Journal of Information Technology (2008) 23, 269–280

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Research article

Linking IT implementation and acceptance via the construct of psychological ownership of information technology

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Abstract
The present paper proposes psychological ownership of IT (POIT) as a construct that can provide a much needed linkage between the IT implementation and IT acceptance research streams. To assess this idea, a research model was developed where POIT was hypothesized to mediate the influence of user participation on perceived usefulness (PU) and perceived ease of use (PEOU). This model was tested with questionnaire data collected from 91 physicians who were using a newly implemented clinical information system across a network of medical clinics. The results of partial least square analysis of the data indicated that POIT was a significant mediator of the influence of user participation on PU and PEOU, providing strong support for the research model.
Journal of Information Technology (2008) **23,** 269–280. doi:10.1057/jit.2008.12
Published online 7 October 2008
Keywords: psychological ownership of IT; user participation; IT acceptance; IT implementation

Introduction

The implementation and management of IT projects (e.g., Kirsch, 2000; Barki, 2006) and IT acceptance (e.g., Venkatesh *et al*., 2003; Benbasat and Barki, 2007) represent two important themes in the information systems (IS) literature. Yet the two research streams appear to occupy different research silos with few linkages existing between them. The present paper bridges this gap by linking three well-known constructs of these streams, namely user participation, perceived usefulness (PU), and perceived ease of use (PEOU), via a construct that is new to the IS literature, psychological ownership of IT (POIT).

Recently, the focus of IT implementation practice and research seems to have largely shifted from IS development to configuring and installing integrated systems. However, this shift in focus has not diminished the relevance and importance of having the eventual users of these systems participate in their implementation. Indeed, whether IS are developed in-house or integrated systems are configured and installed by external parties, an understanding of users' tasks and needs is still required for successful IT implementations, and user participation continues to be seen as one of the most effective ways of achieving positive implementation outcomes (Bandara *et al*., 2005; Procaccino *et al*., 2005; Estévez and Pastor, 2006).

Considerable research has also been conducted on the acceptance of IT in general and the applications of the technology acceptance model (Davis *et al*., 1989) in particular (Lee *et al*., 2003). While this research has examined IT acceptance in varied contexts (e.g., Horton *et al*., 2001; Venkatesh *et al*., 2003), it has largely overlooked the influence on acceptance outcomes of factors that IT implementers can manage and act upon such as user participation, top management support, and user training. Indeed, we could identify only two papers that looked at linkages between IT implementation strategies or tactics and IT acceptance: a conceptual paper by Veiga *et al*. (2001) and an empirical paper by Jackson *et al*. (1997), which found that PU was influenced positively by user involvement, (UI) but not by user participation.

Given our lack of knowledge regarding the antecedents of key constructs in IT acceptance models (Benbasat and Barki, 2007), the paucity of acceptance research that has

examined IT implementation variables as antecedents, and the continued relevance of user participation in IT (Markus and Mao, 2004), there is a need to examine implementation factors such as user participation as antecedents in IT acceptance research. The present paper proposes the construct of POIT as providing a key link between IT implementation and acceptance variables. Based on the concept of psychological ownership (PO) (Pierce *et al*., 2001), POIT is defined here as the sense of ownership an individual feels for an IT or IS. The paper develops and tests a research model where POIT mediates the relationship between user participation and two key constructs of IT acceptance research: PU and PEOU. In doing so, the paper is structured as follows. First, the construct of POIT is defined and its antecedents and consequences are discussed. Then, the relationships between user participation, POIT, PU, and PEOU are examined and the study's research model presented. Next, the paper describes the study conducted and the data that were collected to test this research model, as well as to compare the mediating effect of POIT to that of two other constructs, UI and cognitive absorption (CA). This is followed by the presentation of the study results, their discussion, future research avenues, the study's limitations, and its conclusions.

Theoretical development

Psychological ownership

The origins of PO can be traced to the literature in human development, psychology, and sociology. For instance, Heider's (1958) research on the development of attitudes of ownership toward objects within the self region, Etzioni's (1991) work on the objective and subjective aspects of ownership, and various scholars' work on the 'psychology of mine' provide insights into the phenomenon of PO.

The psychology of possession proposes that feelings of ownership cause people to view both tangible and intangible possessions as part of the extended self (Dittmar, 1992). This suggests that IS, many of which are designed through creative human action (Orlikowski, 1992, 1996; McLaughlin and Skinner, 2000), are also likely to become objects of users' ownership feelings. Additional theoretical support for this hypothesis is provided by Pierce *et al*. (2001), who identify three motives that ownership feelings satisfy: efficacy and effectance, self-identity, and having a place. The first reflects individuals' desires to be in control. The second pertains to people's need for '…defining themselves, expressing their self-identity to others, and ensuring the continuity of the self across time' (p. 300). Finally, the third need concerns individuals' desire to possess a space or territory, that is, to have a 'home.' Each need facilitates the development of PO rather than directly causing it to occur (Pierce *et al*., 2001).

As objects, IT can help satisfy all three motives. For example, by developing feelings of ownership for an IT, one's ability to control, explore, and alter one's technological and work environment can be enhanced, satisfying the efficacy and effectance motive. As well, one can establish and maintain a sense of identity and self-definition, thus satisfying the self-identity motive. And finally, one can develop a sense of being part of a group of employees who are using that IT and perceive the group, and indirectly the IT, as a place where one belongs or 'home,' thereby satisfying the having a place motive. Thus, we posit that many individuals can develop feelings of ownership toward the technologies they are using, and define POIT as the sense of ownership felt by an individual for an IT or IS.

It is important to note that while the constructs of PO and POIT are similarly conceptualized, PO focuses on the organization as the main target of feelings of ownership whereas POIT's target is an IT or IS. As such, the feeling of ownership an individual has for an IT will be reflected by the individual appropriating and being psychologically attached to the ideas embedded in a system in terms of what the system does and how it is used, rather than by a sense of ownership in a physical or legal sense.

