Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 2008 Proceedings

Americas Conference on Information Systems (AMCIS)

2008

What's the Weather Like? The Effect of Team Climate and Individual Attributes on Individual Intention to Explore a New Technology

Likoebe Maruping
University of Arkansas, lmaruping@walton.uark.edu

Massimo Magni
Universita Bocconi, massimo.magni@unibocconi.it

Leonardo Caporarello
Universita Bocconi, leonardo.caporarello@unibocconi.it

Stefano Basaglia
Universita Bocconi, stefano.basaglia@unibocconi.it

What's the weather like? The effect of team climate and individual attributes on individual intention to explore a new technology

Issues in Information Technology Adoption

Likoebe Maruping
Department of Information Systems
Walton College of Business
University of Arkansas
Fayetteville, AR 72701
lmaruping@walton.uark.edu

Massimo Magni
Institute of Organization and
Information Systems
Bocconi University, Milano, Italy
massimo.magni@unibocconi.it

Leonardo Caporarello
Institute of Organization and
Information Systems
Bocconi University, Milano, Italy
leonardo.caporarello@unibocconi.it

Stefano Basaglia
Institute of Organization and
Information Systems
Bocconi University, Milano, Italy
stefano.basaglia@unibocconi.it

Abstract

Research on technology adoption and use has come along way in explaining the factors driving individuals' use of new technologies. However, recognizing the inherently nested structure of social systems, recent research has pointed to the need to understand new technology use from a multilevel perspective. This need is coupled with a desire to understand the factors that drive individuals' utilization of the full range of features provided by the new technology. Drawing on the individual attributes and team climate literature, we develop a multilevel model predicting individual intention to explore a new technology. We test our model in the context of 410 individuals in 69 organizational work teams using a newly introduced VoIP system. Our results show that competitive climate has a positive influence on individual intention to explore. Moreover we also find that individual attributes not only significantly affect the individual intention to explore a new technology, but such attributes also place an important role in influencing the efficacy of competitive climate. In particular we find that older individuals and women exhibit a lower willingness to explore, and that team competitive climate serves as a catalyst for increasing women's willingness to explore a new technology.

Keywords

Intention to explore, team learning climate, team competitive climate, multilevel model, technology use

INTRODUCTION

Despite significant gains in explaining and predicting individual usage intentions and behaviors toward information technology (IT), organizations are still facing problems related to the underutilization of implemented technologies (Venkatesh, Morris, Davis, & Davis, 2003). In particular, previous research has found that individuals often underutilize newly introduced technologies, interacting with only a limited set of features that may support their work tasks (Rigby, Reichheld, & Schefter, 2002; Ross & Weill, 2002). Unfortunately, the limited use of new technology features by employees obstructs potential IT-related job performance improvement and hampers organizational efforts to realize returns from their IT investments (Devaraj & Kohli, 2003; Venkatesh & Davis, 2000). An important issue underlying this underutilization is the extent to which employees explore new technology features. Exploration of various technology features enables employees to discover ways in which the technology can support their work. The propensity for such exploration behavior is reflected in the intention to explore construct, which Nambisan et al. (1999) define as the "willingness and purpose to explore a new technology and find potential use," (p. 373).

Unfortunately, relatively little research has focused on the factors that affect users' willingness to actively explore new technology features. Instead, with relatively few exceptions (Ahuja & Thatcher, 2005; Boudreau & Robey, 2005; Orlikowski, 2000), prior research has tended to view end-users as being fairly passive in their stance toward new technology—i.e., users are ready to adopt a new technology as is (Venkatesh et al., 2003). Agarwal (2000) emphasizes the need for more research investigating how to promote an added-value use of technology rather than simply studying the determinants of technology use *per se*. Similarly, Burton-Jones and Straub (2006) recently highlighted the need to understand deep structure usage of new technology. Clearly, a deeper understanding of the determinants of intention to explore is needed.

Facilitating conditions have emerged as an important precursor to new technology usage (Venkatesh et al., 2003). These conditions have traditionally been linked to organizational provision of resource and infrastructure support for system use (Taylor & Todd, 1995; Thompson, Higgins, & Howell, 1991; Venkatesh et al., 2003). However, an important gap in this extant literature is the role of localized facilitating conditions—specifically in the context of work teams. The organizational reality is that, increasingly, organizations are moving toward a team-based structure for organizing work (Ilgen, Hollenbeck, Johnson, & Jundt, 2005). Recent estimates suggest that over 80% of Fortune 500 companies are utilizing team-based structures to organize work. Thus, a majority of employees are involved in some form of team work as a fundamental part of their jobs (Manz & Sims, 2001). A critical consideration under such work structures is that employees' behavior towards novel situations (including new technology use) is likely to be shaped by shared experiences and interpretations among team members (Hoegl, Parboteeah, & Munson, 2003). Indeed, according to Seibert et al. (2004), individuals belonging to the same team are likely to be exposed to the same goals, strategies, and work environments, which leads to a shared perception of the contextual conditions within the team that is distinct from those of other teams.

Unfortunately, there is currently a dearth of research that examines the intersection of team-level conditions and individual drivers of intention to explore new technologies. Klein and Kozlowski (2000) have lamented the lack of such meso-level theories, arguing that greater attention to models that span multiple levels of analysis can significantly expand our understanding of organizational phenomena. Further, Burton-Jones and Gallivan (2007) have underscored the need for multilevel research that sheds light on technology usage. Thus, the purpose of this research is to understand the role of team-level conditions and individual characteristics in predicting employees' intention to explore new technology. Specifically, we draw on the team climate literature to understand how exploration intentions can be promoted within team-based structures. This foray into the role of team climate is coupled with an examination of individual attributes and attitudinal predictors of employee intention to explore. Previous research has highlighted the importance of individual attributes as predictors of technology usage (e.g. Ahuja & Thatcher, 2005; Morris & Venkatesh, 2000; Venkatesh et al., 2003).

