Exploring the Long Shadow of IT Innovation Adoption Decisions on IT Value

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Résumé :

Un nombre de recherches considérables a déjà été mené en vue de comprendre la valeur des innovations des technologies d'information (TI). Toutefois, la majorité de la recherche existante a étudié cette valeur surtout au stade ex post, indépendamment des conditions ex ante qui facilitent l'adoption de telles innovations. Cet article suggère que les conditions et décisions d'adoption passées laissent une emprunte durable sur la présente évaluation de valeur. Nous développons un modèle conceptuel reliant la valeur des innovations des TI aux motivations à l'origine de l'adoption. La thèse principale suggère que les conditions initiales existantes au stade de l'adoption d'une innovation des TI (ex ante) permettent de comprendre l'accent qui doit être mis sur les différents aspects de la valeur réalisée (ex post). Plus précisément, nous développons une typologie de quatre types de motivation d'adoption qui résultent de la combinaison de deux paramètres d'incertitude dans l'environnement. Ensuite, nous développons des propositions reliant chaque type d'adoption aux différents éléments de valeur des innovations des TI. Cet article permet d'étendre l'état de la recherche sur la valeur des TI (« IT value ») en fournissant une explication de la valeur des innovations TI qui s'aligne sur les motivations premières de l'adoption. De plus, il offre une façon de rassembler deux courants de recherche qui jusqu'ici ont été traités séparément : celui de l'adoption des TI, d'une part, et celui de la valeur des TI, d'autre part.

Mots clés :

innovations des technologies de l'information (TI); valeur des TI; adoption des TI; incertitude dans l'environnement; la théorie des coûts de transaction; la théorie institutionnelle.

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Abstract

Much research has been conducted to understand the value of IT innovations. However, research has examined such value primarily at the ex post stage, independently of the ex ante conditions that lead to adopting such innovations. This paper argues that there is a long shadow cast by past adoption conditions and decisions over the present assessment of value. We develop a conceptual framework that ties IT innovation value to the original motives underlying the adoption. The main premise is that the initial conditions that exist at the adoption stage (ex ante) can be used to understand the emphasis that should be placed on the different types of realized IT innovation value (ex post). Specifically, we develop a typology of four motivational forms of adoption that result from combining two dimensions of environmental uncertainty. We then develop propositions that relate each form of adoption to different components of IT innovation value. This paper extends the extant IT value literature by providing an account of IT innovation value that is consistent with the original motives of adoption. It also provides one way to integrate between the IT adoption and IT value streams, which hitherto have been treated separately.

Keywords:

IT innovations; IT value; IT adoption; environmental uncertainty; transaction cost theory; institutional theory.

1. Introduction

Firms invest substantial financial resources in information technology (IT) with the hope of stimulating innovations. An important stream of information systems (IS) [1] research is directed at examining the value realized from IT innovation adoption and implementation (also referred to as the value of adopting IT innovations, or simply IT value). Indeed, IT value research has dominated, and continues to dominate the field (Gable, Sedera, & Taizan Chan, 2008; Nevo & Wade, 2010). Since the early work of DeLone and McLean (1992), a key issue that continues to challenge IS researchers is to identify appropriate aspects of IT value and link them to relevant individual, technological, and organizational characteristics (Seddon, Graeser, & Willcocks, 2002).

In general, IT value research evaluates IS implementations using two different, yet complementary, broad categories that focus on efficiency-oriented and legitimacy-oriented aspects of value. The *efficiency-oriented* focus assesses value in terms of the way IT reduces costs, increases productivity, enhances quality (e.g., product quality), and maximizes technical or economic performance (Banker, Bardhan, Chang, et al., 2006; Fichman, 2004; Helfrich, Weiner, McKinney, et al., 2007; Klein, Conn, & Sorra, 2001; Premkumar, Ramamurthy, & Nilakanta, 1994; Rogers, 2003; Seddon, Graeser, & Willcocks, 2002; Venkatraman & Zaheer, 1990). While some of these measures may exhibit tensions with one another (e.g., productivity vs. quality goals), they all reflect economic aspects of value that are aimed at improving firm performance. Much of the IT value research employs the efficiency-oriented focus, albeit with mixed empirical results (e.g., Altinkemer, Ozcelik, & Ozdemir, 2011; Banker, Bardhan, Chang, et al., 2006; González-Benito, 2007). This has been attributed in part to the lack of attention given to broader social aspects of IT value (e.g., Ataay, 2006; Luneborg & Nielson, 2003; Palmer & Markus, 2000). The *legitimacy-oriented* focus emphasizes measures that capture the notion of becoming better accepted in the social environment (more legitimate) and achieving social benefits, such as enhanced reputation, better image, and increased media coverage (Avgerou, 2000; Mignerat & Rivard, 2009; Son & Benbasat, 2007; Teo, Wei, & Benbasat, 2003; Tingling & Parent, 2004).

Considering that implementing IT innovations involves multiple stakeholders (e.g., clients; employees; managers; associations; regulations bodies), evaluating IT innovation success requires a broader perspective that includes both the economic (efficiency-based) and social (legitimacy-based) benefits that can be realized from IT adoption and implementation. An important – yet largely unexplored – question that follows the simultaneous inclusion of the efficiency- and legitimacy-oriented foci of value is the relative importance of each type in assessing the realized benefits. As the key research question of this study, we argue that it would be theoretically and practically important to understand *when to put more emphasis on efficiency-oriented aspects of IT value versus legitimacy-oriented ones and vice versa*. This question is also critical because changing the emphasis one puts on either dimension of IT value throughout the innovation lifecycle (i.e. from initial adoption, to implementation, to evaluation of realized benefits) (Cooper & Zmud, 1990) can significantly alter the IT evaluation results. Answering this question can help organizations develop a clearer understanding of their realized benefits from

[1] IT and IS are used interchangeably in this manuscript

the IT innovations, and whether these are consistent with the expected benefits at the adoption stage.

In this paper, we review the literature on IT innovation value, and we show that IS research does not provide satisfactory answers to this question. In particular, our review of the literature leads to two general conclusions that justify this study. First, existing IT value research has rarely examined both aspects of value together. Also, the few studies that include both aspects do not identify what determines the relative importance of each element. Indeed, there have been calls for including the two aspects of IT value (Kohli & Grover, 2008; Son & Benbasat, 2007). However, with few exceptions (e.g., Lin, Huang, & Burn, 2007; Venkatesh & Bala, 2012), extant research has not examined the two complementary aspects together.

Second, most extant studies examine IT innovation value only after the innovation has been implemented (ex post). This ex post value is disconnected from the potential value that had been identified at the adoption stage (ex ante). Stated differently, regardless of the initial intent, the literature largely employs efficiency-based measures to evaluate IT post-implementation success. This disconnect between *ex ante* value and *ex post* value is important to address, in order to estimate more accurately the relative importance of each value type. In other words, our understanding of the extent to which the achieved benefits are efficiency-based or legitimacy-based (or both) is improved when we view these benefits in light of the initial conditions that shaped and motivated the adoption of the IT innovation[2].

To explore these two issues, we adopt a temporal approach that considers IT value both at the adoption stage (ex ante) and the post-implementation stage (ex post). This approach is consistent with IT innovation literature that stresses the importance of considering the environmental factors at the adoption stage that may have shaped the subsequent IT value outcomes (e.g., Nicolaou, 2004; Palmer & Markus, 2000; Poston & Grabski, 2001). As Tingling and Parent (2004) argue, "understanding how organizations complete initial evaluation and acquisition of technology is important not just in its own right but also because the past can cast a long shadow on the future: how and why a particular technology was selected and evaluated in the past can have ongoing implications as to how it is used and understood in the present".

Failing to include the ex ante context in determining the relative importance of realized IT innovation benefits may result in at least three problems. First, it can lead to an erroneous assessment of value. For example, a proprietary EDI (Electronic Data Interchange) application that reduces transaction costs among exchange partners may be evaluated as having high value. However, the initial adoption may have been driven by a need to expand the alliance network, which may have been perhaps better served by adopting a more open XML system. Second, other aspects of value can be overlooked. For example, a firm adopting a CRM system may have been motivated by a desire to enhance its reputation among customers. Forgetting about that ex ante

[2] We assume that the organizational decision to adopt a certain IT innovation is always motivated. Sometimes, this motivation can be a result of rational decision-making. Other times, it may be result from conforming to external pressures in the environment, such as in the case of mimicking. In other words, we assume that there is always a role for human agency in adopting an IT innovation, but that such decisions may be motivated by rational or institutional pressures (cf. Oliver 1991).

context when evaluating the innovation ex post may prevent capturing several benefits that may not directly show up in quantitative performance reports (Hitt, Wu et al. 2002), especially in the short-run. Finally, examining value independently of the ex ante context leads to failure in taking into account the various stakeholders both within the company (internally) and within the institutional environment (externally) (Palvia, Sharma et al. 2001).

We extend the IT innovation literature by including environmental uncertainties as an important ex ante factor that shapes the way by which decision makers adopt an IT innovation (form of adoption), and the subsequent realized value. More specifically, our temporal approach – illustrated in Figure 1 – posits that environmental uncertainties existing at the adoption stage (t_0) motivate different forms of adoption that seek IT value benefits that are efficiency-oriented, legitimacy-oriented, or both. In short, this paper develops a conceptual framework to better understand IT innovation value by tracing between the ex ante context that motivates specific adoption forms expecting and thereby seeking particular value benefits, and the ex post value realization. To develop this connection, we draw upon organization theory literature, which considers how different forms of innovation adoption are driven by existing environmental uncertainties (Martinez & Dacin, 1999). More specifically, this literature suggests that different combinations of the degree of ambiguity surrounding the costs/ benefits of the innovation and the immediacy of concern for organizational survival motivate four different forms of adoption (Martinez & Dacin, 1999). Building upon this typology, we develop propositions stating that the relative emphasis decision makers put on each type of IT value is determined by the form of adoption. It is to be noted that our temporal model traces the realized IT value (ex post) back to the expected IT value (ex ante) by examining the initial conditions shaping the ex ante adoption. However, the model does not examine the causal mechanisms by which a given type of adoption leads to realized value.

The contributions of this paper are twofold. First, our temporal approach allows us to trace the ex post IT value types back to the ex ante context of the innovation adoption, thereby improving evaluation accuracy (e.g., by avoiding erroneous evaluations; accounting for multiple stakeholder perspectives that motivated the initial adoption; etc.), and potentially alleviating the mixed empirical results. Second, by explicitly considering the ex ante conditions when evaluating value, our approach allows us to look beyond the myopic efficiency motives that have been automatically assumed to underlie IT innovation projects (cf. Teo, Wei, & Benbasat, 2003). Specifically, we present different forms of adoption that are motivated by different initial environmental uncertainties, and we propose that each form puts more emphasis on certain types of value than on others.

The paper is structured as follows. The next section reviews the literature on IT innovation value to understand how value has been assessed and explained, and to highlight gaps in the literature. Building upon the review, we then introduce two environmental uncertainties that are dominant at the adoption stage, and that shape IT innovation adoption and IT value outcomes. We then develop four motivational forms of IT innovations adoption that result from combinations in the levels of the two environmental conditions. This typology is then used to guide our propositions, which tie each motivational form of adoption to different aspects of IT innovation value. The paper concludes with a discussion of the merits of this temporal approach and implications for future research.

2. Review of the IT Innovation Value Literature

Following Rogers (2003), we define IT innovation as an information technology-related idea, practice, or object that is perceived as new within the organization involved. Adoption is defined as the decision to accept, invest in, or introduce, an information technology innovation in the organization (Rogers, 2003). This decision is made by decision-making units (individuals or groups; henceforth labeled decision-makers) acting on behalf of the organization. The paper also examines the notion of IT value, which is the realized value at the organizational level during the post-implementation stage. In post-implementation, the system is routinized and embedded into the organization's working processes and operations.

We frame our literature review within the model of IT implementation proposed by Cooper and Zmud (1990), where the domain of IT implementation is conceptualized as comprising two stages: (1) adoption, in which "rational and political negotiations" are followed to get the IT innovation implemented; and (2) infusion, in which increased organizational benefits are sought during the post-implementation. Figure 1 depicts these two temporal stages, which we refer to as t_0 and t_n. The Figure also illustrates the conditions existing at the adoption stage that influence adoption, and the types of value realized at the post-implementation stage.

