Transformational Leadership and Information System Effectiveness

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TRANSFORMATIONAL LEADERSHIP
AND INFORMATION SYSTEMS EFFECTIVENESS

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ABSTRACT

This study examined the positive impact of a specific leadership style (i.e., transformational leadership) on information systems (IS) effectiveness in organizations based upon a subordinate’s perspective. Specifically, we investigated system users’ psychological mechanisms that may mediate the relationship between transformational leadership and IS effectiveness (i.e., individual and organization impacts and IS satisfaction) via perceived organizational support (POS) and systems self-efficacy (SSE) of system users in organizations. In order to test a mediation model, Partial Least Squares were performed on a sample (N=251) embedded in 25 branches of a large multi-national bank in Korea. The results indicated that: (1) transformational leadership behaviors were positively related to individual and organizational IS impacts and individuals’ IS satisfaction, and (2) both POS and SSE of the system users mediated between transformational leadership and IS effectiveness, indicating that system users working with a transformational leader achieve IS effectiveness by perceived organizational support and high levels of systems self-efficacy. Theoretical and practical implications of this study and future research directions were discussed.

Keywords: Transformational leadership, Information Systems Effectiveness, Perceived Organizational Support, Systems Self-Efficacy

* Authors are listed in alphabetical order and contributed equally to this paper.
Introduction

A great deal of research has been conducted to answer the question in the IS research field (See DeLone 1988; DeLone et al. 1992; Ives et al. 1991; Rai et al. 2002; Raymond 1985; Seddon 1997; Shank et al. 1985). In investigating IS effectiveness, it is crucial to identify an individual IS user’s internal characteristics, such as perceptions, attitudes, and behaviors, as well as organizational contextual factors, such as organizational support, that affect individuals’ internal characteristics. This is because IS effectiveness can be achieved by integrating a high quality of information systems into users’ and organizational factors that interact with and surround information systems. Likewise, since some degree of IS effectiveness in organizations is dependent upon the users’ and organizational factors, this study argues that such factors may directly and/or indirectly influence IS effectiveness. Therefore, it would be vital to consider individual IS users’ internal characteristics as well as organizational contextual factors that affect the individuals in IS effectiveness research.

The present study focuses primarily on the effect of leadership on IS effectiveness based upon the fact that leadership has been regarded as an influential factor for individual as well as organizational effectiveness (Bass et al. 1994; Bass et al. 2003; Dvir et al. 2002). We predict that leadership positively affects not only overall effectiveness but also a specific part in organizational effectiveness, such as information systems. Despite the robust findings on the positive effect of leadership on individual and organizational effectiveness, however, to date, sufficient attention has not been paid to identifying the role of leadership on IS effectiveness. Frequently, managership and its characteristics have used as a substitute for leadership in the IS field by emphasizing a general function of managership, such as allocating organizational resources and controlling or coordinating people and work environments (e.g., Karahanna et al. 2006; Tan et al. 1999). More importantly, although extant leadership research has consistently shown that various types of leadership styles have different antecedents and consequences (Yukl, 2006), prior IS literature did not seem to distinguish the effect of specific leadership styles on IS effectiveness. In order to address such issues, in this study we focus on identifying the effect of a specific form of leadership style (i.e., transformational leadership) on IS effectiveness in order to reflect a current research stream as well as to add theoretical richness to the IS field. In particular, we argue that transformational leadership styles would affect increasing IS effectiveness in four major theoretical grounds: (1) Transformational leaders influence system users’ internal values, beliefs, and motivation levels in applying information systems by affecting their perceptions, attitudes, and behaviors toward IS that are embedded in organizations; (2) they enhance the users’ confidence levels in using IS by expressing high levels of expectation and optimism regarding the users’ capabilities to operate the information systems; (3) they, as coaches or mentors, strive to become an exemplary role model in using IS in workplaces by providing individualized support; and (4) they stimulate system users’ creative problem-solving skills by influencing them to view problems from a new perspective. Based upon such features, we argue that transformational leadership is related to enhancing positive IS effectiveness.

The purpose of this study is to identify the positive effect of transformational leadership on IS effectiveness by investigating the role of two potential mediators (i.e., a system user’s perceived organizational support (POS) and systems self-efficacy (SSE) of system users). In order to serve the purpose of the study, two main research questions are addressed in this paper: (1) Does transformational leadership affect IS effectiveness? and (2) If so, why does it happen, and what are the underlying individual as well as organizational mechanisms of the relationship between transformational leadership and IS effectiveness? We suggest the conceptual model that indicates the aforementioned research questions in Figure 1. Specific articulations for each relationship in the model are provided in the next section.
Theory and Hypotheses

Transformational Leadership and Information Systems Effectiveness

Transformational Leadership

Transformational leadership has been applied and developed in the context of organizations by Bass and his colleagues (Bass, 1985) on the basis of Burns’s (1978) seminal work on political leadership. Past research has consistently shown that transformational leadership is positively related to leadership effectiveness. Specifically, such leadership leads to organizational commitment (Avolio et al. 2004), justice perceptions (Pillai et al. 1999), extra-role behaviors (Podsakoff et al. 1996), and performance (Dvir et al. 2002; Jung et al. 2002).

Transformational leadership is a relational-based concept that is built through the influence process, which refers to the transformation of the values and ideas of followers, a transfer that ultimately motivates those followers to perform beyond their expectations and transcend self-interest for the sake of the collective (Bass 1985; Bass et al. 1994). The followers of transformational leaders feel trust, loyalty, and reverence toward the leaders and are likely to be motivated to perform beyond original expectations (Avolio et al. 2004; Conger et al. 1998; Pillai et al. 1999; Yukl 2006).

The concept of transformational leadership consists of four main behaviors: idealized influence, inspirational motivation, individualized consideration, and intellectual stimulation (Bass, 1985). It is characterized by inspirational and nurturing behavioral styles such as stimulating followers’ internal motivation and higher-order needs, articulating a compelling vision of the future of an organization, and providing individualized support and intellectual stimulation (Bass et al. 2006).