We test our research model in a sample of 410 members and leaders of 69 organizational work teams adopting a new communication technology. Through an empirical test of the research model, this research contributes to the technology adoption literature in two important ways. First, by examining individual-level and team-level antecedents, we extend research on intention to explore—a construct that has hitherto received limited attention. Second, by examining the role of team climate, we contribute more broadly to technology adoption research. Previous research has pointed to the importance of adopting a multilevel perspective on the technology adoption and use phenomenon. This research takes a step in that direction. Finally, linking intention to explore to individual usage scope we corroborate the predictive effect of intention to explore on the features adopted by users.

The remainder of this paper is structured as follows. The next sections describe the theoretical background and research hypotheses. Next we describe the method and the findings. Then, we conclude by outlining the theoretical and pragmatic implications of our study.

THEORETICAL BACKGROUND

Technology Adoption and Use

A rich tradition has developed around technology adoption (Venkatesh, Davis, & Morris, 2007; Venkatesh et al., 2003). Much of this research has sought to understand the factors that predict individuals' acceptance and use of new technologies (Venkatesh et al., 2003). Behavioral intention has consistently emerged as the most proximal determinant of usage behavior and has been used to predict duration, frequency, and extent of use (Venkatesh et al., 2003). However, recent research has highlighted the need to go beyond simple use by examining the degree to which individuals are employing the full range of features provided by a technology to complete work tasks (Burton-Jones & Straub, 2006). Ahuja and Thatcher (2005) suggest that utilization of a broader range of features provides significant benefits to users by enabling them to innovate with the technology.

As noted earlier, intention to explore is defined as a user's willingness to explore a new technology with the purpose of finding potential applications to their work (Nambisan et al., 1999). There are distinct differences between intention to explore and intention to use a new technology. Intention to use reflects a user's conscious plans to use a technology (Davis, 1989). It does not necessarily reflect how one plans to use the technology—i.e., the nature of use. In contrast, intention to explore reflects a user's conscious plan to actively survey the various features of a new technology (Nambisan et al., 1999). This exploration behavior can lead to the discovery of methods for leveraging the technology to support one's work (Ahuja & Thatcher, 2005). This is an important distinction because we believe that this emphasis on exploration is consistent with a broader scope of use—i.e., deep structure use. Unfortunately, there is currently a paucity of research on the antecedents and outcomes of user intention to explore.

Individual Attributes Differences

Several researchers have pointed to the importance of individual attributes in the prediction of technology use (e.g. Ahuja & Thatcher, 2005; Gefen & Straub, 1997; Morris & Venkatesh, 2000; Venkatesh & Morris, 2000). In particular, gender and age have emerged as important individual attributes in the prediction of technology use. These individual attributes have consistently been found to influence the way individuals view and approach technology. For instance, previous literature on gender points out that dissimilarity in outcomes between men and women can be traced back to different decision making processes (Bem & Allen, 1974). Gill et al. (1987) argue that men are more oriented toward individualistic tasks than women. Moreover, other studies in the technology adoption domain (Venkatesh & Morris, 2000) point out that men are more task oriented than women, indicating that instrumental factors are more likely to influence men's likelihood to adopt a new technology. Other studies point out that the occurrence of preferences and orientation changes in the human life cycle lead to differential outcomes among individuals of different ages (Hall & Mansfield, 1975). For example, Dalton and Thomas (1971) and Sharit and Czaja (1994) find that older workers are more likely to resist change than their younger counterparts. Although the effects of gender and age have been examined in predicting behavioral intention, we believe it is instructive to understand the implications of such individual attribute differences for the less-well-understood intention to explore.

Team Climate

Climate represents a shared perception of the types of behaviors, practices, and procedures that are supported in a specific setting (Schneider, White, & Paul, 1998). The underlying perceptions that form climate can be shared at various levels of social collectivity, including organizational, unit, department, and team. As numerous studies have found, climate influences the behaviors of individual employees. According to Glomb and Liao (2003) and Schulte et al. (2006) climate influences individual behavior through a social information processing mechanism (Salancik & Pfeffer, 1978), thus leveraging the way individuals think and feel about a certain aspect of their environment. Moreover, the conceptualization of organizational climate represented a source of debate when compared with the concept of organizational culture. Consistent with recent studies, we consider climate and culture interchangeably, given the overlap in conceptualizing the influence of social context within organizations (Ashkanasy, Wilderom, & Peterson, 2000 ; Bock, Zmud, & Kim, 2005; Smith, Collins, & Clark, 2005). We consider the distinction between the two as more a matter of perspective rather than substance (Dennison, 1996).

Team climate is defined as shared perceptions of the kinds of behaviors, practices, and procedures that are supported within a team. Indeed, teams have been conceptualized as social entities that develop shared attitudes and behavioral patterns through social interaction and through the exposure of team members to the same procedures, policies and experiences (Anderson & West, 1998; Wilkens & London, 2006). In a team-based setting, one's teammates are the more proximal source of influence for their colleagues. Consequently, team members are likely to rely on cues from their team environment to interpret events, develop attitudes, and understand expectations concerning their behaviors (Liao & Chuang, 2004). For example, when there exists a climate for service, team members are more likely to engage in behaviors that foster a favorable relationship with the customer and for achieving higher customer satisfaction.

In the context of new technologies, two specific types of climate are important within teams: team learning climate and team competitive climate. *Team learning climate* reflects the extent to which team members have a shared perception that the team supports experimentation, innovation, and risk taking (Edmondson, 1999). This type of team climate is important for individuals dealing with new technologies because it recognizes that the process of exploration of various system features may not necessarily yield immediate tangible returns. Rather, the experimentation process may lead one down many unfruitful paths before the discovery of value-adding use of technology features is made. Team learning climate has been examined in prior research and been found to improve team performance (e.g. Edmondson, Winslow, Bohmer, & Pisano, 2003; Yang & Chen, 2005).

