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DO PERCEIVED LEADERSHIP BEHAVIORS AFFECT USER TECHNOLOGY BELIEFS? AN EXAMINATION OF THE IMPACT OF PROJECT CHAMPIONS AND DIRECT MANAGERS

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ABSTRACT

Understanding the managerial influence on user beliefs of information technology (IT) has been an important concern to the IT adoption research. Our study contributes by examining relationships between managers' leadership behavior and user technology beliefs. Drawing on the transformational leadership theory [Bass 1985], we develop a research model comparing the effect of leadership behaviors of two managerial roles - project champions and direct managers - on user technology beliefs. Our cross-sectional survey across 138 users in five organizations suggests that project champions and direct managers' leadership behaviors exercise different influences on users' technology beliefs. Implications of this study on research and practice are discussed.

I. INTRODUCTION

Today's organizations invest heavily in information technologies to increase efficiency and enhance competitiveness. Integrated information technologies such as enterprise systems are mission critical and their use is mandatory-- without them, end users can not complete their ongoing tasks [Brown et al. 2002]. A unique challenge of adopting these integrated IT lies not in system usage, but in the quality of system usage [Brown et al. 2002; DeLone and McLean 2003]. Users are commonly found to "delay or obstruct the implementation, and resent, underutilize, or sabotage the new system" [Brown et al. 2002, p. 284]. These destructive behaviors are believed to be a result of negative user beliefs toward the technologies [Brown et al. 2002; Markus and Keil 1994].

It has been a consensus that management as a collective affects individual IT adoption. Among all the identified antecedents of user beliefs,[1] management has shown to be one key source of influence on individual technology beliefs [e.g., Igbaria et al. 1997; Lee et al. 2003; Purvis et al. 2001; Sharma and Yetton 2003].

This paper argues for a new emphasis on the leadership behaviors of managers, in particular, an emphasis on those of project champions and direct managers, two important players in individual IT acceptance. Individual IT beliefs, and consequently individual IT usage, could be influenced by the leadership behaviors of business managers.

Prior studies have long advocated the leader role of managers in individual IS adoption. As stated by Bassellier, Benbasat, and Reich [2003], "to achieve successful IT planning and IT implementation, it is essential for business managers to take a leadership" (p. 317). Direct managers are essential in "promoting or advocating the use of technological or other innovations" [Bassellier et al. 2003, p. 322]. Project champions, on the other hand, perform "the crucial functions of transformational leadership, facilitation, and marketing the project to the users" [Akkermans et al. 1999].

The perspective proposed here has not been put to systematic or comprehensive tests. The gulf compromises the claim as to the importance of leadership behaviors. Drawing on the established transformational leadership theory [Bass 1985], this paper aims to (1) develop a conceptual model distinguishing the influence of different types of perceived leadership behaviors of project champions and direct managers on two individual IT beliefs (i.e., perceived usefulness and perceived ease of use); and (2) examine the two types of managers' leadership influence under the context of adoption of integrated systems.

Inquiry into the impact of leadership behaviors offers two benefits. First, it investigates the alleged significant effect of perceived leadership behaviors. Second, by distinguishing the leadership impact of project champions from that of direct managers, it sheds light on behaviors that are perceived most influential by individual users.

The article is organized as follows. We first describe current studies on management influence on individual technology beliefs and introduce transformational leadership theory. We then present our research model and explain research hypotheses. After describing our survey methodology, we present our research findings, and conclude with a discussion of theoretical and practical implications.

II. CONCEPTUAL BACKGROUND

MANAGERS AS ONE SOURCE OF INFLUENCE ON INDIVIDUAL TECHNOLOGY BELIEFS

The important role of management in influencing individual behaviors toward technology has long been alluded to by numerous studies [e.g., Purvis et al. 2001; Sharma and Yetton 2003]. Management is critical in ensuring sufficient resources, organizing supportive activities, and creating a conducive environment for new information technologies [e.g., Igbaria et al. 1997; Ramamurthy and Premkumar 1995; Sharma and Yetton 2003].

Institutional theory provides a theoretical underpinning as to how and why institutional factors such as managers affect individual cognition and subsequent behaviors. In particular, Scott [1995] and Orlikowski [1992] suggest three mechanisms in which individual IS adoption is affected by institutional factors: significance, legitimization, and domination. Through significance, managers establish norms and values, upon which users draw to form their cognitive

[1] For a comprehensive list of antecedents of perceived usefulness and perceived ease of use, please refer to Lee (2003), page 760.

interpretations of a new information system. Through legitimization, managers validate behaviors they expect from users, who apply these behaviors as templates to guide their cognitive understandings of the new system. Through domination, managers develop regulations specifying rules and policies with which users should comply. It is believed that through these mechanisms, managers shape end users' cognitive interpretations as to if and how a new information technology benefits individual work activities [e.g., Purvis et al. 2001].

Managers' leadership behaviors are believed to be essential in cultivating favorable IT beliefs. For example, project champions are influential in advocating new information technologies and overcoming resistance [Beath 1991]. Leadership behaviors of direct managers are purported to be critical in "cultivating favorable attitudes, encouraging discussion and assessment of target services and technology requirements, facilitating technology experiment and evaluation, and fostering technology acceptance and utilization" [Chau 2004, p. 91].

However, few studies so far have examined the impact of management influence on individual technology beliefs (see Table 1). As indicated in the table, general management support has been found to significantly affect technology beliefs [Igbaria et al. 1995; Igbaria et al. 1996; Igbaria et al. 1997]. However, by separating top management from local management, Lewis et al. confirmed only the influence of top managers on these two beliefs [2003]. This finding is inspiring in that it suggests that further research on the behavioral impact of managers at different levels is necessary.

While offering useful findings, the extant research on management impact on user IT beliefs is limited in two aspects. First, all studies are conducted only under the context of voluntary use. Integrated technologies (e.g., enterprise systems) often disrupt existing business processes and organizational structure [e.g., Davenport 1998; Markus and Tanis 2000], resulting in unfavorable attitudes toward the technologies and poor IT usage [Doolin 2004; Markus 1983]. A recent meta-analysis has discovered that management influence has been found to be most salient in promoting individual adoption of integrated technologies [Sharma and Yetton 2003].

