2010

An Integrated Perspective on IT Project Alignment in Highly Dynamic Environments – A Multi-Level Analysis

Martin Wolf
Goethe University Frankfurt, mwolf@wiwi.uni-frankfurt.de

Roman Beck
Goethe University Frankfurt, beck@itu.dk

Jens Vykoukal
Goethe University Frankfurt, jvykoukal@wiwi.uni-frankfurt.de

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Completed Research Paper

Martin Wolf
Goethe University Frankfurt
mwolf@wiwi.uni-frankfurt.de

Roman Beck
Goethe University Frankfurt
rbeck@wiwi.uni-frankfurt.de

Jens Vykoukal
Goethe University Frankfurt
jvykoukal@wiwi.uni-frankfurt.de

Abstract

During recent years, IT alignment research has gained considerable attention in both academia and practice. However, so far most studies focus on the strategic-to-strategic IT alignment dimension, thus omitting an integration of the strategic-to-tactical IT alignment dimension. By drawing upon assimilation and institutional theory, our research model depicts a perspective on IT project alignment that integrates both the internal strategic-to-tactical IT alignment and the external IT alignment dimension. The derived hypotheses were tested based on 189 responses from IT decision makers of U.S. financial services providers. The results from partial least squares analyses suggest the importance of internal as well as external IT alignment for IT project success. Moreover, the role of tactical middle management for the alignment to external dynamics seems to be underestimated in prior studies. Our results contribute to IT alignment theory by integrating a multi-level perspective emphasizing the complementary roles of strategic and tactical management levels.

Keywords: IT alignment, Business-IT Alignment, Institutional Theory, Environmental dynamism, Organizational Dynamics, IT value, Business value of IS/value of IS

Introduction

The close matching of strategic top management objectives and their respective tactical IT management plans has been proven to be decisive for the success of IT-driven innovation within organizations. Several practitioner-oriented frameworks, such as ValIT and CoBit, grasp this need and provide industry best practices for IT alignment. The practical relevance of IT business alignment is further documented by its persistence as number one concern of IT executives in the annual society for information management (SIM) survey for five years in a row by now (Luftman et al. 2009). Based upon 1,217 responses from IT executives from nine countries, the Information Systems Audit and Control Association recently presented results suggesting that less than half of all firms are able to measure the IT-enabled benefits and their alignment to business goals (ISACA 2009). In IS research, during recent years, IT alignment has evolved to a mature research stream drawing a multi-faceted, though partly underspecified picture of the IT alignment concept (Chan et al. 1997). Much research has been conducted on the identification and delineation of different dimensions and levels of IT alignment, such as its social and intellectual dimension, at the strategic and/or tactical level (Chan and Reich 2007). Emphasizing the importance of IT alignment for practice, there is sustained evidence from IT alignment research suggesting that a well implemented strategic alignment of IT objectives with its referring business objectives leads to improved firm performance and better exploitation of IT-based capabilities (Armstrong and Sambamurthy 1999). Though being part of academic discussion for several decades now, an integrated view with regard to the interplay of the strategic and tactical level of IT alignment is still underdeveloped in the extant literature (Tarafdar and Qrunfleh 2009). As Luftman et al. (2009) summarize it: "*[…] people [still] tend to look for the one silver bullet that will enhance alignment*".

Surprisingly, studies with a vertically integrated view on both the strategic and tactical level of IT alignment are still rare. Though, Henderson and Vekataraman's (1993) seminal strategic alignment model (SAM) already depicts the complementarity and intertwining of both strategic and tactical IT alignment embodied in interactions between and among top and middle management forming the internal IT alignment process. However, current research mostly focuses on either the strategic-to-strategic IT alignment component or the tactical-to-tactical IT alignment component (Tarafdar and Qrunfleh 2009). Also, little research has been conducted on a finer level of granularity with regard to the IT alignment object under analysis. For instance, a valuable starting point for further IT alignment research could be the analysis of well-specified IT projects, such as the assimilation of a new enterprise IT infrastructure (EII). Following Chan and Reich (2007), IT project alignment can be understood as the degree to which the outcome of an IT project matches with the organization's IT strategy and overall project's objectives, thus reflecting the strategic-to-tactical alignment component. Especially as far as technology innovation projects are concerned, the gap of perceptions between senior and functional managers has been identified as a core problem for the successful assimilation of technological innovations (Gutierrez and Serrano 2008).

