; Miller and Ross 1975; Zuckerman 1979). This bias predicts that users will attribute system-related failure outcomes to external causes (task difficulty and luck) and system-related success outcomes to internal causes (ability and effort). Based on these observations, we advance the following hypotheses:

H2a: The causal attributions of users for system-related failure outcomes will be external.

H2b: The causal attributions of users for system-related success outcomes will be internal.

Consequences

Consequences of attributions have been observed in the areas of affective or emotional reactions and the expectancy of experiencing similar outcomes. The locus of control dimension of attribution is linked to the formation of affective or emotional reactions of the individual toward the situation (Weiner et al. 1972). Since locus of control is the attribution dimension of interest in this study, only the affective reaction consequence is considered. Although some studies have considered job satisfaction as an affective response in attribution studies (Adler 1980), user satisfaction with a system is the affective response of interest in the current study, given its prominent role in the ISS literature.

Weiner (1974) argues that attributions of success and failure to internal factors tend to heighten "emotional reactivity" as compared to attributions to external factors. So, attributions of success to the internal causes of effort and ability are believed to result in a greater positive impact on the individual's affective response than external attributions. On the other hand, attributions of failure to internal causes are expected to generate greater negative affect than attributions of failure to external causes. This pattern has been consistently observed in the attribution literature (Weiner 1974), and leads us to advance the following hypothesis:

H3: The causal attributions of users for system-related outcomes will be systematically related to their satisfaction with the system.

A fourth hypothesis is advanced which addresses the intuitive impact of the success/failure nature of system outcomes experienced by a user on his/her evaluation of the system:

H4: Successful system-related outcomes will be associated with greater user satisfaction than will failures.

While hypothesis H4 is not within the domain of attribution theory as such, it addresses the issues related to the potential impact of system outcomes on system success measures initially expressed in the ISS literature by Tait and Vessey (1988).

Figure 1 summarizes the relationships suggested by hypotheses H1–H4 and highlights the purported influence of both the success/failure nature of the system outcome, and the information antecedent, on the attributions of users for these system-related outcomes. Further depicted is the suggested influence of both the internal/external nature of the attribution, and the success/failure nature of the system outcome on user satisfaction of the information system.

Prior to discussing the study's method and results, it is appropriate to present the evidence for the direct relevance of attribution theory for ISS research, as demonstrated in the literature.

Attribution Theory and ISS Research

The recognition of the utility of employing the tenets of attribution theory in ISS research is significant, as the theory has been found to have relevance in several facets of the ISS area. Specifically, studies use patterns of causal attributions to better understand the link between end user involvement and ISS (Magal and Snead 1993), to examine the influence of attributional biases for IS professional, end user, and management attributions for

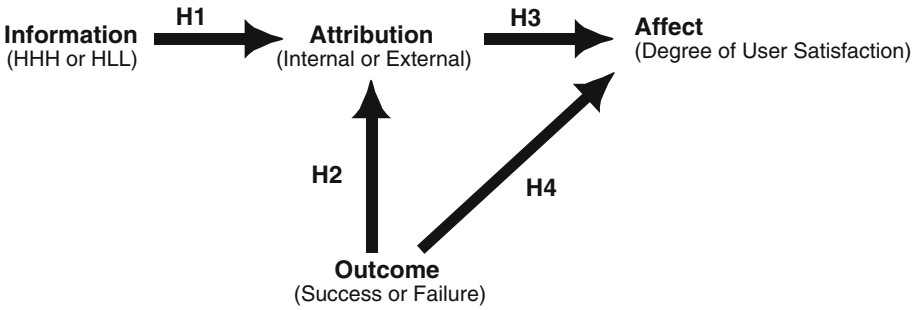


Fig. 1 Hypothesized relationships

system outcomes (Karsten 2002; Peterson et al. 2002; Snead and Ndede-Amadi 2002; Standing et al. 2006), and to identify antecedents contributing toward attribution error (Pan et al. 2007). Further, Thatcher et al. (2008) employ tenets of attribution theory to decompose the computer self-efficacy construct into both an internal and external dimension; they then empirically determine each has a separate influence on user computer anxiety and perceived ease of use of IT.