Transformational Leadership and IS Effectiveness

The concept of information systems effectiveness has been widely accepted in IS research as a principal criterion for assessing organizational performance resulting from the usage of information systems (Rai et al. 2002). Although a variety of conceptualizations have been offered among IS researchers, the core of IS effectiveness indicates the degree of organizational performance triggered from the usage of information systems (Hamilton et al. 1981; Raymond 1985). In order to capture IS effectiveness, IS researchers have used diverse constructs that are able to tap into the concept properly (DeLone et al. 1992; Rai et al. 2002; Seddon 1997). Based upon the extensive review of previous literature, in this study we assess IS effectiveness with three factors: individual impact, organization impact, and users’ IS satisfaction, since these are well-suited for our initial purpose of the study that explores individual- and organizational antecedents in terms of individual- and organization impacts. In addition, since they have been widely accepted in assessing IS effectiveness in the IS field as valid and reliable constructs (See DeLone
et al. 1992; Rai et al. 2002; Thong et al. 1996b), we believe that such factors are appropriate to represent overall IS effectiveness.

According to DeLone and McLean (1992), individual impact refers to the positive effect of information systems on an individual’s performance. They explained that the term impact contains the indication of performance or productivity, such as perceived usefulness, net benefits, individual job performance, individual productivity, ease to do, etc. (Rai et al. 2002; Seddon 1997). Similarly, organization impact indicates the organizational level effect of information systems on organizational performance (DeLone et al. 1992; Hamilton et al. 1981). IS satisfaction refers to end-users’ overall affective and cognitive evaluation of the level of consumption-related fulfillment that is experienced with information systems (Au et al. 2002).

Although the effect of leadership on IS effectiveness has not been fully addressed by prior research, there has been some evidence that the presence of leadership plays a crucial role in enhancing or maintaining a high quality of IS effectiveness (George et al. 1990; Hiltz et al. 1991; Tan et al. 1999). These studies suggested a positive impact on the presence of leadership on users’ satisfaction of decision support systems. For instance, Kahai et al. (2004) suggested that leadership styles can affect users’ satisfaction on task-related electronic meeting systems. Kim et al. (2006) reported that the existence of a leader in groups facilitates users’ satisfaction of decision support systems, also arguing that the presence of leadership contributes to the maintenance of positive group/organizational performance because of high levels of decision quality or group consensus (Kim 2006). Such studies, however, did not clearly specify the types of leadership. Tan et al. (1999) argued that leaders can encourage their followers to achieve works done by allocating resources and time properly, and applying appropriate interactional interventions and the use of group support systems tools. Moreover, although it was only a handful, there was some evidence that a specific leadership style (i.e., charismatic leadership) affects teams’ overall performance during Enterprise Resource Planning (ERP) implementation (Thite 2000; Wang et al. 2005).

In this study, we argue that the major behavioral styles of transformational leadership can contribute to facilitating IS effectiveness in workplaces. The common features of transformational leaders maximize individual and organizational effectiveness by articulating appealing visions, showing self-sacrificing and role-modeling behaviors, and expressing high confidence and expectations toward their followers’ capabilities in order to contribute to the collective goals. In order to inspire collective efforts, transformational leaders not only express high levels of confidence in the success of existing or newly introduced information systems but also communicate toward their followers high expectations of understanding how information systems can be integrated into their works/jobs, which then results in high levels of individual as well as organizational performance. In addition, since transformational leaders recognize each individual’s different capabilities, needs, and developmental stages in order to provide tailored support, they also ensure that each individual understands the positive function of information systems and/or utilizes information systems in order to maximize individual and organizational effectiveness. Furthermore, transformational leaders can create a receptive and open environment in which their followers use information systems favorably and effectively for intellectual stimulation. Such leaders enable followers not only to engage in the maximization of usage of existing and/or new information systems for enhancing IS effectiveness, but also to create challenging and proactive climates for making their decisions that rely upon information systems. For instance, a transformational leader, as a mentor, can coach and guide their followers by showing how decision support systems can function in a way that increases the effectiveness and efficiency of jobs and tasks. This would be linked to increasing individual and organizational impacts as well as high levels of users’ IS satisfaction. Based upon the theoretical logic above, we propose the following hypotheses:

**Hypothesis 1a:** Transformational leadership will be positively related to individual impact.

**Hypothesis 1b:** Transformational leadership will be positively related to organization impact.

**Hypothesis 1c:** Transformational leadership will be positively related to information systems satisfaction.

### Transformational Leadership and POS and SSE

#### Transformational Leadership and POS

Although transformational leadership emphasizes its supportive, considerate, and guiding aspects the development and high quality of organizational performance for followers, little research has been conducted to identify the impact of transformational leadership on followers’ perceived organizational support. Perceived organizational support refers to the notion that an individual infers their organization’s efforts for them by assessing the extent to
which organizations contribute to and care about the individual’s well-being (Eisenberger et al. 1986). According to
organizational support theory, employees interpret whether their organization favors or disfavors them through the
treatment and specific support given by organizational authorities (i.e., supervisor), such as fair treatment, supervisor
support, favorable job conditions, organizational rewards, etc. (Rhoades et al. 2002; Shanock et al. 2006). Since the
common features of transformational leadership include leaders’ concerns for the followers ability to achieve
individual- and collective well-being via various supportive manners (idealized influence, inspirational motivation,
individualized consideration, and intellectual stimulation), transformational leadership would be linked to followers’
beliefs that the organization cares about them. Because supervisors or leaders act as organizational agents, it is
highly likely that the support given by supervisors or leaders would be viewed as representative of the organization
(Rhoades et al. 2002). Ultimately, this would be linked to the followers’ beliefs that the organization cares about
their well-being. This leads to the second hypothesis of the study:

Hypothesis 2a: Transformational leadership will be positively related to a system user’s perceived
organizational support.

