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# Enablers and Inhibitors of Healthcare Information Technology Adoption: Toward a Dual-Factor Model

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## ABSTRACT

This paper formulates, operationalizes, and empirically validates a dual-factor model of healthcare information technology (HIT) adoption, by taking into account both the enabling factors driving HIT adoption and the inhibiting factors constraining such adoption. Perceived usefulness and perceived ease of use were examined as enablers and perceived loss of control as an inhibitor. Using survey data on adoption of a new computerized patient order entry system among physicians at a community hospital, we demonstrate that inhibitors not only have a negative effect on one's intention to adopt HIT systems, counteracting the positive effect of enablers, but also negatively bias some of the enabling perceptions. The overall negative impact posed by inhibitors may override and surpass any positive impact posed by a multitude of enablers. Implications of our findings for HIT research and practice are discussed.

## Keywords

Healthcare information technology, adoption, inhibitors, dual-factor model, computerized physician order entry.

## INTRODUCTION

Research on information technology (IT) and healthcare information technology (HIT) adoption has long focused on “enablers” or positive factors that drive adoption. Examples of such enablers include perceived usefulness, perceived ease of use, and perceived compatibility, as suggested by extant IT adoption models such as the technology acceptance model (TAM) (Davis et al. 1989), the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003), and innovation diffusion theory (Rogers 1995). However, little attention has been devoted to understanding the “inhibitors” or negative factors that hinder adoption. This sole focus on enablers and exclusion of inhibitors has resulted in a “pro-innovation bias” in IT/HIT adoption research – a frequently mentioned problem in innovation adoption research (Rogers 1995). One consequence of this pro-innovation bias is that while our current IT adoption models provide reasonably good explanations of adoption behaviors, they cannot adequately explain non-adoption or rejection behaviors.

Do inhibitors play an important role in influencing (hindering) IT/HIT adoption? We believe so, especially in contexts where users demonstrate a propensity to reject new IT. Healthcare is one such context, where many physicians tend to reject advanced HIT systems, such as computerized physician order entry (CPOE) systems and electronic medical record (EMR) systems (e.g., Lapointe and Rivard 2005), that are expected to reduce medical errors and improve medical service delivery. Freudenheim (2004) described a classic case of HIT rejection at the prestigious Cedars-Sinai Medical Center at Los Angeles, where physicians rebelled against a newly installed computer system for ordering medications and laboratory tests for patients, complaining that the system was too great a distraction from their medical duties and forcing its withdrawal after the system was already online in two-thirds of the 870-bed hospital.

The central research question of interest to this study is how can we extend existing adoption models to explain IT/HIT non-adoption or rejection? In other words, how can we overcome the pro-innovation bias implicit in IT/HIT adoption research? To address this issue, we employ a dual-factor model recently suggested in the IT adoption literature (Cenfetelli 2004), operationalize this generic model to focus on specific enablers and inhibitors relevant to the HIT context, and then test the model using a survey study of CPOE adoption among practicing physicians at a large community-based hospital in Florida. The results of our analysis provide a strong case for considering inhibitors in studies of IT/HIT adoption, and specifically expanding current models of IT/HIT adoption to include the role of inhibitors.

Addressing this research question is important for theoretical as well as practical reasons. From a theoretical standpoint, it focuses our attention on the role of inhibitors, a class of predictors that has been routinely overlooked in IT/HIT adoption research. Incorporating salient inhibitors into extant adoption models can not only provide an improved and more nuanced

prediction of IT/HIT adoption, but also help explain rejection of such systems by the user population – a problem we know very little about at this time. Hence, our study has broader ramifications beyond the healthcare context to generic models of IT adoption. From a practical standpoint, understanding the role of inhibitors may help healthcare administrators (and organizational managers) cope better with the often overlooked but frequent problem of user rejection of IT/HIT and devise strategies to manage the transition to new HIT/IT more effectively. This is critical because traditional change management practices, such as improved interface, user training, and help desk staffing, are aimed at building the positive enablers rather than overcoming the negative inhibitors, and has therefore had limited success in overcoming user rejection of new systems.