One paradigmatic shift that concurrently coined recent IT business alignment research is the perception of IT business alignment as a rather dynamic process than a static one-time (re-)adjustment (Chan and Reich 2007). Thus, IT alignment is regarded as part of the dynamic capabilities of a firm which refer to the organizational ability to configure its internal and external capabilities to address environmental dynamics (Teece et al. 1997) reflecting external IT alignment. Consistently, growing evidence from innovation assimilation research suggests that especially strategic and tactical management are exposed to environmental dynamics with regard to a diverse set of institutional and environmental pressures (Ang and Cummings 1997; Liang et al. 2007). IT innovations, such as a competitive EII with a strategic impact on the business, can be identified and supported by top management as an adequate response to environmental dynamics. In this context, the extant literature emphasizes the role of top management as the key agency and sensemaking entity for the transfer and conversion of environmental dynamics to the firm context. However, so far, there is no horizontally and vertically integrated view on environmental dynamics that affect both the strategic and tactical management. This need for a multi-level analysis is further intensified by inconsistent findings of prior studies focusing on the strategic level of alignment to environmental dynamics that could only partly explain how normative pressure, such as professionalization tendencies, are transferred or mediated to the firm context (Liang et al. 2007).

In our research, we assess the role of the strategic-to-tactical IT alignment dimension (vertical integration) and its alignment with environmental dynamics (horizontal integration) in the EII assimilation process as instance of an IT project. In doing so, we integrate concepts from assimilation and institutional theory with IT business alignment concepts eventually leading to an IT alignment model that is different to well-established IT alignment models but contributes to them at the same time. In our analyses, we focus on the assimilation of Grid-based infrastructures as

EII technology in the asset management (AM) and risk management (RM) processes of financial services providers in the U.S. In essence, Grid computing enables heterogeneous and geographically dispersed IT resources (e.g., storage, databases, application servers) to be virtually shared and accessed across an enterprise, industry, or workgroup in an ad-hoc manner (Foster and Kesselman 1999). The AM and RM processes reflect two of the key business processes of financial services providers that decisively determine their firm performance. Due to its potential to foster the development of advanced data processing, data mining, and (inter-)organizational collaboration capabilities, Grid infrastructures can be classified as type III innovations (Swanson 1994). Especially type III innovations can be understood as strategic responses to environmental dynamics, such as institutional pressure (Ang and Cummings 1997). By means of Grid technology utilization, financial services provider can process more sophisticated risk and return models in a timely fashion, thus leading to regulatory compliance. Our analyses of the external IT alignment dimension shed light on the exposure of both strategic and tactical management to environmental dynamics such as institutional pressure and environmental turbulence in the EII assimilation process. In this paper, we develop and validate a research model based upon responses from 189 IT executives from the financial services industry in the U.S. suggesting that environmental dynamics affect the strategic and tactical level in the IT project alignment process in an idiosyncratic and level-dependent manner. Strategic management as key agency is exposed to overarching industry movements, such as mimetic behavior and regulatory pressure. In contrast, in the course of IT innovation projects, tactical middle management is stronger affected by environmental turbulences, such as fast changing customer demand and technological breakthroughs. Our analyses emphasize the complementary role of tactical middle management which might serve as a second human agency thus extending prevalent theorizing on the strategic top management level. In the course of our analyses, we found first evidence how to interpret and resolve inconsistent findings in prior studies that integrate institutional theory and its conversion to organizations.

The remainder of the article is organized as follows: first, the theoretical underpinnings and the derived hypotheses of our research model are introduced. In detail, environmental dynamics, their grounding in institutional theory, and their impact on both levels of strategic and tactical middle management are depicted to break grounds for the external IT alignment perspective. Subsequently, the internal IT alignment perspective is motivated and conceptualized as the interdependencies between strategic and tactical management against the background of existing organizational inertia. Finally, business process outcomes as a surrogate measure of IT project alignment success is defined. In the third section, an overview of the study design and the development of the utilized survey instrument are provided. Finally, the results of the analyses of the research model are presented. The latter suggest the importance of both the internal as well as the external IT alignment perspective for the generation of increased business process outcomes as surrogate measure of successful IT alignment. The article concludes with a discussion of existing limitations and their value as further research venues.