Transformational Leadership and SSE

Self-efficacy refers to an individual’s belief in his or her capability to successfully achieve a specific task(s)
(Bandura 1986). Self-efficacy is distinguishable from a global self-concept (i.e., self-esteem) in a way that this
concept applies to the context of a specific job and/or task. According to the meta analysis of Stajkovic et al. (1998),
self-efficacy is positively related to individual and organizational performance across a variety of tasks and settings.

The positive impact of self-efficacy has been examined in the transformational leadership research. Several
theoretical and empirical studies have shown that self-efficacy serves a mediating role in the relationship between
transformational leadership and various work attitudes and outcomes (House et al. 1993; Shamir et al. 1993;
Walumbwa et al. 2004). Sharir et al.(1993) suggested that self-efficacy boosts the motivational effect of
transformational/charismatic leadership on followers’ performance. Namely, they suggested that
transformational/charismatic leaders increase followers’ self-efficacy by communicating high performance
expectations, expressing confidence in followers’ abilities to contribute to the mission, and emphasizing the
relationships between effort and important values.

Since self-efficacy is a task-specific concept, it has been widely applied to the field of management information
systems. One example is computer self-efficacy (CSE), which refers to an individual’s belief about one’s
capabilities to operate either computers in general or a specific task-oriented computer program in particular, such as
EXCEL or Lotus 123 (Compeau et al. 1995b). However, since its focus is somewhat limited to the skills for
operating a computer in general or computer software packages in particular, it does not sufficiently serve the
intention of the present study, which captures the individual’s confidence in the systematic usage of the overall
information systems used in performing specific jobs and/or tasks. In order to resolve this conceptual difference, we
define systems self-efficacy as an individual’s belief in his or her capabilities to use and operate information systems
that are employed to achieve tasks and/or jobs done in organizations. As a result, the term systems self-efficacy in
this study indicates an individual’s self-efficacy that is derived from the comprehensive usage of information
systems relating to conducting his or her jobs and/or tasks in workplaces.

Due to the conceptual differences, previous research on CSE provides an important starting point for our argument.
According to prior literature on CSE, organizational and management support, encouragement, and expectation are
major behavioral predictors to CSE (Compeau et al. 1995a; Igbaria et al. 1995). In this paper, we argue that
transformational leadership has a positive impact on individuals’ systems self-efficacy. Transformational leaders
provide to their followers various aspects of support, which are linked to increasing individual confidence and
resilience in using information systems. These types of leaders not only enhance the confidence level of their
followers by expressing high levels of expectation, optimism, and encouragement toward the followers’ capabilities
of using information systems, but also provide meaning and challenge to the current information systems situation.
These would be the essential factors for system users in order to heighten their confidence in using information
systems. Therefore, transformational leadership leads to high levels of individuals’ system self-efficacy in
organizations. The preceding argument leads to the following hypothesis of the study:

Hypothesis 2b: Transformational leadership will be positively related to a system user’s systems self-efficacy.
The Mediating Effects of POS and SSE

POS as a Mediator between Transformational Leadership and IS Effectiveness

The mediating role of perceived organizational support in the relationship between transformational leadership and IS effectiveness is founded upon the notion that individuals’ internal characteristics play an important role in enhancing IS effectiveness. There is some evidence that individuals’ internal characteristics positively affect IS effectiveness in IS research. For example, it has been suggested that internal diversity for IS innovation (Swanson 1994), user involvement (Franz et al. 1986; Montazemi 1988), and top management support (Cerullo 1980; DeLone 1988; Doll 1985; Guinea et al. 2005) are influential factors for IS effectiveness in prior research.

Among such factors, several studies have focused on the positive effect of top management support on IS effectiveness. Top management support includes setting organizational policies and goals, appraising objectives, and planning system development (Cerullo 1980; Doll 1985). In a small business context, top management is in the best position to identify business opportunities for the exploitation of IS (Thong et al. 1996b). Since small businesses have informal committees that meet with top management teams and employees in order to clarify issues related to IS projects, top management support leads employees to create positive attitudes toward the use of IS (Thong et al. 1996b). Top management support, however, may not be effectively embodied or delivered to each individual employee due to the power distance in the organizational structure. For instance, top management support could not be reached by daily-routinized IS implementation, such as everyday project meetings and information requirement analysis (Thong et al. 1996b).

Unlike the support from top management, the support from the work groups’ leaders may be closer to individuals’ efforts to routinized IS implementation. Since leaders interact with the followers on a daily-basis regarding general and specific matters of work, including IS implementation, the leader-followers relationship allows the followers to receive various work-related information and perceptions via the leader’s treatment and behaviors (Yukl. 2006). Where leaders attempt to encourage their followers to accomplish individual as well as organizational performance, users’ psychological factors may be crucial in achieving IS effectiveness. The effect of leaders on followers would be especially escalated when the leaders closely work with the follower as transformational leaders. Since transformational leaders are characterized by supportive and inspiring behaviors, the followers of such leaders perceive that those leaders make efforts for and care about individuals’ well-being. Furthermore, previous research suggested that individuals who perceived high levels of organizational care and support also show favorable outcomes as employees (e.g., job satisfaction and positive moods) as well as for the organization (e.g., high levels of performance, reduced absenteeism, and turnover) (Rhoades et al. 2002).

The argument, that POS affects IS effectiveness, is grounded in social exchange theory. Simply stated, social exchange theory suggests that people in organizations are motivated to reciprocate given favors provided by organizational authorities (in most cases, their supervisors). Blau (1964) defined social exchange as “voluntary actions of individuals that are motivated by the returns they are expected to bring and typically do, in fact, bring from others” (1964: 91). Therefore, in this relationship the norm of reciprocity is an essential part of moving the relationship forward. As such, people in social exchange relationships have a mutual agreement that a given favor will be reciprocated to the benefactor in regards to any returns. Based on the logic of the theory, high levels of perceived organizational support of followers, as a given favor from a supervisor, may result in better individual and organizational performance as well as higher satisfaction with IS because the followers feel indebted to the transformational leaders for the given support. As one way of discharging this debt (perceived support from their transformational leaders), individuals are likely to reciprocate by making efforts to accomplish individual and organizational goals using IS, thus effecting high levels of IS satisfaction on behalf of their organization. Therefore, we suggest that followers who work with transformational leaders also tend to have high levels of POS because they feel indebted to the organizational authorities for the given support. In turn, this leads to high levels of IS effectiveness as a means to repay their obligation to the organization. Hence,

Hypothesis 3a: A system user’s perceived organizational support will mediate the relationship between transformational leadership and individual impact.

