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Inhibitors and Enablers as Dual Factor Concepts in Technology Usage*

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Abstract

Information systems (IS) research has focused extensively on the factors that foster adoption and usage. A large body of work explores overall beliefs about system usage, antecedents of system satisfaction, and other perceptions that enable system success, create positive attitudes, and encourage usage. However, much less attention has been given to what perceptions uniquely inhibit usage. In large part, this is due to the implicit assumption that the inhibitors of usage are merely the opposite of the enablers. This paper proposes a theory for the existence, nature, and effects of system attribute perceptions that lead solely to discourage use. I posit that usage inhibitors deserve an independent investigation on the basis of three key arguments. One, there exist perceptions that serve solely to discourage usage, and these are qualitatively different from the opposite of the perceptions that encourage usage. Two, these inhibiting and enabling perceptions are independent of one another and can coexist. Three, inhibiting and enabling perceptions have differing antecedent and consequent effects.. As unique beliefs, inhibiting perceptions can add to our understanding of the antecedents of usage or outright rejection. Further, such inhibitors may not only be important to the IS usage decision, they may be more important than enabling beliefs.

Keywords: Technology rejection, Use inhibitors and enablers, Discontinuance

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Introduction

“Imagine you have this device that instantly tells you that someone within a 2-mile area has run out of milk. You rush to their house, and take them to the nearest store and, just to make sure they purchase, you give them the cash...you'd think in that particular context you'd have a 100% conversion rate - it's very unlikely this transaction will not succeed. Well we've done just this on the web. We've taken people who needed a product to Web sites that had that product and given them the cash to buy it. The first time we did that we got (only) a 30% conversion rate!” – Jared Spool, President, User Interface Engineering (Rourke, 2002)

The introductory quotation from Jared Spool is intended to paint a realistic and vivid picture of technology use, in this case from a consumer e-Business standpoint. Very few companies design and develop information systems (IS) that include purposeful barriers to their use. Clearly, however, such barriers exist to explain the less than 100% conversion rate in the above example or in the numerous other cases where people reject or discontinue technology usage. From a broader perspective, consider that overall Internet usage has plateaued as there are equal numbers of individuals *abandoning* the Internet as *beginning* online use (Lenhart et al., 2003). While some of the rejection can be explained in terms of individual or environmental factors, we must also consider that system design and function play a role. This paper proposes the existence and theoretical nature of the perceptions of system attributes that serve to discourage use and how they differ from the positive perceptions of technology that have thus far been extensively researched.

The IS literature has focused on technology adoption, acceptance, and use as a means of realizing the value from technology investments (DeLone and McLean, 1992; DeLone and McLean, 2003; Taylor and Todd, 1995). Through various streams of IS research such as that on IS success (DeLone and McLean, 1992; DeLone and McLean, 2003) and technology acceptance (Davis et al., 1989), we are aware that reliability, assurance, usefulness, and many other user perceptual variables are important in predicting attitudes toward technology and its subsequent acceptance. Although these are valuable perspectives, they almost exclusively focus on users' *positive* beliefs regarding technology. The implicit assumption is that technology design should focus solely on the “good” or whatever enhances quality, fosters positive user attitudes, and encourages system use. However, much less attention has been given to the “bad” or what *uniquely* fosters negative attitudes and discourages use. As a result of these assumptions, it is quite possible that we have overlooked important *additional* perceptions beyond previously studied facilitating perceptions such as reliability, ease of use, information currency, and so forth. The existence of these “inhibitors” may explain why people fail to adopt or, worse, outright reject a system. Just as we have considered positive system attributes and their contribution toward use, it is also necessary to investigate in a specific, comprehensive, and theoretical way those perceptions that may be missing in the analysis of technology adoption and that may contribute to discouraging such adoption.

Some research has addressed usage antecedents that act strictly to discourage use or its analogues (e.g., Web site purchase intention) such as distrust (McKnight et al., 2003), risk (Grazioli and Jarvenpaa, 2000; McKnight et al., 2002; Pavlou, 2003), dissatisfiers (Zhang and vonDran, 2000), anxiety (Brown et al., 2004; Compeau et al.,

1999; Venkatesh, 2000), and resource barriers (Mathieson et al., 2001). However, researchers designed these studies to address a particular phenomenon. What has been missing, and what I am proposing here, is a comprehensive theory of usage inhibition that, for the time being, focuses on system design and functionality.

If a system does not "fail to complete" a transaction, will you judge it favorably? If you visit a Web site and it does not have "pop up" advertisements, are you likely to be aware of that absence and thus be more likely to purchase from it? If an order entry system accepts your data input once without your having to enter the exact same data two or three times, are you pleased with it as a result? Indeed, these examples highlight what I call inhibitors—factors that, when present, discourage use, but when absent, make no difference.

This paper argues for the independent investigation of such usage inhibitors based upon three key arguments. One: there exist perceptions that serve solely to discourage usage, and these are qualitatively different from the opposite of the perceptions that encourage usage. Two: these inhibiting and enabling perceptions are independent of one another and can coexist. Three: inhibiting and enabling perceptions have differing antecedent and consequent effects. The core intent of identifying usage inhibitors and the encompassing theory is to add to our understanding of technology use beyond that found in the satisfaction, service quality, technology acceptance, and innovation diffusion models—paradigms that have almost exclusively adhered to a positive outlook. A further goal is to increase our understanding of why people reject or discontinue technology usage.