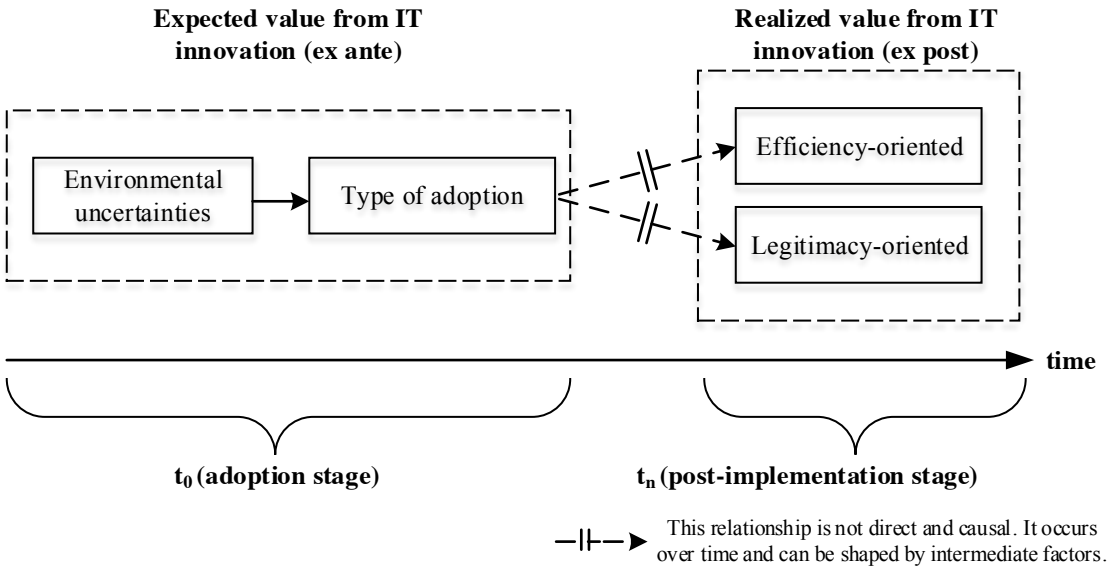

Figure 1 –A temporal approach to IT innovation value

2.1. Literature review methodology

The review covered the past 11 years (2004-2014) and was backward looking and forward looking (Webster & Watson, 2002). Articles were selected from the AIS Senior Scholars' Basket of Six Journals (MISQ; ISR; JMIS; JAIS; EJIS; ISJ), and we added articles from SIM since we believed it published relevant articles on the topic. We targeted the full text of the articles from these journals based on the following keyword search: "information technology" AND adoption AND (methodology or method) AND (impact OR value) AND ("organizational performance" OR "firm performance"). To qualify for inclusion, articles had to be theory-driven, empirical studies (e.g., surveys; case studies; experiments) at the organizational level of analysis. Also, the IT value outcome had to play a central role in the study. Since our object of evaluation is IT innovations, we also excluded studies that do not explicitly focus on adopting a new IT-based idea, practice, or object (e.g., studies on firm-level IT investments; studies on IT capability).

Following the initial search, each article abstract was scrutinized to ensure that the presence of the keywords was not cursory and that our inclusion/ exclusion criteria were satisfied. The resulting articles were then analyzed in their entirety, and a snowballing technique was used to further identify important studies from other publications (Webster & Watson, 2002). The final list – summarized in Appendix 1 – includes 50 articles used as the basis of this investigation.

The review revealed that there are two broad types of value corresponding to two different theoretical perspectives in IT innovation research. The first type, which we refer to as the *efficiency-oriented* type, is mostly salient in rationalist-economic theories of IT innovations (e.g., transaction cost theory). By rationalist-economic, we mean that the emphasis is put on technical rationality including economic factors such as productivity (in contrast to legitimacy). In other words, such naming does not imply being irrational when acting upon institutional motives. Instead, it means that the rationality in such a case is not based on technical, economic rationality. The efficiency type assesses value in terms of internally focused economic aspects such as cost reduction, productivity improvement, enhanced quality (e.g., product quality), and improved technical or economic performance (e.g., Banker, Bardhan, Chang, et al., 2006; Oh & Pinsonneault, 2007; Palmer & Markus, 2000). The second type, which we refer to as the *legitimacy-oriented* type, is discussed most frequently in IT innovation studies that adopt institutional theory. This type recognizes that some adoptions are motivated by achieving legitimacy benefits, such as becoming better accepted in the social environment, enhanced reputation, better image, and increased media coverage (Avgerou, 2000; Mignerat & Rivard, 2009; Son & Benbasat, 2007; Teo, Wei, & Benbasat, 2003; Tingling & Parent, 2004).

Appendix 1 groups the empirical studies with respect to the type of IT value that is examined: efficiency-oriented (Appendix 1a), legitimacy-oriented (Appendix 1b), or both (Appendix 1c). Within each group, the studies are summarized by the IT innovation adopted, specific measures of value, methodology, main findings, whether value was assessed ex ante (before the adoption/ implementation) and/ or ex post (after the adoption/ implementation), and the environmental uncertainties surrounding the adoption (if any were explicated in the paper).

2.2. Literature review results

Three broad observations can be made about the prior IT innovation value literature. First, most research focuses on a single type of value (especially the efficiency-oriented type), and even studies that include both types do not identify what determines the relative emphasis placed on each. By far, most prior IT innovation value research falls in the rationalist-economic stream that assesses value in terms of the efficiency-oriented type (see Appendix 1a). These studies focus on various efficiency-based measures of value such as productivity (e.g., Ataay, 2006; Davamanirajan, Kauffman, Kriebel, et al., 2006; Menon, Yaylacicegi, & Cezar, 2009), cost / time efficiencies (e.g., Banker, Bardhan, Chang, et al., 2006; Braganza, Hackney, & Tanudjojo, 2009; González-Benito, 2007), quality improvements (e.g., Bardhan, Whitaker, & Mithas, 2006; Braganza, Hackney, & Tanudjojo, 2009; González-Benito, 2007), financial performance (e.g., Habjan, Andriopoulos, & Gotsi, 2014; Oh & Pinsonneault, 2007; Piccoli & Lui, 2013), and stock market returns (e.g., Dehning, Richardson, Urbaczewski, et al., 2004; Duan, Grover, & Balakrishnan, 2009; Filbeck, Swinarski, & Zhao, 2013), among others.

The empirical results in this group linking IT innovation adoption to value show a clear pattern of mixed results both within the individual studies and across studies (see Appendix 1a). To account for these mixed results, some authors point out, a posteriori, the need to consider the legitimacy oriented type, which is comprised of less tangible, socially derived measures of value (e.g., Ataay, 2006; Luneborg & Nielson, 2003), such as reputation (Lee, Phan, & Chan, 2005), and becoming more legitimate in the eyes of stakeholders (Duliba, Kauffman, & Lucas, 2001). In one study that finds mixed effects of adopting IT specialty retail innovations on efficiency-based performance, the authors observe that the respondents were members of a consortium, and that many waited until the technology was widely diffused before adopting (Palmer & Markus, 2000). They add that "adoption of [quick response innovations] is influenced by several factors, including level of current IT sophistication and supplier relationships" (p. 256).

In contrast to the abundance of efficiency-oriented research, only two studies focus on the legitimacy type of IT value (see Appendix 1b). Heikkilä (2013) finds that the adoption of e-HRM systems by Chinese subsidiaries allows them to gain local legitimacy and increase the acceptance and use of the systems by Western host country nationals. In another study of B2C e-commerce adoption, Otim and Grover (2006) discover that customer loyalty is enhanced by some features of the system but not by others. While the dependent variable of customer loyalty can be considered as legitimacy-oriented performance, it is assessed via an efficiency-oriented measure (repeat purchase intentions).

As shown in Appendix 1c, only a few studies consider both types of value. However, these studies do not identify what determines the relative emphasis put on each type. For example, Lin et al. (2007) lump both types in a single scale, thereby implicitly assuming that they have equal importance (which may also explain their mixed results). Other researchers find positive impacts of IT innovation adoption on efficiency- and legitimacy-oriented measures of performance (Bandara & Rosemann 2005; Venkatesh & Bala 2012). While the two types are assessed separately, they are also assumed to be pursued with equal priority. Silva and Hirschheim (2007) show that while the Latin American government organization pursued both goals, legitimacy-oriented value have a higher relative importance than the efficiency-oriented type. Similarly, Wang (2010) study of fashion IT innovations finds that the impacts on both types of value are unequal over time.

The second observation we can draw from the literature is that most studies in the Appendix examine IT innovation value only after the innovation has been implemented (ex post). The problem with this approach is that the measured value may be disconnected from the potential value that is identified at the adoption stage (ex ante). Since decision makers may have different goals or preferences when they initially decide to adopt an IT innovation, this may lead to a mismatch between ex ante and ex post value (Kohli & Grover, 2008). Indeed, several researchers discuss the importance of examining IT value both ex ante and ex post (Gable, Sedera, & Taizan Chan, 2008; Kohli & Grover, 2008; Lin, Huang, & Burn, 2007). Tingling and Parent (2004) suggest that "understanding how organizations perceive the benefits and issues of a particular technology prior to acquisition can provide context and insight into subsequent evaluation or description of the technology" (p. 331).

While most studies in Appendix 1 focus only on the ex post stage, some examine the ex ante stage. These are mostly contributions using the event study methodology to test the effects of announcing investments in IT innovations on stock market returns, which is an index of the expected future value of the innovations (Dehning, Richardson, Urbaczewski, et al., 2004; Duan, Grover, & Balakrishnan, 2009; Filbeck, Swinarski, & Zhao, 2013; Sam Otim & Grover, 2012; Ranganathan & Brown, 2006; Yang, Lim, Oh, et al., 2012). A case study by Baars et al. (2009) conceptualizes three aspects of the ex ante valuation of RFID innovations: identification, forecasting, and assessment of the expected benefits.

Only a few papers – mostly case studies – examine jointly the ex ante and ex post aspects of IT innovation value (Chan, Hackney, Pan, et al., 2011; Cotteleer & Bendoly, 2006; Silva & Hirschheim, 2007; Thiesse, Al-Kassab, & Fleisch, 2009). For example, in a study of a US computer peripheral producer, Cotteleer and Bendoly (2006) investigate the value of ERP adoption both ex ante and ex post. Ex ante, the company had been focused on order lead-time improvement. Data on sales order lead-time were collected from all operating regions before and after the ERP adoption. The value realized ex post from the IT innovation was thus consistent with the ex ante expected benefits. By contrast, Silva and Hirschheim (2007) demonstrate that when there is a mismatch between ex ante and ex post valuation, this can lead to failure to derive value from the innovation. More specifically, their case study of a health IS implementation at a Latin American government organization shows that ex ante, the system had been implemented to enhance legitimacy of the health ministry vis-à-vis the voters before the elections, and to a lesser extent, to improve efficiency (via cost reductions). However, these benefits were not realized ex post, because a new government was elected, which did not share the same views about the ex ante benefits. Consequently, the system was abandoned.

The third observation relates to the fact that while the uncertainty surrounding decisions to adopt IT innovation seems to be an important factor influencing the decision process and outcomes, it is rarely examined in the studies summarized in Appendix 1 (see last column). Instead, most IT value studies consider relative stable conditions in the environment, such as industry type (Banker, Bardhan, Chang, et al., 2006), service climate (Ray, Muhanna, & Barney, 2005), global scope (Zhu, Kraemer, & Dedrick, 2004), and the regulatory environment (Zhu & Kraemer, 2005; Zhu, Kraemer, & Dedrick, 2004).

Only a few studies identify some environmental uncertainties that exist at the adoption stage. Some of these uncertainties are technological uncertainties, such as ambiguity of the innovation's costs/ benefits (Baars, Gille, & Strüker, 2009; Heikkilä, 2013; Venkatesh & Bala, 2012; Yang, Lim, Oh, et al., 2012), implementation climate (Filbeck, Swinarski, & Zhao, 2013; Osei-Bryson, Dong, & Ngwenyama, 2008), security concerns (Zhu, Dong, Xu, et al., 2006), and changes in product design and specifications (Mishra, Konana, & Barua, 2007). Others are market uncertainties, such as the concern for organizational survival (Silva & Hirschheim, 2007), volume requirements (Mishra, Konana, & Barua, 2007), market fluctuations (Saint-Léger 2004), and environmental complexity and hostility (Sila, 2010). What is missing in these studies, however, is an explicit investigation of how these environmental uncertainties influence the adoption decision and the subsequent value that is realized from the IT innovation

In summary, our review of the literature highlights important gaps that need to be addressed to better explain IT innovation value. First, there is a need to expand the notion of IT innovation value and consider its multidimensional nature, and the relative importance of each type. Second, it is important to consider both ex ante and post value and the consistency between the two. Third, we need to take into account the environmental uncertainties that shape the IT innovation adoption and its consequences on value. Failure to address these gaps can lead to providing a partial account of the value realized from the IT innovation adoption, an erroneous assessment of value, and/or a failure to take into account the various institutional dynamics. In the following section, we develop a conceptual framework that explains the types of IT innovation value while taking these considerations into account.