Hypothesis 3b: A system user’s perceived organizational support will mediate the relationship between transformational leadership and organization impact.

Hypothesis 3c: A system user’s perceived organizational support will mediate the relationship between transformational leadership and information systems satisfaction.
Numerous studies have reported the positive relationship between self-efficacy and performance in organizational behavior research, suggesting that self-efficacy is a strong predictor of subsequent performance (Bandura 1982). Along with the aforementioned research findings, prior research on computer self-efficacy (CSE) has suggested that CSE plays an important role in forming individuals’ behaviors toward information systems. For instance, the research findings showed that computer-related self-efficacy is significantly correlated with the subjective score of Excel skills, increased productivity, feelings of accomplishment, and an enhanced status for specific computer tasks such as Lotus 123 or Word perfect in a training situation (Compeau et al. 1995a; Compeau et al. 1995b; Gist et al. 1989). Compeau et al. (1999) found that CSE is significantly associated with performance expectations, personal expectations, and system usage with a longitudinal context, and several studies have also reported that CSE affects end-user system satisfaction. For example, Hasan (2006) reported that system-specific computer self-efficacy has positive effects on the perceived usefulness with a technology acceptance model. Also, Henry et al. (1994) suggested that computer self-efficacy is positively related to end-user system satisfaction.

As stated earlier, transformational leadership theory showed that an individual’s self-efficacy becomes an important mechanism in the relationship between transformational leadership and its effectiveness. Namely, transformational leaders contribute to attaining individual and organizational performance by influencing individuals’ positive belief about his or her capability to achieve a specific task(s).

This theoretical logic can be applied to IS effectiveness given by IS implementation. We argue that people working with transformational leaders have high levels of systems self-efficacy which in turn achieve better individual and organizational performance and have higher levels of satisfaction with IS. Transformational leaders provide proactive support for and endless optimism about IS that is tied up in their works, as well as show high levels of confidence in the benefits derived from applying IS. Accordingly, such leaders’ supportive behaviors become a major impetus for followers to enhance their confidence levels toward the application of information systems, which exactly refers to SSE. Once, individuals hold the belief that they are capable of working with IS for their works, such beliefs on the confidence targeting on IS would then have a positive and constructive impact on operating the systems effectively, because the more confidence on a specific informational system individuals have, the better performance and satisfaction they achieve (Bandura 1982). This in turn leads to high levels of satisfaction toward IS. The theoretical logic above offers the following hypotheses of the present study:

- **Hypothesis 4a**: A system user’s systems self-efficacy will mediate the relationship between transformational leadership and individual impact.
- **Hypothesis 4b**: A system user’s systems self-efficacy will mediate the relationship between transformational leadership and organization impact.
- **Hypothesis 4c**: A system user’s systems self-efficacy will mediate the relationship between transformational leadership and information systems satisfaction.

### Methods

#### Sample and Procedure

Surveys took place in 25 branches of a large, multi-national bank located in Korea. The bank operates both in business and consumer markets and has a widespread branch network system, serving many local communities. Each branch consists of 10 to 20 employees. Employees in each branch are responsible for providing financial services, such as investment services, private banking, housing and mortgage services, savings accounts, and so on. In order to execute such tasks, the bank operates information systems, the combination of banking software, hardware, and peripherals, which have been customized to their works. Since the information systems are essential tools for employees’ daily works, all of the employees who participated in our surveys were familiar with the usage of the systems. Therefore, our sample well represented the purpose of the study on examining IS effectiveness including employees’ individual and organizational impacts and IS satisfaction.

Since all participants were Korean, prior to conducting surveys, the survey items had been translated into Korean and then back-translated into English in order to ensure conceptual equivalence and comparability with the original items (Brislin 1980). Additionally, the authors personally visited all of 25 branches of the bank, and all participants...
were assured of anonymous participation and confidentiality of the responses. Completed surveys were returned
directly to the authors on-site.

Table 1 shows descriptive statistics of the participants of the surveys. Of the 25 local branches of the bank, 352
questionnaires were distributed to the bank employees (i.e., tellers, consultants on investment and mortgage of
which 268 completed questionnaires were returned. Of these, after removing surveys that had relatively high
amounts of missing responses and/or surveys in which the same value was circled consecutively for every question,
251 were considered usable. This resulted in 251 total respondents, with an effective response rate of 71%. Of the
usual sample, 43% were male; the average age was 31.3 years (s.d. = 7.5); and the average organizational tenure was
5.6 years (s.d. = 5.0). In addition, participants were well-educated, with 86.5% having completed a college or
university degree.

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<th>Table 1. Descriptive Analysis</th>
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<td>Graduate School</td>
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**Measures**

**Independent Variable**

**Transformational Leadership**

Twenty items from the transformational leadership scale of the Multifactor Leadership Questionnaire (MLQ)-Short Form 5X (Bass et al. 2004) were used to measure leaders’ transformational leadership styles. Since our hypotheses made no distinction among the four behavioral components of transformational leadership, we combined these four factors into one single factor. In this study, leaders were not asked to evaluate their self-report leadership because it is highly likely that leaders could answer not based on actual behaviors but based on social desirability, which may trigger inflation of actual relationships (Podsakoff et al. 2003). In order to avoid this common method bias, subordinates were asked to respond to their supervisors’ leadership behaviors using a 5-point scale ranging from 1 (Not at all) to 5 (Frequently, if not always).

**Mediator**

**Perceived Organizational Support**

Perceived organizational support was assessed with a five-item scale that showed the five highest-loading items from the short form of the scale of perceived organizational support developed by Eisenberger et al. (1986). Respondents were asked to indicate on a 7-point scale (1, strongly disagree, to 7, strongly agree) their perception of how much their organization supported them. Sample items included “the organization is willing to extend itself in order to help me perform my job to the best of my ability,” and “the organization cares about my opinions.”