The Theoretical Foundation for Inhibitors

Inhibitors and enablers defined

Perceptions are a key influence on a user's general attitude, intentions and, ultimately, behavior with respect to a system. The level of abstraction for these perceptions about a system's design and functionality is prescribed by behavioral theories, specifically, the theory of reasoned action (TRA, Ajzen and Fishbein, 1980) and the theory of planned behavior (TPB, Ajzen, 1991). As noted in TRA, there exist variables external to and influential of the beliefs that a person may possess about the outcome of a behavior (e.g., technology adoption). Specific to a technology adoption context, the technology acceptance model (TAM, Davis et al., 1989) is derived from TRA and is also cognizant of such external variables such as system characteristics (Venkatesh, 2000; Wixom and Todd, 2003). Perceptions of ease and utility are the internally oriented beliefs specific to the behavioral outcomes of using a system. Furthermore, consistent with TRA, external variables, such as beliefs about the system's attributes, ultimately influence attitudes and behaviors toward use and are fully mediated by perceptions of ease and utility. For example, if a user believes that a system is reliable, reliability is an external belief that may influence whether the user considers the system to be useful and easy to use, and thus worth using.

The external variables studied in the IS literature have taken a variety of forms, such as trust (Gefen et al., 2003; Pavlou and Gefen, 2004), individual differences (Agarwal and Prasad, 1999), resources (Mathieson et al., 2001), and facilitating conditions (Venkatesh et al., 2003), to name a few. Surprisingly, perceived *system characteristics* have

received less attention as an external variable (Wixom and Todd, 2003). Given that a core artifact of interest to IS researchers is the design and functionality of a system, it follows that we should study those variables specific to the attributes of a system that encourage or discourage use (Benbasat and Zmud, 2003; Orlikowski and Iacono, 2001). Further, it is important to study a user's *perceptions* of those objective attributes. I coin the terms 'enablers' and 'inhibitors' to refer to these perceptions. Enablers and inhibitors are one's external beliefs about the system's attributes that influence a user's adoption or rejection decision.

The term 'enabler' refers to those external beliefs regarding the design and functionality of a system that either encourage or discourage usage, dependent on valence. For example, systems that are perceived to be reliable are used; unreliable ones are not. The user satisfaction paradigm (e.g., DeLone and McLean, 1992; DeLone and McLean, 2003) provides a useful foundation for identifying the full range of enabling beliefs about a system's attributes. These beliefs may be about the technical quality of the system itself (e.g., reliability) or the semantic quality of the information provided by the system (e.g., currency). Several studies have found that positive perceptions of information and system quality ultimately lead to increased likelihood of use. (e.g., Rai et al., 2002; Teng and Calhoun, 1996; Wixom and Todd, 2003). The number of perceptions of system attributes considered in IS has increased with the widespread influence of the Internet on IS. In addition to information and system quality, DeLone and McLean (2003) have proposed *service quality* perceptions, such as assurance and empathy, as additional system attributes that ultimately encourage a user to adopt a technology.

It is readily apparent that the variety of information, system, and service quality beliefs share the characteristic of being *positively oriented*.¹ If taken as external variables to the usage decision, they are universally proposed as being *positively associated* with usage. In one example from DeLone and McLean (2003), the authors identify 13 quality beliefs (e.g., reliable, relevant, assuring, etc.). The authors propose that all of these system attribute beliefs *contribute* to use. But the question remains: are there *additional* beliefs that are *uniquely negative* and thus discourage use and yet are not simply the opposing valence of an enabler (e.g., a system perceived to be unreliable or as providing irrelevant information)? If there are such unique perceptions that influence use, then MIS research to date may well have overlooked an additional and important set of factors not previously considered in a holistic theoretical model of usage.

This is the purpose behind the concept of usage inhibitors. As with enablers, inhibitors are the perceptions held by a user about a system's attributes with consequent effects on a decision to use a system. However, the important aspect of use inhibitors, in contrast to enablers, is that they act *solely* to discourage use. For example, if an online

¹ The dimensions of information, system and service quality have been variously operationalized. The most parsimonious is "ease of use" as wholly system quality with content, accuracy and format for information quality (Rai et al., 2002). DeLone and McLean provide a broader set of five dimensions for each of the information and system quality factors as well as for three dimensions for service quality. The non-redundant dimensions salient in a general system usage context can be gathered from a review of several studies (DeLone and McLean, 1992; DeLone and McLean, 2003; Gefen, 2002; McKinney et al., 2002; Rai et al., 2002; Seddon, 1997; Wixom and Todd, 2003). These include the following dimensions: Information quality: *format, currency, relevance, accuracy, and completeness*. System quality: *reliability, accessibility, navigation, timeliness, and flexibility*. Service quality: *empathy and assurance*.

purchase transaction is completed without incident, it is likely not noticed, let alone favorably perceived. That is, if a user were to *not* have an inhibitor perception, this absence of perception would play *no role* in enabling use. An enabling perception, on the other hand, plays the role of either discouraging or encouraging use contingent upon its valence. Ease of use is an extensively supported usage antecedent (Venkatesh et al., 2003). Easy-to-use systems get used, difficult-to-use systems do not.

It is important to note that objective features largely influence the perceptions of a system's attributes. Perceptions, however, are subject to other factors besides the true reality of the system (Mathieson et al., 2001). In other words, a user can either fail to perceive an actual attribute that exists (e.g., simply does not notice it), or believe the system has an attribute even when it objectively does not.