The rest of the paper proceeds as follows. In the next section, we describe the theory underlying a dual-factor model of IT/HIT adoption and outline the enablers and inhibitors salient to understanding IT adoption and rejection. The third section describes our research methods, including instrument construction, site selection, and sampling issues. The fourth section describes statistical data analysis techniques and results. The final section discusses the limitations of our study and its implications for future HIT research and practice.

## THEORY AND HYPOTHESES

Though one may presume inhibitors to negatively influence potential adopter's intention to adopt a new IT/HIT and consequent adoption behavior, the nomological nature of this association and its impact relative to that of enablers are not well-known. Cenfetelli (2004) attempted to elaborate these issues in his formulation of a dual-factor model of IT adoption., where he argued that IT adoption decisions among potential adopters are based on simultaneous considerations of both enabling and inhibiting factors. Cenfetelli defined inhibitors as those negative factors that discourage IT adoption when present, but do not necessarily favor usage when absent. This "one-sided" or asymmetric nature of inhibitors suggests that inhibitors are not quite the opposite of enablers, but are qualitatively distinct constructs that are independent of but may coexist with enablers. Cenfetelli also contended that while IT adoption is best predicted by enablers, IT non-adoption tends to be best predicted by inhibitors.

Cenfetelli's (2004) model was motivated by the observation that extant models of IT adoption have focused almost exclusively on users' positive (enabling) perceptions related to IT adoption, such as its perceived usefulness and ease of use, while ignoring negative (inhibiting) perceptions that may hinder IT adoption. However, there is empirical evidence that negative perceptions do inhibit usage. For example, Speier et al. (2003) found that system interruptions, such as pop-up advertisements on a web site, "you've got mail" announcements in an e-mail system, and animation characters offering help with writing letters in Microsoft Word, hinders IT usage and task performance, although the lack of such interruptions does not enhance IT usage. Likewise, in a healthcare context, Bhattacharjee and Hikmet (2007) demonstrated that user resistance to change hinders physicians' intent to adopt HIT systems, although the lack of such resistance does not facilitate adoption.

Applying Cenfetelli's (2004) dual-factor model to understanding physicians' adoption of new HIT such as CPOE systems, we propose that physicians' *intention to adopt CPOE systems* is governed by IT adoption enablers, such as perceived usefulness and perceived ease of use (Davis et al. 1989; Venkatesh et al. 2003), as well as inhibitors. *Perceived usefulness* refers to adopters' expectation of benefits from system adoption, such as improvement in job performance, while *perceived ease of use* is their expectation of the amount of effort needed to adopt and use the target system (Davis et al. 1989). Note that our conceptualization of perceived usefulness as expected benefits is a little different from prior conceptualizations in IT adoption literature as expectations of efficiency or productivity gains (e.g., Davis et al. 1989). While IT is viewed as a productivity enhancement tool in most corporate workplaces, in healthcare settings, it is viewed first as a tool for improving healthcare delivery effectiveness (e.g., reduce errors, easy access to medical records) and then as an efficiency tool. This reconceptualization was therefore needed to fit the construct to the healthcare context of our study. TAM suggests that perceived usefulness and perceived ease of use are the two most salient cognitive determinants of IT usage in workplace settings, because people want to use systems that benefit their work and that do not cost them a significant amount of effort. While recent empirical studies show that perceived ease of use is less predictive of IT adoption intention, particularly for today's IT-sophisticated users, in order to remain faithful to the referent theories (TAM, UTAUT), we decided to retain this construct in our model. Perceived usefulness and perceived ease of use both tend to be positively related to IT usage intention, leading us to hypothesize:

- H1. *Physicians' perceived usefulness of HIT adoption is positively related to their HIT adoption intention.*
- H2. *Physicians' perceived ease of HIT use is positively related to their HIT adoption intention.*