Research Model and Hypotheses

IT Alignment

From the very beginning, IT alignment research has distinguished between the strategic and tactical level of alignment regarding both as equally important for the performance link of IT utilization (Chan et al. 1997; Cragg et al. 2002; Henderson and Venkatraman 1993). Strategic IT alignment reflects the congruence of business plans, goals, and needs with corresponding IT plans (Luftman and Brier 1999), whereas tactical IT alignment is defined by the fit and integration among the business infrastructure and the IT infrastructure (Henderson and Venkatraman 1993). Both levels of IT alignment can be subsumed as manifestation of the ***intellectual alignment dimension*** (Reich and Benbasat 2000) which posits a rationality-driven perception of the IT alignment process. In contrast, the ***social alignment dimension*** focuses on relational aspects among involved top managers from both the IT department and the board of executives (Reich and Benbasat 2000). Accordingly, during recent years, IT business alignment literature has continuously emphasized the relationship between the top management team (TMT) and the chief information officer (CIO) as head of the tactical IT middle management (Kearns and Lederer 2003). Especially, top management support and intra-organizational communication between the IT and business departments in the context of IT projects lead to improved IT project alignment and business performance management (Ariyachandra and Frolick 2008). Consistently, top management support in operational IT planning and management setup is required to establish IT alignment (Kearns and Lederer 2003). As extension to the social IT alignment conceptualization, shared mental models between CIOs and the TMT resulting from cognitive (e.g., educational mechanisms, shared understanding, structural systems of knowing) and social commonalities (e.g., relational similarity, shared language, social systems of knowledge) are suggested to prerequisite intellectual alignment (Preston and Karahanna 2004; Preston and Karahanna 2009). Both social and intellectual IT alignment contribute to the alignment of IT resources within an organization as expression of an ***internal alignment perspective*** (Earl 1989). Within prior internal IT alignment research, so far, research mostly focused on the strategic level of analysis, thus omitting TMT and operational management interactions as strategic-to-tactical implementation of internal IT project alignment. Here, we contribute to the need for an integration of the strategic and the tactical level of IT alignment. Such an integrated view is suggested to be a valuable perspective and starting point for further IT alignment research (Chan and Reich 2007).

Besides this internal IT alignment perspective, Henderson and Vekataram (1993) assert that both internal and ***external IT alignment*** are necessary. Firms have to align their business and IT strategies with industry and technology forces while internally safeguarding IT alignment (Chan and Reich 2007). This external perspective of IT alignment can be extended to the alignment of IT strategy and resources within value chains (Sledgianowski and Luftman 2005) or to the influence exerted by crucial partners, customers, and suppliers (Galliers 2004). One valuable starting point for an integration of the internal and external IT alignment perspective is institutional theory which was already integrated in assimilation research to explore the mechanisms driving technology diffusion (Teo et al. 2003) and its mediation via top management (Liang et al. 2007). By doing so, an existing critique towards the partly atheoretical nature of IT alignment research, due to its strong reliance on contingency concepts, could be overcome (Chan and Reich 2007). As a consequence, well-established theories, such as institutional theory, could serve as a viable venue for theoretical (re-)conceptualization of the external alignment dimension (Chan and Reich 2007). This is further consistent with existing empirical evidence of the performance link of IT alignment against the background of well-developed dynamic capabilities of the firm (Teece 2007; Teece et al. 1997). So far, only few studies integrated environmental dynamics, such as institutional pressure and environmental turbulence, as determinants of external IT alignment and its background mechanisms, such as its mediation via different levels of management. In essence, by drawing upon assimilation theory and institutional theory, the depicted research model integrates the internal strategic-to-tactical IT alignment dimension (vertical integration) and the external IT alignment dimension (horizontal integration) (see Figure 1).