Feelings of ownership are also thought to have important consequences. In their psychological theory of change, Dirks *et al*. (1996) argue that PO provides insights into why individuals react to change and the conditions under which they do. They suggest that PO leads to positive or negative orientations toward change, contingent upon the type of change involved. Specifically, they argue that individuals are likely to promote change of a target toward which they feel ownership when the change is self-initiated (*vs* imposed), evolutionary (*vs* revolutionary), and additive (*vs* subtractive).

As such, POIT is likely to be a key antecedent of individuals' salient beliefs about a new system. This is strongly suggested by the fact that implementations of new IT are frequently accompanied by significant organizational change (Markus and Benjamin, 1994; Venkatraman, 1994) and Dirks *et al*.'s (1996) findings which show that PO influences individuals' reactions to organizational change. According to the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980) and the Theory of Planned Behavior (TPB) (Ajzen, 1991) from which the Technology Acceptance Model (TAM) has been derived, individuals' reactions, that is, behaviors, are determined by three constructs (attitude toward the behavior, subjective norms regarding the behavior, and perceived behavioral control concerning the behavior), which in turn are determined by an individual's salient beliefs. Given that POIT influences individuals' reactions to organizational change brought about by the implementation of an IT, it is also likely to influence their IT usage behaviors. According to TRA, TPB, and TAM, this influence will work through the key constructs of these models. Thus, as shown in Figure 1, we posit that POIT will be a significant antecedent of PU and PEOU.

User participation as an antecedent of POIT

The idea that users develop ownership feelings when they participate in system development has long been a tenet of the user participation literature (Ives and Olson, 1984; Hartwick and Barki, 1994) and has been empirically supported (Persaud and Narine, 2001). Defining user participation as the extent to which users carry out system development tasks and perform various activities in the development and implementation of an IT, Barki and Hartwick (1994) noted that '… because of their participation, users may perceive that they have had substantial

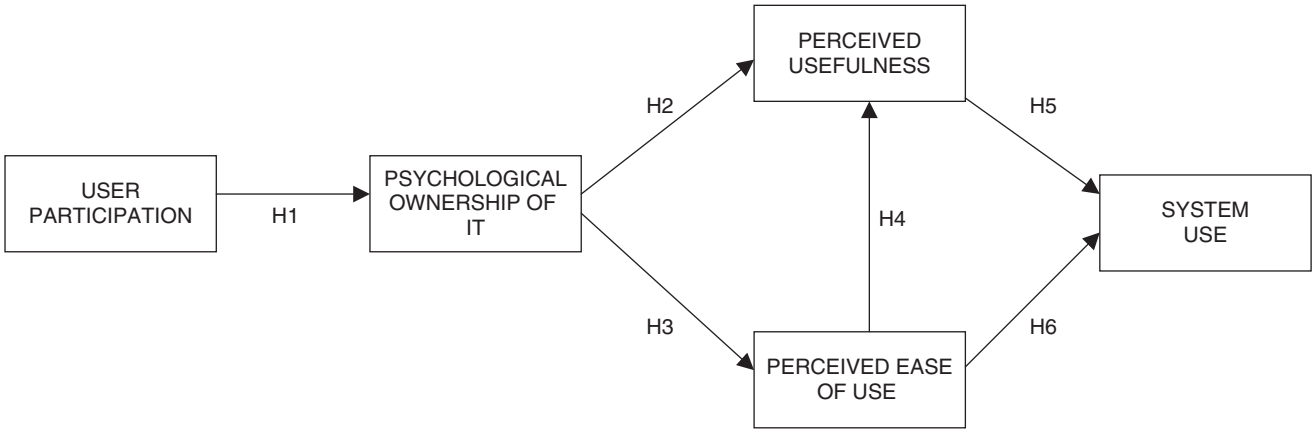


Figure 1 Research model.

influence on the development process and thereby develop feelings of ownership' (p. 72). Along the same vein, Yardley (2002) noted that 'Ownership must be demonstrated throughout the whole project if it is to stand any chance of success' (p. 119), and Lorenzi and Riley (2000) pointed out that 'People who have low psychological ownership in a system and who vigorously resist its implementation can bring a "technically best" system to its knees' (p. 116). Similarly, Brown and Vessey (2000) also emphasized the importance of ownership feelings when they observed that potential users took ownership of an ERP system being implemented via their involvement and participation in the project, and the important influence these feelings had on users' acceptance of the system.

PO theory also suggests a positive relationship between user participation and their feelings of possession toward an IT. Recall that Pierce *et al*. (2001) identified three 'routes' that lead to PO: control of the ownership object, coming to know the target of ownership intimately, and investing the self in the target of ownership. Users' participation in the development or implementation of IT is likely to favor approaches or solutions that reflect their assumptions and objectives, which in turn is likely to enhance their feelings of control, intimate knowledge, and investing oneself. Given that participation in the development and implementation processes of an IT makes it possible for a user to experience all three paths identified by Pierce *et al*. (2001), participation is likely to be a significant antecedent of POIT in system development and implementation contexts. Thus, the research model of Figure 1 hypothesizes that the construct of POIT provides a key link in the relationship between users' participation in IT implementations and their usage behaviors. Thus, POIT is modeled as a mediator between user participation and two key constructs thought to be the immediate antecedents of system use in many acceptance studies, namely PU and PEOU.

UI and CA as other potential mediators of the participation → PU/PEOU relationship

The main hypothesis of the research model of Figure 1 is that POIT acts as a mediator of the relationship between user participation and the constructs of PU and PEOU. Past research suggests that both UI and CA are also likely mediators of this relationship. Defined as a user's psychological state reflecting an information system's personal relevance and importance (Barki and Hartwick, 1994), past research has found UI to mediate the relationship between their participation in system development and their subsequent attitudes toward the system and system use (Hartwick and Barki, 1994). As such, it would be reasonable to expect UI to mediate the relationship between user participation and PU–PEOU, the two key antecedents of system use in acceptance research. This suggests that, similar to POIT, UI can be added to the research model of Figure 1 as an alternative mediator, providing a comparative assessment of the relative importance of POIT as a predictor of PU and PEOU.