3. A Framework for Examining the Value Derived from IT Innovation Adoption

3.1. Integrating the efficiency-oriented and legitimacy-oriented types

Based on insights from the review, we develop a framework that links IT innovation adoption to the multiple types of value (efficiency and legitimacy). These two types are associated with two different theoretical approaches that explain organizational actions. The efficiency type of value is characteristic of transaction cost economics (TCE) that considers "technical rationality" as the main factor underlying action, and which emphasizes the efficiency of the transaction as the key imperative for decision making (Williamson, 1981, 1985, 1991, 1995). Applied to IT innovation adoption, TCE focuses on maximizing efficiency by identifying and calculating the transaction costs and benefits of the adoption (Son & Benbasat, 2007). Organizations adopt an IT innovation to minimize costs associated with this exchange between the organization and external vendor. If the adoption increases the organization's efficiency and effectiveness, the transaction relationship (i.e., adopting the innovation) might be conducted at the market level with price mechanism governing the adoption transaction. The organization's decision to adopt, internally develop, or not to adopt an IT innovation will be determined by the governance mechanism that minimizes the transaction costs, and thus maximizes organizational

efficiency (Martinez & Dacin, 1999). The transaction costs (and benefits) include visible costs such as those associated with technological and IT human resources, and less visible costs such as those associated with customizing the IT innovation and its vendor monitoring expenses. In addition, Williamson suggests that as uncertainty and frequency of transaction increase, the monitoring costs of the transaction are minimized by internalizing the transaction (e.g., internal development of the application, or not adopting the IT application and maintaining the existing tools and processes). In summary, according to TCE, the only systematic factor underlying organizational change (e.g., IT adoption) is efficiency in minimizing transaction costs (Martinez & Dacin, 1999). While TCE provides an economic account of organizational actions (including IT adoption), it may not provide a complete view of the motivations behind organizational actions (Martinez & Dacin, 1999). There are several other factors such as government regulations, norms developed among similar companies and stakeholders, and belief systems that are ignored in TCE when overemphasizing technical rationality of the action.

In contrast, the institutional theory perspective suggests that our understanding of IT innovation adoption can be enhanced by examining the institutional context in which organizations exist, which leads them to seek one or more forms of legitimacy (e.g., pragmatic, moral, or cognitive, cf. Suchman, 1995). Briefly, societal expectations of appropriate organizational form and action become a normative rule in societal thought and action. Various normative, mimetic, and coercive forces, lead organizations to act toward increasing the fit with organization's normative context (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). Such a movement toward conformity may result in inefficient organizational structure and action, as institutional theorists point out. According to the institutional view, IT adoption may occur "as the result of processes that make organizations more similar without necessarily making them more efficient" (DiMaggio & Powell, 1983, p. 147). The pressures to adopt may typically arise from a number of sources. First, *coercive* pressures to adopt an IT innovation may arise through societal, governmental, or other pressures. For instance Davidson and Chismar (2007) studied how governmental and societal pressures (e.g., healthcare campaigns) influence a hospital's compliance to adopt an electronic health record system. Second, *normative* pressures stem from professionalization. For example, Swan et al. (1999) illustrated how technology suppliers and professional associations influence the adoption pattern, design, and success of computer-aided production management (CAPM) technologies in different countries. Third, *mimetic* pressures to adopt an IT innovation are experienced as organizations copy other successful organizations in their industry in an effort to reduce uncertainty. However, institutional theory has been criticized for taking an over-socialized approach to organizational action and neglecting important factors such as economic dynamics and agency of players to make change (Granovetter, 1985), although the latter has been somewhat addressed in some neo-institutional studies (e.g., W. Richard Scott, 2001).

Following prior research on innovation adoption (Martinez & Dacin, 1999; Roberts & Greenwood, 1997), we concur that there is room for integrating these two value types with their different underlying theoretical assumptions. Martinez and Dacin (1999) argue that TCE and institutional theory complement each other in explaining different organizational actions with different adoption motivations: "On the one hand, TCE theorists are unable to explain the success of organizational behavior that is rife with inefficiency. On the other hand, institutional theorists typically decouple efficiency considerations from social action (p. 76)". One way to integrate the

two perspectives is to move away from the deeply-held assumption of TCE that organizational decision makers are efficiency maximizing, toward a view that they are "efficiency seeking subject to cognitive constraints and institutional influences" (Roberts & Greenwood, 1997, p. 351). This requires relaxing some assumptions of TCE, such as by accepting that decision makers cannot always seek an optimal solution, especially when there are complex contingencies and uncertainties in their decision environment (Roberts & Greenwood, 1997). Additionally, organizations do not only operate in competitive environments, but also in institutional environments, which has strong implications for how innovations are adopted and their subsequent consequences of such adoption (Roberts & Greenwood, 1997). Equally important, some institutional theory assumptions need to be relaxed, especially by acknowledging more fully the role of human agency when decision makers adopt IT innovations, and that in some situations some of the institutional constraints can be eased, ignored, resisted, or even overcome (e.g., Oliver, 1991). Finally, efficiency is increasingly viewed as an institutional goal (Roberts & Greenwood, 1997), and legitimacy-seeking goals may become efficient in the long term, as the legitimate organizations develop better access to key resources (Fernández-Alles & Valle-Cabrera, 2006; W. Richard Scott, 2001). Hence, the two types are at the same conceptual level, which allows us to integrate them into a single framework.

In the following sections, we argue that the degree to which efficiency-oriented or legitimacy-oriented value (or both) drive IT innovation adoption depends on environmental factors that are present in the adoption environment.

3.2. Environmental uncertainties driving the IT innovation adoption

Our framework relates the two types of realized IT innovation value (ex post) to the decision makers' goals and preferences at the adoption stage (ex ante), taking into account the environmental uncertainties that exist at the adoption stage. Uncertainty arises when "a decision maker cannot reliably forecast future events based on the information he has in hand" (P. Anderson & Tushman, 2001, p. 683). Environmental uncertainty influences the organizational decisions and actions regarding the IT innovations (Bstieler, 2005; Mishra, Konana, & Barua, 2007). Two main types of environmental uncertainty about innovation adoption exist: technological uncertainty and market uncertainty (Pavlou & El Sawy, 2006). Technological uncertainty is related to a perceived lack of predictability about the best innovation to adopt (P. Anderson & Tushman, 2001). Among others, this requires being able to predict the costs and benefits that are associated with adopting a given innovation. Market uncertainty relates to the perceived lack of predictability about market conditions and the organization's competitive position (Bstieler, 2005).

Our framework is adapted from Martinez and Dacin (1999). These authors identify two environmental uncertainty factors that are salient during the adoption stage of an innovation. The first factor is the *ambiguity surrounding the costs/ benefits of the innovation* (high or low). It is a special type of technological uncertainty. The second factor is the *concern for the survival of the organization* (immediate or deferred), which is a special type of market uncertainty. While there

may be many other important factors, we select these two factors because they can demonstrate how the two value types (efficiency and legitimacy) can be pursued in isolation or together, and the relative emphasis put on each. This is because at the adoption stage (ex ante), the choice to pursue either value type (or a combination of the two) depends on the interplay between the two environmental factors (Martinez & Dacin, 1999). Moreover, since the two value types are emblematic of two different theoretical perspectives (TCE and institutional theory) that have different assumptions and approaches, the choice of these two environmental factors facilitates the integration of the two theoretical perspectives (Martinez & Dacin, 1999).

We introduce each environmental factor below, before showing how the combination of the levels of the two environmental uncertainties leads to different forms of adoption and different IT innovation value outcomes.

3.2.1. Ambiguity surrounding the costs/benefits of the innovation

This construct refers to the degree to which the costs (e.g., search costs; implementation costs; risks) and benefits (tangible and intangible) of adopting and implementing an IT innovation are straightforward versus obscure at the adoption stage (Martinez & Dacin, 1999). As previously suggested, it is a type of technological uncertainty existing in the adoption environment. This is because ambiguity regarding costs/ benefits directly impedes the organization's ability to predict which IT innovation is the best one to adopt (P. Anderson & Tushman, 2001). The ambiguity may come from various sources, such as the lack of availability of similar IT innovations from other vendors, ambiguities regarding differences in technical configurations of candidate IT solutions, obscurities about the claims and success/failure stories oft-told about the IT innovation, or unclearness regarding the innovation's contributions to business operations, and its technical integration with other existing applications. For instance, Benders et al (2006) argue that it is extremely difficult to conduct a reliable cost-benefit analysis for ERP adoption and there is high ambiguity and uncertainty about its exact effects on existing operations.

The degree of ambiguity surrounding the innovation's costs/ benefits can range from low to high (see Figure 2). When ambiguity is low, decision makers have a clear idea about the costs and benefits of different IT innovations available to them. This situation is typical in the rationalist-economic stream of the IT adoption literature, which posits that decision-makers follow a purposive, calculated plan that focuses on the well-defined technical parameters of the innovations and its adoption. In particular, the adoption environment in the rationalist-economic stream is characterized by low ambiguity, and the costs and benefits of the adoption are relatively straightforward to estimate (Serafeimidis & Smithson, 1999; Stockdale & Standing, 2006). For example, Malone et al. (1987) argued that organizations select their best IT-enabled governance structure (e.g., non-private B2B e-marketplaces vs. electronic data interchange) based on a succinct analysis of accurate, consistent, and timely information that is available to them. Decision makers may process such information from the external environment (e.g., availability of the two types of solutions by vendors) or internally by analyzing the product characteristics (the products' asset specificity and complexity) that could influence the adoption decision

(Malone, Yates, & Benjamin, 1987). Son and Benbasat (2007) empirically showed that such unambiguous information about the characteristics of the IT innovations indeed influenced the decision to adopt B2B marketplaces.

When ambiguity is high, decision makers are not able to clearly estimate the benefits and costs involved in adopting the IT innovation, and the decision is surrounded with obscurity. When adoption occurs under ambiguity, organizational actions are constrained by coercive, normative, and mimetic social forces (Avgerou, 2000; Mignerat & Rivard, 2009; Son & Benbasat, 2007; Teo, Wei, & Benbasat, 2003; Tingling & Parent, 2004). For example, Teo et al. (2003) found that the decision to adopt financial EDI was clouded with ambiguity, and that the increased difficulty of understanding the innovation and its use led to stronger pressures to adopt via imitating others. Indeed, a key argument in institutional theory is that the greater the uncertainty between means and ends, the greater the extent to which an organization will seek to enhance its legitimacy by mimicking others that are perceived to be similar and successful (DiMaggio & Powell, 1983). Such ambiguity can originate from sources in the institutional or technical environment. When organizations adopt an IT innovation mainly because of institutional forces (Teo, Wei, & Benbasat, 2003, p. e.g.,), they have less information and knowledge about the technical nuances of the IT innovation and the intended and unintended consequences resulting from its implementation. In addition, a system may be adopted for technical reasons but can still be associated with ambiguity that originates from adopting a very new technology where little is known about its consequences. In general, such technological uncertainties are argued to lead to isomorphism (Ang & Cummings, 1997).

3.2.2. Immediacy of concern for organizational survival

Survival is defined as the probability that an organization will continue to participate in its market environment (Shepherd, 1999). Following Martinez and Dacin (1999), we use the construct of immediacy of concern for organizational survival, which reflects the organization's perception of whether its survival orientation is immediate or deferred. This condition is an example of market uncertainty, and it exists at the adoption stage. Survival concern is salient in both dominant streams of the adoption literature, albeit at different levels.

When concerns for survival are deferred, decision makers do not perceive an imminent threat to their organization's existence. They can then engage in initiatives that may have limited impacts on short-term survivability but rather longer-term consequences on their economic performance. Such a situation is typical in the rationalist-economic stream of the IT adoption literature. In that stream, organizations are typically less concerned with short-term survival and more concerned with efficiency (profit maximization), which is a longer-term survivability goal (Jelinek, Ahearne, Mathieu, et al., 2006; Nicolaou, 2004; Poston & Grabski, 2001). For example, in a study of 50 companies that publicly adopted ERP, the authors noted that such initiatives have "lengthy project windows of 3 to 5 years" (Poston & Grabski, 2001, p. 273). Indeed, the authors found no short-term economic benefits of such adoptions and attributed that in part to the fact that the organizations needed to give their employees time to "co-invent through their own experimentation and discovery, to find ways for the new system to support their work" (p. 279).

By contrast, concerns for survival can be immediate, which is a typical case in the institutional stream of the IT adoption literature (Meyer & Rowan, 1977; Phang, Kankanhalli, & Ang, 2008; Tingling & Parent, 2004). By immediate survival concerns, it is meant that the organization perceives an imminent threat to its survivability, which induces it to adopt actions that enhance its likelihood to survive. Having a pressing need for survival is a fundamental driving force that impels organizations to seek legitimacy-enhancing initiatives (Carroll & Swaminathan, 2000; Hannan & Freeman, 1977). Immediate survival concerns thus became tightly interlinked with legitimacy (Tingling & Parent, 2004). When a firm – especially a less stable one such as a newly formed organization or one facing decline – is concerned with immediate survival, its adoption decisions are motivated by the need to conform to socially acceptable behaviors (i.e. gaining legitimacy) (Hannan & Freeman, 1977; Martinez & Dacin, 1999). Such legitimacy allows the organization to access critical resources and reach greater stability (Zimmermann & Zeitz, 2002). The immediate survival orientation thus drives such a firm to seek "iterative and ongoing relationships with other organizations" (Tingling & Parent, 2004, p. 332). For example, several studies in the institutional literature showed that hospitals that were in critical survival mode adopted electronic medical records in response to their institutional environment as a survival strategy (Chang, Hwang, Hung, et al., 2009; Kazley & Ozcan, 2007). Another study of child care service organizations facing a survival crisis in the 1970s and 1980s found that such organizations adopted practices that enhanced their ties with the institutional environment in order to continue to operate and receive support from parents and the community (Baum & Oliver, 1991). That study also showed empirically that young organizations were especially prone to such a survival mode due to "liabilities of newness" that increased their vulnerability to mortality (Baum & Oliver, 1991).