Attribution theory has also been used to model the satisfaction of users/customers with IT-based system experiences. Fang et al. (2005) examine the impact of employee attributions for control system feedback on performance expectations and job satisfaction, while Anderson et al. (2009) find the nature of customer attributions for service failures moderate the composition of overall customer satisfaction with the service provider. And, Hsieh (2012) incorporates attribution theory's stability, locus, controllability dimensions of causal attributions to help model the extent to which customers perceive they have been treated unfairly ("psychological contract violation") in an E-commerce electronic return (e-Return) experience.

Further, the theory has been incorporated in understanding a more recent construct related to ISS—user *trust* with IT related outcomes. Jarvenpaa et al. (2004) employ those tenets of attribution theory which deal with situational factors and their influence on people's social perceptions of others and themselves to better understand how trust influences user sentiments task performance in IT-enabled contexts. Wang and Benbasat (2008) use the theory of social responses to computers (Reeves and Nass 1996) to examine the nature of users' attributions for their extent of trust with Recommendation Agents in an E-commerce setting, while Porter et al. (2013) use the consensus, consistency, distinctiveness information dimensions to assess their influence on the level of trust consumers associate with firm-sponsored versus member-generated virtual communities.

Standing et al. (2006) offer an explanation for the emerging popularity of the use of attribution theory in ISS research. They state—"The IT context is a relevant one in which to study explanations for success and failure because: this area involves a continuous flow of projects being undertaken; there are many contingencies in developing good IT projects; there are complex determinants for defining the success and failure of projects; the IT environment (e.g., funding of projects) is often unstable; many projects do 'fail'; responsibility is high as projects are often substantial and their success or failure has an impact on many users; there is a hierarch of responsibility for IT project failures; and, IT workers are, therefore, subject to continuous and often large motivational issues in dealing with the complexities of project failures." (pp. 1149–1150)

Noteworthy is that only one of these works consider the theory's "information antecedent," as originally formulated by Kelley (1967), on user attributions of IT related outcomes. This is surprising given this antecedent requires the sequential updating and feedback mechanisms discussed by Bhattacherjee (2001) and Kim and Malhotra (2005) be in place in order for a user to assess the extent to which their current IT experience is consistent and/or distinctive with their other IT experiences, and whether or not it is in consensus with the IT experiences of others. Further, none of these works simultaneously consider the theory's information and motivational antecedents, consequences elements, the success/failure nature of the system outcome, user perceptions of the causes of the outcomes (attributions), and the reported level of user satisfaction with the system. Particularly important is examining the influence of attributional phenomena on the user satisfaction construct, as this construct continues to occupy a key role in defining ISS; further, it has been shown to be linked to system use (DeLone and McClean 1992, 2003; Goodhue et al. 2000; Kim and Malhotra 2005).

In response, the current study develops a model for the simultaneous examination of these issues by incorporating them into a behavioral decision making methodology administered to Professional MBA students. This methodological approach provides for stronger levels of internal validity as compared to the methodologies employed in the other works, and is discussed below.

Method

Data Collection

Data for this study was obtained using a behavioral decision making methodology, which typically presents subjects with various scenarios which require decisions to be made and reported in an effort to evaluate various cognitive processes. This method is widely used in a variety of contexts (Slovic et al. 1977) and has been specifically employed in attribution theory studies (Arrington et al. 1985; Harrison et al. 1988; Kelley and Michela 1980; Weiner 1974). A questionnaire (see Table 1) asked participants to assume they were departmental managers, in a major corporation, charged with the responsibility of preparing the departmental budget. The questionnaire indicated that a newly-developed computer-based information system, intended to support the department manager in his/her budget preparation effort, was made available for his/her use. Participants were provided with information about two experimentally controlled factors, each having two levels: (1) type of system-related outcome: success or failure; and (2) type of information profile: high consistency, high distinctiveness, high consistency (HHH) or high consistency, low distinctiveness, low consensus (HLL).

The success level for the outcome factor was operationalized by indicating to participants that their initial use of the system was successful in that their budget was both timely and accurate. The failure level was operationalized by indicating to participants that their initial use of the system was a failure in that their budget was neither timely nor accurate. The information profile factor was operationalized by providing statements related to the consistency, distinctiveness, and consensus dimensions of Kelley's (1967) information model.

The outcome and information factors were employed as between-subjects factors. Thus, four outcome/information profile experimental cells were formed by the study: (1) success/HLL; (2) success/HHH; (3) failure/HLL; and (4) failure/HHH. Participants were randomly

Table 1 Instrument presenting the "Success" outcome with "High Consistency, Low Distinctiveness, Low Consensus" information (HLL)

PART 1: DESCRIPTION OF SETTING
Assume you are a departmental manager in a major corporation. One of your responsibilities is the preparation of a budget for your department. A newly developed computer -based information system, intended to support you in your budget preparation, was recently made available for you to use.