Team competitive climate reflects the extent to which there is a shared perception of behaviors that promote individual achievement. It is important to note that competitive climate differs from subjective norm in two key ways. First, competitive climate refers to a shared perception, while subjective norm refers to an individual-level perception. Second, competitive climate refers to the characteristics of the contextual environment, while subjective norm directly refers to the pressure related to performing a target behavior. Competitive climate induces team members to search for opportunities for self-enhancement in work performance (Robinson & O'Leary-Kelly, 1998). Indeed, in environments characterized by the norm of competition, individuals are more likely to be oriented toward personal outcomes rather than on the interaction with other team members (Brockner & Wiesenfeld, 1996). Therefore, through a collective expression of competitiveness, team competitive climate increases the focus on tangible resources leading team members to take advantage of opportunities that may emerge (Erdogan, Liden, & Kraimer, 2007). Competitive intrateam structures have been found to lead to improved team performance (Beersma et al., 2003).

HYPOTHESIS DEVELOPMENT

In this section, we develop the theoretical arguments for developing our research hypotheses. We first present the hypotheses related to individual attributes, followed by the hypotheses related to team climate. We then discuss the interaction of these various predictors of intention to explore. Our research model is presented in Figure 1 below.

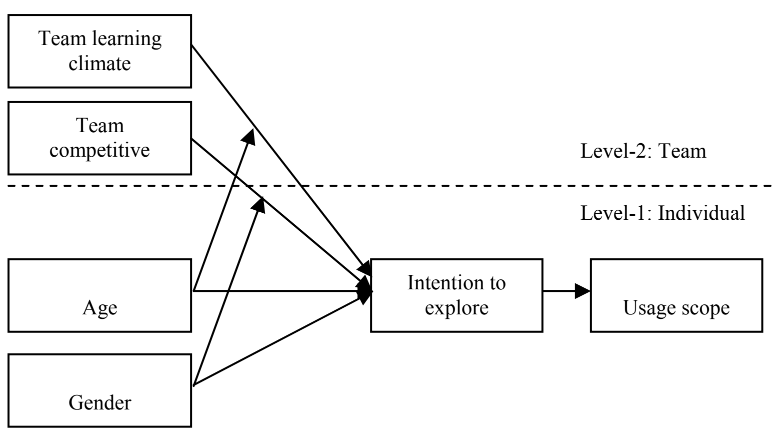

Figure 1. Theoretical model

Individual Attributes and Intention to Explore

Age. Recent psychological studies argue that when individuals grow older they experience changes in their cognitive abilities and their preferences (Kanfer & Ackerman, 2004). In particular, extant research points out that older individuals have limited personal resources for framing organizational events and changes in a positive light, thus inducing a high sensitivity to stressful situations (Hobfoll & Wells, 1998; Mroczek & Almeida, 2004). Older individuals have fewer cognitive resources for processing complex technologies. When the potential work applications of a new technology are not well understood, a great deal of cognitive effort is required for the search and discovery process. Consequently, such individuals are less likely to make an effort to explore new technology features. This is not unlike the challenges that older individuals face when adopting a new technology (Morris & Venkatesh, 2000). Thus, we hypothesize:

Hypothesis 1: Age will be negatively related to individual intention to explore a new technology.

Gender. Men and women have demonstrated different attitudes toward the use of technology (Ahuja & Thatcher, 2005; Venkatesh & Morris, 2000). Specifically, prior studies suggest that women are more likely to exhibit anxiety in interacting with technology (Ahuja, 2002; Bozionelos, 1996) and are less likely to enjoy using technology (Gefen & Straub, 2000). Such differences are likely to be manifested in the individual proclivity for exploring the various features of new technologies and finding potential applications for supporting work tasks. In contrast to women, men—who have a task-achievement orientation—are more likely to explore new technology features so as to find efficient ways of achieving their work tasks. Therefore, ceteris paribus, we expect women to have a lower level of intention to explore when compared to men.

Hypothesis 2: Women will exhibit a lower intention to explore a new technology than men will.

Team Climate and Intention to Explore

Team learning climate. Team learning climate reflects a positive stance toward experimentation with new technologies (Edmondson, 1999; Edmondson, Bohmer, & Pisano, 2001). Such a team climate emphasizes the importance of collective knowledge development through trust and team members' cooperation (Zucker et al., (2002). Team members are able to explore various features and potential applications of the technology without fear of reprisal from making errors. Team members can reflect on their actions and revise their thinking to improve work outcomes (Reagans, Argote, & Brooks, 2005). Individuals who perceive that the team recognizes their effort in taking the initiative for finding new potential uses for the newly introduced technology are more likely to engage in exploratory behaviors (Edmondson et al., 2001). Thus, we expect that team learning climate will foster an environment conducive for individual experimentation.

Hypothesis 3. Team learning climate will positively influence individual intention to explore a new technology.

Team Competitive Climate. As noted earlier, a competitive team climate encourages team members to find ways of improving their own performance. Under such climate, team members continuously search for various sources of advantage in completing their work tasks. To the extent that they believe the technology will boost their work efficiency, team members are likely to explore various features of the technology. Such exploration may present an opportunity to outperform coworkers through the identification of new features and applications. Indeed, empirical evidence suggests that in the workplace, attitudes toward using a technology are closely tied to instrumentality (Davis, 1989). Further, exploration of the technology can enhance one's level of sophistication when it comes to using the technology, potentially improving one's image (Venkatesh & Davis, 2000). Therefore, we expect that team competitive climate will increase the individual intention to explore a new technology.

Hypothesis 4. Team competitive climate will positively influence individual intention to explore a new technology.