Second, although some elements of leadership are included in the measures of management support (e.g., "committed to a vision," Table 1), leadership behaviors are not systematically studied. We argue that elevating minimal technology usage requires transformation of users' attitudes from dislike to affection. Business managers need to act as leaders to persuade users of IT benefits by advocating visions, stimulate critical thinking, and enhance individual self-confidence.

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Table 1. Summary of Research on the Impact of Management Support on User IT Beliefs

Study	Management support construct and measures	Dependent variable(s)	Voluntary vs. mandatory use	Significant results
Igbaria, Zinatelli, Cragg, and Cavaye [1997] - examine personal computing acceptance factors in small firms across 358 respondents	**Management support** ▪ Management is aware of the benefits that can be achieved with the use of computers ▪ Management always supports and encourages the use of computers for job-related work ▪ Management provides most of the necessary help and resources to enable people to use computers ▪ Management is really keen to see that people are happy with using computers	▪ Perceived usefulness ▪ Perceived ease of use	▪ Voluntary	▪ Management support on both perceived IT beliefs
Igbaria, Gamers, and Davis [1995] -214 part-time MBA students were surveyed regarding their use of microcomputers to perform business tasks	**Management support** Measures same as above	▪ Perceived usefulness ▪ Perceived ease of use	▪ Voluntary	▪ Management support is a significant predicator of both IT beliefs
Igbaria, Parasuraman, and Baroudi [1996] -471 professionals and managers in 62 companies in North America were surveyed on microcomputer usage.	**Organizational support** ▪ Management is really keen to see that we are happy using our microcomputers ▪ Management has provided most of the necessary help and resources to get us used to the microcomputer quickly ▪ I am always supported and encouraged by my boss to use the microcomputer in my job	▪ Perceived usefulness	▪ Voluntary	▪ Organizational support significantly affects perceived usefulness

	▪ I am convinced that management is sure as to what benefits can be achieved with the use of microcomputers			
Lewis, Agarwal, and Sambamurthy [2003] - examine three sets of influences on beliefs about usefulness and ease of use in the context of the use of course Web sites across faculty members in a university	**Top management support** ▪ The University is committed to a vision of using course Web sites in teaching ▪ The University is committed t supporting my efforts in using course Web sites for teaching ▪ The University strongly encourages the use of course Web sites for teaching. ▪ The university will recognize my efforts in using course Web sites for teaching ▪ The use of course Web sites for teaching is important to the University **Local management support** ▪ My department is committed to a vision of using course Web sites in teaching ▪ My department is committed t supporting my efforts in using course Web sites for teaching ▪ My department strongly encourages the use of course Web sites for teaching. ▪ My department will recognize my efforts in using course Web sites for teaching ▪ The use of course Web sites for teaching is important to my Department.	▪ Perceived usefulness ▪ Perceived ease of use	▪ Voluntary	▪ Top management commitment significantly affects only perceived ease of use ▪ Local management does not affect either IT beliefs
Karahanna and Limayem [2000] - examine the antecedents for E-mail and V-mail usage	**Support** ▪ Training sessions for medium	▪ Perceived usefulness ▪ Perceived ease of use	▪ Voluntary	▪ Support is a significant predicator of perceived usefulness only for V-mail adoption

In this study, we are interested in leadership behaviors of project champions and direct managers. A project champion, for example, usually formally appointed by an organization, plays a strategic leading role in IS implementation [Akkermans et al. 1999; Keil 1995; Newman and Sabherwal 1996]. In contrast, direct managers work with users on a daily basis [Karahanna et al. 1999; Pinsonneault and Rivard 1998; Taylor and Todd 1995] and reinforce "the signals emanating from enterprise management," and direct their subordinates' behaviors to meet the organization's implementation plans [Lewis et al. 2003, p. 662]. Accordingly, both types of managers are expected to exert impact on individual IT beliefs, differently. Therefore, it is imperative to unravel the impact of perceived leadership behaviors on individual technology beliefs, and separate the influence of project champions from that of direct managers. To achieve this, we refer to the transformational leadership theory

TRANSFORMATIONAL LEADERSHIP THEORY

Leadership can be regarded as *behaviors* that "result in others acting or responding in a shared direction." Transformational leadership theory identifies two types of behaviors: transactional and transformational. Transactional leadership behaviors reflect leaders' primary focus on task accomplishment, while transformational leadership behaviors on people [Burke et al. 2006]. Measured by the frequency of occurrence, these two styles of leadership behaviors are reflective of patterns of behaviors that leaders tend to exhibit [Bass 1990]. For example, leaders with transactional behaviors engage in a "series of exchanges and bargains" [Howell and Avolio 1993, p. 891], while leaders with transformational behaviors usually intellectually stimulate and inspire "followers to transcend their own self-interests for a higher collective purpose, mission, or vision" [Howell and Avolio 1993, p. 891]. Leaders with transactional behaviors motivate normal performance (e.g., finish task) from followers by employing rewards/punishments, while leaders with transformational behaviors stimulate employees' beyond-expectations performance by raising employees' self-esteem and facilitating their value internalization (e.g., excel in job) [Conger 1999].

The predictive ability of transactional and transformational leadership behaviors has been demonstrated over a wide range of management issues. In the political arena, leaders can solve disagreement and broker a decision through bargaining and negotiation (transactional), and/or by advocating common values and beliefs (transformational) [e.g., Kaarbo and Hermann 1998]. Additionally, these leadership behaviors can be applied to improve group cohesion and communication [e.g., Dionne and Yammarino 2004], consequently enhancing group performance [e.g., Dionne and Yammarino 2004; Judge and Piccolo 2004]. Leadership behaviors are also essential in change management [e.g., Bass 1985; Gersick 1994; Shamir and Howell 1999]—transactional behaviors are necessary in clarifying goals and motivate employees using rewards, and transformational behaviors are critical in developing a vision that appeals to individual need for achievement, in stimulating rethinking of old ways of doing business, and in providing coaching and guidance to individuals [e.g., Eisenbach et al. 1999].

The two types of leadership behaviors have been tested across various subjects under different organizational and cultural settings [e.g., Antonakis et al. 2003; Bass 1997; Epitropaki and Martin 2005; Howell and Avolio 1993; Howell and Higgins 1990; Waldman et al. 2001]. These two leadership behaviors have been found to be distinct but closely correlated to each other [Avolio et al. 1999; Judge and Piccolo 2004]. The positive correlation is due to the fact that both these two types of behaviors "represent active and constructive forms of leadership" [Avolio et al. 1999, p. 455], and need to perform these two types of behaviors to various degrees to be effective [Avolio et al. 1999; Bass and Avolio 1993].