I have chosen to focus on system attributes in the interest of more closely focusing on a key IS artifact and one that would directly benefit from an inhibitor perspective. Beliefs about the design and functionality attributes of a system are a fertile area for determining the specific leverage points available to IS managers to design and develop successful systems (Taylor and Todd, 1995; Wixom and Todd, 2003). Particularly fruitful would be those beliefs that were *unique* in comparison to the beliefs found in the usage paradigms and that acted *solely* to discourage use.

In order to defend the existence, nature, and effects of inhibitors separate and apart from well-established enabler perceptions, I propose that inhibitors and enablers are not opposites of one another, that they are independent constructs, and that as independent constructs they have differing antecedent and consequent effects. To defend these arguments, I draw from a number of cognate disciplines that have successfully supported the position that the "bad" is more than the opposite of the "good." I then propose specific inhibitors of IS usage based upon a review of pertinent studies in the IS field, and I encourage further empirical examination to discover additional inhibitors and investigate their effects.

Inhibitors and enablers are not opposites of one another

Most concepts involve a spectrum of possible states ranging from positive to negative—opposite ends of a continuum. A system can be easy to use or, at the opposite end of the spectrum, it can be difficult to use; or there may be any of a variety of states in between (*not easy* to use but also not difficult). An inhibitor can be distinguished from an enabler as a perception for which there is no clear positive opposite that is psychologically meaningful. To borrow an example of such a "one-sided" concept from psychology, trauma is an extreme cognitive/emotional reaction to which there is arguably no positive counterpart (Baumeister et al., 2001). There can certainly be degrees of trauma (e.g., an absence of trauma), but what is the *opposite* of trauma? Additional examples come from Rozin and Royzman (2001), who note the linguistic asymmetry of terms such as risk, accident, and catastrophe, where there is no clear opposing construct for such ideas. Risk, in particular, refers to the chance of a negative outcome. Opportunity (or simply "luck"), while similar in opposition, typically does not refer to the same notion of negatively biased uncertainty. It is interesting to note that risk is a frequently studied antecedent (e.g., Barki et al., 2001; Pavlou, 2003), but there is no research that I am aware of regarding the importance of luck. In an analogous manner, I propose that inhibitors are perceptions that have no psychologically meaningful opposite and, as such, are not simply the opposite of an enabling perception. In some cases,

what might be considered a single construct with opposite ends is actually a pair of qualitatively different “one-sided” or dual-factored concepts.

There is broad support for these types of dual-factored concepts, the most frequently cited being job satisfaction (Herzberg et al., 1966). Herzberg et al. proposed that job satisfaction and dissatisfaction were separate constructs and not the opposite of each other. This duality in satisfaction extends to consumer contexts where there is ample evidence that customer satisfaction is different from the reverse of dissatisfaction (Anderson and Sullivan, 1993; Oliver, 1993). What is important about the dual-factor structure is that it separates what may otherwise be considered a simple bipolar construct into two independent parts. This logic is applied to trust and distrust by Lewicki, Mcallister, and Bies (1998). Here again, trust and distrust are not opposites of one another, but instead have unique characteristics that differ by more than just opposing valence, thus making them separable, although closely related, constructs. Although trust and distrust share confidence in expectations (one is negative and the other positive), Lewicki et al. characterize trust with dimensions such as faith and assurance, whereas distrust is characterized by fear and cynicism. The separate nature of the two constructs is well supported empirically (Clark and Payne, 1997; Lewicki et al., 1998; Robinson et al., 1991). Other examples of duality include positive versus negative emotions (Watson and Tellegen, 1985; Watson and Tellegen, 1999) and pessimism versus optimism (Lewicki et al., 1998; Schulz et al., 1996).

Inhibitors and enablers are not opposite constructs but dual-factored ones. With respect to the domain of external beliefs toward technology usage, I propose that inhibitors are uniquely discouraging of use and possess no opposing construct, at least not one that is psychologically meaningful. Whereas enablers are psychologically meaningful at either end of a positive–negative spectrum, inhibitors are only meaningful at the negative end.² Norms and expectations play a key role in whether certain phenomena are psychologically meaningful and engender cognitive attention (Kahneman and Miller, 1986). If a perceived attribute is normative, it is taken for granted, assumed, and often implicit. It is only when a system violates a user’s norms or expectations that it will be noticed and influential. One plausible example of this phenomenon in the IS literature is that of interruptions. Speier and colleagues (Speier et al., 1999; Speier et al., 2003) studied the effect of system-generated interruptions on decision-making performance. The effect of interruptions on a user is a key concern in systems design, given the ability of technology to provide a wide variety of information even if is not congruent with the task at hand. Receiving “You’ve got mail” announcements while working on an important document or “pop-up” advertisements while searching for product information are two pertinent examples. If we consider interruptions as a phenomenon, what is the opposite? That is, what is the reverse of interruptions other than no interruptions? Although Speier et al. did not study the role of system interruptions on adoption, it can be inferred that they would likely have a negative effect. However, *the lack of interruptions would not encourage adoption*. Indeed, I would contend that the lack of interruptions is not psychologically meaningful. It goes unnoticed and unappreciated. Fortunately, in this current time, we do not expect every site to have interrupting and intrusive pop-up ads. Thus, when they appear, they are psychologically meaningful and they discourage us from using the site. However, the absence of pop-up ads goes unnoticed and thus it is

² I acknowledge that certain positively oriented perceptions may act to solely encourage use. Such asymmetry, however, is not especially beneficial beyond what we already know through prior usage research.

not psychologically meaningful because they are not (yet) normative and expected. Of course, we can fear a future where pop-up ads are so much the norm that their absence would be psychologically meaningful, and thus the pop-up ad would move from being an inhibitor to an enabler.