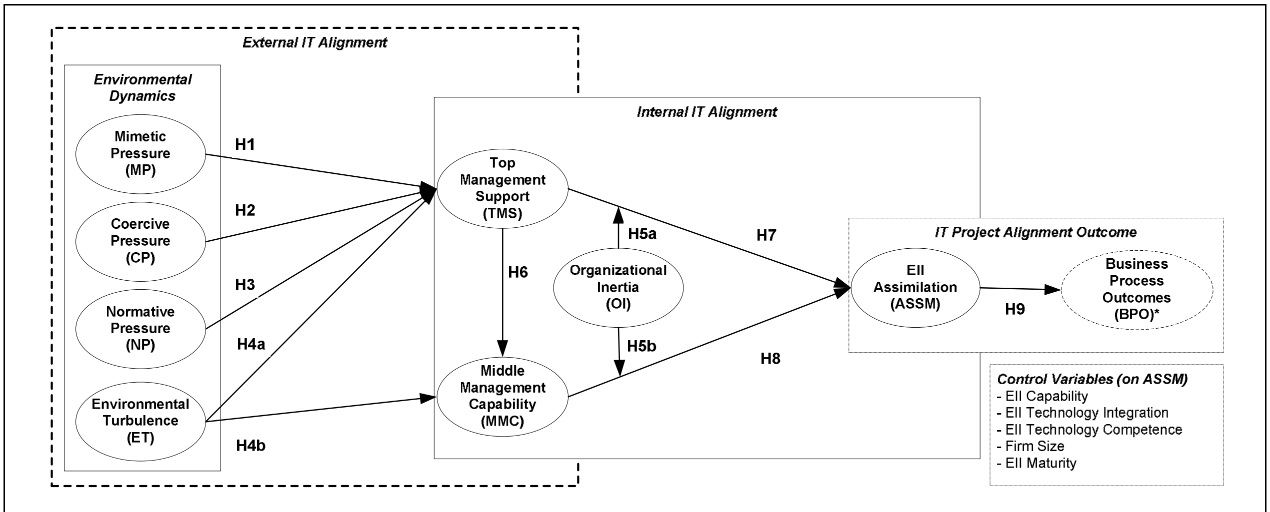

Figure 1. Research Model, * second-order reflective construct

Institutional Pressure

During recent years, institutional theory has emerged to an established theoretical perspective to account for the influence of external forces on organizational decision making (Mizruchi and Fein 1999). Institutional theory posits that structural and behavioral changes in firms are driven by a strong inherent organizational need for legitimacy (DiMaggio and Powell 1983). The continuous search for organizational legitimacy eventually facilitates the process of institutionalization and organizational isomorphism especially in dynamic environments. In these environments, top management fulfills a boundary spanning role (Mitchell 2006) and integrates external knowledge and pressure with internal knowledge (Liang et al. 2007). However, tactical middle management capability is required to transfer strategic implications of top management to the adaption of business processes (Floyd and Wooldridge 1997) as reflection of IT project alignment. In sum, institutional theory proposes three different forces that drive organizations to align their strategies to environmental pressure (DiMaggio and Powell 1983; Meyer and Rowan 1977):

Mimetic pressure reflects the pressure to imitate structurally equivalent successful organizations in the same industry without necessarily considering the firm-specific context (DiMaggio and Powell 1983). These so-called "bandwagon phenomena" can be induced by competitors in the same industry having already successfully adopted an EII that resulted in increased business process outcomes in the adopting firm. Especially a dynamic environment is characterized by an above average level of mimetic pressure among firms (Swanson and Ramiller 2004). In such an environment, the consequences and goals of an innovation are poorly understood or are ambiguous. However, mimetic pressure can induce mimicry in organizational strategic decision-making if adopting firms are perceived as successful by the environment (Swanson and Ramiller 2004). In this context, top management can "borrow" mindfulness from other firms or peers. Also, mimetic behavior helps top management to mitigate arising risks by doing what the majority perceives as "rational". For instance, in financial decision-making situations, participants tend to imitate the behavior of other participants (so-called "herd behavior") (Bikhchandani et al. 1992; Ottaviani and Sorenson 2000). Since organizational decisions are usually agreed upon by top management and consistently with Liang et al. (2007), we hypothesize:

H1: A high level of mimetic pressure leads to stronger top management support in the EII assimilation process.