**Systems Self-Efficacy**

Systems self-efficacy was evaluated through four items by modifying Johnson’s computer self-efficacy scale (2000), using a 7-point scale (1, strongly disagree, to 7, strongly agree). Due to the limited space

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1 Since the MLQ-Short Form 5X is copy-righted, sample items could not be released.
of the questionnaire, we only used four items, with the highest factor loading scores of the original items. Since self-efficacy is a task-specific construct, it has been modified depending on the types of tasks and domains (Marakas et al. 1998). The items for systems self-efficacy focused on measuring an individual’s belief in one’s capabilities to successfully use information systems in achieving a specific task in the bank. The sample questions included: “I believe that I really have the ability to handle the banking systems for doing my tasks” and “I believe that I really have the high system proficiency needed to complete my tasks on time.”

Dependent Variable

**Individual Impact** We used four items developed by Delone and McLean (1992), tapping into individual productivity, task performance, time saving on the job, and individual effectiveness on the job. They were designed as a 7-point scale (1, strongly disagree, to 7, strongly agree). For example, respondents were asked to indicate the extent to which the current information systems of the bank improved their individual performance.

**Organization Impact** Six items from Thong et al (1996b) were used to measure organization impact. Since the costs and benefits of information systems that attribute to organization performance hardly quantify and are not recorded in the form of objective data (Lucas 1981), these items were perceptual measures for organization impact. Respondents were asked with a 7-point scale (1, strongly disagree, to 7, strongly agree) to indicate their perception of the degree to which the information systems of the bank contributed to the organization’s impact in terms of profit, sales revenue, staff productivity, competitive advantage, operations efficiency, and improved decision-making in their branch.

**IS Satisfaction** IS satisfaction was measured by five items from Raymond (1985), and Doll et al (1997). Respondents were asked with a 7-point scale (1, strongly disagree, to 7, strongly agree) to indicate the degree to which they were satisfied with each item in terms of timeliness of reports, accuracy of reports, reliability of reports, convenience of systems, and ease of use.

Control Variable

A team type was controlled in order to minimize their potential confounding effects on IS effectiveness. Since each team (operation vs. marketing) of the branches has different objectives and intra-organizational dependencies, such differences might affect the actual relationships. Also, because employees’ experience with the specific information systems may affect their reactions to its application (Marakas et al. 1998), reflected in how long employees have implemented their tasks with the information systems, IS experience was considered to be a control variable. Lastly, gender was controlled in order to minimize the potential confounding effects that may influence the actual relationships.

Data Analysis

We used Partial Least Squares (PLS) for the structural equation modeling procedures implemented in PLS Graph 3.0 in order to identify the nomological network of the study. It performed a simultaneous evaluation of both the quality of measurement (the measurement model) and the construction of inter-relationships (the structural model). PLS Graph provides the ability to model latent constructs even under conditions of non-normality and small- to medium-size samples (Chin 1998). In addition, we tested the mediation effects of two mediators (i.e., POS and SEE) by using two complementary methods: (1) comparing a full model (a model including a mediation path) to a nested one (a model excluding a mediation path), and (2) analyzing individual mediated paths (Subramani 2004). The statistical conclusions about model fit were obtained based upon the difference between $R^2$ of the two models, obtained from the PLS results. We tested each mediator separately. Along with these techniques, we performed Sobel’s (1982) test, which has been suggested as a powerful test for mediation by prior research (MacKinnon et al. 1995) to ensure the hypothesized relationships.
Results

Descriptive Statistics

Table 2 shows the scale means, standard deviations, Pearson’s correlations, composite reliability (C.R.), and Average Variance Extracted (AVE) among the measures. The composite scale reliability for each construct, which is similar to Cronbach’s alpha, were high, being above .80 (the recommended cut-off of .70), indicating that the measures used in this study were adequately reliable. Confirmatory factor analysis showed that each construct explains equal variance. These results suggest that our constructs exhibit good psychometric properties. Table 3 shows that the factor loadings of most indicators associated with each construct were high, exceeding .70 except three items in transformational leadership which were slightly below than the cut-off, indicating adequate reliability.

Table 2. Means, SD, Inter-Construct Correlations and Average Variance Extracted (N=251)

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<tr>
<th></th>
<th>Mean</th>
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<th>C.R.*</th>
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<th>(7)</th>
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<tr>
<td>Trans. Leader (1)</td>
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<td>0.971</td>
<td>0.790</td>
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<td>POS (2)</td>
<td>3.84</td>
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<tr>
<td>SSE (3)</td>
<td>4.14</td>
<td>0.81</td>
<td>0.899</td>
<td>0.328</td>
<td>0.372</td>
<td>0.836</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Org. Impact (4)</td>
<td>4.05</td>
<td>1.16</td>
<td>0.955</td>
<td>0.243</td>
<td>0.394</td>
<td>0.353</td>
<td>0.883</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indi. Impact (5)</td>
<td>4.25</td>
<td>1.21</td>
<td>0.973</td>
<td>0.244</td>
<td>0.420</td>
<td>0.368</td>
<td>0.669</td>
<td>0.948</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS satisfaction (6)</td>
<td>4.30</td>
<td>1.23</td>
<td>0.962</td>
<td>0.269</td>
<td>0.351</td>
<td>0.359</td>
<td>0.637</td>
<td>0.703</td>
<td>0.913</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team type (7)</td>
<td>0.51</td>
<td>0.5</td>
<td>1.0</td>
<td>-0.073</td>
<td>-0.126</td>
<td>-0.074</td>
<td>-0.089</td>
<td>-0.067</td>
<td>-0.034</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Gender (8)</td>
<td>0.56</td>
<td>0.49</td>
<td>1.0</td>
<td>-0.071</td>
<td>0.003</td>
<td>-0.045</td>
<td>0.019</td>
<td>0.036</td>
<td>-0.028</td>
<td>-0.103</td>
<td>1.0</td>
</tr>
<tr>
<td>IS experience (9)</td>
<td>2.2</td>
<td>1.2</td>
<td>1.0</td>
<td>-0.043</td>
<td>-0.104</td>
<td>0.058</td>
<td>-0.073</td>
<td>-0.136</td>
<td>-0.080</td>
<td>-0.046</td>
<td>-0.121</td>
</tr>
</tbody>
</table>

* Transformational leadership was measured on a 5-point scale. All other constructs were estimated 7-point scales.