Combining these two environmental uncertainty conditions allows us to develop a typology of motivations for adopting IT innovation, and to subsequently link these to IT innovation value (see Figure 2).

3.3. Four motivational forms of IT innovation adoption

Figure 2 presents a 2x2 matrix that combines the end points of the level of the degree of ambiguity of the innovation's costs/ benefits (high or low) and the immediacy of concerns for organizational survival (immediate or deferred). This combination results in four motivational forms of adoption, with each form placing different emphasis on the types of value sought and realized from the IT innovation. Below, we discuss each form of adoption, present examples from the reviewed literature (see Figure 2), and develop propositions linking each form of adoption to ex ante and ex post IT value.

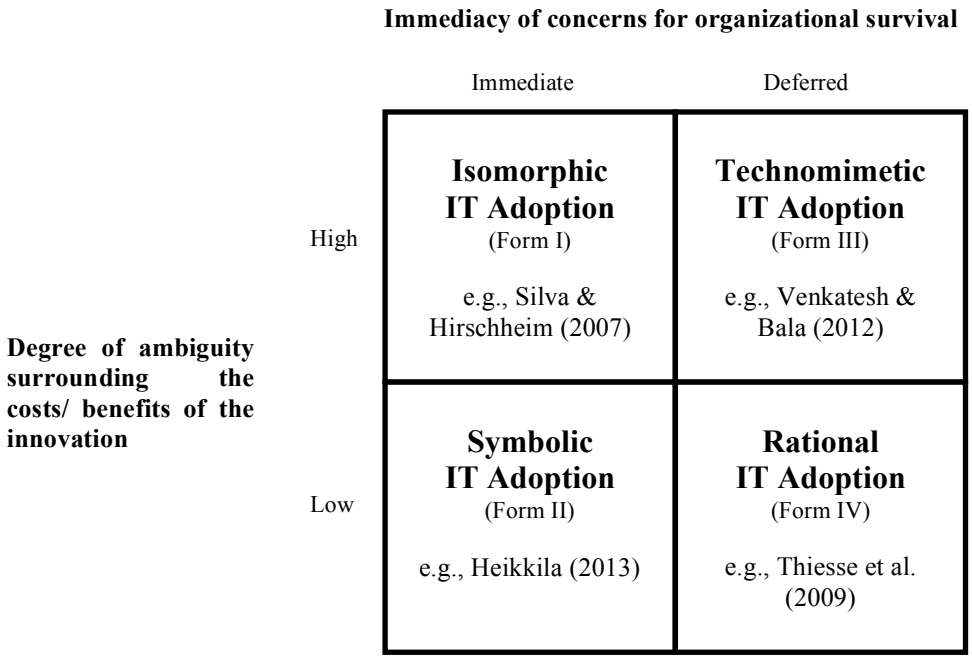

Figure 2 –Four motivational forms of IT innovation adoption

(adapted from Martinez & Dacin 1999)

3.3.1. Isomorphic IT adoption (Form I)

In isomorphic IT adoption, the organization faces immediate survival concerns and the costs and benefits of IT innovation adoption are ambiguous to decision makers at the adoption stage (see Figure 2). When survival is at stake (the first dimension in Figure 2), organizations may abandon, neglect, or distort their pursuit of rational organizational goals in order to save themselves (W. R. Scott & Davis, 2007). Hence, they need to ensure access to critical resources by following institutional norms that bring them "resources, stability, and enhanced survival prospects" (Meyer & Rowan, 1977, p. 340). In such situations, organizational decisions are "enforced by public opinion, by the views of important constituents, by knowledge legitimated through the educational system, by social prestige, [and] by the laws" (Meyer & Rowan, 1977, p. 343) because, for survival, organizations depend on their established relations with the larger system that they are a part of (W. R. Scott & Davis, 2007). Hence, decision makers may continue to seek minor improvements in the organization's technical efficiency (i.e., productivity or output quality), but they fiercely compete for social fitness to enhance access to critical resources and survivability (DiMaggio & Powell, 1983; Zimmermann & Zeitz, 2002). That means, the higher the likelihood of immediate survivability concerns, the less attention is paid to efficiency motives (Martinez & Dacin, 1999) in adopting an IT innovation. Indeed, extant organization theory research found that when firms – especially new ones – are dealing with immediate survival concerns, they mostly seek legitimacy imperatives, which in turn increases their chances of

survival (Ruef & Scott, 1998; Shane & Foo, 1999; Zimmermann & Zeitz, 2002). In an experimental study from the IT adoption literature, managers were conditioned to face imminent survival concerns by being told that only one of the two technologies being evaluated will eventually survive, and they were given the example of Beta and VHS. Subsequently, they selected the IT innovations that were "suboptimal" from an economic viewpoint, but that were deemed more legitimate because they were also selected by competitors (Martinez & Dacin, 1999). Similarly, a case study of a Mexican oil company that suffered survival problems and imminent collapse of its subsidiaries found that the company adopted several enterprise information systems for legitimacy motives, and indeed managed to improve its accountability and reputation (Avgerou, 2000).

The tendency for institutionally-motivated adoption is also reinforced when IT adoption occurs under ambiguous situations (the second dimension in Figure 2) and the organization fails to identify the most technically efficient solution. Such ambiguity and uncertainty in associating between the means (e.g., IT adoption) and the ends (e.g., its costs and benefits) lead organizations to model themselves after other organizations and follow a mimetic approach in their decision-making (Barki & Benbasat, 1996; DiMaggio, 2006). Such greater attention to the institutional environment may require IT innovation adoptions that are not the most economically efficient ones, but they are expected to be instrumental (Tingling & Parent, 2004). Indeed, a large body of the institutional IT adoption literature found that firms experiencing ambiguity in their decision environment adopt IT innovations to achieve legitimacy and other social benefits (Avgerou, 2000; Mignerat & Rivard, 2009; Teo, Wei, & Benbasat, 2003; Tingling & Parent, 2004). Swanson and Ramiller's (2004) story of Keller – a Gartner Group analyst for ERP systems in the 1990s – is an example showing that firms mimetically adopt ERP without being able to provide technical justifications.

There are various ways through which firms gain legitimacy by following institutional mechanisms in this form of adoption. First, organizations may adopt special, legitimate IT innovations (including IT standards) as a response to stakeholder criticism. If a professional association raises concerns about the IT security of a firm, the adoption of the most common, legitimate and known IT security solution is an example of isomorphic IT adoption that seeks legitimacy enhancement during ambiguity and survival threats. Such a solution is selected because of the high expected legitimacy among external stakeholders and not because it is the best technically fitted solution with the needs and specifics of the firm. Second, firms in this category may seek external certifications (e.g., ISO) for their adopted innovation as a signal of legitimacy, even though the innovations may not be the most efficient one (Benders, Batenburg, & van der Blonk, 2006). Finally, organizations may adopt IT innovations to enhance their legitimacy among the mass audience through improving their social acceptance. One dimension of such legitimacy is the perception of appropriateness among people, which can be measured via media coverage. Adopting some IT innovations under immediate survival concern and high ambiguity regarding the technical benefits may directly target increased media coverage of the firm. For instance, office automation solutions, e-commerce, and business process re-engineering are examples of some IT tools that have been swinging back and forth along the IS fashion pendulum since the 1980s (Baskerville & Myers, 2009). During fashion boosts, exaggerated claims and success stories are made about such innovations (David & Strang, 2006), which may convince organizations with ambiguity surrounding their decision scenario and immediate

survival concerns to jump on the bandwagon in order to gain legitimacy and reduce uncertainty. Adopting ERP during its fashion peak and adopting Facebook applications are some other examples where firms requiring a radical shake-up may not gain technical benefits in the short-run, yet they may achieve a more legitimate order through media coverage, word-of-mouth, and other social mechanisms (Swanson & Ramiller, 2004).

However, it should be emphasized that efficiency concerns do not disappear entirely, but are given less importance relative to immediate legitimacy-oriented factors. While in this form of adoption "decision makers often do not have the luxury of pursuing the *most* economically efficient course of action" (Martinez & Dacin, 1999, p. 88 italic added for emphasis), they may still pursue efficiency, albeit with lower priority. Indeed, organizations need to be efficient in order to survive in the long-run, and so efficiency aims are not ignored even during survival mode. That is, organizational actions under uncertainty and survival crisis – while not mainly motivated by efficiency – require conveying efficiency in the future (Martinez & Dacin, 1999). Hence, when isomorphic IT adoption primarily aims at legitimacy we can expect the value of IT to be realized more through legitimacy-oriented benefits than efficiency-oriented benefits.

The case study of Silva and Hirschheim (2007) (see Appendix 1) serves as an exemplar of the isomorphic adoption form. Indeed, the study describes that the Guatemalan health ministry was facing immediate survival concerns before the upcoming national elections. Additionally, the costs and benefits of adoption were ambiguous to the decision makers at the time of the adoption. This is evidenced by the fact that there was wide disagreement about the expected value of the system between the senior managers and the championing engineer on the one hand, and the resistance by the deep structures represented by the line managers on the other hand. Further, the IT infrastructure in the hospitals (where the SIS was to be implemented) was very rudimentary, and there was no formal IS function in the ministry, which relied on a single engineer to analyze the investment and estimate its costs and benefits. As a result of these environmental uncertainties, the health ministry decided to follow an isomorphic IT adoption approach, which was mainly aimed at enhancing its legitimacy vis-à-vis the voters before the elections, and to a lesser extent, to reduce administrative costs at the hospitals (Silva & Hirschheim, 2007).

In sum, when decision makers face immediate survival concerns as well as a lack of clarity surrounding the costs and benefits of the decision (high ambiguity), they are primarily motivated by legitimacy-oriented motives to reduce uncertainty (Son & Benbasat, 2007) and ensure organizational access to critical resources for survival (DiMaggio & Powell, 1983; Swanson & Ramiller, 2004; Teo, Wei, & Benbasat, 2003, p. 20). As such, decision makers may follow other organizations in adopting a known, legitimate IT innovation.

> *P1: In isomorphic IT adoption (immediate survival concern and high ambiguity), the firm primarily seeks legitimacy by imitating IT innovation adoptions made elsewhere (or otherwise conforming to the institutional environment) as a means to help gain access to critical resources and reduce uncertainty. But despite ambiguity, efficiency concerns do not disappear because efficiency guarantees the long-term survival and is followed under the shadow of legitimacy-seeking imitation.*

P2: Because in isomorphic IT adoption the adoption decision is made to ensure immediate survival, the value of IT innovations will primarily reside in legitimacy-oriented benefits (e.g., regulation compliance, external evaluations, stakeholders' impressions, or media coverage) more than in efficiency-oriented benefits (e.g., productivity or product quality).

3.3.2. Symbolic IT adoption (Form II)

Symbolic IT adoption occurs when ambiguity is low (thus driving an organization to adopt based on technical benefits) while survival concerns are immediate (thus driving the organization to adopt based on legitimacy-seeking). If by analyzing the costs and benefits it becomes clear to the decision makers that the IT innovation is not the best choice for contributing to technical performance, the adoption may then be viewed as an opportunity to benefit the organization by achieving legitimacy, securing its threatened survival (Meyer & Rowan, 1977), and strengthening support by managing stakeholders' impressions during poor performance periods (Westphal & Zajac, 1994). In fact, the technical benefits of the innovation adoption become much less important than how firms *communicate* the rationales underlying the adoption decision (Zajac & Westphal, 1995).

Since organizations exist among environmental institutions (including professional associations, clients, and the state), this has some crucial consequences for them: (a) they incorporate elements that are legitimated externally, rather than in terms of technical efficiency, (b) they employ "external or ceremonial assessment criteria" (Meyer & Rowan, 1977, p. 350) (e.g., endorsement by management consultants; prestige; enhanced media coverage) for measuring the value of actions that are based on such externally defined elements, and (c) they depend on these external institutions to reduce turbulence and remain stable " (Meyer & Rowan, 1977). This contributes to organizational legitimacy, success and accordingly survival " (Meyer & Rowan, 1977; W. R. Scott & Davis, 2007). Hence, firms facing imminent survival threats may be inclined to adopt an IT innovation that was deemed suboptimal in order to demonstrate social fitness with internal and external stakeholders, enhance their reputation and prestige, obtain a higher credit position, or increase access to loans and investments to offset immediate survival threats.