Inhibitors and enablers as independent constructs

Because inhibitors to usage are more than the opposite of enabling system attribute beliefs, they can exist separately and independently from those enablers. On the basis of prior work regarding other dual-factored perceptions, we know, for instance, that employees can be both satisfied *and* dissatisfied with their jobs (Herzberg et al., 1966). People can both trust and distrust the same person or organization (Lewicki et al., 1998). In a similar manner, a person can possess perceptions of a variety of system attributes that are both positive and uniquely negative in nature. For example, a user may find a particular Web site very reliable and responsive to requests for information but also too intrusive as a result of numerous advertisements or repeated requests to “speak with a live agent now.” Humans commonly juggle multiple disparate and conflicting perceptions when evaluating a target and subsequently arriving at an attitude and a choice (Bettman et al., 1998).

Further supporting this independence between inhibitors and enablers is the concept of greater negative differentiation (Rozin and Royzman, 2001), or the notion that negative phenomena are more varied than the positive. For example, it is generally agreed that there are a greater number of negative emotions than positive ones (Diener et al., 1995) and that there tends to be a greater number of negative than positive words describing a phenomenon (e.g. words for pain versus pleasure, Peeters and Czapinski, 1990). This greater differentiation concept also supports the position that phenomena exist that are uniquely negative and have no corresponding positive opposite. For example, even if we agreed that some emotions were simply opposing pairs (happy versus sad), there would be a lack of sufficient positive opposites for the remaining negatives (e.g., pride versus regret, shame, and guilt). Thus, in addition to enablers either encouraging or discouraging use, there are likely factors that exist and act *separately* from those beliefs strictly to discourage use.

Inhibitors and enablers have differing antecedents and effects

The contrast between inhibitors and enablers is further extended to the nomological networks in which they reside. Being qualitatively distinct from enablers, inhibitors should arise from a different set of causal factors than that of enablers. Further, inhibitors should differ from enablers in their effects on consequent variables such as use. As an analogy, research shows that distrust, in contrast to trust, will breed suspicion, which in turn breeds greater degrees of attribute information processing (Kramer, 1999) as well as more varied and active emotional responses (McKnight et al., 2003).³ Another example from social psychology is the differential causes of negative emotions as compared to positive emotions (Baumeister et al., 2001). Both positive and negative emotions will predict a person’s subjective well-being. A person’s level of distress, on the other hand, is predicted *only* by negative emotion and is not affected by the presence of

³ In fact, the differential effects of distrust as compared to trust has lead to significant research into distrust as its own phenomenon of interest within the IS literature (Komiak and Benbasat, 2004, McKnight et al., 2003, Wang and Benbasat, 2004).

positive emotions. As a purely physiological example, a positive emotional state is evidenced by blood flow to a different region of the brain than the one playing a role in a negative emotional state (Cacioppo and Gardner, 1999). In other words, in addition to not being conceptually reciprocal, positive and negative emotions are also not physiologically reciprocal. These examples point to how dual-factored perceptions may reside in different nomological nets with differing antecedents and consequents. Next, I will illustrate the ways in which the antecedents and consequents of inhibiting and enabling perceptions may differ. In addition, I will offer explicit and testable propositions regarding these differing causes and effects.

Differing antecedent causes of enablers and inhibitors

As noted in the introduction, very few companies design and develop information systems purposefully including barriers to their use. The design, development, and functionality of a system is presumably driven by an overall purpose (Ba et al., 2001; Hevner et al., 2004) and one oriented to achieving positive perceptions of quality, whether in terms of information, system, or service. Uniquely negative attributes, on the other hand, arise from accident, error, or the byproduct of some other benefit that comes from their existence (e.g., a pop-up advertisement that, while intrusive, garners attention). A system that requires a user to enter identical information several times was likely not intentionally designed that way.⁴ System designers purposely develop system attributes to instill positive perceptions on the part of a user. As a result, enablers are typically created through the application of purposeful design, whereas inhibitors are not. Purposeful design may be evidenced by the existence of specific and proactive design practices, for example, policies and procedures on quality system development. These help to assure that systems are well formatted and provide timely and accurate information. But just as systems *projects* may fail from a lack of attention to risk (e.g. Barki et al., 1993; Lyytinen et al., 1998), usage inhibitors are also instigated by inattention to a variety of risk factors. These may include unrealistic development schedules or interpersonal conflict among developers. The absence of these factors does not beget enablers, but their presence increases the risk that a usage inhibitor will be “allowed” to exist in the system.

Proposition 1: The existence and degree of system usage enablers will result from purposeful design as evidenced by such features as design policies and procedures or the existence of system quality assurance programs. Inhibitors will be produced through the lack of attention to risk management factors.