Empirical studies have also discovered that managers at all levels perform transactional and transformational leadership behaviors [e.g., Avolio et al. 1999; Bass 1985; Bass 1997; Howell and Avolio 1993; Waldman et al. 2001], but with different methods and actions [Shamir and Howell 1999]. Lower level managers, for example, "would rely less on global visions, planned speeches, and large scale symbolic activities, and more on setting a personal example by their daily behaviors" [Shamir and Howell 1999, p. 276]. However, how leaders at different levels differ in

their influence is a question that has yet been answered. In the following, we propose a conceptual model discerning the impact of two types of leaders, project champions and direct managers, on individual IT beliefs.

III. RESEARCH MODEL AND HYPOTHESES

Based on the transformational leadership theory, we propose a conceptual model (Figure 1) capturing the effect of perceived leadership behaviors of project champions and direct managers on individual technology beliefs.

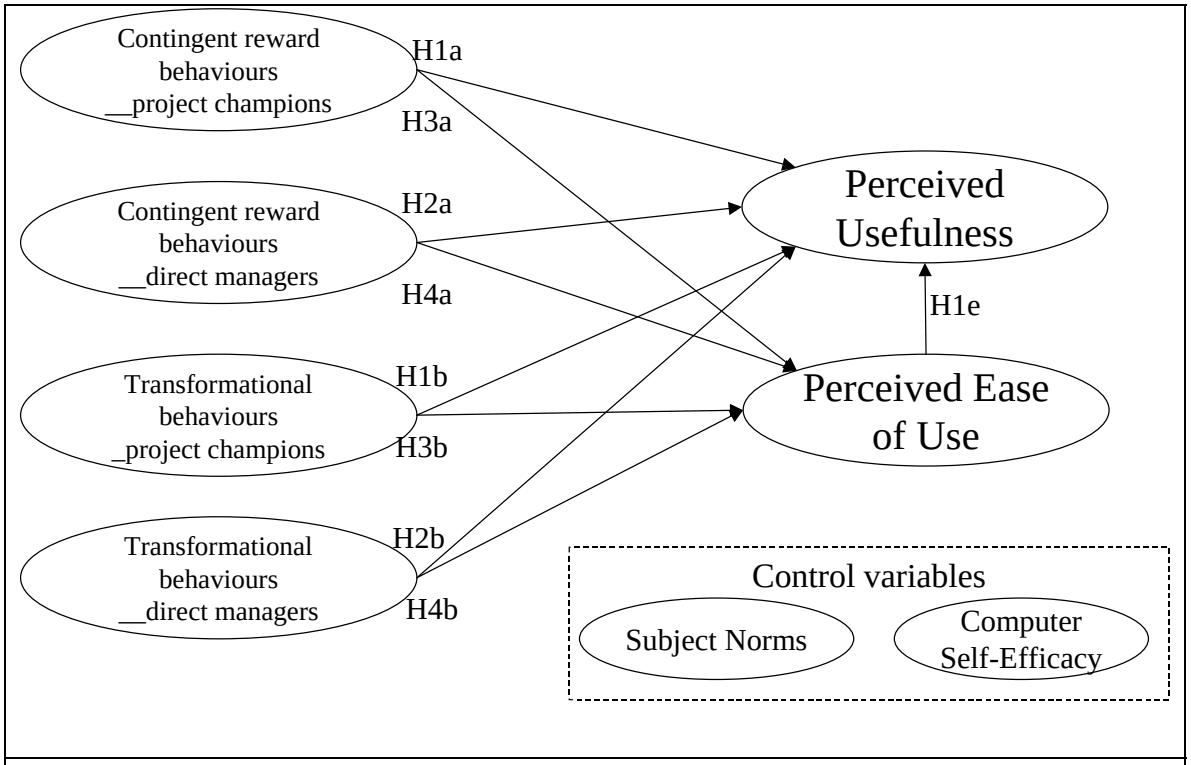

Figure 1. The Research Model

Transactional leadership behaviors are manifested in two types of behaviors: (1) contingent reward ("an active and positive exchange between leaders and followers whereby followers are rewarded or recognized for accomplishing agreed-upon objectives" [Bass 1985; Howell and Avolio 1993, p. 891]); and (2) management-by-exception (whereby leaders transact with followers by "focusing on mistakes, delaying decisions, or avoiding intervening until something has gone wrong" [Bass 1985; Howell and Avolio 1993, p. 891]). We are interested in active leadership behaviors and therefore focus only on contingent rewards in the paper.

Leadership literature describes managers with contingent reward behaviors as individuals who make a conscious effort to guide employees' actions toward the designated goals [Bass 1990]. In particular, they give specific instructions on employees' roles and responsibilities, provide support for their effort, and offer rewards "for progress toward such goals or for reaching them" [Bass 1990, p. 321]. They constantly monitor employees' performance, actively search for problems, and take immediate corrective actions when deviations occur [Howell and Avolio 1993].

Consistent with the leadership literature, we argue that the general contingent reward behaviors may have slightly different manifestations for managers at different levels. As the person who oversees the system adoption to success, project champions' contingent reward behaviors can be found mainly in providing funding for internal and external computing [Keil 1995], offering material resources [Wixom and Watson 2001], and offering necessary rewards [Rai and Yakuni 1996; Sharma and Yetton 2003]. By contrast, contingent reward behaviors of direct managers are manifested in (1) securing necessary resources from top managers [Essex et al. 1998]; (2) detailing their expectations to the employees [Harrison, 1995]; and (3) providing necessary assistance for employees when they face difficulties in using the system [Karahanna et al. 1999; Taylor and Todd 1995].

Individual users tend to develop beliefs of usefulness toward an information technology that has sufficient funding and whose use is rewarded [Davis 1989; Devane 2000; Koch 2001; Leonard-Barton and Deschamps 1988]. With clear expectations from managers, users can foresee potential benefits of using the technology, resulting in beliefs of usefulness toward the technology. Additionally, necessary assistance makes users feel they are capable of handling the new system with support [Compeau and Higgins 1995a], therefore resulting in beliefs of ease of use [Igbaria et al. 1995]. Accordingly, we propose that:

Hypothesis 1a: Perceived contingent reward behaviors of project champions positively influence PU.