Defined as a state of deep involvement with software, CA has been conceptualized as a multi-dimensional construct that consists of the dimensions of temporal dissociation (TD) (the ability to register the passage of time while engaged in interaction), focused immersion (FI) (the experience of total engagement where other attentional demands are ignored), heightened enjoyment (HE) (the pleasurable aspects of the interaction), control (the user's perception of being in charge of the interaction), and curiosity (CU) (the extent to which the experience arouses an individual's sensory and cognitive curiosity). Past research has found CA to be a significant antecedent of both PU and PEOU (Agarwal and Karahanna, 2000; Saadé and Bahli, 2005; Shang *et al*., 2005). In addition, based on the argument that user participation can lead to higher quality systems (Markus and Mao, 2004), it can also be hypothesized that users who participate in the implementation of an IT are also likely to be more cognitively involved with the system (because of its higher quality). As such, including CA as a third mediator of the relationship between user participation and PU–PEOU in the research model of Figure 1 provides a second basis of comparison (in addition to UI) for POIT's importance as a mediating variable.

Method

Study context

To test the research model of Figure 1, questionnaire data was collected from physicians who were using a recently

developed computer physician order entry (CPOE) system (not pre-packaged software) primarily aimed at speeding up the transmission of clinical data within a community health information network. The transmitted data consisted mainly of patients' laboratory test and medical imagery exam results. The CPOE system also offers a series of electronic functionalities that enable physicians to share patient information (conditional upon patients' consent). At the time of the study, the network consisted of 13 medical clinics all located in a high-density suburb in a large cosmopolitan Canadian city. The number of physicians at each of the clinics varied between three and 23 (mean = 10; standard deviation = 4.2).

The implementation of CPOE was characterized by high levels of physician participation, and in each clinic a physician volunteered to act as project champion. The new system benefited from a high degree of customizability. The champions were compensated for the time they spent on the project but had multiple responsibilities: they were all members of a steering committee whose main responsibility was to conduct detailed information requirements analyses; the committee held monthly meetings throughout the project and the champions acted as experimental users and repeatedly tested the system interface in a laboratory setting; they also intervened as experts in the configuration of the CPOE system to adapt it to their own clinic's needs; as well, they also acted as super users when the system was first introduced to their colleagues in their respective clinics. Following implementation, the system was made accessible to all of the 130 general practitioners working in the 13 clinics. While adoption of the system was not mandatory, the physicians were strongly encouraged to use it.

Measures

Scale items used to measure all study variables are listed in the Appendix. All constructs except POIT were measured with scales adapted from previous research. Actual use of the CPOE system was measured using a three-item scale adapted from Thompson *et al*. (1991). Scales of four items each for PU and PEOU were adapted from Venkatesh *et al*. (2003). Three dimensions of user participation, overall responsibility, hands-on activity, and communication were operationalized with four-, four-, and six-item scales, respectively (Hartwick and Barki, 2001). User–IS relationship, the fourth dimension of participation, was not assessed because many of its items were not applicable to the project that was studied.

The POIT scale was developed using a multi-stage iterative procedure. First, an initial set of items was created using the scale developed by Van Dyne and Pierce (2004) for assessing feelings of ownership about an organization. The wording of items was modified to reflect the clinical information system as the target of ownership instead of the organization. In doing so, Van Dyne and Pierce's (2004) recommendations to emphasize possession as the basis of the scale and to use possessiveness vocabulary as reflected in everyday associations with property were followed. Next, 10 physicians experienced in the use of various clinical IS were contacted in order to probe their conceptualization of the notion of ownership in their particular context of IT development and implementation, and to obtain their reactions to the items of the POIT scale. This resulted in further modifications and a final POIT scale of seven items.

As mentioned earlier, two constructs that are not included in Figure 1 were also measured to allow a comparative assessment of POIT's importance. UI was measured with a seven-item scale adapted from Barki and Hartwick (1994). CA was measured with items adapted from Agarwal and Karahanna (2000), and the five dimensions reflecting this construct – that is, TD, FI, HE, CO, and CU – were each operationalized with three items. All constructs except CA and user participation were modeled as first-order factors with reflective indicators. Following Agarwal and Karahanna (2000), CA was modeled as a second order reflective construct, that is, as a molecular second-order factor (Chin and Gopal, 1995). The score for each CA dimension was calculated by averaging the dimension's items, and the five average scores used as five reflective measures. User participation was conceptualized as emerging from its dimensions and was therefore modeled as a formative construct formed by its three dimensions, that is, as a molar second-order factor (Chin and Gopal, 1995). The score for each user participation dimension was calculated by adding the dimension's items, and the three summated scores used as three formative measures.

Data collection

The study questionnaire was first pre-tested with five physicians from different medical clinics. Each respondent completed a first version of the questionnaire and provided feedback about the process and the measures, including the questionnaire administration time, and the clarity of the instructions and questions. The pre-test indicated that the questionnaire was relatively clear and easy to complete. Following the pre-test, minor modifications were made to improve the wording of some items and the overall structure and presentation quality of the questionnaire. The physicians who took part in the pre-test were excluded from the subsequent survey. The final questionnaire was mailed to the remaining 125 physicians, with a cover letter explaining the purpose and importance of the study. Four weeks after the initial mailing, a follow-up letter was sent, which also provided a phone number the respondents could call in case they had any questions or required another copy of the questionnaire.

A total of 91 questionnaires were received, representing a 72.8% response rate, and forms the study sample. Twenty-three questionnaires were received after the mailing of the follow-up letter. Data from these late respondents were compared to the data of the early respondents ($n = 68$) to examine non-response bias (Linsky, 1975). No significant differences were found between the two groups in terms of gender, age, job tenure, and any of the study variables, indicating that non-response bias was unlikely to be present in the sample. In addition, independent *t*-tests showed no statistically significant differences between the respondents and non-respondents in terms of gender, age, and job tenure.