However, while crucial for survival, compliance to institutional expectations (e.g., adopting an IT security application which is highly recommended by professional associations) may not be aligned with decisions that are exclusively based on the firm's technical rationalities. For example, the firm's internal units (e.g., IT function, service departments, and administrative sections) may entirely see no definable, technical contribution (i.e., productivity or quality) of the IT innovation in business processes, products, or services. Hence, in this adoption form, the externally-derived institutional expectations are at odds with the organization's decision that is based on technical efficiency. Put differently, if the firm were isolated from its institutional pressures, it may never have adopted such an IT innovation when the firm could clearly

(unambiguously) determine that the innovation would not contribute to its rationalist-economic aspects of value (e.g., productivity).

Heikkila's (2013) study of Western MNC subsidiaries adopting an e-HRM system in China (see Appendix 1) can be seen as an exemplar of symbolic IT adoption. This system was well known to the MNCs and hence ambiguity regarding its costs and benefits was low. In particular, the MNC subsidiaries saw no technical benefits from adopting the system in their host environment. The Chinese legislative environment was characterized by constantly changing labor laws, complex tax regulations, and differences between national and local government legislations. The system would need to be constantly updated, which was very costly. There were also some normative restrictions, such as the increased costs of translating the system into local language and the increased costs and time for monitoring via the system to avoid using the guanxi system in promotions. In addition, the Chinese line managers questioned the strategic role of the e-HRM. Together, these issues dissipated the potential efficiency gains from the system, and raised concerns that the system would reduce the time spent on strategic activities and decrease the HR service delivery quality. Furthermore, while survival is not explicitly discussed in the case, it can be assumed that survival concerns were imminent. Indeed, the case characterizes the context of the Western MNCs in China by high corruption, fierce competition, high employee turnover rates, and a negative image of the implemented system by the Chinese nationals. This survival concern may have been responsible for triggering a legitimacy-based imperative for adopting the e-HRM despite its efficiency drawbacks. Indeed, the Western MNC subsidiaries needed to adopt the system to obtain internal legitimacy from their MNCs (e.g., to maintain consistent practices and a strong corporate identity). Additionally, the adopted system would need to achieve external legitimacy by conforming to the cultural, societal, ad legislative environment of the subsidiaries' host Chinese country and to increase its acceptance and use among the host country nationals. In light of these opposing efficiency- and legitimacy-based imperatives, the MNC subsidiaries decided to adopt a hybrid, toned down version of the system (symbolic adoption). For example, they adopted the standardized Western e-HRM practices such as talent and performance management systems, while also using the local Chinese systems for recruiting and payroll.

Other studies also show that symbolic adoption is effective in satisfying external stakeholders and accordingly securing survival, rather than enhancing technical efficiency. For instance, Wood and Caldas (2001) studied 28 ERP implementations by interviewing two respondents per implementation (a key user and an implementation agent) within large and medium-sized enterprises. They found six (out of eight) institutional reasons for ERP adoption and acknowledged the possibility of "lip-service behavior" (p.390) (i.e., symbolic adoption) among ERP adopters. In the management literature, Westphal and Zajac (1998) showed that symbolic adoption of a "corporate governance reform" innovation, while not contributing to technical efficiency, led to "significant positive stockholder reactions and deter[red] other, more substantive governance reforms, thus perpetuating power imbalances in organizations" (p.127). As another example from practice, the Software Engineering Institute (SEI) has proposed a staged model of process improvement, known as Capability Maturity Model (CMM). This standard has gained acceptance among software development community and is often required by US clients (Gopal, Mukhopadhyay, & Krishnan, 2005). However, European software organizations and clients are more inclined toward ISO 9001 and ISO/IEC 15504 standard

developed by International Standards Organization (Paulk, 1999). In such a situation, while a US-based IT software development company may extensively use CMM – which is widely accepted in North America – for IS development, it may ceremonially adopt the ISO/IEC 15504 standard when conducting business in Europe for the first time (hence, high immediacy of survival concerns in the European market). In other words, the external pressures may compel the firm to follow the fashionable, socially accepted ISO practice on the surface (e.g., by limiting its use to output presentation to customers), while in reality continuing to structure the bulk of its internal development practices according to CMM (since it could determine with little ambiguity that ISO was not the most technically beneficial solution for all of its operations). As a final example, a firm facing survival threats may decide based on a cost/benefit analysis to partially adopt a costly IT security application in a single department. Accordingly, while the IT innovation has been adopted, managers may not implement it around all organizational processes and procedures due to the determined increased costs of operation. However, the firm may advertise its adoption of the innovation in a way that signals company-wide adoption and implementation in order to enhance its legitimacy in the eyes of potential users.

In summary, in symbolic IT adoption, while the legitimacy-oriented perspective dominates the decision to adopt, efficiency benefits are not expected to be directly realized by adopting the innovation. In fact, the IT innovation is exclusively adopted for legitimacy purposes and the firm maintains its technical operations by not fully implementing the innovation. Hence, we expect this form of adoption to increase IT value in terms of legitimacy benefits, but not in terms of efficiency benefits that have never been the goal of the adoption.

> *P3: In symbolic IT adoption (immediate survival concern and low ambiguity), the firm primarily seeks legitimacy by complying with the institutional (coercive, normative, or mimetic) forces in adopting IT innovations as a means to help gain access to critical resources and ensure survival. However, since decision makers are aware that the prescribed IT innovation is not the most efficient one that can be freely selected, they decouple the IT innovation from the actual business operations and full implementation is not sought.*

> *P4: Because in symbolic IT adoption the adoption decision is made to demonstrate social fitness and secure survival, the value of such a ceremonial IT adoption will reside in legitimacy-oriented benefits (e.g., regulation compliance, external evaluations, stakeholders' impressions, or media coverage) and is not expected to reflect in efficiency-oriented benefits (e.g., productivity or product quality).*

3.3.3. Technomimetic IT adoption (Form III)

Whereas Martinez and Dacin (1999) originally labeled this form of adoption as *efficient imitation*, we found that, in the context of IS, a more appropriate term to describe it based on the underlying motivations is *technomimetic IT adoption*. The term *technomimetic* originates from the molecular science literature (Rapenne, 2005). It has been used to describe molecular systems that imitate the motions of macroscopic objects (e.g., gears; motors) for efficiency-based reasons

(e.g., to be able to generate rotary motion with the least consumption of energy, the least oxidation potential, etc.). We adapt this term to describe technomimetic IT adoption, where organizations aim for higher technical performance and imitate their successful counterparts in an ambiguous environment. In particular, in technomimetic IT adoption, organizations do not have immediate survival concerns, yet face ambiguity in identifying and calculating the costs and benefits surrounding the IT adoption decision. Since survival is not immediately at stake, the organization is primarily motivated to take a rational, cost-minimizing approach in the decision. However, since decision makers need accurate, precise, and timely information to make good decisions, they face significant problems when the costs and benefits surrounding the IT adoption decision are not easily identifiable or interpretable. This is often the case with complex information systems such as ERP, where decision makers may be unsure about the unforeseen issues of ERP adoption (Benders, Batenburg, & van der Blonk, 2006). This leads to escalation of the information search costs and therefore, it may simply be most efficient to wisely follow the actions of others and imitate peers, competitors, or market leaders (Benders, Batenburg, & van der Blonk, 2006; Martinez & Dacin, 1999). By technomimetic IT adoption it is meant that the imitation here is not a simple copy procedure of the most salient solutions without having technical justifications for that. In contrary to the earlier example of isomorphic IT adoption (where legitimacy was a primary concern and the manager was not able to come up with a single technical reason behind ERP adoption), in technomimetic IT adoption, decision makers envisage finding the solution that is most likely to be *technically* useful based on efficiency reasons. They actually use imitating similar firms in similar situations less as a means for legitimacy and more as a proxy, indirect method for finding the most technically efficient innovation that is not directly identifiable. This is actually a rigorous process that includes benchmarking, finding, analyzing, and selecting the more similar, successful, and economical solutions. Since survival is not of immediate concern, the organization can afford to invest the time and effort needed to reach a good, technically justified solution.

In technomimetic IT adoption, while not completely sure about the exact consequences (Benders, Batenburg, & van der Blonk, 2006), decision makers are able to - at least technically - compare various innovations and exclude the ones that are less likely to be appropriate for their firm based on technical reasons. Venkatesh and Bala (2012) is an exemplar of technomimetic IT adoption. This research surveyed 248 firms (124 dyads) in the high-tech industry implementing an interorganizational business process standard (IBPS). The study found that standards uncertainty (i.e. the inability to forecast accurately whether the IBPS standard will be successful and deliver its intended benefits) was a key determinant of adoption. Hence, the adopting firms can be considered to generally experience high ambiguity regarding the innovation's costs and benefits. Furthermore, while not explicitly stated, there is no reason to believe that the firms participating in the study had an immediate survival concern on average. The participating firms were selected randomly from a list of 3000 high-tech firms considering the adoption of the IBPS. Each firm contacted was asked to select a successful partner firm to participate in the study. Also, data collection occurred over a period of two years, during which no firm closed down.

Given that cost/ benefit ambiguity was high and survival concerns were not immediate, the adopting firms turned to their partners for cues on adopting specific IBPS standards (technomimetic adoption). More specifically, the firms would take their counterparts' moves as signals of the technical suitability of the IBPS. They would then reevaluate their position with

respect to the costs and benefits, which led to adopting the innovation that their influential partners were adopting. The study found that the firms using this technomimetic adoption strategy achieved both efficiency benefits (reduced cycle time), and to a lesser extent, legitimacy (partnering satisfaction).

Another example is Benders et al.'s (2006) case study of SDU, a large Dutch publisher that was involved in ERP adoption through founding a multi-departmental core team of employees to evaluate different alternatives. While a SAP solution would have satisfied their data integration standards, the board finally rejected the SAP solution and adopted Vista, which was an ERP package developed for the publishing industry. The main reason was that SAP implementation including package tailoring was expected to be a financial as well as a technical barrier. While not explicitly argued in their paper, such an expectation of the implementation costs and barriers is shaped by a close examination of peers and competitors who have implemented SAP. What is interesting is that due to the ambiguity surrounding the selection of such a complex IT, the firm faced several technical problems (e.g., adaptation to specific needs of employees, inappropriate interfaces, failure to support the on-line web shop, and failure to be connected to the customer database) and financial problems (e.g., increased integration budget) during implementation, which further reinforced the decision to reject SAP. In this example, while the organization used technical criteria for wisely selecting Vista and rejecting SAP, it imitated - due to the high degree of ambiguity surrounding the IT adoption - the application that was designed for and widely adopted in the publishing industry.

In other words, in such situations, the firm attempts to exclude inappropriate innovations and move toward finding and imitating innovations that are most likely to be effective and proven courses of action that fit with its current needs. An example would be established firms concerned with determining an appropriate level of outsourcing versus in-house IS development. While it is not suggested that organizations will always outsource IS development (E. Anderson & Jap, 2005) because it is cheaper than in-house development, it is likely that certain development projects would be outsourced as a result of the tacit and hidden nature of in-house development costs, which is identified by closely examining competitors. For instance, for the purpose of reducing service costs, a small bank may look at financial intuitions that are similar in size and business environment and decide to adopt the core banking system of the one that comparatively has the highest performance. The small bank that currently faces no survival concern for its niche positioning in a market has sufficient time to review and compare various applications in other similar financial institutions. However, despite the time- and other resources allocated for the comparison of various systems, not all technical costs and benefits of the systems are simply uncovered by market search. There may be many unintended consequences originating from idiosyncratic technical, human and temporal characteristics of the small bank that make it difficult to simply adopt best practices within the industry. In addition, the difference in organization size may also reveal some problems or benefits after implementation.

In this adoption scenario, efficiency is the primary motive for IT adoption. However, the costs and benefits of the adoption are not very clear to the organization and the extensive search for and analysis of the potential solutions is costly. As a result of such ambiguity, the organization uses legitimacy (i.e., legitimate IT innovations in the industry) as a proxy variable that can signal the efficient course of action. If the organization is not under immediate survival

concern, then it has sufficient time to study best practices and imitate the actions of higher-performing organizations. Hence, in technomimetic IT adoption, while the firm attempts to enhance efficiency in the decision to adopt IT (i.e., rational aspect), the legitimacy-oriented imperative is not entirely abandoned and, due to ambiguity, it is used for finding an efficient decision through wisely *imitating* peers or competitors in the institutional environment.

P5: In technomimetic IT adoption (deferred survival concern and high ambiguity), the firm primarily seeks efficiency because there are no immediate survival concerns. However, because of ambiguities surrounding finding and implementing the most efficient IT innovation, the organization wisely searches for the most technically efficient IT innovation among peers and competitors as a means to reduce uncertainty. But legitimacy-oriented motives do not disappear because the search for and analysis of the potential innovation is costly and therefore, the organization wisely imitates the most fitted IT solution in its institutional environment.

P6: Because in technomimetic IT adoption the organization is not preoccupied by the trappings of immediate survival, the adoption decision is made to ensure improving the firm's technical performance. Hence, the value of IT innovations will primarily reside in efficiency-oriented benefits (e.g., productivity or product quality) more than in legitimacy-oriented benefits (e.g., regulation compliance, external evaluations, stakeholders' impressions, or media coverage).