Hypothesis 2a: Perceived contingent reward behaviors of direct managers positively influence PU,

Hypothesis 3a: Perceived contingent reward behaviors of project champions positively influence PEOU.

Hypothesis 4a: Perceived contingent reward behaviors of direct managers positively affect PEOU.

Managers can exhibit transformational behaviors to inspire employees to perform beyond expectations. Transformational leadership behaviors can be categorized into three dimensions: (1) charisma (managers provide "followers with a clear sense of purpose that is energizing, is a role model for ethical conduct and builds identification with the leader and his or her articulated vision" [Avolio et al. 1999; p. 444]; (2) intellectual stimulation (managers inspire "followers to question the tried and true ways of solving problems, and encourage them to question the methods they use to improve upon time" [Avolio et al. 1999, p. 444]; and (3) individualized consideration (managers focus "on understanding the needs of each follower and work continuously to get them to develop to their full potential" [Avolio et al. 1999, p. 444].

Project champions are known for their transformational behaviors — they are visionary, intellectually inspiring, and charismatic [Beath 1991; Wixom and Watson 2001]. Compared to non-champions, champions tend to be innovative, self-confident, persistent in overcoming obstacles, and willing to risk their personal reputations to bring changes into an organization [Howell and Avolio 1993; Kendall and Kendall 1993]. Most importantly, project champions instil new visions to motivate workers to achieve a high-level purpose that is useful to them as individuals [Beath 1991; Howell and Higgins 1990; Wixom and Watson 2001].

Under the context of mandatory use environment, transformational behaviors of a project champions are manifested in persuading users the benefits of a new system [Akkermans and van Helden 2002; Newman and Sabherwal 1996], articulating a clear vision [Beath 1991; Rai and Yakuni 1996; Ravichandran and Rai 1999/2000], seeking political support to protect a project [Keil 1995; Wixom and Watson 2001], and handling resistance [Rai and Yakuni 1996; Rainer and Waston 1995]. Through these behaviors, project champions convince users of the usefulness of a new information system. These supportive behaviors also "pave the way for making technology easy to use" [Lewis et al. 2003, p. 669].

In contrast to project champions, direct managers are those who directly supervise and monitor employees' daily work [Pinsonneault and Kraemer 1997]. While a project champion directs and steers an IS adoption, direct managers work closely with individual users to provide necessary assistance [Karahanna et al. 1999; Taylor and Todd 1995]. Direct managers convey the usefulness of the new system by reiterating the visions articulated by the project champions [Bass et al. 1987] and by "encouraging discussion and assessment of target services and technology requirements, facilitating technology experiment and evaluation" [Chau 2004, p. 91]. It is reasonable to argue that these behaviors lead to positive user beliefs. As a result, we propose that:

Hypothesis 1b: Perceived transformational behaviors of project champions positively influence PU.

Hypothesis 2b: Perceived transformational behaviors of direct managers positively influence PU.

Hypothesis 3b: Perceived transformational behaviors of project champions positively influence PEOU.

Hypothesis 4b: Perceived transformational behaviors of direct managers positively affect PEOU.

Perceived ease of use has significant impacts on perceived usefulness. Davis et al. identify perceived ease of use as a major determinant of perceived usefulness [Davis et al. 1989]. The rationale behind this link is that effort saved due to improved PEOU may be reemployed, enabling a person to accomplish more work for the same effort and subsequently increasing PU [Davis 1989]. This link is well-studied and a significant body of research empirically confirms the relationships between PEOU and PU [e.g., Davis 1989; Davis 1993; Davis et al. 1989; Gefen et al. 2000; Karahanna et al. 1999; Venkatesh 2000].

Hypothesis 1e: Perceived ease of use is positively related to perceived usefulness.

CONTROL VARIABLES

We included subjective norm and computer self-efficacy as control variables because they are considered two major sources of user beliefs besides management influence [Lewis et al. 2003]. Subjective norm is defined as "a person's perception that most people who are important to him think he should or should not perform the behavior in question" [Fishbein and Ajzen 1975, p. 320], subjective norm or similar concepts such as social influence [Venkatesh et al. 2003], has been confirmed to be a significant antecedent of perceived usefulness, mainly through internalization and identification.[2] Computer self-efficacy is defined as "an individual's perceptions of his or her ability to use computers in the accomplishment of a task" [Compeau and Higgins 1995a, p. 191]. Previous studies have shown that computer self-efficacy may influence both perceived usefulness and perceived ease of use [Compeau and Higgins 1995a; Compeau and Higgins 1995b; Compeau et al. 1999].

IV. RESEARCH METHODOLOGY

MEASURES

Contingent Reward and Transformational Leadership Behaviors – Measures for each type of leadership behavior were borrowed from the Multifactor Leadership Questionnaire (MLQ 5X), the latest version of leadership measurements. Four items measure contingent reward; example items include "The manager provides me with assistance in exchange for my efforts." Twenty items evaluate three dimensions of transformational leadership behaviors, and sample items of

[2] Social norm can influence behavioral intention directly by the compliance mechanism.

transformational leadership behaviors include "The manager goes beyond self-interest for the good of the group," "The manager articulates a compelling vision of the future," and "The manager spends time teaching and coaching." The instruments passed through several tests [Avolio et al. 1999; Tejeda et al. 2001], and has been found to possess strong psychometric properties — all construct reliabilities are above .70 and factor loadings above .60.

Self-efficacy – Marakas and his colleagues suggest that self-efficacy questions "must be constructed such that the subject is focused only on his or her ability within that specific task context if any interpretable results are to be obtained" [Marakas et al. 1998, p. 154]. Since all systems we studied are enterprise systems, we geared self-efficacy measures toward the context by interviewing users and asking them to review and revise developed measures. Finally, three measurement items were developed to evaluate users' self-efficacy under the ES context ("I know which departments receive the information I input into the system," "I can interpret the data shown in the system without problems," "I can solve the problems I face by using the system").

Subjective norm—we adapted two measurement items of Taylor and Todd to evaluate subjective norm [1995]. These two items are "People who influence my behavior thought that I should use the system," "People who are important to me thought that I should use the system").