A large majority of the respondents were established physicians, 66% of them having more than 11 years of

medical experience. Fifty-seven percent of the respondents were male, and 11% were champion users in their clinics. Ten of the 13 champion users actively involved in the project completed the questionnaire. On average, the respondents used the CPOE system for 7.5 h/week, and their self-rated experience with personal computers was 6.1 on a 1–10 Likert scale. Their profiles are described in Table 1.

Results

Analysis of the measurement model

Data analysis was conducted with partial least squares (PLS), a structural equation modeling approach (Chin, 1998; Chin and Newsted, 1999). As a preliminary step, we examined the distributional characteristics of the sample. Our statistical analyses (not shown here) revealed no departure from missing data and normality of variables. Next, the psychometric properties of the reflective constructs were assessed. Following Agarwal and Karahanna (2000), exploratory factor analyses of each reflective construct's items and their Cronbach alpha reliabilities were first examined as a preliminary check of unidimensionality (for the second-order constructs of user participation and CA, this examination was carried out for the first-order dimensions that were modeled as reflective). All items of each first-order construct loaded into a single dimension and all factor reliabilities were acceptable. As a result, all 33 items were then analyzed in a PLS confirmatory factor analysis (CFA). Examination of construct reliabilities (Table 2), the variance shared between constructs (Table 3), and the cross-loadings (Table 4) indicated that the psychometric properties of the six reflective constructs were acceptable.

As can be seen, all composite reliability scores (rho) and all Cronbach alphas were 0.91 or better. As well, all item loadings were greater than 0.69 (for the formative user participation construct Figure 2 reports item weights). As reliabilities and item loadings greater than 0.70 are considered acceptable (Fornell and Larcker, 1981), the scales used in the study can be considered to meet the required standards.

Indicators loading more highly on their corresponding factor than on other factors and a square root of average variance extracted (AVE) that is higher than inter-construct correlations are two criteria recommended for assessing discriminant validity (Chin, 1998). The CFA results depicted in Tables 3 and 4 show that all indicators loaded more highly on their own factor than on others, and each factor's AVE scores (the diagonal in Table 3) exceeded its inter-construct correlations. These results indicate that the measurement model can be considered to satisfy the recommended convergent and discriminant validity criteria.

Analysis of the structural model

Figure 2 depicts the research model's path coefficients, construct indicator loadings (weights in the case of user participation), and the proportion of explained variance in each construct. As recommended by Marcoulides and Saunders (2006), we first assessed the power of our study.

Table 1 Respondent profiles ($n = 91$)

Gender	
Male	57%
Female	43%
Age (in years)	
30–45	36%
46–55	38%
56+	26%
Tenure in medical clinic (in years)	
Less than 1	3%
1–5	16%
6–10	15%
11+	66%
Champion users	
Yes	11%
No	89%
System use per week (in hours)	
Mean	7.5
Standard deviation	10.6
Minimum	<1
Maximum	48
Experience with computers in general	
Mean	6.1
Standard deviation	2.3
Minimum	1
Maximum	10

Table 2 Reliability assessment of research model constructs

	Number of items	*Rho*	*Cronbach alpha*	*Mean*	*Minimum*	*Maximum*	*Standard deviation*
Participation (P)	3	NA	NA	2.7	1	8.1	2.2
User involvement (UI)	7	0.98	0.98	6.4	1	10	2.6
Psychological ownership of information technology (POIT)	7	0.94	0.91	3.8	1	10	2.5
Cognitive absorption (CA)	5	0.91	0.91	5.7	1	10	2.2
Perceived ease of use (PEOU)	4	0.96	0.96	6.6	1	10	2.2
Perceived usefulness (PU)	4	0.94	0.96	4.9	1	10	3
System use (SU)	3	0.96	0.96	5.5	1	10	3.4

Table 3 Variance shared between research model constructs

	Variance						
	P	*UI*	*POIT*	*CA*	*PEOU*	*PU*	*SU*
Participation (P)	NA						
User involvement (UI)	0.26	**0.97**					
Psychological ownership of information technology (POIT)	0.54	0.81	**0.87**				
Cognitive absorption (CA)	0.42	0.55	0.64	**0.86**			
Perceived ease of use (PEOU)	0.24	0.81	0.72	0.53	**0.97**		
Perceived usefulness (PU)	0.44	0.83	0.87	0.66	0.73	**0.96**	
System use (SU)	0.18	0.82	0.72	0.47	0.77	0.75	**0.97**

The bold numbers on the leading diagonal show the square root of the variance shared by the constructs and their measures. Off diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Table 4 PLS construct cross-loadings of the research model

Items	*UI*	*POIT*	*CA*	*PU*	*PEOU*	*SU*
UI1	**0.96**	0.79	0.54	0.82	0.79	0.81
UI2	**0.97**	0.78	0.54	0.79	0.78	0.78
UI3	**0.98**	0.80	0.53	0.83	0.80	0.83
UI4	**0.98**	0.77	0.52	0.80	0.76	0.78
UI5	**0.96**	0.79	0.57	0.82	0.78	0.79
UI6	**0.97**	0.76	0.52	0.81	0.78	0.78
UI7	**0.98**	0.78	0.53	0.80	0.77	0.78
POIT1	0.61	**0.84**	0.50	0.68	0.56	0.55
POIT2	0.58	**0.88**	0.50	0.67	0.49	0.53
POIT3	0.76	**0.87**	0.61	0.78	0.67	0.65
POIT4	0.82	**0.89**	0.61	0.78	0.76	0.75
POIT5	0.73	**0.86**	0.64	0.65	0.68	0.64
POIT6	0.76	**0.89**	0.62	0.61	0.57	0.60
POIT7	0.69	**0.88**	0.60	0.75	0.51	0.51
TD	0.42	0.52	**0.81**	0.46	0.36	0.34
FI	0.42	0.50	**0.88**	0.54	0.42	0.36
HE	0.55	0.60	**0.90**	0.68	0.51	0.45
CTL	0.42	0.50	**0.81**	0.55	0.48	0.41
CUR	0.54	0.62	**0.88**	0.60	0.46	0.44
PU1	0.80	0.81	0.64	**0.97**	0.76	0.69
PU2	0.82	0.82	0.71	**0.97**	0.79	0.74
PU3	0.79	0.82	0.63	**0.97**	0.76	0.75
PU4	0.81	0.80	0.58	**0.93**	0.80	0.79
PEOU1	0.79	0.73	0.53	0.81	**0.97**	0.72
PEOU2	0.80	0.71	0.55	0.80	**0.98**	0.74
PEOU3	0.82	0.73	0.51	0.82	**0.98**	0.76
PEOU4	0.73	0.63	0.46	0.71	**0.94**	0.68
SU1	0.84	0.75	0.50	0.79	0.77	**0.98**
SU2	0.82	0.70	0.45	0.78	0.73	**0.98**
SU3	0.70	0.64	0.43	0.66	0.67	**0.94**