> Your initial use of this system was VERY SUCCESSFUL. Your budget was much more timely and it more accurately reflected your resource requirements.

You will be asked to make judgements about the extent to which certain factors contributed to your successful experience using the system. The following three statements are designed to help with your judgements:

YOUR PREVIOUS EXPERIENCES WITH SIMILAR
COMPUTER-BASED SYSTEMS HAVE BEEN..... VERY SUCCESSFUL

YOUR PREVIOUS EXPERIENCES WITH DIFFERENT
COMPUTER-BASED SYSTEMS HAVE BEEN..... VERY SUCCESSFUL

OTHER USERS' EXPERIENCES WITH SIMILAR
COMPUTER-BASED SYSTEMS HAVE BEEN..... FAILURES

PART 2: YOUR JUDGMENTS REGARDING THE SETTING
The following four general factors have been identified as possible causes for your successful experience with the system. Please allocate a total of 100 points among these possible causes with the understanding that the more points an item is assigned, the more important you perceive it to be the cause of your successful experience with the system. Any one item can receive as many as 100 points, or as few as 0 points. Just be sure to allocate a total of exactly 100 points among the possible causes.

POSSIBLE CAUSES	POINTS
(1) You have above average ability.	_____
(2) You exerted a great deal of effort.	_____
(3) This task was very easy.	_____
(4) Good luck, chance, or some other irrational factor is important in this case.	_____
TOTAL POINTS	100

assigned to one of the four cells. The top portion of Table 1 presents the information presented to participants for the success/HLL profile.

Participants provided causal attribution and user satisfaction measures related to the hypothetical IT experience presented; they also provided a variety of demographic measures. Attribution responses were obtained by having participants allocate a total of 100 points among the four potential causes of system-related outcomes: (1) ability; (2) effort; (3) task difficulty; (4) luck (see the bottom portion of Table 1). This method of measuring subject attributions is widely accepted (Adler 1980), (Harrison et al. 1988; Kaplan and Reckers 1985). From this point allocation, an attribution score variable (ATTRIB) was formed by mathematically combining participants' ability, effort, task difficulty, and luck responses as follows:

$$\textbf{ATTRIB} = (\textbf{Ability} + \textbf{Effort}) - (\textbf{Task Difficulty} + \textbf{Luck}).$$

Ability and effort points are combined since each represents an internal cause, while task difficulty and luck points are also combined since each represents an external cause. Thus, the ATTRIB variable represents a net of internal and external causes. Because a total of 100 points was allocated among the four causes, a perfect internal score would be +100, while a perfect external score would be −100. This formulation is well established in the attribution research literature (Weiner 1974).

User satisfaction measures were obtained by having participants indicate their level of satisfaction with the computer-based system on a 11-point Likert scale (0–10).

Subjects

Subjects used in this study were students in the Professional MBA program of a Midwestern US university, who are primarily employed full time in a management capacity. A total of 81 usable responses were obtained during a regular class session. Demographic information was obtained which included age, gender, employment information, and the level of experience with computer-based information systems. There were 18 female and 63 male participants and the average reported age was 31 years. Important to potential concerns related to this study's generalizability, it is noted that approximately 70 % of participants indicated being employed full-time in management positions, and 60 % indicated moderate to extensive experience with computer-based information systems when performing their job.

Results

Hypotheses H1 and H2 were tested by subjecting the data collected to a general linear model procedure. The dependent variable of the model was the attribution score (ATTRIB) for the participants. The model contained two explanatory factors, each at two levels: OUTCOME (success or failure) and INFORMATION profile (HHH or HLL). Table 2 presents the results of the model estimation. The overall model achieved a level of significance of 0.0001 with an associated F value of 10.81. Both the OUTCOME and INFORMATION factors are related to the attribution variable in a significant way (Type III SS p values of 0.0002 and 0.0276, respectively).

Testing hypotheses H1a and H1b required focusing on the results of the INFORMATION factor. ATTRIB cell means for each of its two levels are reported at the top portion of Table 3. The mean attribution for the HHH and HLL levels of INFORMATION are 2.59 and 34.14, respectively. Because the higher the ATTRIB value the more internal the attribution, the pattern of cell means supports hypotheses H1a and H1b. Attributions for the system-related outcome are more internal for users provided the HLL information profile, and more external for users provided the HHH information profile. These research results support H1a and H1b suggest that Kelley's (1967) information ANOVA model may generalize to the ISS area of research.