Perceived usefulness and perceived ease of use- Measures for the two constructs have been well established, and therefore were adopted from Davis [1989].

RESEARCH CONTEXT

We sent a screening survey to 800 randomly selected midsized or large Canadian manufacturing companies. To be included in our survey frame, companies must have completed one ES technology adoption within a two-year timeframe. The screening survey indicated that the majority of these companies were not qualified. Fifteen qualified organizations gave us their initial consent, but in the end, only seven of these firms were committed to the research. To ensure that all respondents accurately reported information about the most recent technology adoption, we interviewed a senior manager of each organization to gather the system name, the name of project champions, system functionalities, names of users who were affected by the system, and the system adoption process (e.g., training). To ensure that all respondents in one company evaluated managers' (project champion and direct managers) behaviors in the same system adoption, the name of the most recent system adopted and the name of its project champion were printed in the survey questionnaire for that particular company, and specific instructions were given to respondents to make sure that they assessed the behaviors of the very project champions and the manager to whom they directly reported during the system adoption.

Multiple contacts were applied to boost the response rate [Dillman 2000]. Respondents first received an invitation a few days prior to the survey, followed by a detailed cover letter with the survey questionnaire, and a thank-you card or a second reminder letter after the first questionnaire. A replacement questionnaire was sent to non-respondents along with the second reminder letter two to four weeks after the first questionnaire, and the final reminder/thank-you letter was sent a week after the fourth contact. The comparison between the first and last batch did not indicate any significant differences in age ($F=.230$, $p= .633$) or tenure ($F=3.542$, $p=0.062$), nor was there any difference in working position (Wilk's Lambda =.994, p = .739), gender (Wilk's Lambda =.988, p=.530), or education (Wilk's Lambda=. 994, p=.720).

Based on the collected information, we were able to specify the actual name of the focal system in all survey questions. A total of 422 questionnaires were distributed, 239 (56.6 percent) were returned, and 209 were usable. Based on the two important indicators of absolute mandatory usage (a clear cutover date and no alternatives to using the system) [Brown et al. 2002], we excluded responses where system use was not mandatory (60). We also excluded responses from senior managers (11). The final sample size for the survey was 138. Detailed information for each system is specified in Table 2.

Table 2. Systems and Sample Distribution

Firm	Industry	System description	Sample Size
1	Manufacturing – plastic packaging	An enterprise system including human resources, financial, and manufacturing and distribution modules	28
2	Manufacturing – consumer appliance parts and accessories	An enterprise system including financial, manufacturing and distribution modules	36
3	Manufacturing – power generation equipment	An enterprise system including financial, human resources, transportation and distribution, and material requirements planning modules	27
4	Manufacturing – food	An accounting information system that integrates with other systems including financial and inventory management systems	29
5	Manufacturing – medical devices	An enterprise-wide finance information system	18
Total			138

Excluding missing responses, 51.4 percent of the respondents were male, and 48.6 percent were female; 66 were employees, and 38 were managers. The average age of the respondents was a little over 40 years, and the tenure average was a bit more than five years**.** Detailed demographic information of the respondents was reported in Table 3.

Table 3. The Demographic Data

Demographic Item		Count	Percent	Mean
Gender	Male	54	51.4	
	Female	51	48.6	
Educational Background	High school	15	14.3	
	College or University	67	63.8	
	Graduate	23	21.9	
Type of Position	Direct manager	38	36.1	
	Employee	66[3]	63.9	
Age (year)				40.9
Tenure (year)				5.4

[3] The numbers do not add up because of missing values in these variables.

DATA ANALYSIS TECHNIQUE

Data were analyzed using Partial Least Squares (PLS), a multivariate analysis technique for testing structural models with latent variables [Chin 1998b]. A PLS 3.0 bootstrap method with 500 re-samples was used to test statistical significance of the structural paths.

Since transformational behaviors are composed of three dimensions (charisma, intellectual stimulation, and individualized consideration), we applied a two-step procedure proposed by Chin and Gopal [1995] and illustrated by Kelley [2001]. The first step of the procedure requires that PLS be run between first-order factors and the adjacent construct(s) to obtain factor scores for these first-order factors. The generated factor scores are deemed to "more accurately [reflect] the underlying constructs than any of the individual items by accounting for the unique factors and error measurements that may also affect each item" [Chin and Gopal 1995, p. 50]. These factor scores are then treated as indicators of second-order constructs and entered into PLS. Construct validity and reliability of the first-order factors were examined before using these factor scores in the full model.

V. RESULTS

MEASUREMENT MODEL

Three common tests of reliability and validity (i.e., convergent validity, discriminant validity, and reliability) were performed [Barclay et al. 1995; Chin 1998a]. Composite reliability was applied to assess internal consistency reliability [Werts et al. 1974]. The common cut-off is .70 [Chin 1998a]. The examination of internal consistency reliability indicates that the composite reliability for all constructs is higher than the .7 threshold, suggesting that all construct measures are reliable.

Convergent validity was examined based on two criteria: (1) factors of their assigned construct should exhibit loadings above 0.70 (Chin 1998b); and (2) average variance extracted (AVE) score for each construct should be above 0.50 [Fornell and Larcker 1981]. As shown in Tables 4 and 5, all factor loadings are above the .70 threshold level, and the square roots of AVEs are above .50, satisfying convergent construct validity.