3.3.4. Rational IT adoption (Form IV)

In the rational IT adoption form, the organization does not have pressing concerns for survival that would drive it toward legitimacy-seeking goals. Moreover, the costs and benefits surrounding the IT adoption are relatively identifiable to decision-makers (see Figure 2). The decision to adopt is made solely based on a favorable technical analysis, independently of any potential legitimacy benefits ensuing from the adoption. Hence, efficiency aspects motivate the adoption decision. This approach is generally consistent with Williamson's (1995) TCE theory, which considers the efficiency of the transaction (i.e., IT innovation adoption) as the key imperative for decision making. Because of the low degree of ambiguity surrounding the adoption decision, the organization can identify the economic costs and benefits of IT adoption and accordingly, above all, adopt the IT innovation that minimizes costs associated with business operation. In rational adoption, as pointed out by Mirani and Lederer (1998), "goals are clear and cause/effect understanding is complete, [hence] maximization of 'efficiency' is the appropriate approach to organizational assessment, since it is possible to test whether the desired goals were achieved with the minimum possible consumption of resources" (p. 807).

Most of the extant IT innovation adoption studies are classified within this category (e.g., Fichman, 2004; Helfrich, Weiner, McKinney, et al., 2007; Klein, Conn, & Sorra, 2001; Rogers, 2003). Seddon et al. (2002) reported that 96% of the IS practitioners they surveyed used some

form of technical cost/benefit analysis to evaluate their IT innovations. Additionally, much of the rational IT adoption literature indicates that short-term survival is not a pressing need for organizations adopting the IT innovations (e.g., Jelinek, Ahearne, Mathieu, et al., 2006; Nicolaou, 2004; Poston & Grabski, 2001).

As an exemplar, consider Thiesse et al.'s (2009) case study of Kaufhof (see Appendix 1), one of the largest department store chains in Europe, who was adopting a major RFID initiative in 2008. Clearly, Kaufhof faced no immediate survival concerns at the time of the study, being the subsidiary of one of the largest retailers in the world, operating 126 department stores, receiving 2 million customer visits daily, and reporting 3.6 billion euros in sales in the year preceding the case study. Furthermore, Kaufhof faced little ambiguity regarding costs and benefits of adopting and implementing the RFID. They had implemented two previous RFID project trials, and were familiar with the expected costs and benefits of that technology. They had also conducted a series of feasibility tests in conjunction with a fashion merchandize manufacturer to assess the time and labor cost savings that would result from adopting the technology. Moreover, Kaufhof had joined a consortium funded by the European Commission, whose purpose was to share experiences about the benefits and implementation challenges of the RFID technology.

Given the low costs/ benefits ambiguity and deferred survival concerns, Kaufhof followed a rational adoption approach focusing on efficiency benefits. Their expected benefits (ex ante) were to cut operational costs, improve the efficiency of the customer service process, reduce capital commitments, enhance inventory visibility, achieve time and cost savings, and increase data quality. As the study reports, these efficiency gains were all achieved at the ex post stage (Thiesse, Al-Kassab, & Fleisch, 2009).

As another example, Rogers (2003) employs a rational perspective of adoption by organizations. Rogers specifies relative advantage, compatibility, complexity, observability, and trialability as important technical characteristics that motivate IT innovation adoption in organizations. Indeed, several studies appeared in the 1990s showing that the adoption of the relatively unambiguous CASE tool technologies by established firms were undertaken based on detailed technical/economic analyses of the benefits and costs involved (Orlikowski, 1993; Premkumar & Potter, 1995; Rai & Patnayakuni, 1996) (see Figure 2). Over time, such rational adoption of CASE tools was found to enhance various aspects of efficiency, such as removing tedious work, freeing employees' time and allowing them to focus on more value-added activities, and enhancing productivity and profitability (Orlikowski, 1993).

Overall, empirical support has been found for the salience of efficiency-oriented factors in rational IT adoption (e.g., Premkumar, Ramamurthy, & Nilakanta, 1994). Collectively, IT innovation research found that rational IT adoption enhances various aspects of the firm's efficiency-oriented value (e.g., process productivity or product quality). In particular, empirical results reported improvements in productivity (Ataay, 2006; Barua, Kriebel, & Mukhopadhyay, 1995; Law & Gorla, 1996), processing times (Banker, Bardhan, Chang, et al., 2006), capacity utilization (Duliba, Kauffman, & Lucas, 2001), inventory turnover (Palmer & Markus, 2000; Venkatraman & Zaheer, 1990), labor displacement (Truman, 2000), other operational efficiencies

(Gonzales-Benito 2007), enhanced process quality (Truman, 2000), product quality (Banker, Bardhan, Chang, et al., 2006; Bardhan, Whitaker, & Mithas, 2006; Barua, Kriebel, & Mukhopadhyay, 1995; González-Benito, 2007), sales performance (Duliba, Kauffman, & Lucas, 2001; Lee, Phan, & Chan, 2005; Palmer & Markus, 2000; Venkatraman & Zaheer, 1990), and profitability (Duliba, Kauffman, & Lucas, 2001; Palmer & Markus, 2000).

In rational IT adoption, legitimacy plays no important role as a source of value that shapes the IT adoption decision (Martinez & Dacin, 1999; Son & Benbasat, 2007). IT innovations are selected for their clear contributions to the firm's technical efficiency (e.g., productivity or process/product quality). Hence, being socially legitimate or not, the adoption is mainly motivated by the expected technical advantages, and is aimed at improving the firm's economic performance.

> *P7: In rational IT adoption (deferred survival concern and low ambiguity), the firm exclusively seeks to improve its technical performance because the costs and benefits of the IT innovation adoption are clear and there are no immediate survival concerns that escalate legitimacy motives behind adoption.*

> *P8: Because in rational IT adoption the adoption decision is made to maximize the firm's technical performance, the value of such an IT adoption will reside in efficiency-oriented benefits (e.g., productivity or product quality) and is not expected to reflect in legitimacy-oriented benefits (e.g., regulation compliance, external evaluations, stakeholders' impressions, or media coverage) in the short-run.*

Figure 3 summarizes our proposed links between the forms of adoption and the IT innovation value. On the left-hand side, each form of IT adoption is positioned between the two major value types (legitimacy versus efficiency) based on the relative importance of the expected value at the adoption stage (ex ante). Symbolic and rational IT adoption forms are positioned within the legitimacy- and efficiency-oriented value waves, respectively. While seeking both value types, isomorphic IT adoption and technomimetic IT adoption reside mainly in the legitimacy and efficiency value waves, respectively. On the right-hand side, the two distinct aspects of the realized IT value (ex post) are linked to the different forms of IT adoption.

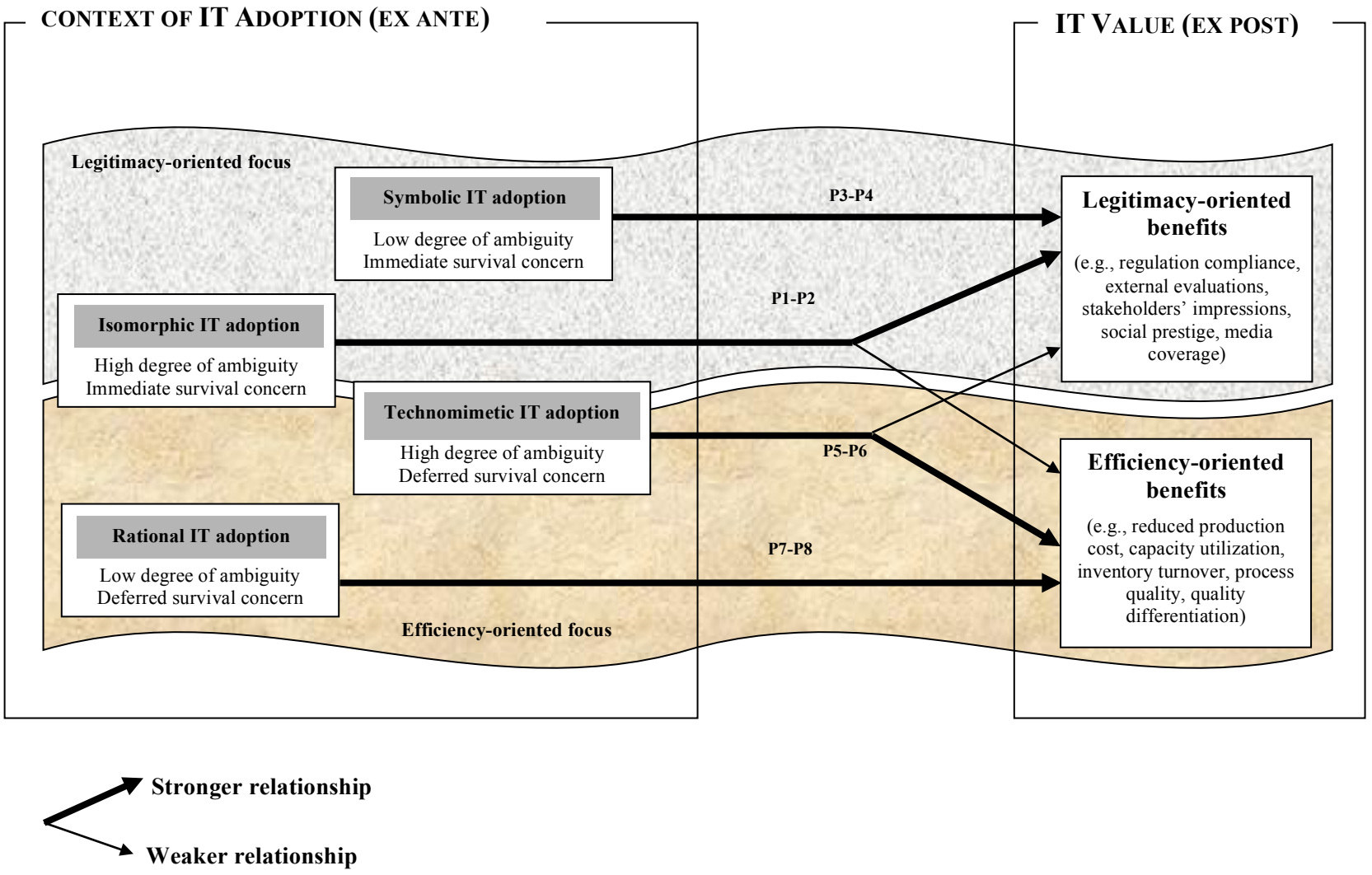

Figure 3 – Conceptual model

4. Discussion and Implications

The key message in this paper has been that a good understanding of the ex ante conditions and motivations under which IT is adopted is fundamental for better understanding the ex post value derived from such adoption, and the emphasis put on each value type. To develop this linkage, we have conceptualized four forms of IT adoption based on two ex ante environmental conditions: (1) degree of ambiguity in identifying and analyzing the costs and benefits of the IT innovation adoption, and (2) the immediacy of concerns for organizational survival when facing the IT adoption decision. We have argued for the existence of different motivations underlying each adoption form with a particular configuration of environmental uncertainties (ambiguity × survival). Accordingly, a conceptual framework has been developed to better understand IT innovation value by tracing between the original motivations of adoption in each form and IT value. As such, we have shed light on the long shadow cast by the past adoption environment on the present assessment of value.

Indeed, past conditions under which decisions are made matter for managers because they provide a temporal and contextual meaning to the consequences of those decisions. Failing to include temporal factors in IS research may lead to simplification of the complexities of the underlying social, economic and managerial processes surrounding IT and can lead to reductionism by forcing researchers to "rarefy and distill the real world environment" (Mason, McKenney, & Copeland, 1997, p. 258). This can also be the case with IT value research. While different approaches have been employed in explaining IT innovation value, it has been unclear how the context of the IT adoption can shed light on the subsequent value realization. As a consequence of a disconnect between ex ante and ex post conditions, IT value research has been constrained to considering a narrow aspect of value (most efficiency-based), and has reported mixed empirical results.

This paper extends our understanding of the notion of IT value by considering its multidimensional nature, and by assessing it within the temporal context of the adoption decision. Our approach to assessing the value of IT innovation is consistent with management literature showing that innovations' development, implementation and outcomes are path-dependent and temporally constructed (Graham, 2007; Usselman, 2002).

Our paper has several implications for research and practice. First, the temporal approach we have developed allows us to better relate IT value to the original adoption goals and motives. In particular, IT value evaluation schemes should consider the adoption form of the IT innovation. This is because the expected benefits from the IT innovation are different in each form and evaluating them based on a single approach may lead to insignificant or inconclusive results. For instance, a symbolically adopted electronic medical record system may aim to increase support and to lessen control from the government. Institutional reasons that are dominant in isomorphic and symbolic adoptions are required to be included in the evaluation scheme of the IT innovation adoption. While some IT innovations are initially adopted for non-technical reasons, they are often evaluated via benefits based on technical rationality. This mismatch between IT innovation's ex ante and ex post value may result in IT innovations'

failure rate inflations since some of the technically failed systems should still be counted as effective by virtue of providing organizations with a variety of legitimacy benefits. This argument roots back to the organizational theory literature suggesting that adoption may also originate from institutional sources (Benbasat, Gefen, & Pavlou, 2010; DiMaggio & Powell, 1983; Hannan & Freeman, 1977; Kennedy & Fiss, 2009; Meyer & Rowan, 1977; Teo, Wei, & Benbasat, 2003; Westphal & Zajac, 1998). In other words, concern for social legitimacy threats or opportunities (Kennedy & Fiss, 2009) is an important reason that leads organizations to adopt an innovation that might not necessarily enhance technical efficiency (e.g., sales or profit).