Cenfetelli (2004) did not suggest any specific inhibitor of IT adoption, and it is plausible that our choice of inhibitors may depend on the specific research context and technology being examined. However, one prominent inhibitor that emerged during our numerous formal and informal interactions with physicians at this and several other Florida hospitals, was their

fear of losing control over their work if they used IT systems such as CPOE. This is because CPOE systems are essentially workflow systems, that automate, streamline, and restructure the way physicians order laboratory tests (e.g., blood culture, urine analysis), radiological tests (e.g., X-rays, magnetic resonance imaging, etc.), pharmacy prescriptions, and special procedures (e.g., bronchoscopy, biopsy) for their patients, and access the results of those tests. Although CPOE systems help avoid unnecessary duplication of critical patient tests, reduce incidences of adverse drug interactions, and ultimately, deliver a better quality of medical care, physicians in many hospitals dislike these system because they force physicians to abandon their age-old practice of writing prescriptions and tests on paper and instead entering it on a computer terminal and navigating through a complex series of screens and numerous checks and balances in the process.

While there may be additional inhibitors of HIT adoption, the above observation led us to select *perceived loss of control* as the core inhibitor of interest to this study. This construct, not previously examined in IT adoption research, can be defined as the extent to which users expect to lose control over they way they work as a direct consequence of adopting a new IT. Further, perceived loss of control fits the classic definition of an inhibitor as well as portrays similar idealized (e.g., asymmetric) behaviors. For instance, loss of control hurts HIT adoption among physicians but lack of this control does not necessarily enhance HIT adoption. Further, perceived loss of control is independent of but may coexist with enablers such as perceived usefulness (expected benefits from system adoption) and perceived ease of use (effort expected in using a system) commonly discussed in the adoption literature, since physicians may view a CPOE system as being useful and easy to use, yet controlling rather than helping their work. Viewing perceived loss of control as an important inhibitor for physicians’ intention to adopt CPOE systems, we propose:

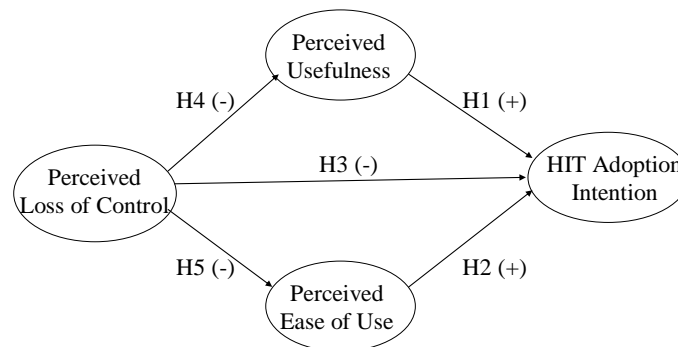
*H3. Physicians’ perceived loss of control is negatively related to their HIT adoption intention.*

Cenfetelli (2004) contended that inhibitors influence IT adoption both directly *and indirectly* via enablers as mediators. The indirect effect suggests that inhibitors tend to influence (or “bias”) adopters’ perception of enablers in a negative manner. Note that this “biasing effect” is unidirectional, since enablers do not have any corresponding effect on inhibitors, and is the essence of Cenfetelli’s asymmetric effects hypothesis. There are two plausible reasons for such biasing effects of inhibitors. First, according to norm theory (Kahneman and Miller 1986), negative perceptions tend to garner more cognitive attention, instigate greater information processing, and are remembered better than positive ones. Second, inhibitors, when present, tend to anchor one’s overall perception toward the target object or behavior, subsequently biasing all other perceptions, including enablers. For instance, a single instance of system failure may lead physicians to view a given HIT as being of poor quality, despite numerous prior instances of proper functioning or a multitude of positive features and capabilities. In light of this asymmetric biasing effect of inhibitors of HIT adoption, such as perceived loss of control, on enablers, such as perceived usefulness and perceived ease of use, we hypothesize:

*H4. Physicians’ perceived loss of control is negatively related to their perceived usefulness of HIT adoption.*

*H5. Physicians’ perceived loss of control is negatively related to their perceived ease of HIT use.*

The five hypotheses postulated above are illustrated in Figure 1. Note that the research model shown in this figure represents our first-cut attempt at examining the role of inhibitors in HIT adoption and their nomological relationships with enablers. We focused on perceived loss of control as the sole inhibitor of interest because this construct was particularly salient in our HIT adoption context. Presumably, there may be other potential inhibitors that are not examined in our study, which may be the subject of future investigations. Further, note that the salience of perceived loss of control may extend to most other workflow systems in other organizational contexts beyond the healthcare setting.