Coercive pressure is defined by the pressure grounded in societal expectations and dependencies towards other enterprises (Bela and Venkatesh 2007; DiMaggio and Powell 1983). Coercive pressure arises from societal expectations in a broader sense where firms try or have to conform to expectations, policies, or regulation from the government, customers, or the competitive environment. Furthermore, various government and industry regulations exert coercive pressure on enterprises and decisively drive the diffusion of IT innovations addressing these pressures (Ang and Cummings 1997; Zhu et al. 2006b). Especially against the background of the current financial crisis, financial services providers face increased governmental regulations and competitive conditions in their markets. Therefore, top management is obliged to identify and introduce an EII to meet the regulatory requirements and increased customer demands, such as highly complex risk scenario simulations and new financial products. Due to estimated overall losses of 4.1 trillion US-$ caused by the financial crisis so far (IMF 2009), top management in the financial services industry is exposed to considerable pressure to re-organize current risk management and asset management practices. Since an EII technology, such as Grid technology, provides firms with the opportunity to encounter coercive pressure imposed by government and industry regulations and top management members are the focal point of this coercive pressure, we hypothesize:

H2: A high level of coercive pressure leads to stronger top management support in the EII assimilation process.

Pressure that is rooted in the ongoing process of professionalization is encompassed by *normative pressure* (DiMaggio and Powell 1983). Normative pressure is further enforced by the close collaboration with suppliers, business partners, and governmental promotion. Here, normative pressure arises from the exchange of best practices among business partners, suppliers, and the government. Since (financial) value chains consist of several participating entities, the assimilation of a specific technology may also impact the other entities to do the same in order to realize business value (Dong et al. 2009). Also, if one entity exhibits a relatively high level of professionalization, pressure arises among the involved entities to advance. Finally, the ongoing interpersonal communication between value chain managers from different entities provides firms with access to firsthand experience of EII technology, its potential advantages, and best practices of efficient assimilation. Since top management is likely to be influenced by institutional norms that are prevalent in their inter-organizational networks and consistent with Liang et al. (2007), we hypothesize:

H3: A high level of normative pressure leads to stronger top management support in the EII assimilation process.

Environmental Turbulence

Both strategic top and tactical middle management are affected by a turbulent environment. *Environmental turbulence* encompasses environmental conditions of uncertainty and unpredictability caused by massive and rapid changes in technological development or market preferences (Jaworski and Kohli 1993; Pavlou and El Sawy 2006).

These can be either induced by market turbulences or technological turbulence (Jap 2001). Market turbulences are formed by unpredictability in market demands, consumer needs, competitors' strategies, or a changed rapidity of market demands with regard to the frequency of change in the environment. In contrast, technological turbulences encompass the unpredictability of new technological innovations in terms of their unanticipated consequences for an industry and their rapidity with regard to innovation speed (Jap 2001). Technological breakthroughs, the ongoing deregulation of markets and globalization have further intensified competition and increased the level of environmental turbulence leading to the emergence of new responsive organizational forms (Ansoff and Sullivan 1993). A crucial objective of strategic top management is to identify market or technological changes early after their emergence and to develop contextually tailored (IT) strategies. Strategic IT responses (Ang and Cummings 1997), such as the assimilation of a flexible EII, are one means to address environmental turbulence. The assimilation of EII technologies, such as Grid technology which allows the on-demand provision of access to IT resources, is one viable approach. Finally, top management is responsible to transfer strategies to the internal context of operational strategies and capabilities. Accordingly, we hypothesize:

H4a: A high level of environmental turbulence leads to stronger top management support in the EII assimilation process.