The bold numbers indicate items belonging to a construct.

Considering no departure from normal distribution and missing data, the findings in Figure 2 indicate that our sample size was large enough to achieve power of 0.80 and, hence, support our findings and conclusions reported below.

As can be seen, all hypothesized links of the research model were supported, with user participation explaining 30% of the variance in POIT, which in turn explained 83 and 56% of the variance in PU and PEOU, respectively. Consistent with past acceptance research (Davis *et al*., 1989; Chau and Hu, 2002), PU was a stronger predictor of system use than PEOU, with both constructs explaining 64% of the variance in system use.

The Sobel test recommended by Preacher and Hayes (2004) was used to formally assess POIT's mediation of the user participation → PU/PEOU relationship. To do so, the user participation → PU and user participation → PEOU direct paths were added to the model of Figure 2, and the

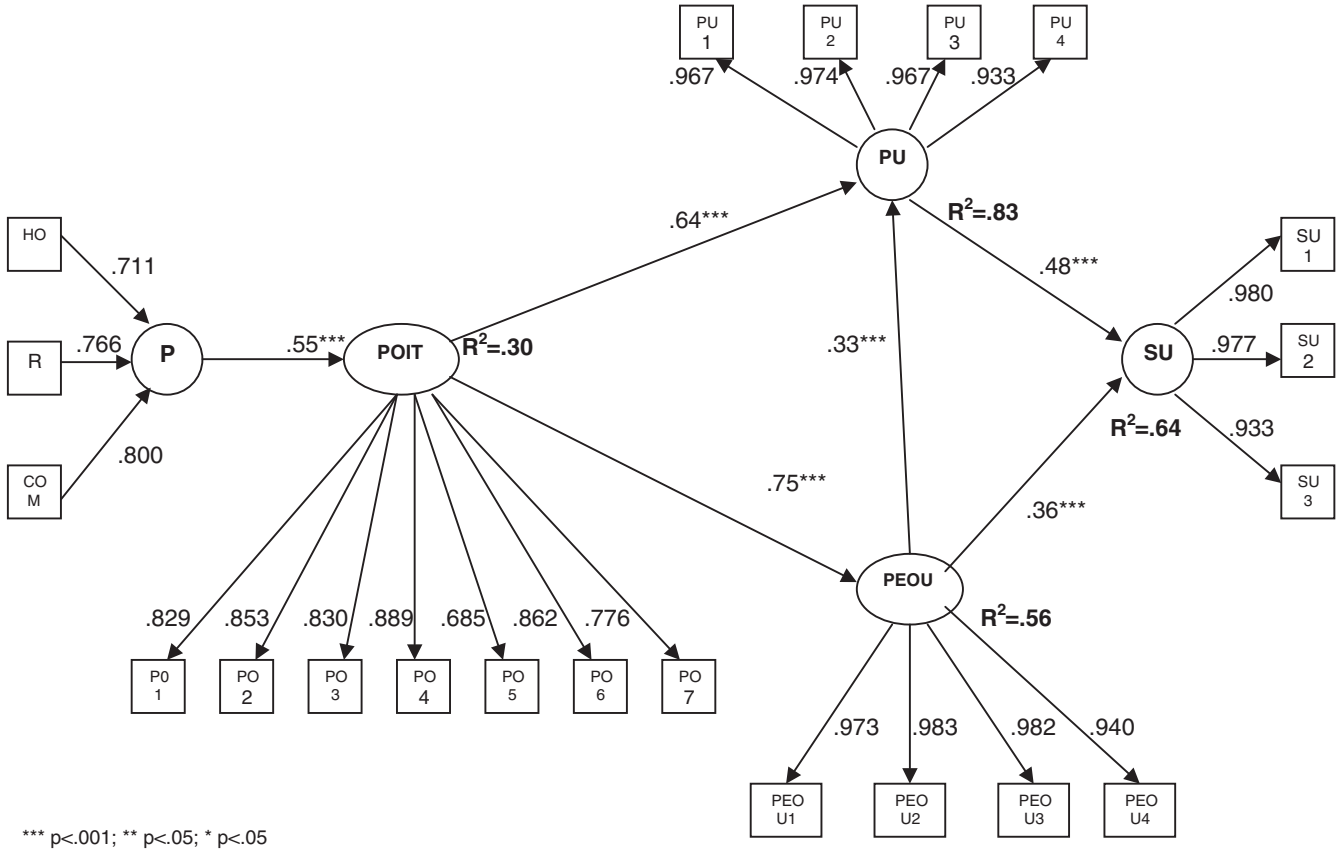


Figure 2 PLS results.

significance of the user participation → POIT → PU and the user participation → POIT → PEOU indirect paths were tested with Sobel's formula. One of the two added direct paths was significant (user participation → PEOU, $t = 2.65$, $P < 0.01$) and, as shown in the top half of Table 5, both indirect paths were significant ($P < 0.001$), indicating that POIT fully mediated the user participation → PU relationship, and partially mediated the user participation → PEOU relationship.