Team Climate and Individual Attributes

Team learning climate. Older users of a new technology are more likely to engage in exploration behavior when they perceive a climate that supports such behavior. As noted earlier, exploring various technology features requires significant cognitive effort for older users (Morris & Venkatesh, 2000). They are unlikely to engage in such behavior unless there is a context that supports it. Given their natural curiosity and abundance of cognitive resources, younger users do not rely on a supportive climate for experimentation with technology as older users might. Thus, we expect the relationship between team learning climate and individual intention to explore to be stronger for older individuals. Women are highly sensitized to contextual factors that support technology use. In particular, women have been found to respond well to social influences that promote technology use (Venkatesh & Morris, 2000). We expect that team learning climate will encourage women to be less timid in exploring various technology features in their work. Given their instrumental focus, men are less likely to rely on the influence of team learning climate. Consequently, we expect team climate to be more important in forming women's intention to explore a new technology.

Hypothesis 5: Team learning climate will interact with age in its influence on intention to explore a new technology.

Hypothesis 6: Team learning climate will interact with gender in its influence on intention to explore a new technology.

Team competitive climate. Given the drain that new technology exploration places on individuals' cognitive resources, older individuals are unlikely to explore the features of a new technology unless they feel compelled to. Team competitive climate creates conditions that favor such exploration. Older individuals may feel the need to explore various features of the technology merely as a competitive necessity. Hence, we expect team competitive climate to be more important for older users. As noted earlier, women hold less favorable attitudes toward new technology (Ahuja, 2002; Gefen & Straub, 1997). However, a competitive team climate can prompt women to explore various features of technology to ensure that they perform their work effectively. Such a climate is more important as a catalyst for intention to explore technology among women than is the case for men. Since men generally have an instrumental view of technology, the need for a competitive environment is less urgent (Venkatesh & Morris, 2000). Thus, we hypothesize the following:

Hypothesis 7: Team competitive climate will interact with age in its influence on intention to explore a new technology.

Hypothesis 8: Team competitive climate will interact with gender in its influence on intention to explore a new technology.

Intention to Explore and Individual Usage Scope

Drawing on the theory of reasoned action (Fishbein & Ajzen, 1975), several studies in the technology acceptance stream of research point out the positive relationship between intentions and use (see Venkatesh et al., 2003). Consistent with this stream of research we expect that individual intention to explore will positively influence the scope of system features exploited by the user when interacting with the system (Karahanna, Agarwal, & Angst, 2006). That is, individuals with a greater intention to explore are more likely to use a broader range of system features and functions than individuals with lower such intentions. Indeed, prior research suggests that individuals who develop an internal determination to perform a behavior are likely to follow through with their plans, barring any unanticipated constraints (Venkatesh, Maruping, & Brown, 2006). Therefore, individuals who intend to explore a new technology are more likely to perform behaviors that are oriented toward the discovery and use of new features. Formally,

Hypothesis 9. Individual intention to explore will positively influence individual usage scope.

METHOD

Study context

Data were collected in two large European companies which introduced a new communication technology—voice over IP (VoIP). The technology was introduced to manage all technology-mediated communications among individuals in an integrated manner. The technology was needed to support activities such as agenda sharing, information sharing, mobility management, and event coordination. In addition to offering more information that can be accessed and managed by users, this system embodied the convergence of different communication capabilities, enabling individuals to communicate with colleagues within and outside their team. This is particularly relevant because individuals, through a unique platform, are allowed to chose among different communication channels that match their synchronicity needs (e.g., voice, instant messaging, conference call, and e-mail). In this particular case, while the use of the system was strongly encouraged, there was no policy in place for non-compliance and no actions were being taken as a result of the usage reports, suggesting that system use was voluntary. Data were collected using a survey methodology. The questionnaire was developed using a multi-stage iterative procedure. First, an initial set of items was constructed drawing upon prior work. Next, we conducted interviews with the IT managers responsible for the implementation project. This helped ensure that the questionnaire was appropriate for the organizational setting and the technology introduced. One week before the launch of the survey, CIOs at the participating organizations sent an e-mail memo explaining the importance of the study to all potential respondents.

Data were gathered through a web survey containing five-point Likert-type scales. To obtain more reliable ratings of the team-level constructs under consideration, multiple respondents from each team participated: the team leader and at least three team members. To ensure data validity, only teams returning at least three questionnaires (the team leader and two team members) were considered. Of a total of 810 individuals and 129 teams targeted for the survey, 410 usable surveys referring to 69 teams were completed, yielding response rates of 50.6% (individuals) and 53.4% (team). Data for the team-level independent variables were gathered through the assessment of items formulated explicitly at the team level.

Measures

Usage scope. Two measures of usage scope were assessed. First, we asked users to self-report the percentage of technology features and functions they used regularly. A second method listed the various features and functions of the technology. Respondents were asked to simply indicate which features they used. We created a summated score of the number of features used by respondents. There were no significant differences in usage scope across the participating companies.

Intention to explore. We employed a three-item measure to assess individual intention to explore the new technology. The scale was adapted from Nambisan et al. (1999). The measure has a reliability of .93. We detected no significant differences in intention to explore across the two companies.

Team learning climate. A five-item scale was used to measure team learning climate. The scale was adapted from Marsick and Watkins (2003). The reliability of the scale is .75. The ICC(1) is .10 ($F_{69, 408} = 1.995$, $p < .001$) indicating significant between-team variation. The ICC(2) is .50 suggesting adequate stability in the team-level means (Bliese, 2000). Thus, individual scores were aggregated to the team level.

Team competitive climate. The team competitive climate scale included two items which were adapted from Erdogan et al. (2007). The reliability of the scale is .69. The measure has an ICC(1) of .08 ($F_{69, 408} = 1.838$, $p < .001$) and an ICC(2) of .46. This suggests that it is appropriate to aggregate the scores to the team level.

Age and **Gender.** Consistent with previous research respondents were asked to self-report their age. We used a dummy code for gender (0 = female, 1 = male).

Controls. Given consistent findings linking performance expectancy to behavioral intention, we included this measure as a control variable. We adapted the scale from Venkatesh et al. (2003). The scale has a reliability of .78.