On the other hand, tactical management is affected by massive and rapid changes in available technologies as well, because it has to interpret strategies from top management and is responsible to transfer them to the operational course of action (Floyd and Wooldridge 1997). If the available technology portfolio or IT project objectives defined by customer demands change, this also affects the EII assimilation process and success because the design of applicable EII solutions can differ significantly. Prior research drawing upon the dynamic capabilities of the firm theory suggests a strong link between a turbulent environment and middle management capabilities (Cepeda and Vera 2007). Accordingly, we hypothesize:

H4b: A high level of environmental turbulence leads to stronger middle management capabilities in the EII assimilation process.

Organizational Inertia

Organizational inertia reflect the extent to which management is confronted with an underdeveloped organizational readiness for change (Zhu et al. 2006b). These obstacles might arise from a lack of well-trained IT staff, restraining IT landscapes, and potential resistance from the user side as for example the business departments. In addition, regarding technological concerns, a lack of standardized applications, compatibility, and performance hinders the diffusion of technologies (Corrocher and Fontana 2008). Organizational inertia are posited to be among the most critical challenges for (technological) changes and their success (Kelly and Amburgey 1991). Since change processes, such as the assimilation of an EII, are driven by both strategic and tactical managers, both levels have to overcome these challenges to progress in the EII assimilation process. Thus, we hypothesize:

H5a: The positive impact of top management support on the progress of EII assimilation will be weakened if a high level of organizational inertia persists.

H5b: The positive impact of middle management capability on the progress of EII assimilation will be weakened if a high level of organizational inertia persists.

Top Management Support

Top management support of IT refers to the degree to which top management regards the IT function as important and is interested in operational IT details (Ragu-Nathan et al. 2004). Several empirical studies emphasize the significant impact of top management on IT alignment (Teo and Ang 1999). Top management serves as main human agency for absorbing, conversing, and delegating institutional pressure arising from the environment to operational course of action (Liang et al. 2007). Opposing the concept of institutional isomorphism, top management support was found to partly account for the differing assimilation behaviors among firms exposed to the same level of institutional pressure (Teo et al. 2003). This diversity arises from individual top management decisions about required changes in organizational structures and policies for accommodating institutional pressure. IT project success heavily relies on the support by managers being able to change resource allocation if required to succeed in the project (Jiang et al. 2000). Kim and Kankanhalli (2009) further emphasize the role of top management support to overcome user resistance and to initiate change processes at the operational level. As a result of intense collaboration and communication with middle management, the grounds for operational middle management capability as ability to implement demanding change processes are set (Terziovski et al. 2003). In this context, Spreitzer and Quinn (1996) distinguish between individual characteristics (such as self-esteem and affect about work) and organizational characteristics (such as barriers to change and social support) that foster the evolution of middle management capability as capability to lead transformational change processes. As result of their analyses of Ford's Leadership Education and Development program, among the organizational characteristics especially social support of the superiors (in our case top management) is important with regard to substantiating the effectiveness of operational middle management in transformational change processes. In this context, social support of superiors leads to the sharing of information and resources between management levels and the provision of access to key sociopolitical networks (Kanter 1983). Moreover, this social support is important for fostering middle management's will to take risk and initiate change (Dutton and Ashford 1993). Finally, top management provides an interpretation frame for middle management to derive the link between strategic goals and operational response, thus facilitating the evolution of middle management capability. Accordingly, we hypothesize:

H6: A high level of top management support facilitates the evolution of middle management capability.

If top management understands the benefits and the strategic importance of IT, the chances of successful IT alignment are higher (Teo and Ang 1999). With regard to EII technology, top management can legitimize EII assimilation by demonstrating their commitment and political support through participation in deployment initiatives. Since EII technology is suggested to provide enterprises with a competitive IT infrastructure, thereby improving efficiency, effectiveness, and flexibility of IT-enabled business processes, top management is expected to be aware about these benefits. This awareness of benefits by the top management eventually leads to top management support that is likely to facilitate the EII assimilation process, wherefore we propose:

H7: A high level of top management support leads to a more mature stage of the EII assimilation process.