Second, this research calls for rethinking the notion of value and looking beyond the myopic efficiency motives that have been automatically assumed to underlie IT innovation projects (cf. Teo, Wei, & Benbasat, 2003), with legitimacy-based benefits having received scant attention. Our paper provides a better explanation of IT value by considering both efficiency-based and legitimacy-based aspects of value, and, more importantly, by determining the relative emphasis of each type based on the existing environmental conditions. This can open up future lines of inquiry into other sets of factors that influence the different types of value.

Third, this paper contributes to the discourse suggesting that the adoption of an IT innovation is not a discrete decision that can be dichotomously confined to either adoption versus rejection (Khalifa & Davison, 2006). We do this by conceptualizing four distinct adoption forms that are motivated by the past environmental uncertainties. The typology suggests that not all IT innovations are rationally adopted (under low ambiguity and deferred concern for survival). Instead, there are distinct conditions under which decision makers seek different types of values from IT. For instance, these conditions may sometimes result in adopting an IT innovation that aims at demonstrating consistency and compliance with the social environment rather than improving efficiency aspects of IT value. Under such conditions, decision makers may not follow a totally technically rational approach with all of their adoption initiatives. This means that organizations can have a portfolio of IT innovation adoptions, in which different innovations are adopted for different motives under different conditions. As a result, the IT evaluation schemata of organizations should have the potential to include the uncertainties at the adoption stage and the ex ante value motivating the adoption. Failing to do so, (i.e., taking a mere rational scheme of evaluation) may lead to increases in the failure rates that negatively affect practice and research communities. That is because some IT innovations that were seeking legitimacy and may have been successful in that regard, may be identified as failures for not improving - or perhaps even decreasing – efficiency aspects of IT value. We argue that while organizations try to position the majority of their IT innovations in the rational adoption category through accruing knowledge and experience, they also need to have other forms of IT innovation adoption in order to be effective and survive in the long-run. In other words, a portfolio of IT innovation adoption forms is needed to address a variety of technical and institutional issues and guarantee organizational effectiveness and survival.

Fourth, the conceptual model developed in this paper has the potential to bridge between the IT adoption and IT value streams, which have been treated as separate entities. On one hand, the IT adoption literature has mainly focused on the process and motivations of adoption, and has dealt less with the IT value derived from such adoption. On the other hand, IT value literature has mainly emphasized factors occurring during the implementation process (i.e. with the focus

being on IT innovations that have been already adopted are implemented). By explicitly linking between the IT adoption and the IT value literatures, new avenues of research can be opened at the intersection of both streams. Such research may also benefit from longitudinal designs that explicitly take the temporal context of the adoption into account and trace forward the realized value from adopting and implementing such innovations.

Finally, despite its conceptual nature, this paper has potential practical contributions. Specifically, our research suggests that managers should tailor their IT innovation initiatives toward exploiting efficiency or legitimacy goals (or both) based on a careful analysis of the ex ante conditions surrounding the adoption. In conditions of low costs/ benefits and deferred survival concerns, IT innovations pay off according to efficiency measures of performance. However, as our typology suggests, different benefits and/ or different weight in the benefits can also be derived depending on the interplay between the ex ante conditions. Consequently, managers should evaluate their IT innovations by selecting performance measures that account for the ex ante conditions.

The present study has also some theoretical limitations. There have been different views on how to relate efficiency and legitimacy goals. While some researchers see that the two performance goals stand in conflict and should be decoupled (Meyer & Rowan 1977), others see that the two can coexist (e.g., Roberts & Greenwood 1992; Fernandez-Alles & Valle-Cabrera 2006). In addition, legitimacy may also eventually lead to efficiency by helping the organization gain access to valuable resources (Scott 1995). Given the complexity of these relationships and the lack of consensus in the literature, this paper takes a simpler approach, which argues for the co-existence of the two types by decision-makers but to different degrees. While we acknowledge that the two outcomes of efficiency and legitimacy can be linked in more complex ways on the long-term, we consider this to be a limitation of the existing paper. We believe that our paper provides a first-step toward understanding the factors that explain the relative weights of these two outcomes. Future research can look at how these two outcomes can be related over the long-term.

Another theoretical limitation is that our model does not explain the causal mechanisms by which the expected IT value will lead to realized value. Our aim is more modest; namely to alert researchers and organizational decision makers that when they assess the realized value of their IT innovation adoption and implementation, they need to look back at the initial conditions that shaped such value formation. This backward reflection will improve their understanding about the realized value from the adoption, the initial conditions that motivated the adoption, and whether the value realized ex post is consistent with the motivational forms of adoption (ex ante). Future research can examine the causal mechanisms between the ex ante and ex post stages. One possible causal mechanism that can be investigated relates to self-fulfilling prophecy theory, which posits that people's expectations shape their behaviors, which in turn generates outcomes that are consistent with the initial expectations (Merton, 1948)[3]. Applied to our context, this would mean that decision-makers' initial expectations about the specific type(s) of value of IT innovation (which are shaped by the initial conditions), will lead them to seek, and eventually realize IT value types that are consistent with the initial expectations. Indeed, the

[3] We are grateful to an anonymous reviewer for providing this insight.

efficacy of such self-fulfilling prophecies has been confirmed in the organizational literature (e.g., Eden, 1984; McNatt & Judge, 2004)

5. Concluding Remarks

In conclusion, this paper develops a framework of IT innovation value, which expands the types of value, considers their relative emphases, and suggests that the ex post value is related to the ex ante conditions of the innovation adoption and its corresponding expected value. Additionally, the IT adoption typology developed in this paper extends our understanding of IT adoption beyond the most traditional adoption views (rational and isomorphic) to include two other forms (symbolic and technomimetic) based on the interplay among the environmental uncertainties under which the IT innovation is adopted. Linking IT value to its initial motives sharpens our understanding of expected and realized value. It is our hope that the ideas presented in this paper are further developed and tested, especially through longitudinal research designs that link ex ante adoption conditions to ex post value.

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Appendix 1: Prior studies on IT innovation value

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Appendix 1a: Studies examining the efficiency-oriented aspect of IT value						
Altinkemer et al. (2011)	BPR	Productivity; financial/ operational performance	Panel data of 237 Fortune 500 US firms	**Mixed**: Significant drops in ROA following initial BPR adoption. This is followed by improvements in productivity and performance, but these decrease again over time.	Ex post	None identified
Ataay (2006)	E-communication technologies	Objective / perceived labor productivity	Survey of respondents from 31 manufacturing firms	**Mixed**: Negative effects of usage of e-CRM, e-communication, and EDI on labor productivity. No effect of e-procurement usage. *Authors call attention to the need to examine softer and less tangible measures of value.*	Ex post	None identified
Baars et al. (2009)	RFID	Cost-efficiency; error reduction; inventory optimization; improved decision-making	Multiple case studies of firms in the food manufacturing, automotive, and retail industries	**Not applicable**: No assessment of realized value in this study.	Ex ante	Ambiguity surrounding costs/ benefits (low)
Bang et al. (2013)	Mobile channel introduction in e-commerce	Market outcomes: order size; cancellations; returns; exchanges	Panel data from a leading e-market in Korea	**Positive**: Fit between product and channel characteristics positively impacts market outcomes.	Ex post	Time-criticality of transactions; intensity of product information
Banker et al. (2006)	Operations management system	Product quality; time to market; efficiency; cycle time; lead time	Survey of 1077 manufacturing plant managers	**Mixed**: Reduced cycle- and lead times, but no effects on time to market, efficiency, and product quality.	Ex post (5 years after adoption)	None identified
Bardhan et al. (2006)	Supplier integration technologies	Plant costs; product quality	Survey of 266 manufacturing plant managers	**Mixed**: Positive impact on product quality but no effect on plant costs.	Ex post	None identified

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Braganza et al. (2009)	KMS	Various efficiency measures (e.g., improved speed; solution quality)	Case study of a KMS implementation at Schlumberger	**Positive**: KMS resulted in improved performance (e.g., cost savings; increased revenues; time savings; improved coordination; real-time access to knowledge).	Ex post	None identified
Benbya and Meissonier (2007)	KMS	Time-to-market; new product introduction; product quality	Case study of a major European aerospace company	**Mixed**: KMS had a positive impact on time-to-market efficiencies and increased rate of new product introduction, but no impact on product quality or creativity.	Ex post	None identified
Chan et al. (2011)	E-government system	Operational efficiencies; error reductions	Case study of an e-government system implementation in Singapore	**Positive**: The implementation succeeded after an initial period of instability. In each implementation phase, a focal capability emerged from the symbiotic enactment of knowledge, social, and leadership resources.	Ex ante and ex post	None identified
Chang (2006)	Enterprise IS	Various efficiency measures (e.g., solution flexibility; on-time delivery; technological competitiveness)	Qualitative interviews with 49 senior managers and survey of 219 high-tech firms	**Mixed**: IS performance dimensions are rated significantly higher by technical people than by management people. Some IS performance dimensions were not influenced by the EIS. *Authors find a disagreement between IT and general management on how to rate the performance of the EIS.*	Ex post	None identified
Chang and Gurbaxani (2012)	IT outsourcing practices	Sales / cost efficiencies; leverage	Panel data of 617 Fortune 1000 adopters/ non-adopters of IT services outsourcing	**Positive**: Significant efficiency improvements from IT services outsourcing.	Ex post	None identified
Cotteleer and Bendoly (2006)	ERP	Order fulfillment lead-time	Longitudinal case study of a US computer peripheral producer	**Positive**: Significant reductions in order lead-time following ERP implementation. *The company was focused on order lead-time improvement, even before the ERP implementation. The value realized ex post is thus aligned with the ex ante expected value.*	Ex ante and ex post	None identified

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Davamanirajan et al. (2006)	Systems supporting the trade services process	Productivity; cycle time	Panel data from 11 banks in the trade services area	**Positive**: System use increases productivity and decreases cycle time.	Ex post	None identified
Dehning et al. (2004)	E-commerce	Stock market returns	Archival data of 251 e-commerce investment announcements made between 1998 and 2000	**Mixed**: Mixed effects of ERP investment announcements on shareholder value. Effects range from non-significant to positive depending on the time period of the announcement.	Ex ante	Internet boom and bust
Duan et al. (2009)	Business process outsourcing	Stock market returns	Archival data of 298 BPO announcements made between 1998 and 2005	**Mixed**: Mixed effects of BPO announcements on shareholder value (higher for outsourcing primary processes than for support processes)	Ex ante	None identified
Duliba et al. (2001)	Computerized travel reservation system	Load factor; sales; profitability	5-year longitudinal analysis of major airline carriers	**Mixed**: Enhanced sales but no impact on load factor. *Authors call for examining softer and less tangible measures of value, such as becoming more legitimate in the eyes of the supplier.*	Ex post	Strike occurrence
Filbeck et al. (2013)	CMM appraisal	Stock market returns	Archival data of 348 CMM appraisal announcements made between 2006 and 2008	**Mixed**: Mixed effects of CMM appraisal announcements on shareholder value (short-term effect positive but long-term effect is mixed). Effects are moderated by implementation maturity.	Ex ante	Implementation maturity
Gonzales-Benito (2007)	IT investments in purchasing function	Product quality; purchasing efficiency; logistics efficiency; dependability	Survey of 141 purchasing managers	**Mixed**: Enhanced product quality, dependability, and purchasing efficiency, but no effects on logistics efficiency. Logistics integration had a positive effect on dependability, but not on efficiency or quality.	Ex post	None identified
Habjan et al. (2014)	GPS	Improved decision-making; financial	Comparative case studies of three Slovenian firms in	**Positive**: Positive performance impacts from GPS implementation. This is facilitated by wider scope of implementation and use of GPS	Ex post	None identified