RESULTS

Results of a factor analysis established the discriminant and convergent validity of the scales. As Table 1 indicates, all items loaded on the expected factors and had low cross-loadings on other factors. The correlations and descriptive statistics are shown in Table 2 below. Given the hierarchically nested structure of the data and the research model, it was necessary to use a random coefficient modeling (RCM) technique. RCM enables researchers to examine relationships that span levels of analysis and can meaningfully partition the variance components in outcome variables (Hofmann, 1997). As a further check on whether such analysis was necessary, we examined the ICC(1) for intention to explore—our dependent variable. The measure had an ICC(1) of .09 ($F_{69, 408} = 1.838$, $p < .01$) suggesting that some of the variability could be attributed to between-team differences. We used hierarchical linear modeling (HLM) to test the research model (Bryk & Raudenbush, 1992). The results of the analysis are presented in Table 3 below.

As Model 1 in Table 3 illustrates, the main effects model explains 30% of the variance in intention to explore ($\chi^2 = 46.82$, $p < .05$). Age has a negative influence on intention to explore ($\gamma_{10} = -.02$, $p < .05$). Thus, hypothesis 1 is supported. The coefficient for gender is positive and significant ($\gamma_{20} = .26$, $p < .05$) providing support for hypothesis 2. Team learning climate has no significant effect on intention to explore ($\gamma_{02} = .08$, $p > .10$). Hence, hypothesis 3 is not supported. Finally, in support of hypothesis 4, the coefficient for team competitive climate is positive and significant ($\gamma_{01} = .18$, $p < .05$).

In the second model, we entered the interaction terms. As Model 2 shows, the interaction model explained an additional 3% of the variance in intention to explore. A model comparison suggests a significantly greater fit to the data, thus providing initial support for the interaction hypotheses (Carte & Russell, 2003). Only hypothesis 8 is supported ($\gamma_{21} = -.28$, $p < .05$). Hypotheses 5, 6, and 7 are not supported. To better understand the form of the cross-level moderation, we plotted the interaction. As Figure 2 illustrates the slope of team competitive climate is steeper (more positive) for women than for men. This is consistent with our prediction that team competitive climate would be more important for women than for men in predicting intention to explore a new technology.

As a final check, we also used intention to explore and team climate to predict the two measures of usage scope. As Table 4 indicates, intention to explore has a positive and significant effect on both measures of usage scope (Usage scope $_{(Percentage)}$: $\gamma_{10} = .15$, $p < .05$; Usage scope $_{(Summation)}$: $\gamma_{10} = .19$, $p < .05$) corroborating hypothesis 9. The results underscore that both types of team climate have no significant effect on either measure of usage scope.

	Factors			
Items	1	2	3	4
INT1	**.92**	.12	.07	.10
INT2	**.94**	.14	.10	.10
INT3	**.91**	.12	.07	.04
PE1	.00	**.78**	-.16	.08
PE2	.07	**.76**	-.03	.11
PE3	.12	**.75**	-.03	.05
PE4	.12	**.69**	.09	.06
PE5	.12	**.59**	.25	.21
COMP1	.10	-.06	**.72**	-.15
COMP2	.08	.08	**.81**	.08
LEARN1	.19	.07	-.26	**.66**
LEARN2	.08	.13	-.19	**.77**
LEARN3	-.10	.04	-.23	**.74**
LEARN4	.09	.12	.05	**.73**
LEARN5	.04	.12	.26	**.60**

Notes: INT = intention to explore; PE = performance expectancy; COMP = team competitive climate; LEARN = team learning climate.

Table 1. Factor Analysis Using Varimax Rotation.

Variables	Mean	S.D.	1	2	3	4	5	6	7
1. Usage scope[1]	2.44	1.37							
2. Usage scope[2]	4.61	1.75	.39***						
3. Intention to explore	3.54	1.05	.12*	.10†					
4. Age	41.16	9.15	-10†	.06	-.17**				
5. Gender	-	-	-.06	-.04	.13**	-.01			
6. Team learning climate	3.31	.74	.12*	.05	.17**	-.09	.15**		
7. Team competitive climate	2.67	.92	.06	.07	.17**	.08	.06	-.21**	
8. Performance expectancy	2.89	.84	.18**	.23**	.23**	-.08	.01	.26**	.05

Notes: Level-1 n = 410; Level-2 n = 69; † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.
[1] This scale is measured on a six-point scale: 1 = less than 10%, 2 = 10%-24%; 3 = 25%-49%; 4 = 50%-74%; 5 = 75-94%; 6 = 95% and above.
[2] This measure is a count of the number of features used; intention to explore, team learning climate, team competitive climate, and performance expectancy are all measured on a five-point agreement Likert scale.

Table 2. Correlations, Means, and Standard Deviations.

DV: Intention to Explore	1	2
Variables		
Intercept (γ00)	3.46*** (0.40)	3.47*** (0.38)
Performance expectancy (γ30)	0.27** (0.08)	0.27** (0.07)
Main Effects:		
Age (γ10)	-0.02* (0.00)	-0.02** (0.00)
Gender (γ20)	0.26* (0.10)	0.26** (0.10)
Competitive climate (γ01)	0.18* (0.08)	0.61 (0.40)
Learning climate (γ02)	0.08 (0.08)	0.41 (0.27)
Interactions:		
Competitive climate x Age (γ11)		-0.01 (0.01)
Competitive climate x Gender (γ21)		-0.28* (0.12)
Learning climate x Age (γ12)		-0.01 (0.01)
Learning climate x Gender (γ22)		0.04 (0.12)
χ^2	46.82*	43.21†
R^2	.30	.33
ΔR^2	.30	.03

Notes: Level-1 n = 410; Level-2 n = 69; standard errors are shown in parentheses.
† p < .10, * p < .05, ** p < .01, *** p < .001.

Table 3. Models Predicting Intention to Explore.