Comparing POIT's influence to that of UI and CA

To provide an additional assessment of the importance of POIT's role as an antecedent of PU and PEOU, UI and CA were added as mediators of the user participation → PU/PEOU relationship to the research model of Figure 2. The results of the PLS analysis of this model are depicted in Figure 3, and the Sobel test results for the indirect paths are shown in the bottom part of Table 5.

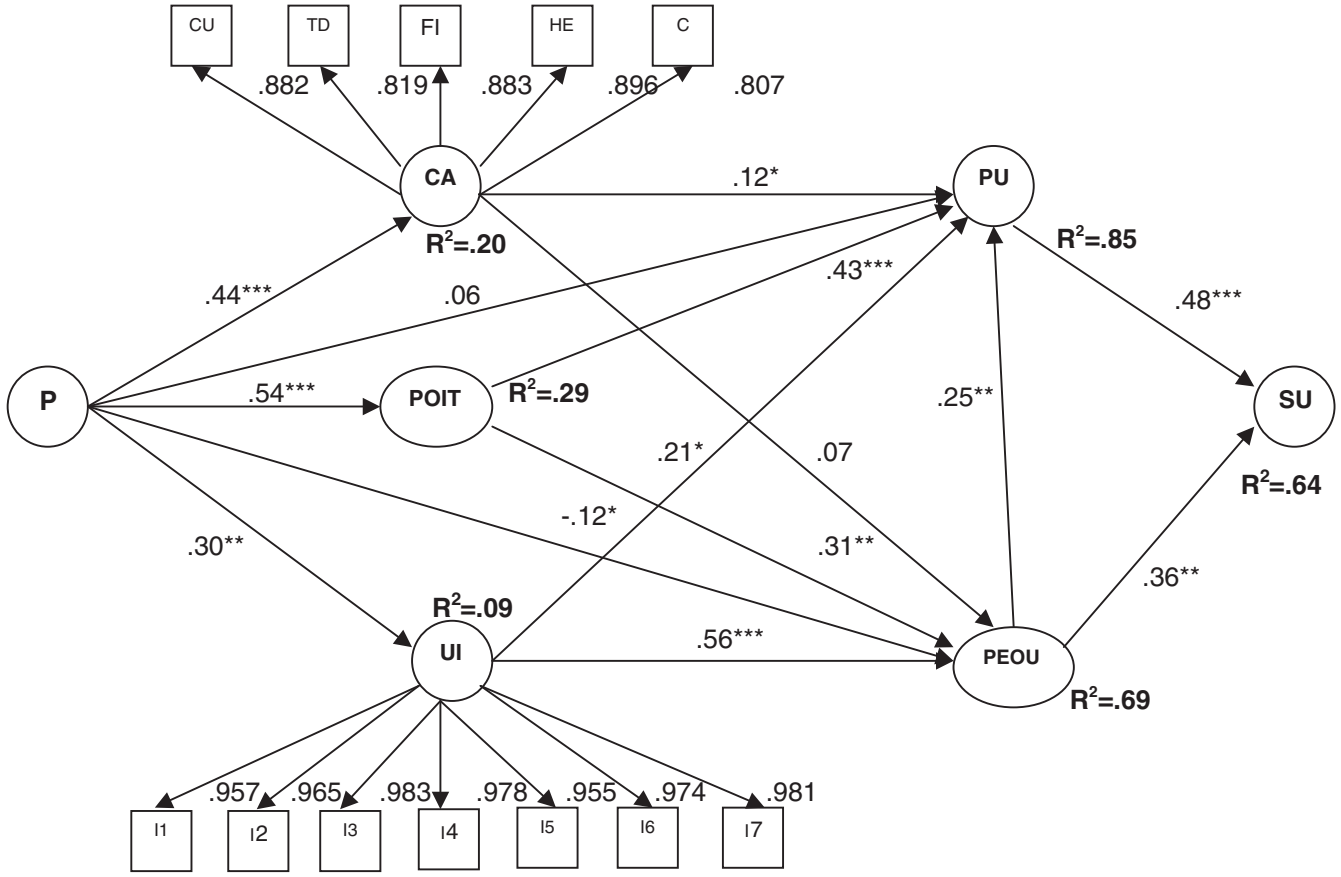
As can be seen in Figure 3 and Table 5, while UI was a significant mediator only for PEOU and CA was a significant mediator only for PU, POIT was a significant mediator for both PU and PEOU. One of the two direct paths was significant (user participation → PEOU, $t = 1.71$, $P < 0.05$), indicating that POIT, CA, and UI fully mediated the user participation → PU relationship, and partially mediated the user participation → PEOU relationship. The same results were obtained in Figure 2 with POIT as the only mediator, suggesting that the addition of UI and CA did not result in full mediation of the user participation → PEOU link. Overall, these results suggest that POIT is a more significant mediator of the user participation → PU/PEOU relationship than either UI or CA. As such, they provide further support for the role played by POIT as a significant link between an important implementation variable, that is, user participation, and the key IT acceptance constructs of PU and PEOU.

Table 5 Results of mediation tests

Indirect paths – Figure 2	*Sobel test statistic*	*P*
User participation → POIT → PU	4.98	0
User participation → POIT → PEOU	6.92	0
Indirect paths – Figure 3		
User participation → UI → PU	1.63	0.100
User participation → UI → PEOU	2.52	0.010
User participation → CA → PU	1.93	0.050
User participation → CA → PEOU	1.17	0.240
User participation → POIT → PU	3.56	0
User participation → POIT → PEOU	2.23	0.026

Discussion

Despite the prevalence of user acceptance research, the implementation antecedents of acceptance models remain



*** p<.001; ** p<.01; * p<.05

Figure 3 Is PO a stronger mediator than CA and I?

relatively unexplored. Interestingly, only one empirical study (i.e., Jackson *et al*., 1997) could be found, which examined the relationship between user participation, one of the more important and well-researched IT implementation, and the largely TRA/TPB-based IT acceptance research. To fill this gap, the present paper proposed the construct of POIT as a mediator of user participation's influence on PU and PEOU. Based on the concept of PO, a research model was developed with the idea that users who participate in IT implementations are likely to develop feelings of PO for recently implemented systems, and that these feelings are in turn direct antecedents of user evaluations of PU and PEOU. To test the study's research model reflecting this hypothesis, questionnaire data was collected from physicians who were using a newly implemented clinical information system across an information network of medical clinics. PLS analysis of the questionnaire data provided support for the research model where, as hypothesized, POIT was found to be a significant mediator of user participation's influence on PU and PEOU. Moreover, the construct of POIT was also found to be a more significant mediator than two other constructs, UI and CA, providing additional support for the study hypothesis. Thus, by providing an important link between user participation and two key constructs of IT acceptance, POIT helps us to relate and better understand IT implementation and acceptance phenomena.