**Figure 1. Research Model**

## METHODS

### Empirical Setting

Our hypothesized research model was empirically tested using data collected from a field survey of practicing physicians at a large community-based hospital in Florida regarding their perceptions toward a newly installed CPOE system. This system allowed physicians to order a wide range on in-patient tests, procedures, and medications, and access the results of these tests and other medical data (e.g., vital signs, discharge data, prior hospitalizations) from hospital floors or remotely from their home or private clinics. The system provided workflow support using “order sets” which were customized sets of procedures that a physician could create for managing all patients with a similar diagnosis, cross-checked physician prescriptions against patients’ allergy records for adverse interactions, and tracked patients’ medication schedule alerting the attending physician or nurse whenever a new dose was needed.

At the time of this study, the hospital had recently completed CPOE implementation in all departments and on all floors, with the goal of transitioning physicians from paper forms to computerized ordering. However, 75% of physicians had not yet adopted the CPOE system. The remaining 25% used the system for entering about half of their orders. This high level of non-adoption was surprising, since this hospital employed a large IT staff to support the CPOE system and train physicians on their usage, and invested a considerable amount of resources and high priority to the CPOE implementation, but made this hospital an ideal site for studying inhibitors hindering HIT adoption. For instance, trainers worked around physicians’ busy schedules, providing one-on-one hands-on training to those physicians who could not attend the scheduled CPOE training sessions. Some physicians liked the system and used it regularly, even logging in from home to check on patient charts, and indicated that the system helped them save time during their hospital rounds. However, others hated the system and devised innovative workarounds to avoid its adoption, such as placing telephone orders (to a nurse), using old discontinued paper forms, requesting patient assignment on floors where the system was not yet installed, and using “Post-It” notes on patient charts to add orders. Still others adopted a “over my dead body” stance, refusing CPOE adoption and asking the administration to withdraw it.

### Construct Operationalization

The four constructs of interest to this study were measured using multiple-item, five-point Likert scales anchored between “strongly disagree” and “strongly agree.” Wherever possible, prevalidated measures from prior research were employed, after appropriate rewording to fit the study’s context.

Perceived usefulness was measured using a scale similar to Davis et al.’s (1989) four-item scale. Three of these items assessed subjects’ expectations of productivity, performance, and effectiveness gains from CPOE adoption, and the fourth item examined their overall perceptions of its usefulness. Perceived ease of use was also measured using Davis et al.’s (1989) scale that captured the ease with which subjects believed that could learn to use the CPOE system, be skillful at its use, get the system to do what they wanted to do, and their overall perceptions of its ease of use. Intention to adopt was measured using an adapted version of Bhattacharjee and Sanford’s (2006) intention scale. The three items on this scale examined subjects’ intent to use the CPOE system, use more features of the system, and use the system for more of their job responsibilities.

Given the absence of an appropriate pre-validated scale, a new multiple-item scale was created for measuring our perceived loss of control construct, using Nunnally’s (1978) “domain sampling technique.” Toward this end, we identified different domains of physicians’ work and created individual items to represent each work domain. During initial interviews, physicians revealed that they saw the CPOE system changing the way they traditionally made clinical decisions, ordered patient tests, accessed lab results. Hence, the perceived loss of control construct was measured using three items that asked physicians the extent to which they expected to lose control over the way they ordered patient tests, accessed lab results, made clinical decisions using the system, plus a fourth item regarding their loss of control over their overall medical responsibilities.

## DATA ANALYSIS AND RESULTS

The survey questionnaire was distributed in paper format to the entire population of about 700 physicians at this hospital, along with a cover letter from the hospital’s chief executive officer emphasizing the importance of their participation in this study and a postage-prepaid envelope for returning completed responses. Respondent anonymity was assured. A second round of survey was administered 1.5 months later to encourage participation from non-respondents. The survey questionnaire was reviewed and approved by the institutional review boards at the researchers’ university and at this hospital.