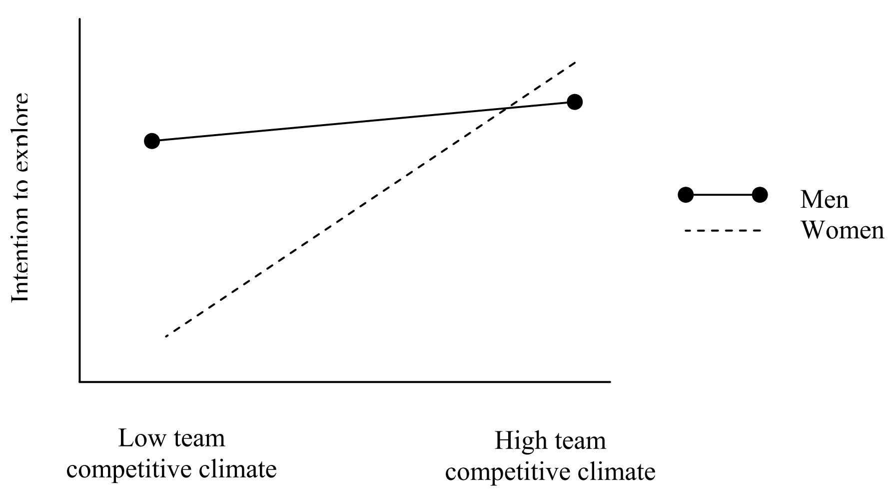

Figure 2. Team Competitive Climate x Gender Interaction Plot.

DV:	Usage scope $_{(percentage)}$	Usage scope $_{(summation)}$
Variables		
Main Effects:		
Intercept (γ00)	1.89*** (0.22)	3.85*** (0.32)
Intention to explore (γ10)	0.15* (0.06)	0.19* (0.08)
Competitive climate (γ01)	0.06 (0.09)	0.19 (0.23)
Learning climate (γ02)	0.11 (0.08)	0.01 (0.28)
χ^2	73.06**	102.08**
R^2	.05	.07
ΔR^2	.05	.07

Notes: Level-1 n = 410; Level-2 n = 69; standard errors are shown in parentheses.
† p < .10, * p < .05, ** p < .01, *** p < .001.

Table 4. Models Predicting Usage Scope.

DISCUSSION

The purpose of this research was to develop a multilevel understanding of user intention to explore new technology. To this end, we examined the role of differences in individual attributes and team climate as antecedents of intention to explore. We reasoned that by understanding the drivers of intention to explore, we would begin to discover ways to promote the use of a broader array of system functions by users. Our multilevel model of individual attributes and team climate explained 33% of the variance in user intention to explore a new technology.

Theoretical Implications

This research contributes to the literature on technology adoption and use in several ways. First, our paper goes beyond the traditional IT acceptance literature by emphasizing a more active role for users in looking for emergent use of newly introduced technology, thus, answering the call by Agarwal (2000) who encourages researchers to depart from simply looking at the acceptance of a new technology. Our examination of users' willingness to explore various IT features represents an important step in overcoming the underutilization of new systems.

Second, our research confirms the importance of individual attributes as drivers of users' cognitions about, and behavior towards, new technologies. In particular, the current research reveals that men are more willing to perform exploratory behaviors than women. The role of gender in driving individual intention to explore technology was hitherto not well understood. Prior research has primarily focused on the role of gender in predicting acceptance of new technology (Venkatesh & Morris, 2000). We also found that age affects the individual willingness to explore a new technology, with older individuals being less likely to explore a newly introduced technology. The nature of this relationship is not unlike that hypothesized by Morris and Venkatesh (2000). However, we suggest that the mechanism that leads older workers to be less likely to explore a new technology is substantially different. Morris and Venkatesh (2000) point to differences in exposure to technology as the reason for age differences. In contrast, our conceptualization of the relationship is linked to motivational mechanisms (Kanfer & Ackerman, 2004). We reasoned that older individuals find it more difficult to increase the effort required to comprehend and experiment with features of the new technology. Consequently, such individuals would be less likely to have the motivation to explore new features.

In order to shed some light on the intention to explore predictors, we adopted a climate-based approach because it allows one to consider facilitating conditions at the team level of analysis. Our results indicate a strong influence of competitive climate in shaping individual intention to explore a new technology. This finding suggests that the competitiveness among team members is a catalyst for individuals' exploration behavior. We also found that competitive climate at the team level of analysis interacts with gender in shaping individual intention to explore a new technology. In particular, when team competitive climate is low, men are more likely than women to explore a new technology. However, increasing team competitive climate serves as a catalyst for exploration behavior among women.

Another important contribution of the present study is related to the adoption of a multilevel perspective for studying individuals' interaction with technology. A multilevel perspective allowed us to address the limitation of previous studies which mainly rely on one level of analysis. Thus, we respond to calls for considering the hierarchical nature of organizational phenomena (Burton-Jones & Gallivan, 2007; Hofmann, 1997; Klein & Kozlowski, 2000).

Managerial Implications

The results of this study have substantial implications for organizations that introduce new technologies. It has long been recognized that the introduction of new technologies is not enough for realizing gains in performance; and the underutilization of technology does not allow for the full exploitation of its potential in supporting organizational processes. Thus, to the degree that it facilitates the discovery of new sources of value for the technology, active exploration of system features is a desirable behavior.

Based on our findings about team climate, managers may consider creating competitive team structures that emphasize a tight integration of technology use into employee work practices. While previous research underscores the need to design team-based structures, our results point out that the individual exploration of a new technology is influenced by a climate that fosters individualism within the team. However, we stress the importance of exercising caution in fostering such climate as it may have unintended consequences for employee outcomes (e.g., satisfaction). On one hand it could trigger desirable exploratory behaviors. On the other hand it may lead to negative outcomes such as opportunistic behavior or information hoarding which may threaten overall team performance. The use of such climate should be aligned with desired exploration behaviors.

Our research also points to a need for managers to be sensitive to the compositional makeup of the teams in which technological innovations are being deployed. To the degree that individuals have different approaches to using a new technology, team composition should be based upon a balance in individual attributes for facilitating the emergence of technology "explorers" within each team. Teams composed primarily of men may not require a competitive climate. However, a team composed primarily of women may require such a climate in order to foster greater exploration of the system.