It is important to note that, while the present study tested POIT's role in IT implementation and acceptance by examining it within a specific research model and study context, POIT is likely to constitute a useful construct for a variety of theoretical perspectives. For example, as mentioned earlier in the paper, a possible approach might be to view POIT as representing the broader conceptualization of acceptance that Schwarz and Chin (2007) have recently encouraged researchers to conceptualize[1]. Interestingly, the construct of POIT defined in the present study can be viewed as incorporating Schwarz and Chin's (2007) acceptance dimensions of 'to receive' (defined as appropriateness regarding the decision to take possession over the object), 'to be given' (defined as an individual's willingness to tolerate the changes required by an object), and 'to submit' (defined as an individual's psychological attachment to an IT). As such, POIT can be viewed as a broad construct of acceptance providing a richer and more realistic dependent variable than the narrower construct of 'amount of system use' that has dominated past IT acceptance research (Burton-Jones and Straub, 2006; Barki *et al*., 2007). Additional insights into implementation and acceptance phenomena can also be gained by investigating POIT's relationship with other views of usage such as infusion, routinization, substantive use, emergent use, exploitative usage, or faithfulness of appropriation (Saga and Zmud, 1994; Chin *et al*., 1997; Burton-Jones and Straub, 2006).

The construct of POIT can also be helpful by providing a better understanding of different IT implementation and acceptance phenomena such as project escalation (Keil, 1995). For example, it would be reasonable to hypothesize that the likelihood of escalation would be greater in projects where key stakeholders may hold strong feelings of PO about the project. By developing and testing theoretical models linking POIT and its antecedents to project escalation, future research can provide us with an improved understanding of this phenomenon.

It would also be interesting to investigate in future research whether POIT is an antecedent or consequence of salient cognitive beliefs. For example, the role of POIT in acceptance models may be dependent on the timing of a study's observations. Prior to go live, users' POIT feelings are likely to have developed via their participation during the implementation process. As such, at the time of, or shortly after 'go live,' POIT is likely to be an antecedent of PU and PEOU, and play the mediating role observed in the present study. In contrast, a study conducted at the routinization stage may find POIT to be a consequent construct. At this stage, having experienced the system for some length of time, users' ownership feelings are likely to be at least partly based on their use of the system and, consequently, on their perceptions of PU and PEOU (e.g., because I find the system useful and easy to use, I use it often and I feel it is mine). This suggests that POIT may be a consequence of PU and PEOU at routinization periods. It would therefore be important for future research to take into account the timing of each study when examining the causal relationships between these constructs.

The findings obtained in this study can guide IT project leaders whose objectives are to promote system adoption and use among target users in their organizations. First, our findings confirm prior results that, in order to foster users' adoption of an IT, it is important to encourage and cultivate a positive attitude toward using the new system. In this regard, perceiving a technology to be useful is crucial, whereas the technology's ease of use may be less important for users. One logical implication is that IT project leaders and managers should strongly emphasize devising effective means to communicate the utility of the system to target users. Information sessions and sufficient training on the system need to focus primarily on how the technology can help improve the efficiency and effectiveness of users in accomplishing their task rather than on the steps or procedures to follow in order to actually use the system.

One of the main objectives in this study was to increase our understanding of POIT by testing predicted relationships between feelings of POIT and users' beliefs about a new IT. The results indicate that feelings of POIT increased the explained variance in both PU and PEOU. Overall, these findings show that POIT increases project managers' ability to predict and understand users' acceptance of IT. Given the early stage of research on POIT, it would be premature to make strong recommendations for practice. Nevertheless the findings reported herein reveal that through their participation, users feel they have greater influence on the development process, thereby developing feelings of POIT. For one thing, POIT is not possible without continuous communication activities involving formal or informal exchanges of facts, needs, opinions, visions, and concerns regarding the technology. IT project leaders and managers must therefore provide users with opportunities to make their own needs and desires known to other key actors (e.g., IT specialists), listen to others, and discuss each party's concerns about the system and its impacts on work. Next, it is reasonable to expect that when users are given incrementally more control over how the new IT is configured, through hands-on activities such as testing the system's interface and designing data input screens, their overall level of ownership and satisfaction will increase. Finally, our findings indicate that overall project responsibilities (e.g., performing a needs analysis, approving project objectives and schedule) also contributed to users' feelings of POIT. As noted by Barki and Hartwick (1994), such responsibilities are normally assigned to a small number of user representatives. In order to create a sense of responsibility in a larger number of users, the authors proposed two strategies. Additional development activities that lead to a sense of responsibility could be identified and assigned to different users and responsibility activities could be assigned to user groups. In short, active and meaningful participation of users in IS development and implementation processes are likely to enhance their feelings of control, intimate knowledge, and self-investing, which are the roots of POIT.