Middle Management Capability

Middle management capability reflects the extent to which tactical middle management is capable and committed to effectively monitor, administer, and guide through operational processes (Pavlou and El Sawy 2006; Sethi et al. 2001), such as innovation assimilation processes. Within the organization, middle managers have a coordinating role in mediating, negotiating, and interpreting connections between the organization's strategic and tactical level (Parsons 1960; Thompson 1967). The ability of middle management to redesign processes and implement organizational changes to accommodate the assimilation of IT is a prerequisite for improved firm performance (Dong et al. 2009). As part of this, worker incentives have to be installed and arising conflicts have to be overcome (Pavlou and El Sawy 2006). Moreover, successful tactical middle management is reflected by the ability to acquire critical IT expertise if the project requires it (Dong et al. 2009). Kanter (1983) summarizes the aforementioned capabilities of effective middle managers as the three "power tools": access to resources, access to information, and access to support. In their "downward role", middle management translates strategic objectives into operational objectives and thus establishes a certain degree of uniformity in order to achieve consistency at the operational level (Floyd and Wooldridge 1997). This operational consistency eventually leads to organizational performance and a faster assimilation of EII systems. Accordingly, we hypothesize:

H8: A high level of middle management capability leads to a more mature stage of the EII assimilation process.

Enterprise IT Infrastructure Assimilation and Business Process Outcomes

The concept of assimilation in the broader technology literature encompasses sub-concepts such as user assimilation, technological receptivity (Gilbert and Cordey-Hayes 1996), and absorptive capacity (Zahra and George 2002), thus integrating an organizational learning perspective with the technology-centric view of IT assimilation prevailing in IS research. However, Fichman (1999) notes that due to the absence of a general theory of innovation (diffusion), middle range theories focusing on specific classes of technologies and/or particular assimilation contexts exhibit a great value on their own. Thus, we draw upon the extant IS literature which defines assimilation "as the extent to which the use of a technology diffuses across organizational work processes and becomes routinized in the activities associated with those processes" (Chatterjee et al. 2002). Consistently, we conceptualize *EII assimilation* as the extent to which a firm has progressed through stages of innovation deployment (initiation, adoption, and routinization) (Fichman 2001). We deemed an EII assimilation process as a valuable instance for the analysis of the

IT project alignment process because it exhibits a well-defined scope and reflects an IT project. Since EII assimilation on firm level is assessed, an aggregated measure for the assimilation stages is employed (see Table 4). As unit of analysis for measuring EII assimilation progress and business value generation, a business process level perspective was deemed appropriate due to the fact that IT investments are supposed to first affect the performance of specific business processes (Davamanirajan et al. 2006). Prior research suggests that a firm encompasses approximately 18 key processes being vital for the overall firm performance (Davenport 1993). In order to identify the key business processes being primarily influenced by EII assimilation in the financial services industry, several expert interviews with IS executives were conducted. The interviews revealed that the asset and risk management processes are especially appropriate as well as crucial for the financial services industry in this context (for simplification reasons both called PROCESS in Table 3 and 4). For instance, in 2008, the asset management process of the Bank of America accounted for 10 percent of the revenue but concurrently contributed with 35 percent to the net income (SEC 2008) with projected growing potential for the future. Further evidence of the relevance of the risk management process was provided by the Risk Management Association (RMA) in 2010: Among 75 global firms being interviewed by the RMA, 56.8% rated the data quality for their risk management process as average or even worse (RMA 2010). Due to the perception of the risk management professionals, an improved data quality and risk management process would lead to a more timely identification of emerging problems and a more efficient capital allocation and utilization. The finally utilized assimilation measure combines several benefits, e.g., greater robustness and generalizability, at the cost of a possible loss of context specificity and reduced clarity of the theoretical interpretation (Fichman 2001). Since it is expected that both strategic and tactical management have an impact on all assimilation stages in the same direction, this bias can be deemed to be of minor importance compared to its potential benefits. Business value then usually manifests in forms of changes of operational process efficiency, effectiveness, and flexibility (Karimi et al. 2007a; Karimi et al. 2007b). As proposed by Karimi et al. (2007a; 2007b) in the domain of ERP assimilation, process efficiency, process effectiveness, and process flexibility form the overall *business process outcomes* construct. *Process efficiency* reflects the extent to which the use of IT implementation reduces the operational costs and decreases the input/output conversion ratio, whereas *process effectiveness* defines the extent to which IT implementation provides an improved functionality and enhances the quality of the users' work. The extent to which IT implementation provides firms with more flexibility in response to changing business environments defines the *process flexibility* of the business process outcomes construct.