Limitations and future research directions

As with any work our research has limitations that should be addressed in future studies. Because of the cross-sectional nature of the study we were unable to test for true causality, although causality is theoretically implied in some of the proposed relationships. A longitudinal study can provide some more relevant considerations and implications. Therefore, this study should be reiterated over time in order to catch the temporal effects of depicted variables on the individual intention to explore. Moreover, we did not have access to the demographic data of non-respondents and were thus unable to verify the existence of any significant differences between respondents and non-respondents. Some issues for future research emerge from this study. Although the system we exmained embodied characteristics that are common to other systems, future research should validate our results in other settings in order to increase the generalizability of our findings. Moreover, the results are based on the Italian context, suggesting the need for future research in other national and cultural settings. Consistent with these directions future research should also analyze if there are any differences between individual biological gender and psychological gender in influencing individual intention to explore.

CONCLUSION

In conclusion, the primary contribution of this work is the empirical validation of individual attributes and team level climate as factors influencing individual intention to explore. From a theoretical perspective, a climate-based perspective acting in a cross-level manner provides new opportunities for extending the research on individual behaviour toward technology across levels. The fact that our data allow us to examine influences at multiple levels of analysis is a strength of this study. Clearly, an understanding of the interaction between individual attributes and team-level influence is of significant importance to practitioners who are attempting to fully exploit the potential of new information technologies.

REFERENCES

Agarwal, R. (2000). Individual Acceptance of Information Technologies. In R. W. Zmud (Ed.), *Framing the Domains of IT Management: Projecting the Future from the Past* (pp. 85-104). Cincinnati: Pinnaflex Educational Resources.

Ahuja, M. (2002). Information Technology and the Gender Factor. *European Journal of Information Systems, 11*(1), 20-34.

Ahuja, M., & Thatcher, J. B. (2005). Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly, 29*(3), 427-459.

Anderson, N. R., & West, M. A. (1998). Measuring climate for work group innovation: Development and validation of the team climate inventory *Journal of Organizational Behavior, 19*, 235–258.

Ashkanasy, N. M., Wilderom, C. P. M., & Peterson, M. F. (2000). *Handbook of organizational culture and climate.* . Thousand Oaks, CA: Sage Publications, Inc.

Beersma, B., Hollenbeck, J. R., Humphrey, S. E., Moon, H., Conlon, D. E., & Ilgen, D. R. (2003). Cooperation, competition, and team performance: Toward a contingency approach. *Academy of Management Journal, 46*(5), 572-590.

Bem, D., & Allen, A. (1974). On predicting some of the people some of the time: The search for cross-situational consistencies in behavior. *Psychological Review, 81*, 506-520.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. *Multilevel theory, research, and methods in organizations*, 349-381.

Bock, G., Zmud, R. W., & Kim, Y. G. (2005). Behavioral Intention Formation in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces and Organizational Climate. *MIS Quarterly, 29*(1), 87-111.

Boudreau, M. C., & Robey, D. (2005). Enacting integrated information technology: a human agency perspective. *Organization Science, 16*(1), 3-18.

Bozionelos, N. (1996). Psychology of Computer Use: Prevalence of Computer Anxiety in British Managers and Professionals. *Psychological Reports, 78*, 995-1002.

Brockner, J., & Wiesenfeld, B. M. (1996). An integrative framework for explaining reactions to decisions: Interactive effects of outcomes and procedures. *Psychological Bulletin, 120*, 189–208.

Bryk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: applications and data analysis methods*. Thousand Oaks, CA: Sage Publications.

Burton-Jones, A., & Gallivan, M. (2007). Toward a Deeper Understanding of System Usage in Organizations: A Multilevel Perspective. *MIS Quarterly, 31*(4), 657-679.

Burton-Jones, A., & Straub, D. W. (2006). Reconceptualizing System Usage: An Approach and Empirical Test. *Information Systems Research, 17*(3), 228-246.

Carte, T., & Russell, C. (2003). In Pursuit of Moderation: Nine Common Errors and Their Solutions. *MIS Quarterly, 27*(3), 479-501.

Dalton, G. W., & Thompson, P. H. (1971). Accelerating obsolescence of older engineers. *Harvard Business Review, 49*(5), 57-67.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 318.

Dennison, D. R. (1996). What Is the Difference between Organizational Culture and Organizational Climate? A Native's Point of View on a Decade of Paradigm Wars. *Academy of Management Review, 21*(3), 619-654.

Devaraj, S., & Kohli, R. (2003). Performance Impacts of Information Technology: Is Actual Usage the Missing Link? *Management Science, 49*(3), 273-289.

Edmondson, A. C. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Edmondson, A. C., Bohmer, R. M., & Pisano, G. P. (2001). Disrupted Routines: Team Learning and New Technology Implementation in Hospitals. *Administrative Science Quarterly, 46*(4), 685-716.

Edmondson, A. C., Winslow, A. B., Bohmer, R. M., & Pisano, G. P. (2003). Learning How and Learning What: Effects of Tacit and Codified Knowledge on Performance Improvement Following Technology Adoption. . *Decision Science, 34*(2), 197-223.

Erdogan, B., Liden, R. C., & Kraimer, M. L. (2007). Justice and leader-member exchange: the moderating role of organizational culture. *Academy of Management Journal, 40*(2), 395–406.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research*: Addison-Wesley Reading, MA:.

Gefen, D., & Straub, D. (2000). The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption. *Journal of the Association for Information Systems, 1*(8), 1-30.

Gefen, D., & Straub, D. W. (1997). Gender Differences in the Perception and Use of E-Mail: An Extension to the Technology Acceptance Model. *MIS Quarterly, 21*(4), 389-400.

Gill, S., Stockard, J., Johnson, M., & William, S. (1987). Measuring Gender Differences: The Expressive Dimension and Critique of Androgyny Scales. *Sex Roles, 17*, 375-400.