Differing effects of enablers and inhibitors

Rejection versus Adoption Effects: The presence of an inhibitor perception can play a role in a user’s rejection of a system that may not take place in the absence of an enabling perception. From a consequential point of view, it is obvious that inhibitors and enablers will have, respectively, a negative and positive effect on use. A more nuanced proposition is that *rejection* of technology—a separate decision from not adopting—may best be predicted by inhibitors, whereas adoption may best be predicted by enablers. Rejection refers to a user’s conscious decision to avoid a system, as opposed to *non-*

⁴ This redundant effort does not include verification steps (e.g., specifying a new password) but cases where a system should clearly carry forward data it already has to future input fields (e.g., through “cookies” or other devices).

adoption, which leaves the door open to future use. Support for this asymmetry in effects comes from Venkatesh and Brown (2001), who found that specific factors were salient *only to rejection* but that the lack of these factors did not contribute to adoption. Venkatesh and Brown state: “*Prior technology adoption research has typically seen the presence of certain factors (e.g., perceived usefulness) as leading to adoption, while a lack of those factors is seen as the cause of rejection. (Our) research broadens that perspective by presenting preliminary evidence that non-adoption (rejection) decisions are based on critical barriers (i.e., rapid change, high cost, and lack of knowledge)...*” (p. 91). This makes it clear that inhibitors and enablers engender distinct and separate effects on the usage decision.

Proposition 2: Enablers are predictive of a user’s decision to adopt a system. The absence of enablers may or may not be predictive of system rejection (e.g., a weaker relationship vis-à-vis enablers and adoption). Conversely, inhibitors are predictive of a user’s decision to reject a system but the absence of inhibitors may not be predictive of system adoption.

Relative Power of Inhibitors vis-à-vis Enablers: Another key differentiating aspect of inhibitors versus enablers is the salience of presence versus absence. The presence of a given negative characteristic is more informative than its absence and, conversely, the absence of a positive characteristic is less informative (Leyens et al., 1997; Peeters and Czapski, 1990; Treisman and Gelade, 1980). A user thus gives precedence to the presence of an attribute that is solely negatively perceived. Given the psychological power of presence over absence, the perception of an inhibitor may act as a clear signal to a user that a system is poor, despite otherwise positive features. The asymmetrical influence of certain phenomena is well established theoretically. The perception of a negative attribute can act as a much more diagnostic cue relative to a positive attribute (Skowronski and Carlston, 1987). For example, it is more likely that a person who tells one lie is judged as dishonest than that a person who tells one truth is judged as honest. In addition to the clarity of the signal that an inhibitor can provide, the overall power of that signal is strong. Norm theory (Kahneman and Miller, 1986) supports that negative acts are more noticed and garner more cognitive attention than positive ones. Negative experiences have powerful effects on memory such that negative events are remembered better than positive ones, in some cases twice as well (Baumeister et al., 2001; Reeves and Nass, 1996; Ybarra, 2002). Baumeister et al. (2001) refer to this negativity bias as simply “bad is stronger than good.” Negative perceptions also have power over information processing. There is a distinct asymmetry in the speed and confidence of decisions made with negative information versus those made with positive information (Yzerbyt and Leyens, 1991): negative information leads to faster, more confident decisions.

An additional issue is one of attribution. In social interaction, people tend to attribute positive behavior as normative and situational, but negative behavior as dispositional (Ybarra, 2002). In other words, positive behavior is seen as expected from and in conformance with social demands, but negative behavior is “blamed” on the person. Since users many times project a social presence onto computers (Kumar and Benbasat, 2002; Reeves and Nass, 1996; Sundar, 2000), it is likely that such misattribution occurs when a system is perceived to have negative characteristics.

In summary, an inhibitor will lead to clear and salient negative perceptions about the system, and thus intentions to use, because of the power of presence over absence, the

diagnosticity and power of negative over positive information, and the asymmetry of attributions made by a user regarding the source of negative versus positive perceptions.

Proposition 3: Inhibitors are more explanatory of adoption and rejection as compared to enablers.

Biasing Effects of Inhibitors: In addition to the psychologically unique effect inhibitors have on usage, inhibitors may also act to bias perceptions of *other beliefs* about the system in ways that enablers will not. In other words, *regardless of the objective attributes that a system may have*, the presence of an inhibitor will lead to negative perceptions of those attributes. Such a bias occurs with the halo effect. A halo effect is the potentially invalid judgment of specific attributes based upon a person's overall evaluation of a target (Dick et al., 1990; Russo et al., 1998). An example would be a student who evaluates a professor as a poor teacher because he is disgruntled about a low grade on an assignment, even when that professor has otherwise excellent teacher ratings. However, the halo effect is a top-down model: in other words, a global attitude influences the evaluation of a specific dimension regardless of the dimension's objective true performance. What I propose, instead, is that there is a perceptual-specific sequential processing model for the effects of inhibitors; in other words, a single perception can bias another perception. The presence of an inhibitor and its asymmetric nature provide salient, diagnostic, and readily accessible cues that factor into the anchoring of other perceptions (Dick et al., 1990; Wilson and Brekke, 1994). Such an effect is similar to impression formation (Asch, 1946; Everard and Galletta, 2004; Yzerbyt and Leyens, 1991). Specific to IS, Everard and Galletta supported the theory of negative impression formation toward a Web site, whereby a perception of a flaw led to diminished perceptions of Web site quality. Arguably, a user arrives at such negative quality perceptions by anchoring and subsequently biasing the perception of the flaw. This anchoring of perceptions is known to be a key influence in initial systems use contexts, swaying beliefs about use (Venkatesh, 2000). In combination with the inhibitor's clear and salient negative signals, inhibitors may also anchor and subsequently bias perceptions of other beliefs about the information, system, and service quality attributes of the IS.