Table 4. Factor Loadings and Composite Reliability

Measure (composite reliability) / Item	CR_pc (0.866)	TF_pc (0.963)	CR_dm (0.848)	TF_dm (0.963)	SE (0.910)	SN (0.941)	PU (0.949)	PEOU (0.928)
CR_pc1	**0.75**	0.69	0.29	0.21	0.22	0.27	0.24	0.29
CR_pc2	**0.77**	0.70	0.24	0.21	0.32	0.27	0.21	0.31
CR_pc3	**0.76**	0.62	0.32	0.27	0.39	0.31	0.24	0.29
CR_pc4	**0.87**	0.80	0.26	0.25	0.33	0.33	0.23	0.42
TF_pc1	0.87	**0.95**	0.27	0.26	0.40	0.31	0.29	0.36
TF_pc2	0.82	**0.94**	0.41	0.39	0.43	0.36	0.31	0.43
TF_pc3	0.86	**0.95**	0.31	0.29	0.35	0.33	0.26	0.34
CR_dm1	0.25	0.18	**0.73**	0.54	0.11	0.10	0.17	0.18

CR_dm2	0.35	0.39	**0.74**	0.61	0.14	0.22	0.15	0.16
CR_dm3	0.19	0.19	**0.77**	0.62	0.23	0.25	0.15	0.17
CR_dm4	0.28	0.33	**0.82**	0.78	0.24	0.19	0.18	0.23
TF_dm1	0.28	0.31	0.78	**0.93**	0.21	0.15	0.16	0.16
TF_dm2	0.29	0.33	0.79	**0.96**	0.23	0.23	0.18	0.22
TF_dm3	0.27	0.31	0.82	**0.95**	0.21	0.20	0.14	0.21
SE1	0.35	0.38	0.20	0.20	**0.82**	0.27	0.54	0.37
SE2	0.32	0.29	0.19	0.16	**0.91**	0.30	0.67	0.48
SE3	0.39	0.44	0.25	0.24	**0.90**	0.23	0.67	0.55
SN1	0.34	0.31	0.20	0.15	0.29	**0.94**	0.27	0.35
SN2	0.37	0.36	0.26	0.24	0.28	**0.94**	0.31	0.35
PU1	0.23	0.25	0.28	0.21	0.62	0.26	**0.90**	0.39
PU2	0.28	0.30	0.17	0.15	0.65	0.28	**0.92**	0.42
PU3	0.27	0.28	0.14	0.11	0.66	0.29	**0.89**	0.48
PEOU1	0.36	0.33	0.23	0.17	0.48	0.35	0.46	**0.93**
PEOU2	0.44	0.43	0.24	0.21	0.54	0.38	0.47	**0.95**
PEOU3	0.37	0.35	0.21	0.21	0.47	0.31	0.39	**0.90**

To evaluate discriminant validity, we applied two criteria: (1) each factor loading must be higher under its corresponding construct than under any other construct; and (2) the square root for each construct must be larger than its correlation with other constructs [Chin 1998a]. Our analysis shows that all factor loadings meet the first criteria (Table 4), and all constructs, except CR_pc and CR_dm, satisfy the second criteria (Table 5).

Table 5. Discriminant Validity (AVEs anc correlations)

	CR_pc	**TF_pc**	**CR_dm**	**TF_dm**	**SE**	**SN**	**PU**	**PEOU**
CR_pc	**0.79**							
TF_pc	0.90	**0.95**						
CR_dm	0.35	0.35	**0.76**					
TF_dm	0.30	0.33	0.84	**0.95**				
SE	0.40	0.42	0.24	0.23	**0.88**			
SN	0.37	0.36	0.25	0.20	0.30	**0.94**		

PU	0.42	0.40	0.25	0.21	0.54	0.37	**0.93**	
PEOU	0.29	0.31	0.21	0.17	0.71	0.31	0.48	**0.90**

The lack of discriminant validity between contingent reward and transformational behaviors could potentially harm the validity of our research findings. The high correlations suggest that current leaders may perform both transactional and transformational roles. As a result, we created two formative variables (PC and DM), and then loaded the two types of perceived leadership behaviors to their respective new variables. The reexamination of construct correlations and AVEs indicated sound construct discriminant validity (Table 6). We then proceeded to examine the structural model.

Table 6. Discriminant Validity (AVEs and Correlations)

	PC	**DM**	**EOU**	**SE**	**SN**	**PU**
PC	**0.85**					
DM	0.41	**0.81**				
EOU	0.33	0.18	**0.91**			
SE	0.48	0.24	0.65	**0.80**		
SN	0.42	0.37	0.19	0.21	**0.90**	
PU	0.51	0.26	0.55	0.46	0.33	**0.91**

STRUCTURAL MODEL

Our model explains 42.7 percent of the variance in perceived ease of use and 43 percent of the variance in perceived usefulness. Perceived leadership behaviors of project champions are significantly related to perceived usefulness (β=.31, t=3.22, p<.01) but not perceived ease of use. Surprisingly, none of perceived leadership behaviors of direct managers exert significant effects on either PU or PEOU. Consistent with the IT acceptance literature, PEOU is a significant determinant of PU (β=.41, t=4.26, p<.001). We examine the impact of the two types of leadership behaviors by comparing their path coefficients to its respective high-order construct. Results show that transformational behaviors consistently carry a heavier influence than do contingent reward behaviors.

Since we combine behaviors, a new table (Table 7) was created to illustrate the relationship between old and new hypotheses, and hypotheses that are supported by our study.

VI. DISCUSSION

Quality use of information technologies such as enterprise systems is urgently important for organizations that intend to reap benefits from their IT investments. The impact of perceived leadership behaviors of business managers on individual IT adoption, although have long been advocated, have yet been examined. Nor has the influence of project champion been differentiated from that of direct managers. Our study, grounded in the transformational leadership theory and IT acceptance literature, examines the significance of leadership behaviors of business managers, and reveals the impact of project champions and direct managers on individual technology beliefs under the context of ES adoption. Based on a cross-sectional survey of 138 users in five organizations, our research generates findings that are unique to the mandatory ES use context.