Testing hypotheses H2a and H2b required focusing on the model results for the OUTCOME factor. ATTRIB cell means for each of the two levels are reported at the bottom portion of Table 3. The mean attribution for the success and failure levels of OUTCOME are positive 44.57 and negative 7.03, respectively. This pattern of cell means offers support for hypotheses H2a and H2b. The self-serving bias of attribution theory appears to generalize to the ISS area of research, suggesting that users experiencing system

Table 2 General linear model results (H1 and H2)

Dependent variable: ATTRIB				
Source	DF	Sum of squares	*F* value	Pr > F
Model	2	70217.6713629	10.81	0.0001
Error	78	253436.3533285		
Corrected total	80	323654.0246914		
Source	DF	Type I SS	*F* value	Pr > F
Outcome	1	53836.7646181	16.57	0.0001
Information	1	16380.9067448	5.04	0.0276
Source	DF	Type III SS	*F* value	Pr > F
Outcome	1	50221.7474086	15.46	0.0002
Information	1	16380.9067448	5.04	0.0276

Table 3 Mean attribution score by factor

Level of information	*N*	ATTRIB	
		Mean	SD
HHH	37	2.5945946	68.2248975
HLL	44	34.1363636	56.2575435
Level of outcome	*N*	ATTRIB	
		Mean	SD
Failure	39	−7.0256410	67.3152392
Success	42	44.5714286	48.7968126

related failure outcomes provide more external attributions than do users experiencing successful outcomes.

Hypotheses H3 and H4 predict a systematic relationship between user satisfaction and attribution and system outcome, respectively. These hypotheses were examined by estimating a general linear model where user satisfaction (SATISFACTION) serves as the dependent variable and user attributions (ATTRIBUT) and system outcome (OUTCOME) serve as factors. The OUTCOME factor was tested at two levels: success and failure. The ATTRIBUT factor was also tested at two levels: internal and external. This dichotomy was accomplished by assigning "internal" to positive ATTRIB scores and "external" to negative scores. The results are presented in Table 4.

As Table 4 shows, the overall model achieved a level of significance of 0.0001 with an associated *F* value of 46.20. Further, both the OUTCOME and ATTRIBUT factors are related to the satisfaction variable in a significant way (Type III SS *p* values of 0.0001 and 0.0220, respectively), supporting hypotheses H3 and H4. Thus, the hypothesized link between the locus of control attribution and user satisfaction (H3) is supported in this study. To test the nature of this link, the mean user satisfaction is reported for each of the

Table 4 General linear model results (H3 and H4)

Dependent variable: SATISFACTION				
Source	DF	Sum of squares	*F* value	Pr > F
Model	2	351.50015288	46.20	0.0001
Error	78	296.72206935		
Corrected total	80	648.22222222		
Source	DF	Type I SS	*F* value	Pr > F
Outcome	1	330.70573871	86.93	0.0001
Attribut	1	20.79441417	5.47	0.0220
Source	DF	Type III SS	*F* value	Pr > F
Outcome	1	216.02985669	56.79	0.0001
Attribut	1	20.79441417	5.47	0.0220

two ATTRIBUT levels at the top portion of Table 5. The mean user satisfaction for internal attributions is 5.27, compared to a mean level of 2.36 for external attributions (user satisfaction ranged from a low of 0 to a high of 10). According to these results, the more internal the attribution of users, the higher the satisfaction with the system, even after controlling for outcome. With respect to outcome, the means reported in the bottom portion of Table 5 confirm the intuitive expectations that successful system outcomes will be associated with higher levels of user satisfaction (mean of 6.43) than with failures (mean of 2.38).

The theoretical framework of attribution theory developed and employed in this study considers the impact of both system related outcomes and their perceived causes on user satisfaction. The model (Fig. 1) predicts that the success/failure nature of the outcome affects user satisfaction directly (H4), and indirectly through its motivational influence on user attributions through the self-serving bias (H2). Specifically, it was predicted that attributions of system outcomes are directly influenced by a user's past experiences with system use comprising of consistency, distinctiveness, and consensus information (H1). Attributions were also predicted to directly influence user satisfaction (H3). According to the reported results, all hypothesized relationships (H1–H4) in this study were supported.