Each construct should share more variance with its items than with those of other constructs in the model in order to obtain convergent and discriminant validity. Convergent and discriminant validity is inferred when the square root of each construct’s AVE is larger than its correlations with other constructs (Chin 1998; Fornell 1981). As shown in Table 2, AVE exceeded the suggested criterion of .50 for all measures and the diagonal elements in the matrix showed that the AVE of each construct is higher than its correlations with other constructs. Therefore, adequate convergent and discriminant validity was obtained.

Table 3. PLS Component-Based Analysis: Cross-Loadings

<table>
<thead>
<tr>
<th>Items</th>
<th>Experiment group</th>
</tr>
</thead>
</table>

2 Although control variables—a team type, gender, and IS experience—were included in a structural equation model, none of the control variables significantly affected the predictors and criterion. Thus, such variables were not considered in further analyses.

3 According to Barclay et al.(1995), “since most scales are developed for a particular theoretical and research context, it is not surprising that some of the scales (or scale items) do not display the same psychometric properties when used in theoretical and research contexts distinct from those in which they were first developed. (pp. 295-296).” This indicates that it is important to retain as many items as possible from the original scale to preserve the integrity of the original research design, as well as the comparability of the results with other studies that used the same scales (Barclay et al.1995), even though some of the factor loadings are slightly below than .70. In addition, Duxbury and Higgins (1991) mentioned that well-established scales often show poor factor loadings when they are used in causal modeling. For these reasons, we included three items of transformational leadership, that showed slightly lower factor loading scores than the recommended cut-off, .70 in further analyses.
effectiveness factors were explained by transformational leadership, respectively. In addition, transformational leadership was shown to have a significant impact on IS effectiveness. As shown in Figure 2, the result presented that 10.2%, 9.1%, and 10.3% of variance in IS effectiveness was explained by transformational leadership, respectively.

In order to test the hypothesis 1a, 1b, and 1c, we analyzed the effect of transformational leadership on IS effectiveness. The boldfaced numbers are loadings (correlations) of indicators; other numbers are cross loadings. To calculate cross loadings, a factor score for each construct was calculated based on the weighted sum, provided by PLS graph, of that factor’s standardized and normalized indicators. Factor scores were correlated with individual items to calculate cross loadings. Boldface item loadings should be greater than cross-loadings.

### Hypothesis Tests

**The Effect of Transformational Leadership on IS Effectiveness**

In order to test the hypothesis 1a, 1b, and 1c, we analyzed the effect of transformational leadership on IS effectiveness. As shown in Figure 2, the result presented that 10.2%, 9.1%, and 10.3% of variance in IS effectiveness factors were explained by transformational leaderships, respectively. In addition, transformational leadership was shown to have a significant impact on IS effectiveness.
leadership was significantly related to increasing each IS effectiveness: individual impact (path=0.273, \( p<0.001 \)), organizational impact (path=0.247, \( p<0.001 \)), and IS satisfaction (path=0.250, \( p<0.001 \)). Therefore, Hypothesis 1a, 1b, and 1c were strongly supported.

Transformational leadership showed the 9-10% explained variance for the direct effect to each IS effectiveness, which seems to be a relatively low level of explanatory power. However, regarding this issue, according to Falk et al. (1992), the predictive power of the structural model can be evaluated from the arithmetic average of the R² values for all the endogenous variables. Based on their suggestion, note that the arithmetic mean of the five R² values in Figure 2 was over the 0.10, indicating that the model demonstrates acceptable predictive power⁴.

![Figure 2. The Effect of Transformational Leadership on IS Effectiveness](image)

The Effect of Transformational Leadership on POS and SSE

The results for the effect of transformational leadership on POS and SSE are also presented in Figure 2, showing that transformational leadership was significantly associated with increasing perceived organizational support (path=0.482, \( p<0.001 \)) and systems self-efficacy (path=0.328, \( p<0.001 \)). Therefore, Hypothesis 2a and 2b were strongly supported by the results.

The Mediating Effects of POS and SSE

In order to examine the mediation effects of POS and SSE, we first explored whether the mediators hold direct effects on each IS effectiveness factors. Figure 3 presents the PLS results of the full model, which showed that POS had significantly positive impacts on individual impact (path=0.219, \( p<0.01 \)), organization impact (path=0.295, \( p<0.001 \)), and IS satisfaction (path=0.325, \( p<0.001 \)). In addition, the direct path from SSE to individual impact (path=0.250, \( p<0.001 \)), organization impact (path=0.236, \( p<0.001 \)), and IS satisfaction (path=0.245, \( p<0.001 \)) were positive and significant. Overall, both POS and SSE were significantly related to increasing individual impact, organization impact, and IS satisfaction, respectively.

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⁴ Although there are no community standards for the issue of what is an acceptable level of explained variance (Gefen et al. 2000), Falk and Miller (1992) suggested that R² values should be 0.10. In basic research fields like sociology, indeed, levels under 10% are commonly reported, and even IS fields has reported the low level of R² (See Ho et al. 2003; Jaeki et al. 2005; Moeez et al. 2000; Ravichandran et al. 2000; Richard et al. 2006; Thong et al. 1996; Traci et al. 2003; Violet et al. 2003). Using such criteria for the R² values of 0.1 for a substantive level, it can be seen that four of the five endogenous variables in Figure 2, POS, SSE, individual impact, and IS satisfaction, attain this level.
In order to identify the mediation effects of POS and SSE, we then (1) conducted the comparison between the full and nested models, and (2) calculated the magnitude and significance of each mediation effect in the PLS model. The results of comparing the nested and full models are presented in Table 5. As shown in the second row of the table, the first mediation by POS between transformational leadership and individual impact revealed that by including the direct link (TL → Indi. Impact), there was not a significant difference of $R^2$ between the nested and full models, indicating a presence of the mediation effect. Specifically, first, 13% of variance in individual impact was initially explained by a nested model. Next, when adding a direct path to the nested model, the explained variance in individual impact was not significantly increased (from 13% to 14%), and its $f^2$ value was .02.