Following two rounds, a total of 131 responses were obtained for a response rate of about 19%. Two responses were mostly blank and were discarded. Respondents had a mean age of 49.5 years (SD=10.1 years), full-time work experience in the medical profession of 20.1 years (SD=11.4 years), and have used computers for work for 9.7 years (SD=6.2 years). This group included physicians of all specialties, including internal medicine, pediatrics, gynecology, pathology, general surgery, anesthesiology, radiology, neurology, oncology, and cardiology. Two tailed t-tests comparing sample demographics with population demographics for all physicians in this hospital (obtained from the hospital administration) found that our sampled respondents did not differ significantly from the broader physician population in age ( $t=0.39$ ) or specialty distribution ( $t=0.01$ ), indicating that our subject sample was indeed representative of the CPOE user population at this hospital.

We also tested for common method variance (CMV) bias using Lindell and Whitney's (2001) marker-variable technique. This technique is considered to be a more robust test of CMV than alternative techniques such as Harmon's one-factor test. We used respondents' total medical work experience (at this and other facilities) as the marker variable, which had a mean absolute correlation ( $r_M$ ) of 0.088 with the remaining items in this study. CMV-adjusted correlations ( $r_A$ ) was computed by partialling out the effect of  $r_M$  from the unadjusted bivariate correlations ( $r_U$ ). The mean change in correlations ( $r_U - r_A$ ) due to this adjustment was 0.081 and was not significantly different from zero, suggesting the lack of CMV bias in our data sample.

### Scale Validation

The validity for our measurement scales was assessed using confirmatory factor analysis (CFA). This was performed using the partial least squares (PLS) technique using Visual PLS 1.04. Raw data was used as input to the PLS program, and path significances were estimated using the bootstrapping resampling technique with 200 sub-samples.

Convergent validity of scale items was assessed using three criteria suggested by Fornell and Larcker (1981): (1) all item factor loadings should be significant and exceed 0.70, (2) composite reliabilities ( $\rho_c$ ) for each construct should exceed 0.80, and (3) average variance extracted (AVE) for each construct should exceed 0.50. As seen from Table 2, standardized loadings for all scale items in the CFA model met the minimum loading criterion of 0.70 (the lowest value being 0.76 for the fourth item for perceived loss of control) and were significant at  $p<0.001$ . Composite reliabilities of all constructs exceeded the required minimum of 0.80; the lowest value being 0.92 for perceived loss of control (see Table 3). Further, AVE values for all four constructs exceeded 0.50, with the lowest values being 0.75 for perceived loss of control. Hence, all conditions for convergent validity were met.

Scale Item	Item Mean	Item S.D.	Factor Loading	T-statistic
PU1	4.01	2.12	0.95	122.71
PU2	3.53	2.22	0.96	118.82
PU3	3.80	2.16	0.98	277.97
PU4	4.21	2.13	0.94	70.86
EOU1	4.62	1.88	0.88	22.43
EOU2	4.85	1.66	0.89	24.66
EOU3	4.06	1.82	0.90	34.28
EOU4	3.90	1.93	0.89	37.78
PLC1	3.46	1.82	0.87	26.16
PLC2	3.40	1.82	0.92	45.22
PLC3	3.62	1.85	0.91	55.54
PLC4	3.16	1.83	0.76	14.51
INT1	5.22	1.95	0.93	41.85
INT2	4.92	1.94	0.96	130.15
INT3	4.80	1.86	0.95	119.40

Item legend: PU: Perceived usefulness, EOU: Perceived Ease of Use, PLC: Perceived loss of control, INT: Intention.

**Table 1. CFA Results**

Discriminant validity between constructs was assessed by comparing the square root of AVE for each construct with all bivariate correlations involving that constructs (Fornell and Larcker 1981). The highest bivariate correlation in our CFA model was 0.71 between perceived usefulness and intention (see Table 3). This correlation was lower than the lowest square root of AVE among all constructs, which was 0.86 between perceived loss of control. Hence, the discriminant validity criterion was also met, assuring that our construct measures indeed measured what they were intended to measure.