Discussion and Implications

These findings have important implications for ISS research. First, the demonstrated importance of the success/failure nature of outcome (in H2 and H4) supports the concerns first posited by Tait and Vessey (1988) that the success/failure nature of system outcomes needs to be monitored and controlled. Second, the evidence supporting the applicability of Kelley's (1967) information model (H1) implies that users will consider both their past system experiences and their perception of others' past experiences when forming causal attributions for system outcomes. Thus, the attribution theory model presents a conceptual framework that specifies the important attributes of a user's past experiences likely to be considered when evaluating system outcomes (consistency, distinctiveness, and consensus) and the likely impact of particular combinations of these dimensions on their causal

Table 5 Mean user satisfaction by factor

Level of Attribut	*N*	SATISFACTION	
		Mean	SD
External	22	2.36363636	2.46007074
Internal	59	5.27118644	2.57862907
Level of outcome	*N*	SATISFACTION	
		Mean	SD
Failure	39	2.38461538	1.78613645
Success	42	6.42857143	2.18802570

attributions for current system outcomes experienced. What is interesting is that by holding consistency constant in both information profiles (high in both—HHH and HLL), the influence on attributions of the "lesser mentioned" dimensions of a user's past system experiences are revealed. Specifically, information related to the user's past experiences with other systems (distinctiveness), and information related to other users' system experiences (consensus), were found to be important in the formation of attributions. The implication is that many ISS research efforts may be focusing on an incomplete set of past experiences which may further contribute to inconsistent results. As previously noted, the consistency, distinctiveness, and consensus information constructs subsume the sequential updating and feedback mechanisms discussed in Bhattacherjee (2001) and Kim and Malhotra (2005) and provide a more comprehensive explanation of elements of interest in these updating and feedback mechanisms. Third, the support for hypothesis H3 indicates that the nature of the causes a user perceives to be responsible for system outcomes will influence his/her reported level of satisfaction. Therefore, these causal attributions potentially act as an intervening mechanism between the host of factors thought to increase system success identified by previous ISS research and measures of system success. Ignoring these causal attributions in ISS research will likely introduce a confounding source potentially contributing to inconsistent results.

The practical implications of this study suggest that managers need to be aware of the attributional processes users evoke when reacting to the system outcomes they experience. The demonstrated applicability of the information antecedent in H1 suggests that users will rely on their perceptions of the quality of both their own previous system-related experiences, as well as these same perceptions for the quality experienced by other users, when forming all-important attributions for system-related outcomes. This would suggest the importance of holding ongoing IT outcome "debriefings" which involve all users of similar systems in order to facilitate the accuracy of user perceptions of the success/failure nature of the outcome and user perceptions of the levels of consistency, distinctiveness, and consensus. Further, the demonstrated applicability of the self-serving bias (H2) implies that user attributions and corresponding impact on affect are potentially more a response to protect the user's image than a logical response to the facts surrounding the situation. Consequently, managers need to be aware of these tendencies to more effectively understand user reactions in order to evaluate more accurately the merits of a system. For instance, system training sessions could include techniques for influencing the attributional process thereby increasing the likelihood of users making attributions that are in the best interest of the organization. The results of this study

suggest that encouraging internal attributions may lead to more favorable user reactions toward a system for either success or failure outcomes. This attribution "retraining" may be particularly desirable for newly implemented systems (Weary et al. 1989).

The strength of this study lies in its simultaneous consideration of the information and motivational antecedents of attribution theory in examining individual user attributions for system-related outcomes. Future research could examine another tenet of attribution theory likely to have interesting and important implications for ISS research—the "actor-observer bias." In an ISS context, this bias suggests that observers (such as a system designer or a user's supervisor) are likely to attribute causal responsibility to the actor directly experiencing the outcome (such as a user), regardless of surrounding circumstances. Significant differences between the observers' and actors' attributions are likely to cause considerable conflict within the organization (Tosi et al. 1986). While this bias has been examined in other works, (Karsten 2002; Standing et al. 2006), neither of these works employed any of attribution theory's antecedents; nor did they examine the consequences of the patterns of attributions for system satisfaction.