Based on obtained $f^2$ value, pseud $F$ should be calculated in order to determine whether the explanatory power of the direct path on the dependent variable is significant (See the footnote 5). There are two potential results determining a mediation effect: (1) if pseud $F$ is not significant, it is concluded that a direct path does not have a significant explanatory power for the dependent variable and, therefore, a mediation effect is inferred; and (2) if pseud $F$ is significant, it is concluded that a direct path has a significant explanatory power for the dependent variable and, therefore, no mediation effect is inferred.

Returning to the first mediation test, based on the equation, pseud $F$ was identified as non-significant (pseud $F = 3.75, p > .10$), indicating that a direct path has a significant power to explain individual impact. Therefore, it is concluded that there was a mediation effect of POS in the relationship between transformational leadership and individual impact, and hypothesis 3a was supported. Also, as shown in the second row of the table, there were no significant differences of $R^2$ between the nested and the full models by including direct paths (TL → Org. Impact and TL → IS Sat.), indicating that the direct links do not have a significant power to explain organization impact and IS satisfaction (pseud $F = .88$ and = .60, respectively, $p > .10$). As a result, the nested models were supported, indicating the presence of mediation effects. Thus, hypothesis 3b and 3c were supported. Further, Sobel’s (1982) test suggested that the indirect effects of the relationships through perceived organizational support were statistically significant, $z = 5.41, p < .001$ for TL → Indi. Impact; $z = 5.15, p < .001$ for TL → Org. Impact; $z = 4.73, p < .001$ for TL → Indi. IS Sat, respectively. Thus, the results of the mediation tests showed support for hypothesis 3a, 3b and 3c.

Similarly, as shown in the third row of the table, there were no significant differences of $R^2$ between the nested and the full models by including direct paths (TL → Indi. Impact, TL → Org. Impact and TL → IS Sat.), indicating that the direct links do not have a significant power to explain each dependent variable (pseud $F = 2.33, = 2.28$ and = 2.85, respectively, $p > .10$). As a result, the nested models were supported, indicating the presence of mediation effects. Thus, hypothesis 4a, 4b, and 4c were supported. Further, Sobel’s (1982) test suggested that the indirect effects of the relationships through Systems self-efficacy were statistically significant, $z = 3.21, p < .01$ for TL → Indi. Impact; $z = 3.27, p < .01$ for TL → Org. Impact; $z = 3.35, p < .001$ for TL → Indi. IS Sat, respectively. Thus, the results of the mediation tests showed support for hypothesis 4a, 4b and 4c.

Table 5. Comparison between Nested and Full Models
Furthermore, the results for the magnitude and significance of each mediation effect are provided in Table 6, which shows that POS had statistically significant and positive impacts on each IS effectiveness factors: individual impact (path=0.121, z = 3.09), organization impact (path=0.146, z = 3.25), and IS satisfaction (path=0.157, z = 4.03). In addition, each mediation effect of SSE showed statistically significant and positive results for each factor of IS effectiveness: individual impact (path=0.086, z = 3.27), organization impact (path=0.078, z = 2.97), and IS satisfaction (path=0.080, z = 3.15). Therefore, Based on the two complementary methods for testing mediation effects, hypothesis 3a, 3b, and 3c (the mediation effects of POS) and hypothesis 4a, 4b, and 4c (the mediation effects of SSE) were strongly supported.

Table 6. Significance of Mediated Paths from Transformational Leadership to IS Effectiveness

<table>
<thead>
<tr>
<th>Specific Mediator Effect</th>
<th>Indirect Effect</th>
<th>Row</th>
<th>Mediated Paths</th>
<th>Patha</th>
<th>Z statb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trans. Leadership → POS</td>
<td>A</td>
<td>TL→POS→Indi. Impact</td>
<td>0.121</td>
<td>3.09**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>TL→POS→Org. Impact</td>
<td>0.146</td>
<td>3.25**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>TL→POS→IS Sat.</td>
<td>0.157</td>
<td>4.03**</td>
<td></td>
</tr>
<tr>
<td>Trans. Leadership → SSE</td>
<td>D</td>
<td>TL→SSE→Indi. Impact</td>
<td>0.086</td>
<td>3.27**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>TL→SSE→Org. Impact</td>
<td>0.078</td>
<td>2.97**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F</td>
<td>TL→SSE→IS Sat.</td>
<td>0.080</td>
<td>3.15**</td>
<td></td>
</tr>
</tbody>
</table>

a. Standardized path coefficients are shown.  
***p<0.001, **p<0.01, *p<0.05 in one-tailed tests

Discussion

The purpose of the present study was to explore the impact of a specific form of leadership style, transformational leadership, on IS effectiveness via two potential mediators: perceived organizational support, and systems self-efficacy. The major findings suggest that both an individual’s perceived organizational support and systems self-efficacy of individuals act as mediators in the relationship between transformational leadership and IS effectiveness. We applied transformational leadership theory to an information systems context in organizations, and the results were consistent with the previous findings of the transformational leadership literature, suggesting that transformational leadership has a positive impact on IS effectiveness in work settings.

Theoretical and Practical Implications

This study makes several important contributions to theory development and empirical testing. First, the present study extended theoretical application of transformational leadership and information systems research by integrating transformational leadership into the information systems area. In current business situations, because effective leaders act as a crucial role in motivating and inspiring their people to accomplish individual as well as organizational performance, leadership is a key to success (Dvir et al. 2002). The effect of leadership, however, has not been fully explained in information systems research. Although several studies examined the effect of leadership

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5 $f^2$ value is calculated as $(R^2_{full}- R^2_{excluded}) / (1- R^2_{full})$. The Pseudo F statistic is calculated as $f^2*(n-k-1)$, with l, (n-k) degree of freedom when n=sample size, k=the number of constructs in the model (Subramani, 2003).