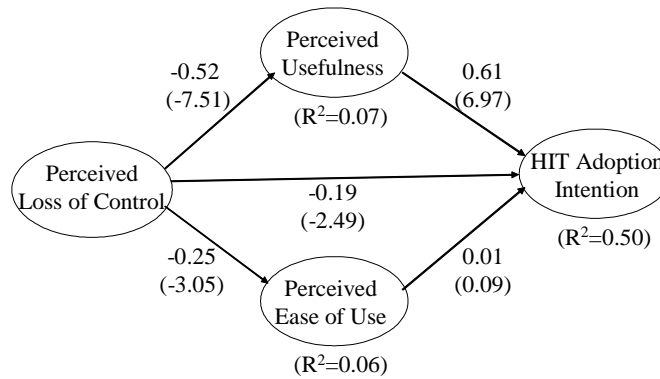
Construct	$\rho_c$	Cronbach Alpha	AVE	Inter-Construct Correlations			
				PU	EOU	PLC	INT
PU	0.97	0.97	0.92	<i>0.96</i>			
EOU	0.94	0.91	0.80	0.56	<i>0.89</i>		
PLC	0.92	0.89	0.75	-0.51	-0.24	<i>0.86</i>	
INT	0.96	0.94	0.90	0.71	0.39	-0.51	<i>0.95</i>

Construct legend: PU: Perceived usefulness, EOU: Perceived Ease of Use, PLC: Perceived loss of control, INT: Intention.  
 Diagonal terms (in italics) represent square roots of AVE for that construct.

**Table 2. Scale Properties**

**Hypotheses Testing**

The next step in our data analysis was to examine the explanatory power of our hypothesized model and the strengths and significances of each path in this model. This analysis was also conducted using PLS. The research model explained 50% of the variance in physicians’ HIT (CPOE) adoption intention, while variance explained in perceived usefulness and perceived ease of use were 7% and 6% respectively (see Figure 2).



Note: t-statistic in parentheses

**Figure 2. PLS Results**

Examining individual path coefficients, we found that four out of the five hypothesized associations in our research model were significant at  $p < 0.05$ , while the effect of perceived ease of use on intention was non-significant. The valence of each significant path (positive or negative) was also as hypothesized, providing overall support to our research model.

HIT adoption intention was predicted positively by perceived usefulness ( $\beta = 0.61$ ;  $p < 0.001$ ) and negatively by perceived loss of control ( $\beta = -0.19$ ;  $p < 0.01$ ), providing empirical support for Hypothesis H1 and H3 respectively. However, perceived ease of use on intention had a non-significant effect, failing to support H2. This non-significance was not surprising in light of similar findings in the IT adoption literature. While ease of use may be a predictive construct for users who are less computer savvy, it appears to be less predictive for users who have significant computer experience, as was the physician sample in this study. Overall, the above findings supported our initial expectation that physicians’ intention to adopt HIT is predicted by both enabling (e.g., perceived usefulness) and inhibiting (e.g., resistance to change) perceptions, though some enablers such as perceived ease of use, and probably some inhibitors as well, may be less predictive of intention.

Perceived loss of control had significant negative effects on perceived usefulness ( $\beta = -0.52$ ;  $p < 0.001$ ) and perceived ease of use ( $\beta = -0.25$ ;  $p < 0.001$ ), supporting Hypotheses H4 and H5 respectively. These findings confirmed that inhibitors, such as perceived loss of control, do indeed have a biasing effect on enablers such as perceived usefulness and perceived ease of use. Hence, perceived loss of control not only has a direct negative effect on HIT adoption intention, but also an indirect negative effect mediated by enablers. It is worth noting that the magnitude of total indirect effects of perceived loss of control (-0.32) is substantially larger than its direct effect (-0.19), attesting to the importance of the biasing effects of inhibitors.

Although the effects of perceived loss of control on perceived usefulness and perceived ease of use were significant, the

variances explained in the dependent variables were very nominal (7% and 6% respectively). Hence, it will be improper to view inhibitors such as perceived loss of control as predictors of enablers such as perceived usefulness and perceived ease of use. Rather, what our analysis demonstrated here was that the presence of inhibitors creates a significant negative bias on enabling perceptions in the minds of IT adopters.