Study limitations

The study sample was obtained from practicing physicians using a clinical IT. As such, it represents an interesting context where the targeted users were highly skilled professionals who practiced medicine in a highly autonomous environment and the newly implemented CPOE system aimed to support them in their medical practice. But still, this represents an instrumental context that may differ from those that exist in other types of organizations. As such, the generalizability of the findings to non-medical settings needs to be investigated in future research. Also, note that because constructs such as CA, POIT, PU, and PEOU are usually conceptualized as individual perceptions, it is difficult to establish a causal ordering between them with questionnaire data. Even if they were to be longitudinally assessed, determining their causal relationship would still be difficult since they all reside in a respondent's mind. As such, future research might also benefit from alternative methods such as process tracing approaches (Todd and Benbasat, 1987) when investigating the causal links between these perceptual constructs. Another study limitation is its sample size that, while adequate for the PLS analysis that was used, precluded the use of covariance-based methods such as LISREL that require larger sample sizes. Also, the fact that all model variables were measured with one questionnaire means that the danger of common method bias is present, inflating the strength of the observed relationships. Also, the fact that measures were taken at a single point in time means that caution needs to be exercised in drawing conclusions about causal relationships between the constructs of the research model. Finally, further validation of the POIT construct, particularly in terms of discriminant validity, is needed as our sample size precluded the use of CFA for this purpose.

Conclusion

Despite the advances made by IT implementation and acceptance research, few studies have examined potential linkages between IT implementation tactics or strategies and IT acceptance research models. The present paper proposed the construct of POIT as a useful linkage between these two research streams by providing empirical support for the premise that users who participate in IT implementation will tend to develop PO feelings for the implemented system, which in turn will influence their belief structures in general, and their evaluations of PU and PEOU in particular. While the POIT construct and the study findings contribute to IT implementation and acceptance research by providing a much needed integration between the two research areas, much still needs to be done to explore the POIT construct's potential role in varied contexts and to further explicate its relationships with other implementation and acceptance constructs.

Acknowledgements

We are grateful to The Canada Research Chairs Program for providing financial support for this research.

Note

1 The authors would like to thank an anonymous reviewer for this insight.

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Appendix – Questionnaire items

User participation: Items were assessed on 10-point Likert scales ranging from strongly disagree to strongly agree (the * shows the composite variables that were used in the PLS analysis as formative measures of the latent user participation construct).

*Hands-on**
Before the new system was deployed, you took part in ….

HO1 Training other doctors who use the new system.
HO2 Testing the new system's interface.
HO3 Designing data input screens.
HO4 Designing system outputs (reports).

*Responsibility**

R1 Determining the new system's information requirements (needs analysis).
R2 The final decision regarding vendor and/or hardware and software selection.
R3 Managing of the project (objectives, schedule, budget).
R4 Making the project a success.

*Communication**

COM1 Informal exchanges concerning the project with other users.
COM2 Informal communication with project management.
COM3 Idea and opinion exchanges concerning the project with other users.
COM4 Discussions with other users regarding your concerns about the project.
COM5 Debates with project management about your ideas and opinions on the project.
COM6 Discussions with project management about your ideas and opinions on the project.

User Involvement: Items were assessed on 0–10 semantic differential scales.
As a tool for my work at the clinic, I consider the new system to be …

UI1* Useless *vs* Essential.
UI2* Irrelevant *vs* Relevant.
UI3* Means nothing *vs* Means a lot.
UI4* Does not matter to me *vs* Matters to me.
UI5* Trivial *vs* Fundamental.
UI6* Of no concern to me *vs* Of great concern to me.
UI7* Unimportant *vs* Very important.

Psychological Ownership of Information Technology: Items were assessed on 0–10 Likert scales ranging from not at all to a lot.

POIT1* I personally invested a lot in the implementation of the new system in my clinic.
POIT2* When I think about it, I see a part of myself in the new system.
POIT3* I feel the new system belongs to all the doctors in my clinic.
POIT4* I feel a high level of ownership toward the new system.
POIT5* I hardly think of the new system as being my own system (reverse coded).
POIT6* I see myself as a champion of the new system in my clinic.
POIT7* I configured the functionalities of the new system to better align it with my medical practice.

Cognitive Absorption: Items were assessed on 0–10 Likert scales ranging from not at all to a lot (the * shows the composite variables that were used in the PLS analysis as reflective measures of the latent cognitive absorption construct).

*Temporal Dissociation**

TD1 Time passes very quickly when I use the new system.
TD2 At times I am not aware of the passage of time when I use the new system.
TD3 Frequently I end up spending more time using the new system than initially planned

*Focused Immersion**

FI1 When I use the new system I can concentrate on what needs to be done.
FI2 When I interact with the new system I am absorbed in the task I am working on.
FI3 Most of the time I do not get distracted from my task when using the new system

*Heightened Enjoyment**

HE1 Using the new system is enjoyable.
HE2 Using the new system gives me pleasure.
HE3 Using the new system bores me a lot (reverse coded).

*Curiosity**

CUR1 Using the new system awakens my interest.
CUR2 Interacting with the new system makes me curious about it.
CUR3 Interacting with the new system makes me curious about health informatics in general.

*Control**

C1 I am in complete control of how I use the new system.
C2 I am a capable user of the new system's different functionalities.
C3 When I use the new system, I frequently make mistakes (reverse coded).

Perceived Usefulness: Items were assessed on 0–10 Likert scales ranging from not at all to a lot.

PU1* I can accomplish my tasks very rapidly by consulting the information contained in the new system.
PU2* Using the new system makes me more efficient in my work.
PU3* The new system has improved the quality of my work as a doctor.
PU4* Following the new system's implementation in my clinic, accessing the contents of my patients' files has become much easier.

Perceived Ease of Use: Items were assessed on 0–10 Likert scales ranging from not at all to a lot.

PEOU1* Using the new system is simple.
PEOU2* One becomes quickly comfortable in using the new system.
PEOU3* Overall, the new system is easy to use.
PEOU4* Learning how to use the new system is easy.

System Use: Items were assessed on 0–10 Likert scales.

SU1* Are you an intensive user of the new system? (0 = not at all; 10 = very much).
SU2* How frequently do you use the new system? (0 = never; 10 = frequently).
SU3* For what percentage of your patients do you consult or use the new system? (0 = a minimal percentage; 10 = all of them).