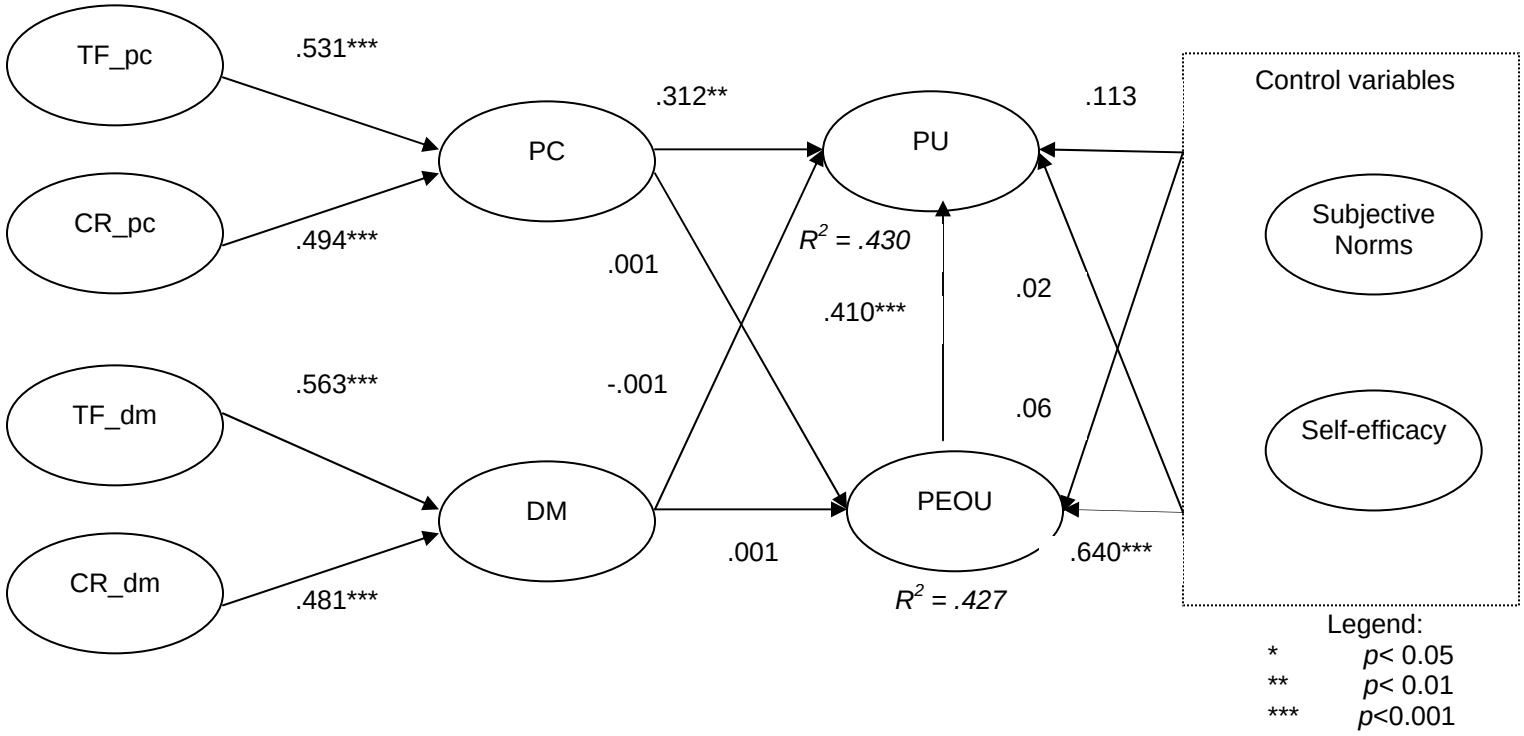

Figure 2. Revised Model

Prior to discussing the results, there are several limitations that should be kept in mind. First, due to the close relationship between the two types of leadership behaviors, we are unable to differentiate the direct impact of each of the two types of leadership behaviors. However, the results from our data analysis clearly suggest that transformational behaviors exert a greater influence than do contingent rewards. Additionally, as we will discuss to follow, the close relationship between the two types of leadership behaviors may be reflective of the context of the adoption of integrated systems. Second, we gathered perceived leadership behaviors of champions from only five organizations, which limited the variability of champion behaviors. However, despite the small number

Table 7. Old and New Hypotheses

Original Hypothesis	**New Hypothesis**	**Results**
H1a: Perceived contingent reward behaviors of project champions positively influence PU.	Leadership behaviors of project champions positively influence PU.	Title Case
H1b: Perceived transformational behaviors of project champions positively influence PU.		
H3a: Perceived contingent reward behaviors of project champions positively influence PEOU.	Leadership behaviors of project champions positively influence PEOU.	No
H3b: Perceived transformational behaviors of project champions positively influence PEOU.		
H2a: Perceived contingent reward behaviors of direct managers positively influence PU.	Leadership behaviors of direct managers positively influence PU.	No
J2b: Perceived transformational behaviors of direct managers positively influence PU.		
H4a: perceived contingent reward behaviors of direct managers positively affect PEOU.	Leadership behaviors of direct managers positively influence PEOU.	No
H4b: Perceived transformational behaviors of direct managers positively affect PEOU.		
H1e: Perceived ease of use is positively related to perceived usefulness.	Same as original	Yes

of organizations, the significant impact of perceived leadership behaviors of champions undoubtedly highlights the critical role of project champions in shaping user technology beliefs. Third, the established measures for two types of leadership behaviors are not situation-specific; therefore, we can provide only general guidelines for effective management behaviors under the context of mandatory use of enterprise systems.

The primary contribution of this paper lies in that we have proved the importance of perceived leadership behaviors in cultivating favorable technology beliefs under the adoption of integrated technologies, and differentiated the impact of project champions from that of direct managers. Perceived leadership behaviors of project champions exercise a direct influence on perceived usefulness. The finding confirms the claim that project champions are effective leaders in conveying visions and transcending users' self interest for collective goals [Beath 1991].

However, perceived leadership behaviors of project champions do not directly affect individual user's beliefs on ease of use, probably due to the complexity of enterprise systems. The finding is inconsistent with the study of Lewis et al., who discovered that top management significantly affected both technology beliefs. Nonetheless, the finding is intriguing in that we discover that when it comes to the adoption of complex systems such as enterprise systems, leadership behaviors of project champions are effective only on certain IT beliefs.

In contrast to project champions, the perceived leadership behaviors of direct managers exert no significant influence on either technology belief. This finding is surprising given the commonly believed importance of direct managers [Dirks and Ferrin 2002; Eisenberger et al. 2002]. Leaders led by capacity and motivation [Popper et al. 2000]. Integrated systems such as enterprise systems are complex. One possible explanation is that lacking sufficient knowledge of the technologies may reduce the capacity and motivation of direct managers to act as leaders. Bassellier et al. [2003] suggest that business managers are more inclined to play the role of leaders when they are equipped with IT knowledge. Accordingly, we postulate that the lack of sufficient knowledge of enterprise systems prevents direct managers from being perceived as effective leaders. However, this proposition needs to be further examined.