Lastly, following a reviewer's suggestion, we reexamined our model using age, gender, and prior computer experience at work as covariates, as suggested in prior IT adoption research (e.g., Venkatesh et al. 2003). Age and gender had no significant effects on our model, and the effect of prior experience was weakly significant. However, since these effects did not substantively change any of our path significances or variance explained, and were also not part of our formal hypotheses, they are not discussed here in further detail.

## **DISCUSSION AND CONCLUSIONS**

### **Limitations of the Study**

Our reported findings should be interpreted in light of our study's limitations. The first limitation is our choice of perceived loss of control as the inhibitor of interest. This choice was not theoretically motivated, as would have been ideal, but rather based on the prior literature (e.g., Lapointe and Rivard 2005) and our own observations at the study site. There may be other important inhibitors of HIT adoption not examined here, which can be the subject of future research.

Second, given the lack of a pre-validated scale, our measure of the perceived loss of control construct was based on physician inputs during our initial interviews. As such, this measure is physician-specific and may not generalize to other populations or contexts. Future researchers should consider building and validating a more generalized measure of this construct that can apply across a wider range of empirical settings.

Finally, this study was conducted in a large community-based hospital located in an urban setting. Findings derived from such setting may not be entirely generalizable to smaller hospitals, to rural hospitals, and to staff-based hospitals or academic/teaching hospitals. In view of our site's unique contextual factors, we urge readers to exercise caution while extending our findings to other healthcare facilities.

### **Implications for Research**

This study was one of the earliest to empirically test Cenfetelli's (2004) dual-factor model of IT adoption, by theoretically integrating adoption enablers and inhibitors within a unified model. Since current IT adoption models (based on enablers) provide only a limited explanation of adoption behavior, further exploration of the additional predictors is certainly warranted. Our consideration of inhibitors is a step in that direction.

Second, we explored the complex nomological relationships between adoption enablers and inhibitors, and demonstrated empirically that inhibitors not only have direct negative effects on adoption intention, but also negatively bias adopter perceptions of enablers. The combined (direct and indirect) negative effect of inhibitors may sometimes negate and/or supersede the positive effects of enablers, thereby hindering IT adoption. The asymmetric nature of the inhibitor effects should be of interest to future adoption research, which for the most part, has assumed linear relationships between predictors and adoption intention.

Third, we theorized and validated perceived loss of control as an important inhibitor of IT usage. However, we did not explore what factors may cause loss of control, an issue that can be studied in future research. Future research should also explore additional inhibitors salient to the problem of IT non-adoption.

Finally, a concept related to but conceptually distinct from non-adoption is resistance. Non-adopters may forgo a new IT because of lack of time or for reasons other than their resistance toward the system. Although this study was about non-adoption, user resistance is an equally overlooked but potentially fertile area of research that should be explored in future research.

### **Implications for Practice**

The findings of this study have important implications for healthcare administrators and organizational managers responsible for HIT/IT implementation. First, it draws attention to the concept of inhibitors, such as perceived loss of control, which are often ignored in IT implementation programs. Since inhibitors bias adopters' perceptions of enablers, traditional change management programs, geared toward building enabling perceptions, may be ineffective if administrators do not have an action plan for combating and overcoming the effects of inhibitors.



Inhibitors, such as perceived loss of control, can also be a valuable diagnostic tool for post-mortem analysis of IT implementation failures or ex ante evaluation of the chances of implementation success. Toward that end, managers and consultants should measure and continually track adopter perceptions of inhibitors salient to the adoption context using scales similar to that used in this study.

Finally, hospital administrators should proactively explore strategies to mitigate perceptions of loss of control among physicians while implementing new HIT such as CPOE. Such strategies may include providing options for physicians to customize the tool to their personal preferences and work patterns, instead of forcing them to comply with the idiosyncrasies of the system.

In closing, this study integrated the notion of inhibitors with traditional enablers of IT/HIT adoption within a unified dual-factor model. A survey of physicians' adoption of CPOE systems in a hospital setting validated the unified model, while also pointing out asymmetric effects and biases on adoption behaviors when inhibitors are taken into account. This study advanced our current understanding of IT adoption research by pointing usage researchers to the importance of inhibitors such as perceived loss of control that can serve as the starting point for building richer and more comprehensive models of IT adoption.

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