Limitations

One limitation of this study relates to its scope. Only the locus of control dimension of attribution (internal versus external) was considered. As previously noted, other dimensions related to the stability and controllability of causes exist, with each dimension having a distinct consequence. Another limitation involves the study's methodology. Some external validity was sacrificed given the hypothetical nature of the decision making exercise and the use of students as subjects, in order to gain the benefits of internal validity. The gains to internal validity were made possible by being able experimentally control, simultaneously, key constructs related to the antecedents of attribution theory. The use of Professional MBA students as subjects and associated generalizability concerns is attenuated in this case, since most of the 81 participants were full time working professionals, occupying management roles, and having moderate to extensive experience with computer-based technology.

References

Abdinnour-Helm S, Chaparro B, Farmer S (2005) Using the end-user computing satisfaction (EUCS) instrument to measure satisfaction of web-based systems. Decis Sci 36(2):341–359

Adler S (1980) Self-esteem and causal attributions for job satisfaction and dissatisfaction. J Appl Psychol 65(3):327–332

Anderson S, Baggett L, Widener S (2009) The impact of service operations failures on customer satisfaction: evidence on how failures and their source affect what matters to customers. Manuf Serv Oper Manag 11(1):52–69

Arrington CE, Bailey CD, Hopwood WS (1985) An attribution analysis of responsibility assessment for audit performance. J Account Res 23(1):1–20

Barki H, Hartwick J (1989) Rethinking the concept of user involvement. MIS Q 13(1):53–63

Benbasat I, Zmud R (2003) The identity crisis within ghe IS discipline: defining and communicating the discipline's core properties. MIS Q 27(2):183–194

Bhattacherjee A (2001) Understanding information systems continuance: an expectation–confirmation model. MIS Q 25(3):351–370

Bogumil DD (2001) Attribution and reciprocity in international relations: the attribution reciprocity model. N Am J Psychol 3(3):463

Davis F, Bagozzi R, Warshaw P (1989) User acceptance of computer technology: a comparison of two theoretical models. Manag Sci 35(8):982–1003
DeBrabander B, Edstrom A (1977) Successful information system development projects. Manag Sci 24(2):191–199
DeLone W, McLean E (1992) Information system success: the quest for the dependent variable. Inf Syst Res 3(1):60–95
DeLone W, McLean E (2003) The DeLone and McClean model of information system success: a 10-year update. J Manag Inf Syst 19(4):9–30
Dixon AL (2001) Successful and unsuccessful sales calls: measuring salesperson attributions and behavioral intentions. J Mark 65(3):64
Eccles JS, Wigfield A (2002) Motivational beliefs, values, and goals. Annu Rev Psychol 53(1):109
Fang E, Evans K, Landry T (2005) Control systems' effect on attributional processes and sales outcomes: a cybernetic information-processing perspective. Acad Mark Sci 33(4):553–574
Franz CR, Robey D (1986) Organizational context, user involvement, and the usefulness of information systems. Decis Sci 17:329–356
Ginzberg MJ (1979) A study of the implementation process. TIMS Stud Manag Sci 13:85–102
Goodhue D (1995) Understanding user evaluations of information systems. Manag Sci 41(12):1827–1844
Goodhue D, Klein B, Salvatore T (2000) User evaluation of IS as surrogates for objective performance. Inf Manag 38(2):87–95
Harrison PD, West SG, Reneau JH (1988) Initial attributions and information-seeking by superiors and subordinates in production variance investigations. Account Rev 63(2):307–320
Heider F (1958) The psychology of interpersonal relations. Wiley, New York
Hsieh P (2012) Why e-Return services fail: a psychological contact violation approach. Cyberpsychol Behav Soc Netw 15(12):655–662
Ives B, Olson MH (1984) User involvement and MIS success: a review of research. Manag Sci 30(5):586–603
Jarvenpaa S, Shaw T, Staples D (2004) Toward contextualized theories of trust: the role of trust in global virtual teams. Inf Syst Res 15(3):250–267
Jones EE, Davis KE (1965) From acts to dispositions: the attribution process in person perception. Adv Exp Psychol 2:219–266
Kaplan SE, Reckers PM (1985) An examination of auditor performance evaluation. Account Rev 60(3):477–487
Karsten R (2002) An analysis of IS professional and end user causal attributions for user-system outcomes. J End User Comput 14(4):51
Kelley HH (1967). Attribution theory in social psychology. In D. Levine (Ed.), Nebraska Symposium on Motivation (University of Nebraska Press) pp. 192–240
Kelley HH, Michela JL (1980) Attribution theory and research. Annu Rev Psychol 31:457–501
Khayun V, Ractham P, Firpo D (2012) Assessing e-Excise success with DeLone and McLean's Model. J Comput Inf Syst 52(3):31–40
Kim S, Malhotra N (2005) A longitudinal model of continued IS use: an integrated view of four mechanisms underlying postadoption phenomena. Manag Sci 51(5):741–753
Lamb R, Kling R (2003) Reconceptualizing users as social actors in information systems research. MIS Q 27(2):197–235
Magal S, Snead K (1993) The role of causal attributions in explaining the link between user participation and information system success. Inf Res Manag J 1993 6(3):8–19
Marakas G, Johnson R, Palmer J (2000) A theoretical model of differential social attributions toward computing technology: when the metaphor becomes the model. Int J Hum Comput Stud 52(4):719–750
Miller DT (1976) Ego involvement and attributions for success and failure. J Pers Soc Psychol 34:901–906
Miller DT, Ross M (1975) Self-serving biases in the attribution of causality: fact or fiction? Psychol Bull 82:313-225
Pan G, Pan S, Newman M (2007) Information systems project post-mortems: insights from an attribution perspective. J Am Soc Inf Syst Technol 58(14):2255–2268
Peterson D, Kim C, Kim J, Tamura T (2002) The perceptions of information systems designers from the United States, Japan, and Lorea on success and failure factors. Int J Manag 22:421–439
Porter C, Devaraj S, Daewon S (2013) A test of two models of value creation in virtual communities. J Manag Inf Syst 30(1):261–292
Reeves B, Nass C (1996) The media equation: how people treat computers, television, and mew media like real people and places. Cambridge University Press, New York
Slovic P, Fischhoff B, Lichtenstein S (1977) Behavioral decision theory. Annu Rev Psychol 28:1–39