Plausibly, such an argument could be reversed by stating that enablers bias inhibitors; in other words, objectively positive features of a system will diminish a user's perception of the negative aspects. However, as noted earlier, negative information is more salient (Baumeister et al., 2001), more diagnostic (Skowronski and Carlston, 1987), and tends to instigate greater information processing (Yzerbyt and Leyens, 1991). Even if an enabler takes on a negative valence, the issue becomes one of psychological awareness and the concept that the absence of a positive feature is not as salient as the presence of a negative one (Leyens et al., 1997; Peeters and Czapinski, 1990; Treisman and Gelade, 1980).

Proposition 4: The presence of an inhibitor will negatively bias enabling beliefs regardless of the objective nature of the system. In other words, controlling for the objective attributes of enablers, the presence of an inhibitor will result in a more negative perception of those enablers as compared to the system without the inhibitor. As a result, inhibitors will have both a direct and an indirect effect on usage. Enablers will mediate the inhibitor indirect effects.

Consider the following scenario within a consumer e-Business context. A consumer visits a shopping Web site for the first time and is confronted with one or more “pop up” advertisements. If the user is both aware of the ad and aggravated by its presence, how will she go on to mentally evaluate other aspects of the Web site? For many users, the intrusion will negate objectively positive perceptions of any other feature of the site. As a further example, two systems of otherwise identical design and functionality that differ on a single inhibitor-provoking attribute (one has it, the other does not) will likely create *different user perceptions* of the objectively identical attributes of the systems.

Summary of theoretical arguments for inhibitors

In summary, I have proposed that inhibitors to usage are perceptions about a system’s attributes that are qualitatively unique from the vast array of positively oriented beliefs found primarily in the user satisfaction literature. These beliefs act to solely discourage use, but their absence does not encourage use. These inhibiting beliefs are independent from enabling beliefs and so can both coexist with those beliefs and have differing antecedent and consequent effects. Among these differing causal effects is the unique influence inhibitors have upon system rejection, a more powerful influence on the usage decision vis-à-vis enablers, and a biasing impact on the perceptions a user has of the otherwise objectively positive features that a system may possess.

Table 1 compares and contrasts enablers and inhibitors. The table also presents possible scenarios in which enablers and inhibitors may combine at different levels. For simplicity, these levels are categorized as either high or low. The perceptions of high or low enablers (quadrants I and III) are consistent with the extant literature on user satisfaction and quality. High quality systems foster adoption, whereas low quality systems do not. Optimally, a system will possess a high degree of enablers and a low degree of inhibitors (quadrant I). This is the normative position prescribed by the bulk of usage research.

Proposition 5: Systems designed with a high degree of enablers and few, if any, inhibitors, are likely to be adopted, as well as continue to be used post-adoption.

At the other end of the spectrum from high enablers/low inhibitors is low enablers/high inhibitors. This situation is described in quadrant IV of Table 1. Not only would a system in this category be perceived to be poorly designed and have minimal if any functionality, it is practically negligent, having specific features that serve only to discourage use.

Proposition 6: Systems designed with few, if any, enablers but with a high degree of inhibitors, are likely to be rejected by the user.

The situations described above as having high (low) enablers with low (high) inhibitors represent fairly plausible scenarios that would be expected if enablers and inhibitors were not dual-factored, but instead were opposites of one another. Quadrant II and quadrant III take a more independent perspective of the two. Quadrant II (high/high) describes the case of generally well-designed systems that have inadvertently included certain aggravating features. As a result, the presence of inhibitors will negate the effects of the enablers (as explained above) and increase the likelihood that the system will be rejected. Even if the system is adopted, the continuing presence of the inhibitors will eventually foster discontinuance.

Proposition 7: The presence of both inhibitors and enablers will result in a system that, even if adopted, risks the possibility of the user eventually discontinuing use.

Table 1. An Integration and Description of Usage Inhibitors and Enablers		
<p><u>High enablers</u></p> <p>The user perceives a high degree of system, information and service quality. For example, the system is perceived to operate reliably, to provide current information and to provide service with assurance.</p> <p>These perceptions foster system <i>adoption</i>.</p>	<p><u>I</u></p> <ul style="list-style-type: none"> • High quality (e.g., reliable, responsive) systems • High probability of adoption • System likely to have <i>continued</i> use past initial adoption 	<p><u>II</u></p> <ul style="list-style-type: none"> • Systems that are generally well designed and functionally adept but possess certain aggravating features to the user, preventing adoption. • If the system is adopted, the presence of inhibitors may eventually lead to discontinuance.
<p><u>Low Enablers</u></p> <p>The user either has no perception or a poor perception of system, information and service quality dimensions.</p> <p>These perceptions do not foster adoption.</p>	<p><u>III</u></p> <ul style="list-style-type: none"> • Perceptually ambiguous systems in terms of design and functionality. A simple handheld calculator, for example. The user gives little thought as to whether to use or not use the system. 	<p><u>IV</u></p> <ul style="list-style-type: none"> • A poorly designed and non-functioning system. No consideration is given to end user needs. Adoption is unlikely.
<p><u>Low Inhibitors</u></p> <p>An absence of perceptions regarding system attributes which would otherwise serve to discourage use if present.</p> <p>The absence of inhibitor perceptions does not foster system <i>rejection</i>.</p>		<p><u>High Inhibitors</u></p> <p>The user perceives the presence of system attributes that are negatively oriented and act <i>solely</i> as barriers to use. No meaningful opposing construct exists.</p> <p>Examples include perceptions of intrusiveness, rapid change, and insufficient documentation.</p> <p>These perceptions foster system <i>rejection</i>.</p>