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
		performance	the transport industry	in operational decision-making.		
Karimi et al. (2007)	ERP	Process efficiency/ effectiveness/ flexibility)	Survey of IS executives from 148 US manufacturing firms	**Positive**: Extent of ERP implementation positively influences business process performance, and the effects are moderated by ERP radicalness and delivery system.	Ex post	Innovation radicalness; delivery system
Lee et al. (2005)	Integrating the firm's adopted human resource practices and processes to the IT infrastructure	Average sales growth	Survey of CEOs from 70 companies in Singapore	**Non-significant**: No effects on sales growth. *Authors point to the importance of looking at non-financial measures of performance that may have motivated adoption: "other forms of valuable resources that can confer a competitive advantage, such as reputation, social networks and financial resources that can render the HR configuration socially complex" (p. 1753).*	Ex post	None identified
Menon et al. (2009)	Hospital IT (clinical and administrative)	Hospital output; labor productivity	Longitudinal study with archival data from US hospitals	**Mixed**: Clinical IT improves hospital output in the short run. Administrative IT decreases output and productivity in the short run, and increases them in the long run.	Ex post	None identified
Meroño-Cerdan and Soto-Acosta (2007)	Website content (e-information; e-communication; e-transaction)	Financial firm performance	Archival data and content analysis of the websites of 288 Spanish SMEs	**Mixed**: E-communication and e-transaction have a positive effect on firm performance, whereas e-information has a non-significant effect. Some interaction effects are also non-significant.	Ex post	None identified
Lüneborg and Nielsen (2003)	Internet banking; CRM	Sales performance; relationship marketing performance	Survey of IT managers from 278 small and large European retail banks	**Mixed**: Adoption of Internet banking enhanced sales performance (for small banks) and relationship marketing performance. Adoption of CRM had no effect on sales performance. *Authors call for adopting "broader perspectives [that] are needed to understand and to prescribe the manner in which new technologies are introduced into the organization. Technological advance implies strategic and organizational possibilities at several stages in the adoption and implementation processes, and*	Ex post	None identified

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
				it seems necessary to analyze these processes all the way" (p. 265).		
Mishra et al. (2007)	E-procurement	Process efficiencies; cost savings	Survey of procurement professionals from 412 US manufacturing firms	**Mixed**: Positive effect of e-procurement use in order initiation and completion on performance, but no direct effect of e-procurement use in search.	Ex post	Changes in product design and specifications; regular product innovations; volume requirements
Oh and Pinsonneault (2007)	Portfolio of 48 IT systems for manufacturing SMEs	Expenses; revenue; perceived profitability	Survey of executives from 110 Canadian SMEs in the manufacturing industry	**Mixed**: Expenses, revenue, and profitability were reduced by some IT systems, increased by others, and not influenced by yet others.	Ex post	None identified
Okoli et al. (2010)	E-business policies	Financial value	Survey of 316 managers and professionals from SMEs in Latin America and sub-Saharan Africa	**Non-significant**: No significant effect of e-business policies adoption on e-business value.	Ex post	None identified
Osei-Bryson et al. (2008)	ERP	Implementation effectiveness	Survey of 206 users from 6 firms that implemented ERP	**Mixed**: Mixed effects on implementation effectiveness.	Ex post	Implementation climate; innovation-values fit
Otim and Grover (2012)	E-commerce	Tobin's q	Archival data of 172 e-commerce investment announcements made between 2000 and 2006	**Mixed**: Mixed effects of e-commerce investment announcements on shareholder value. Effects range from non-significant (for scale-up investments) to positive (for joint investments)	Ex ante	Internet boom and bust

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Palmer and Markus (2000)	Levels of adoption of various IT innovations for specialty retailing	Sales growth; profitability; inventory turnover	Survey of IS executives from 80 specialty retail firms that are members of a technology-oriented consortium	**Mixed**: Mixed effects of the different levels of adoption on performance measure (positive, negative, and non-significant). *Respondents are members of a consortium who may have been motivated by institutional pressures to adopt. Authors note that some members waited until technology was widely diffused before adopting, and that "adoption of [quick response innovations] is influenced by several factors, including level of current IT sophistication and supplier relationships" (p. 256).*	Ex post (5 years after adoption)	None identified
Piccoli and Lui (2013)	Self-service kiosk	Hotel's competitive performance (RevPAR)	Archival data from 165 hotels where customers use the hotels' self-service check-in kiosks	**Positive**: Competitive performance enhanced and sustained by the joint effect of self-service kiosk use and brand.	Ex post	None identified
Poston and Grabsky (2001)	ERP	SG&A costs / revenues; COGS/ revenues; number of employees/ revenues; residual income	Archival data of 50 firms that publicly announced ERP adoption	**Mixed**: Mixed effects of ERP adoption on financial performance measures: labor rate decrease but costs as a percentage of revenue increase after adoption.	Ex post (3 years after implement ation)	None identified
Rai et al. (2009)	E-procurement	Procurement productivity	Survey of procurement professionals from 166 firms	**Positive**: Assimilation of the e-procurement system increases procurement productivity.	Ex post	None identified
Ranganathan and Brown (2006)	ERP	Stock market returns	Archival data of ERP investment announcements by 116 US firms	**Mixed**: Mixed effects of ERP investment announcements on shareholder value. Effects range from negative to positive depending on the level of functional and physical scope.	Ex ante	None identified

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Ray et al. (2005)	Flexible IT infrastructure; generic technologies	Customer service output quality	Survey of managers from 72 firms in the life and health insurance industry	**Mixed**: No effects of flexible IT infrastructure and generic technologies on customer service quality. Positive interaction effect of generic technologies and shared knowledge.	Ex post	None identified
Saint-Léger (2004)	ERP	Cost-efficiency; error reduction; inventory optimization; improved decision-making	Case study of a large European organization	**Mixed**: The post-ERP phase results in inventory efficiencies but also in hidden costs.	Ex post	Market fluctuations
Setia et al. (2011)	Health IS (business and clinical)	Financial performance	Archival data of 285 implementations of health IS in the US	**Mixed**: Positive effects of business IS on performance, but negative effects of clinical IS.	Ex post	None identified
Sila (2010)	Inter-organizational systems	Operational performance; business process performance; financial performance	Survey of supply chain management professionals from 319 Canadian firms	**Positive**: Positive indirect effect of IOS adoption on firm performance. *Although the study includes antecedents of IOS adoption, all variables were measured ex post (no ex ante assessment of value)*	Ex post	Environmental complexity; environmental hostility
Thiesse et al. (2009)	RFID	Operational efficiencies; improved customer service process	Case study of a major European retail chain	**Positive**: RFID adoption results in various improvements in operational performance (e.g., time and cost reductions; improved data quality; higher sales) and customer service performance (e.g., more efficient search). *The case study focuses on ex ante and ex post benefits that are efficiency-oriented.*	Ex ante and ex post	Trading partner resources
Truman (2000)	EDI use intensity and EDI integration	Labor displacement; claim error rate; claim payment time	Survey of IS managers from 48 group insurance firms	**Mixed**: Only some weak support of EDI effects on labor displacement. No effects on effectiveness (claim error rate and payment time). *Authors explain mixed results by indicating that the context of adoption, which may be uncertain*	Ex post	None identified (but authors call for incorporating the uncertainties of the context of adoption)

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
				before adoption, must be considered: "Because the claims adjudication process is complex and (probably) nonuniform in execution, the complete and accurate modeling of manual decision rules may remain elusive prior to EDI implementation" (p. 233).		
Turel and Bart (2014)	IT governance by board	Financial performance	Survey of 171 Canadian board members	**Positive**: Positive effect of board adoption of IT governance on financial performance. *Authors draw on an organization performance scale that includes efficiency- and legitimacy-oriented measures, but they only use the efficiency type in this study.*	Ex post	None identified
Venkatraman and Zaheer (1990)	Electronic integration of agents with insurance carriers	Commission- and premium increases; change in number of existing/ new policies	Quasi-experiment of electronically-interfaced and non-interfaced insurance agents and carriers	**Mixed**: Increased number of new business policies, but no increases in premiums, commissions, or operating efficiency. *Authors observe that "strategic benefits through electronic integration seems to have reached the status of an implicitly accepted truism in the professional circles, with scant theorizing and little empirical demonstration" (p. 390).*	Ex post	None identified (but authors recommend considering environmental uncertainties and corresponding actions, such as those that involve power shifts between partners or other changes in business relationships, and the consequent benefits to the different participants)
Yang et al. (2012)	Virtual world initiatives	Stock market returns	Archival data of virtual world initiative announcements by 261 firms	**Positive**: Positive effect of virtual world initiative announcements on stock value.	Ex ante	Strategic importance of supported processes; contribution to exploitable capacity; innovation radicalness; interpretive flexibility; divisibility (authors also suggest there is cost/ benefit ambiguity

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
						surrounding the virtual world adoption decision)
Zhu et al. (2004)	E-business	Sales measures; internal efficiency; coordination measures	Survey of IT executives from 612 firms across 10 countries in the financial services industry	**Mixed**: Internal factors (technological and organizational context) had a positive impact on value while the competitive environment had no impact. *Authors identify competitive pressures as a motivating force of adoption and find that it does not influence efficiency-oriented measures of realized value.*	Ex post	None identified
Zhu et al. (2006)	E-business	Sales performance; procurement performance; operational efficiency	Survey data from 1415 firms in 6 European countries	**Positive**: Positive impact of e-business usage on performance.	Ex post	Relative advantage; compatibility; cost concerns; security concerns
Zhu and Kraemer (2005)	E-business	Impacts on sales, procurement, and internal operations	Survey of managers and executives from 624 firms across 10 countries in the retail industry	**Positive**: Positive impact of e-business use on performance.	Ex post	None identified
Appendix 1b: Studies examining the legitimacy-oriented aspect of IT value						
Heikkilä (2013)	e-HRM systems	Local legitimacy of subsidiary; system acceptance and use by host country nationals	Semi-structured interviews with 14 informants from 10 MNC subsidiaries in China	**Positive**: Adoption of e-HRM systems by Chinese subsidiaries allowed them to gain local legitimacy and increase the acceptance and use of the systems by Western host country nationals. *Authors find that the adoption of the system was to achieve legitimacy-oriented, rather than efficiency-oriented goals. Also, there was low ambiguity regarding the (low) strategic potential of adopting the e-HRM, which led subsidiaries to follow a symbolic adoption.*	Ex ante and ex post	Ambiguity regarding the strategic potential of the adoption (low)

Authors (year)	IT innovation adopted	Measures of IT value	Methodology	Findings/ *comments*	Value evaluated ex ante / ex post	Environmental uncertainties surrounding the innovation adoption
Otim and Grover (2006)	B2C e-commerce (pre-purchase; transaction-related; post purchase)	Customer loyalty	Archival data of B2C firms on the Bizrate.com database	**Mixed**: Customer loyalty (repeat purchase intention) influenced by some e-commerce features but not by others. *While the dependent variable of customer loyalty can be considered as legitimacy-oriented performance, it is assessed via an efficiency-oriented measure (repeat purchase intentions)*	Ex post	Product pricing
Appendix 1c: Studies examining the efficiency- and legitimacy-oriented aspects of IT value						
Bandara and Rosemann (2005)	Process modeling initiatives	• Model quality; model use; modeling impact (Efficiency) Modeler satisfaction; user satisfaction (Legitimacy)	Case study of a leading Australian tele-communications firm	**Positive**: Adoption of process modeling initiatives increase both efficiency and legitimacy measures of success	Ex post	Adoption readiness
Lin et al. (2007)	B2B e-commerce	• Sales increase; cost reduction (Efficiency) • Corporate image (Legitimacy)	Survey of IT executives from 181 Australian firms	**Mixed**: B2B e-commerce benefits are influenced by B2B e-commerce readiness and adopting a benefits realization process, but not by adopting a investment evaluation method. *The efficiency and legitimacy measures of performance were lumped together in a single scale.*	Ex post	Adoption readiness
Silva and Hirschheim (2007)	Health IS (SIS)	• Cost reductions (Efficiency) • Political approval to party in office (Legitimacy)	Case study of an SIS implementation at a Latin American government organization	**Not applicable-**: Ex ante, the system was implemented to enhance legitimacy of the health ministry vis-à-vis the voters before the elections, and to a lesser extent, to improve efficiency (via cost reductions). These benefits were not realized ex post, because a new government was elected, which did not share the same views about the ex ante benefits. Consequently, the SIS implementation was abandoned.	Ex ante and ex post	Concern for organizational survival (immediate); ambiguity surrounding costs/ benefits (high)

Authors (year)	**IT innovation adopted**	**Measures of IT value**	**Methodology**	**Findings/ *comments***	**Value evaluated ex ante / ex post**	**Environmental uncertainties surrounding the innovation adoption**
Venkatesh and Bala (2012)	Inter-organizational business process standards	• Cycle time (Efficiency) • Partnering satisfaction (Legitimacy)	Longitudinal survey of managers from 124 client organizations and their B2B partners in the high-tech industry	**Positive**: IBPS adoption is influenced by technological, organizational, and environmental factors, and in turn it increases operational efficiency and enhances partnering satisfaction. *Authors relate the ex post value to ex ante conditions surrounding the adoption, such as expected benefits, process compatibility, and standards uncertainty.*	Ex ante and ex post	Expected benefits; process compatibility; standards uncertainty;
Wang (2010)	Eight IT innovations in fashion (ASP; MPR; DW; e-commerce; ERP; groupware; KM)	• ROA;ROE; ROS (Efficiency) • Corporate reputation; executive compensation (Legitimacy)	Archival data of 109 Fortune 500 firms	**Mixed**: In the short-term, adopting the IT innovations in fashion has a negative effect on efficiency and a positive effect on legitimacy. In the long-term, there is only a positive effect on efficiency.	Ex post	None identified