Snead K, Harrell A (1994) An application of expectancy theory to explain manager's intention to use a decision support system. Decis Sci 4:499–513
Snead K, Ndede-Amadi A (2002) Attributional biases as a source of conflict between users and analysts in an information system development context-hypotheses development. J Syst Pract Action Res 15(5):353–365
Stajkovic AD, Sommer SM (2000) Self-efficacy and causal attributions: direct and reciprocal links. J Appl Soc Psychol 30(4):707
Standing C, Guilfoyle A, Lin C, Love P (2006) The attribution of success and failure in IT projects. Ind Manag Data Syst 106(8):1148–1159
Swanson EB (1974) Management information systems: appreciation and involvement. Manag Sci 21(2):178–188
Swanson EB (1982) Measuring user attitudes in MIS research: a review. Omega 10(2):157–165
Swanson SR, Kelley SW (2001) Attributions and outcomes of the service recovery process. J Mark Theory Pract 9(4):50
Sykes T, Venkatesh V, Gosain S (2009) Model of acceptance with peer support: a social network perspective to understand employees system use. MIS Q 33(2):371–393
Tait P, Vessey I (1988) The effect of user involvement on system success: a contingency approach. MIS Q 12(1):91–108
Thatcher J, Zimmer J, Gundlach M, McKnight D (2008) Internal and external dimensions of computer self-efficacy: an empirical examination. IEEE Trans Eng Manag 55(4):628–644
Tosi H, Rizzo J, Carroll S (1986) Managing organizational behavior. A Longman Company, New York
Venkatesh V, Morris M, Davis F (2003) User acceptance of information technology: toward a unified view. MIS Q 27(3):425–478
Wang W, Benasat I (2008) Attributions of trust in decision support technologies: a study of recommendation agents for E-commerce. J Manag Inf Syst 24(4):249–273
Wastell DG (1999) Learning dysfunctions in information systems development: overcoming the social defenses with transitional objects. MIS Q 23(4):581
Weary G, Stanley MA, Harvey JH (1989) Attribution. Springer, New York
Weiner B (1974) Achievement motivation and attribution theory. General Learning Press, New Jersey
Weiner B, Heckhausen H, Cook R (1972) Causal ascriptions and achievement behavior: a conceptual analysis of effort and reanalysis of locus of control. J Pers Soc Psychol 21(2):239–248
Yi M, Jackson J, Park J, Probst J (2006) Understanding information technology acceptance by individual professionals: toward an integrated view. Inf Manag 43(3):350–363
Zuckerman M (1979) Attribution of success and failure revisited, or: the motivational bias is alive and well in attribution theory. J Pers 47:245–287