Glomb, T. M., & Liao, H. (2003). Interpersonal aggression in work groups: social influence, reciprocal, and individual effects. *Academy of Management Journal, 46*(4), 486-496.

Hall, D. T., & Mansfield, R. (1975). Relationships of Age and Seniority with Career Variables of Engineers and Scientists. *Journal of Applied Psychology, 60*(2), 201-210.

Hobfoll, S. E., & Wells, J. D. (1998). Conservation of resources, stress, and aging: Why do some slide and some spring? . In J. Lomranz (Ed.), *Handbook of aging and mental health: An integrative approach* (pp. 121-134). New York: Plenum.

Hoegl, M., Parboteeah, K. P., & Munson, C. L. (2003). Team-Level Antecedents of Individuals' Knowledge Networks. *Decision Science, 34*(4), 741-770.

Hofmann, D. (1997). An Overview of the Logic and Rationale of Hierarchical Linear Models. . *Journal of Management, 23*(6), 723-744.

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in organizations: From Input-Process-Output Models to IMOI Models. *Annual Review of Psychology, 56*(1), 517-543.

Kanfer, R., & Ackerman, P. L. (2004). Aging, adult development, and work motivation. *Academy of Management Review, 29*, 440–458.

Karahanna, E., Agarwal, R., & Angst, C. M. (2006). Reconceptualizing compatibility beliefs in technology acceptance research. *MIS Quarterly, 30*(4), 781-804.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevelapproach to theory and research in organizations:Contextual, temporal, and emergent processes In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multileveltheory, research, and methods in organizations* (pp. 3–90). San Francisco: Jossey-Bass.

Liao, H., & Chuang, A. (2004). A multilevel investigation of factors influencing employee service performance and customer outcomes. *Academy of Management Journal*(47), 41-58.

Manz, C. C., & Sims, H. P. (2001). *The New Superleadership: Leading Others to Lead Themselves*: Berrett-Koehler Publishers.

Marsick, V. J., & Watkins, K. E. (2003). Demonstrating the Value of an Organization's Learning Culture: The Dimensions of the Learning Organization Questionnaire. *Advances in Developing Human Resources, 5*(2), 132-151.

Morris, M. G., & Venkatesh, V. (2000). Age Differences in Technology Adoption Decisions: Implications for a Changing Work Force *Personnel Psychology, 53*, 375-403.

Mroczek, D. K., & Almeida, D. M. (2004). The effect of daily stress, personality, and age on daily negative affect. *Journal of Personality, 72*, 355-378.

Nambisan, S., Agarwal, R., & Tanniru, M. (1999). Organizational mechanisms for enhancing user innovation in information technology. *MISQ Quarterly, 23*(3), 365-395.

Orlikowski, W. J. (2000). Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations. *Organization Science, 11*(4), 404-428.

Reagans, R., Argote, L., & Brooks, D. (2005). Individual experience and experience working together: Predicting learning rates from knowing who knows what and knowing how to work together. *Management Science, 51*(6), 869–881.

Rigby, D. K., Reichheld, F. F., & Schefter, P. (2002). Avoid the Four Perils of CRM. *Harvard Business Review, 80*(2), 101-109.

Robinson, S. L., & O'Leary-Kelly, A. M. (1998). Monkey see, monkey do: The influence of work groups on the antisocial behavior of employees. . *Academy of Management Journal, 41*(41), 658-672.

Ross, J. W., & Weill, P. (2002). Six IT Decisions Your IT People Shouldn't Make. *Harvard Business Review, 80*(11), 84-91.

Salancik, G. J., & Pfeffer, J. (1978). A social information processing approach to job attitudes and task design. *Administrative Science Quarterly, 23*, 224-253.

Schneider, B., White, S. S., & Paul, M. C. (1998). Linking Service Climate and Customer Perceptions of Service Quality: Test of a Causal Model. . *Journal of Applied Psychology 83* 150-163.

Schulte, M., Ostroff, C., & Kinicki, A. J. (2006). Organizational climate systems and psychological climate perceptions: A cross-level study of climate-satisfaction relationships. *Journal of Occupational and Organizational Psychology, 79*, 645–671.

Seibert, S. E., Silver, S. R., & Randolph, W. A. T. (2004). aking empowerment to the next level: A multiple level model of empowerment, performance, and satisfaction. *Academy of Management Journal, 47*, 332–349.

Sharit, J., & Czaja, S. J. (1994). Ageing, computer-based task performance, and stress: issues and challenges. *Ergonomics, 37*(4), 559-577.

Smith, K. G., Collins, J. C., & Clark, K. D. (2005). Existing knowledge, knowledge creation capability, and the rate of new product introduction in high-technology firms. *Academy of Management Journal, 48*(2), 346–357.

Taylor, S., & Todd, P. A. (1995). Understanding Information Technology Usage - a Test of Competing Models. *Information Systems Research, 6*(2), 144-176.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly, 15*(1 (March)), 125-142.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science, 46*(2), 186-204.

Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead or Alive? The Evolution, Trajectory, and Future of Technology Adoption Research. *Journal of the AIS 8*(4), 267-286.

Venkatesh, V., Maruping, L. M., & Brown, S. A. (2006). Role of time in self-prediction of behavior. *Organizational Behavior and Human Decision Processes, 100*(2), 160-176.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115-139.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance Of Information Technology: Toward A Unified View. *MIS Quarterly, 27*(3), 425.

Wilkens, R., & London, M. (2006). Relationships between climate, process, and performance in continuous quality improvement groups. *Journal of Vocational Behavior, 69*(510-523).

Yang, J., & Chen, C. (2005). Systemic design for improving team learning climate and capability: A case study. *Total Quality Management & Business Excellence, 16*(6), 727-740.

Zucker, L. G., Darby, M. R., & Armstrong, J. S. (2002). Commercializing Knowledge: University Science, Knowledge Capture, and Firm Performance in Biotechnology. *Management Science, 48*(1).