Finally, quadrant III presents a situation where both enablers and inhibitors are low. In other words, there is little perception of the presence of either enabling or inhibiting attributes. These situations are perceptually ambiguous and likely not of great importance to the end user. Objectively, the system may possess a number of clear attributes. Handheld calculators are usually highly reliable in operation, for example. However, the perception of this attribute by the user is minimal, if perceived at all. Other factors may influence the degree of a user's perceptions, such as the user's level of involvement. For example, some people using the calculator may have little at stake in its use and likely do not give much thought to the device's attributes. Usage of the device depends less on the perceptual factors and more on environmental factors (e.g., the calculator is used because "it is there").

Proposition 8: The absence of both inhibitors and enablers will result in the usage/rejection decision being predicated on factors beyond perception (e.g., environmental variables).

Discovering inhibitors, their effects and future research

Pertinent Prior Research: I have discussed inhibitors to technology usage in general terms with some examples cited to illustrate what these unique perceptions are and how they act. Specific identification of the perceptions of system attributes that solely discourage use must rely on further empirical research to discover both uniquely negative usage perceptions and their unique effects on use. However, there are precedents in the literature that suggest possible design and functionality inhibitors. Earlier, I mentioned the presence of system-based interruptions as an inhibitor (Speier et al., 2003). Users will likely frown upon systems that intrude on their cognitive demands and diminish task effectiveness, even if such intrusions have a positive intent. For example, Microsoft Word™ was derided (Luening, 2001) for the use of cartoon characters that attempted to help users write letters. It is unlikely that people would be more willing to use the application because an animated paperclip was absent.

Venkatesh and Brown (2001) identified specific facets of technology that served solely to discourage but not encourage PC adoption, such as high cost and rapid change. As they note (p. 92) “...*high cost coupled with the rapid change in technology results in a cost-to-useful life ratio that is possibly unacceptable to many consumers. However, if the cost were lower and the perceived useful life higher, cost and/or obsolescence may not be significant factors.*” In other words, if a system is perceived to possess volatile design characteristics, rejection is likely. However, the absence of volatility (design stability) is not psychologically meaningful.

Gatignion and Robertson (1989) found that secrecy was a predictor of technology rejection, but the lack of secrecy did not predict adoption. Although this was at the organizational level of adoption, the individual level may share an analogous factor similar to the usage barrier of inadequate documentation proposed by Mathieson et al. (2001).

More inhibitors come to light when considering the service quality perspective of systems. Research into general service paradigms has found that certain service dimensions act only to dissatisfy and not satisfy, such as transaction failure (d'Astous, 2000; Johnston, 1995; Meuter et al., 2000; Mittal et al., 1998) (e.g., a book is selected, ordered, and paid for without incident). A successful e-Business transaction is taken for granted, and not conducive to satisfaction, but a failed transaction will certainly dissatisfy.

Future Research Directions: There are exciting avenues for empirical research to both identify inhibitors and support their effects. There is a primary need to uncover uniquely negative usage phenomena. Exploratory techniques such as critical incident analysis (Bitner et al., 1994; Flanagan, 1954) may be useful in this discovery phase. However, the semantic nature of such concepts is a challenge. We need to identify the types of “trauma” concepts applicable to usage. The incorporation of semantics and linguistics may help elucidate the conceptually unique factors beyond the enablers that we have already identified in prior usage research. Researchers must pay careful attention to

assure content validity. That is, in order to be able to defend that the identified usage factors are in fact conceptually unique, they will need to stand apart from all other possible positively-oriented beliefs. In addition to semantic analysis, variance-based approaches would also be useful, allowing both exploratory and confirmatory factor analysis. The goal of this approach would be to support that, in aggregate, perceptions of inhibitors are indeed separate from perceptions of enablers. This would require studies that gather data regarding how users perceive a system (or multiple systems) based on a content-valid set of both enablers and inhibitors. Additional variance analysis (e.g., multiple regression) could be used to support that inhibitors not only are conceptually distinct from enablers, but that they also predict *additional* variance in usage above and beyond that of enablers. Studies could be done in any number of contexts. A variety of contexts would help to identify “persistent” inhibitors, perceptions that discourage use in a wide variety of use settings.

Discovery and empirical testing of inhibitors are amenable to qualitative, experimental, and field survey approaches. Venkatesh and Brown (2001) demonstrated the value of qualitative analysis for uncovering a set of unique usage barriers. Experimental designs would be beneficial in isolating the direct nature and effects of specific inhibitors. The research conducted by Speier and colleagues (1999, 2003) is an excellent example of such lab-based approaches. Their research isolated the effect of system-based interruptions, which I have noted as a possible usage inhibitor. An interesting question may be whether certain inhibitors are beneficial in some ways but still act to dissuade usage. For example, some Web sites incorporate online mechanisms to “chat live” with customers visiting the site. These mechanisms are designed to foster a rapport with the customer, but may also dissuade use by being perceived as intrusive. The specific effect is best investigated in an experimental setting. Finally, field survey techniques would be useful to further explore the richness and variety of potential usage inhibitors as well as to compare their effects on attitudes, usage, and enablers. This would allow the isolation of key variables (such as intrusiveness) and determine the overall structural causes and effects of inhibitors and enablers.