Our results reveal a high correlation between the two types of perceived leadership behaviors. Modest correlations were discovered by previous studies [Avolio et al. 1999; Howell and Avolio 1993; Howell and Higgins 1990; Judge and Piccolo 2004]. The high correlation found in our study suggests that the two types of behaviors are performed together with a similar frequency of occurrence [Antonakis et al. 2003]. This assertion is confirmed by examining the average of occurrence of these two types of behaviors (CR_pc =4.51, TF_pc=4.51; CR_dm=4.97, TF_dm=4.72). Scholars have speculated that the research context may have contributed to the relationship between the two types of leaderships [Antonakis et al. 2003]. Therefore, it is possible that under the adoption of integrated systems, managers need to perform both types of behaviors.

It is intriguing that perceived leadership behaviors of direct managers, although showing a higher level of frequency than those of project champions, had no significant effect on the two IT beliefs. Therefore, it is possible that the rank of the individuals who perform these behaviors also plays a role in their influence. That is, compared to direct managers, project champions are perceived to be more authoritative, therefore their behaviors are more influential on individual user IT beliefs.

Furthermore, we have confirmed the significant effect of PEOU on perceived usefulness, which was not discovered under the voluntary use environment by Lewis et al. [2003]. Our results suggest that under the mandatory use of enterprise systems, it is important to obtain individual user's beliefs about ease of use of the technologies in order to help them develop positive beliefs of the usefulness of the technology.

In Table 7, we compare our results with those discovered in the context of voluntary IT use. Shaded cells indicate different findings. As shown in the table, the overall pattern of construct relationships is similar across both contexts; however, as discussed previously, our findings are reflective of mandatory use of integrated systems.

VII. FUTURE DIRECTIONS AND CONCLUSIONS

Prior studies focus on general management influence on user technology beliefs; the impact of perceived leadership behaviors of business managers on individual technology beliefs remain unexamined. The current research, rooted in transformational leadership theory and IT acceptance literature, presents a research model distinguishing the impact of two salient actors -- project champions and direct managers --on user technology beliefs under the context of mandatory use of enterprise systems. Our research findings unravel the impact of perceived leadership behaviors of both types of business managers.

Table 7. Results Comparison

	Construct Relationships	Results from Lewis et al. (voluntary use environment)	Findings from this research (mandatory Enterprise Systems use environment)
Relationships hypothesized by Lewis et al. 2003	Beliefs about the ease of use of a technology have a significant positive influence on beliefs about the usefulness of the technology	Not supported	Supported
	Perceived top and local management support for the use of a technology has a significant positive influence on individual beliefs about the usefulness of that technology	Partially supported Top management (not local management) commitment enhanced usefulness and ease of use beliefs	Partially supported Perceived leadership behaviors of project champions enhanced only usefulness beliefs
	Perceived social influence form referent others in support of the use of a technology has a significant positive influence on individual beliefs about the usefulness of that technology	Not supported None of the five sources of social influence influenced usefulness beliefs	Not supported Subjective norm does not affect perceived usefulness
	Computer self-efficacy toward a technology have a significant positive influence on individual beliefs about the usefulness and ease of use of that technology	Partially supported Computer efficacy had a significant influence only on ease of use beliefs	Partially supported Computer efficacy had a significant influence only on ease of use beliefs
Relationship not hypothesized in the study of Lewis et al. 2003	**Project champion has significant impacts on beliefs**		Partially supported Project champion significant influence perceived usefulness, but not perceived ease of use.
	Direct manager behavior has significant impacts on beliefs		Not supported Direct manager behavior does not have significant impacts on either perceived usefulness or perceived ease of use.

Aside from suggestions for future research indicated in the discussion section, we offer a few more directions to follow. First, the proposed research model can be tested under the voluntary use context to discern possibly different impact of perceived leadership behaviors under different IT use environments. Second, the impact of direct managers needs to be further examined to uncover reasons for the insignificance of their perceived leadership behaviors and reveal the role of direct managers in promoting individual adoption of integrated systems. A combination of survey with case studies would be helpful to bring insights into the subject.

In spite of the similar frequency of perceived leadership behaviors performed by both project champions and direct managers, project champions were perceived more influential than direct managers. What factors (other than rank) could contribute to the different effects of perceived leadership behaviors? Leadership literature has identified certain personal traits (e.g., positive affectivity) mediate the effectiveness of leadership behaviors [Judge et al. 2002; Rubin et al.,2005]. Future research should explore these personal traits that may contribute to the effectiveness of business managers as leaders under the context of adoption of integrated systems.

Furthermore, previous studies have found that user technology beliefs could be affected by gender, age, and experience [e.g., Venkatesh et al. 2003]. Building on the current research, future studies can explore whether the three variables moderate the influence of perceived leadership behaviors of project champions and direct managers on user technology beliefs.

Evidence suggests that individuals with unfavorable technology beliefs under-utilize or intentional sabotage the technologies [Brown et al. 2002]. Accordingly, a key issue facing managers responsible for promoting integrated information technologies is the development of favorable individual beliefs toward these technologies in order to achieve quality technology usage. The findings of this study provide a basis for organizations to define effective strategies to fit the need of the situation.

A key implication of this research is that under the context of mandatory use of enterprise systems, perceived leadership behaviors of project champions are more influential on individual technology beliefs than direct managers. Therefore, project champions need to actively engage their leadership behaviors to promote individual technology acceptance.

Second, in appointing project champions, organizations need to select ones who are transactional as well as transformational. Transactional behaviors are essential for project champions to ensure that responsibilities are clearly defined and necessary resources are provided, and transformational behaviors are critical to advocate the vision behind the technology adoption and facilitate end users to internalize the benefits of the technology.

Third, beliefs about ease of use are found to be the most salient predictor of beliefs about usefulness under the context of mandatory use of enterprise systems. The finding suggests that in order to cultivate positive beliefs about usefulness of enterprise systems, organizations need to find ways to reduce the complexity of the technologies. Our results suggest that enhancing computer self-efficacy leads to increased perceived ease of use. Thus enhancing computer self-efficacy would be an effective approach to developing positive beliefs of ease of use.

In summary, the major contribution of the study is twofold: the examination of perceived leadership behaviors on individual technology beliefs under the context of mandatory ES use, and the differentiation of the impact of project champions from that of direct managers. Our study generates findings that lead to a richer understanding of the effect of leadership behaviors of business managers at different levels on individual technology beliefs. Practitioners should heed our research findings in the course of garnering expected benefits from their investment in enterprise systems.

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