6 The standard error for the mediated path is approximated as sqrt $(b^2s_a^2 + a^2s_b^2 + s_a^2s_b^2)$, where a and b are the magnitudes of the paths between x, M, and y, and $s_a$ and $s_b$ are the standard deviations of a and b.
on IS effectiveness, to our knowledge little is known of the impact of a specific form of leadership. Because previous research has been consistently shown that various types of leadership and their unique characteristics have different antecedents and consequences in leadership research (Yukl, 2006), it is crucial to investigate the influence of a specific form of leadership on outcomes in the IS field. Therefore, by investigating the effect of transformational leadership on IS effectiveness, the present study enhances applicability of transformational leadership to an information systems context and, ultimately, contributes to the theoretical extension of transformational leadership and information systems research.

Second, by focusing on system users’ cognitive elements, perceived organizational support, and systems self-efficacy, this study identifies the underlying individual as well as organizational mechanisms of the relationship between transformational leadership and IS effectiveness. This is especially important in order to respond to the question of why system users being guided by transformational leaders show high levels of IS effectiveness. Since information systems in organizations are operated by people, considering system users would be important in articulating IS effectiveness. Based on this argument, we explored individuals’ perceptions about the organization (POS) and themselves (SSE) as two potential mediators of the relationship between transformational leadership and IS effectiveness, which in turn helps us answer, in part, why system users with transformational leaders achieve high levels of IS effectiveness.

Third, this study effectively captures multi-dimensional facets of IS effectiveness by applying multiple factors (i.e., individual and organization impact as well as IS satisfaction). As Thong et al. (1996a) mentioned, using multiple responses from the users could minimize measurement bias. By using multiple factors in estimating IS effectiveness, the current study not only minimizes measurement bias but also delivers detailed and specific dimensions about IS effectiveness.

Fourth, in considering self-efficacy, this study applied a comprehensive and substantial concept, systems self-efficacy, which has not been assessed for a self-efficacy measure in the IS arena. This concept focuses on an individual’s belief in his or her capabilities to operate overall information systems when performing tasks. Since the concept refers to an individual’s ability to deal with the comprehensive and systematic usage of information systems, systems self-efficacy is not limited to the perception of general and/or specific computer skills. Rather, this concept includes the perception of comprehensive skills in operating existing information systems used for people’s specific tasks. Consequently, using the construct of systems self-efficacy enables us to not only have precise and detailed information for its concept but to also serve as better psychometric property.

This study also has important practical and managerial implications. The major findings of the study illustrate that transformational leadership allows employees to perceive organizational support and/or a belief about the confidence of operating information systems in workplaces, which, in turn, provides competitive advantage by inducing high levels of IS effectiveness. Therefore, management should note that IS effectiveness would be enhanced by leaders’ transformational leadership styles that are able to both (1) create system users’ perception that their organization and/or supervisors care about their well-being, and (2) encourage their beliefs in their own capabilities to apply IS in their jobs.

To enhance applicability of such theoretical notions, management should first provide transformational leadership development programs for their managers, informing the trainees that their transformational leadership behaviors could help achieve high degrees of IS effectiveness. In doing so, managers need to be encouraged to act in ways that create high levels of perceived organizational support of their employees as well as systems self-efficacy. In addition, management needs to structure their organizational procedures so that employees are able to obtain the belief that not only are they valued, but also that they are capable of addressing information systems for their specific tasks. Consistent with the institutional efforts for enhancing employees’ perceived organizational support and systems self-efficacy, top management should clearly advertise that the organization cares about the well-being of each employee as an important mission of the organization for helping employees to perceive feelings of organizational support. Moreover, it would be vital if top management shows confidence toward their employees’ capabilities in using information systems to their work. Such transformational leadership components will facilitate employees’ perceived organizational support and self-efficacy toward information systems and, ultimately, this would lead to positive outcomes of IS effectiveness in organizations.
Limitations and Suggestions for Future Research

The present study has several methodological limitations that need to be considered in future research. First, because the primary research focus of the paper was on individuals’ cognitive and psychological factors, we did not consider technical factors for IS effectiveness, such as information quality, systems quality, or service quality of systems. However, previous research has consistently suggested that technical factors relating to information systems also contribute to IS effectiveness (Rai et al. 2002; Seddon 1997). Therefore, it would be enormously valuable if future research identifies both technical and psychological factors by integrating technical factors into the current research model. Second, regardless of the fact that the results were consistent with the theoretical assumption, the cross-sectional design cannot completely rule out alternative explanations (reverse causality), and was not able to truly test the causal inferences of this study (Podsakoff et al. 2003). Therefore, in order to minimize this problem future research should consider additional experimental designs or longitudinal studies to examine the posited relationships. Third, since the findings were drawn from a Korean sample, a generalizability issue should be mentioned. Some may question the applicability of transformational theory, which was created based upon Western cultures, to Korea, which is characterized by collectivistic and high-power distance cultures (Hofstede 1980; 2001). Although a growing body of research in transformational leadership has reported consistent results across cultures, it would be crucial to replicate the current study with a sample from the U.S. or any Western culture in order to test the consistency of the findings of this study with studies across different cultures. Finally, all of the variables in this study were measured from a single source, which might cause the potential common method bias. Although some scholars suggest that the effects of common method variance are overstated (Crampton et al. 1994; Doty et al. 1998), future research should be cautious using the data from a single source.

Despite these limitations, this study contributes to understanding both the impact of transformational leadership on IS effectiveness as well as the underpinnings of psychological processes in the relationship between transformational leadership and IS effectiveness based upon solid empirical results, and it also provides feasible suggestions for further investigation. The results suggest that transformational leadership achieves individual and organizational IS effectiveness as well as IS satisfaction via perceived organizational support and systems self-efficacy of system users.
REFERENCES