Discussion

This paper proposed a theory that beliefs about a system’s design and functionality exist that act solely to discourage, but not encourage, the use of those systems. I posited three arguments to support the existence and effects of these beliefs. The first argument was that inhibitor perceptions are more than the opposite of the vast array of enabling perceptions of system attributes found in other usage paradigms. Second, as perceptions that are uniquely a barrier to use, inhibiting beliefs are independent and can coexist with enabling perceptions. Third, inhibiting perceptions can be further distinguished from enabling perceptions by having differing antecedent and consequent effects. The core purpose of this paper and the proposed theory was to support the position that the barriers to the use of technology are in many cases *qualitatively different* from the extensively studied positive features. As a result, the extensive technology adoption literature may well have overlooked important and unidentified perceptions not previously considered, at least not from a holistic and theoretical perspective. Further, these additional perceptions may be more powerful than enablers in the usage decision, they may play a role in biasing other perceptions a user may have, and may ultimately push a user toward outright system rejection.

Contextual considerations

As a usage phenomenon, inhibitors will vary across time and context. Norms and expectations will play a key role in identifying inhibitors. For example, if a person uses a multitude of systems and perceives them to be constantly changing in design (the aforementioned inhibitor of rapid change), once that user encounters a system that is stable, he will judge it relative to the norm of volatility. Rapid change becomes not an inhibitor but an expectation, and lack of volatility becomes a perceived positive feature rather than taken for granted. At the same time, what is key to inhibitor theory is that the presence of a given negative characteristic is more informative than its absence. Even in cases where certain objectively negative attributes are considered normative, the presence of these inhibitors may still discourage use. As Ybarra (2002) notes, norms may make little difference in the interpretation of negative behaviors.

I presented the proposed theory on the existence and effects of inhibitors in a general usage context and pertinent to adoption or continued use. In empirical applications of the theory, it will be essential to determine the specific context as to whether it pertains to user beliefs and attitudes toward general technology usage or a specific application. Furthermore, with respect to specific applications, certain inhibitors -- or enablers for that matter -- may not be relevant. This variation in perception can also apply to the context of initial or continued use. That a particular system is constantly changing in design is likely to be noticed through continued, and not initial, use.

Additional boundary conditions are plausible given the wide number of external variables that impinge upon the usage decision (Venkatesh, 2000; Venkatesh and Davis, 2000; Venkatesh et al., 2003). Any number of factors outside of the actual system attributes considered here may possibly follow the dual-factor model. The study of distrust and its distinct effects on Web site purchases (McKnight et al., 2003) is one such example. Again, I have chosen to focus on system attributes in the interests of more closely focusing on a key IS artifact, system attribute perceptions. Such an approach may invigorate a research stream that has been proposed to be explored to its practical limits (Venkatesh et al., 2003). That said, the arguments presented here might become a basis for exploring a wider variety of external beliefs regarding system adoption.

Managerial implications

This proposed theory has several potential practical benefits. First, the identification of inhibitors -- qualitatively different perceptions from enablers -- ensures *additional* leverage points for technology providers to be aware of and ones that they can address (Taylor and Todd, 1995; Wixom and Todd, 2003). As the introductory quote by Jared Spool makes clear, systems are designed to succeed and be used. No company designs a system with purposeful barriers to use in mind. Yet clearly something does happen to interfere with the usage process. There are arguably technology design and functionality facets that act only to interfere with use. Technology designers would be well advised to guard against interruptions, inadequate documentation, redundant efforts, or other inhibiting aspects just as they should assure that the system is reliable and responds quickly. Whether the result of accident or inattention, inhibitors are not predetermined and can be avoided through prudent management techniques.

As proposed, much positive work can be for naught in the presence of a poorly designed (and perceived) technology feature. A single negative feature may outweigh all of the other positive features that a technology has to offer. In fact, it may be a better and

cheaper investment to avoid the design and functionality pitfalls described by the inhibitors than to try to meet each and every positive attribute.

Theoretical Implications

The theory of technology usage inhibitors expands the paradigm of how we think about system adoption. It is just as important to consider the barriers to use as those factors that facilitate it. Further, it is important to consider the *asymmetrical* effects of perceptions on usage. Such a perspective may well be applicable to domains other than adoption. Other consequences of interest should consider negative as well as positive influences to fully explore antecedent phenomena. In other words, taking a purely positive antecedent approach may leave important facets undiscovered.

Conclusion

This paper introduces and clarifies the concept of the inhibitors of usage. Inhibitors are the perceptions that users have about a system that discourage them from adopting technology that, if absent, do not encourage adoption. These inhibitors deserve independent investigation on the basis that they are fundamentally different in nature and effects from previously established positively oriented perceptions within the technology acceptance and user satisfaction literature. Further, these beliefs are posited to negatively influence *other beliefs* a user has about the system. The examination of use inhibitors can add to our understanding of why people decide to accept or reject technology. In the presence of an inhibitor such as intrusiveness, rapid change or others that are left to be explored, the old adage "one bad apple spoils the whole bunch" may well apply.

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