A high level of IT project alignment results in high organizational performance (Chan and Reich 2007; Gutierrez and Serrano 2008) and it becomes first visible on the process level of analysis. In our study, business process performance as perceptual measure of business value was operationalized as dependent variable for the AM and RM processes of a financial services provider. Here, it served as a surrogate measure and indicator of the consequences of IT project alignment on the project level of analysis. Accordingly, we hypothesize:

H9: Aligned EII assimilation positively affects business process outcomes.

Controls

Technological innovation assimilation processes are subject to different other organizational determinants (Fichman 2001; Zhu et al. 2006b). Therefore, we included EII capability (adapted from Zhu et al. 2006b), EII technology integration (adapted from Zhu et al. 2006b), EII technology competence (adapted from Zhu et al. 2006a; Zhu et al. 2006b), firm size, and EII maturity (as years elapsed since first adoption) (Fichman 2001) as control variables for EII assimilation in order to account for differences among financial services providers.

EII capability captures the firm's technical capability resulting from having access to distributed computing power and purpose-specific technologies (e.g., a high-capacity, low latency network) within the firm. EII technology integration refers to a set of investigation, evaluation, and refinement activities aimed at creating a match between technological options and the application context (Iansiti 1998). EII technology competence reflects general, explicit skills (e.g., distributed systems programming skills) owned by the firm's IT staff that are needed to successfully develop Grid architectures and Grid applications (adapted from Ray et al. 2005) as our instance of an EII technology. Consistent with prior studies (Zhu et al. 2006a; Zhu and Kraemer 2005), we hypothesize that EII capability, EII technology integration, and EII technology competence positively drive EII assimilation.

Prior studies suggest that smaller firms are more flexible with regard to innovative technologies (Zhu & Kraemer 2005). However, there is also opposite theorizing based on the fact that larger firms are assumed to exhibit slack resources facilitating innovation diffusion (Rogers 1995; Tornatzky and Fleischer 1990). In general, an EII technology such as Grid technology requires at least a certain firm size to be implemented in a reasonable manner, since there have to be at least a number of IT resources (e.g., servers) which can then be interconnected and virtualized. Thus, we hypothesize that among the surveyed firms with more than 1,000 employees smaller firms are more likely to assimilate EII technology due to their higher openness to innovation.

Finally, EII maturity reflects the fact that firms that initiated EII implementation activities earlier had more time to reach later stages of assimilation. Therefore, it is likely that this measure involves some degree of commingling of behaviors across different assimilation stages (Fichman 2001).

Study Design and Data Collection

In order to validate the research model presented in Figure 1 and the aforementioned associated hypotheses, we conducted a quantitative survey-based field study. The study aimed at senior IT decision makers that work for financial services providers in the U.S. with more than 1,000 employees and have responsibility for the IT budget. Since the study encompasses an IT value measure as surrogate of IT project alignment success, only financial institutions already having implemented Grid technology (our instance of EII) were considered for our post-adoption analyses. Since the IT budget in the financial services industry is approximately twice as high as in other industries (Zhu et al. 2004), the EII adoption rate is likely to be higher than in other industries. In addition, the financial services industry exhibits a high extent of environmental turbulence, reflected by high market volatility (market turbulence) and a high degree of technologically driven IT innovations (technological turbulence), such as algorithmic trading. These facts make the financial services industry a valuable test-bed for our research. From an empirical perspective, focusing on a single industry also allows to control for extraneous industry factors that could otherwise confound the analysis, thereby enhancing internal validity (Zhu et al. 2004).

During August and September 2009, the link to the online survey was administered via email to 2,034 U.S. American participants of a financial services IT business-to-business panel provided by a large international market research company. Initially, we verified that all the participants of the involved panel satisfied our requirements (financial services industry, >1,000 employees, IT decision maker). Subsequently, in a first wave, the market research company sent out electronic invitations to the panelists. After one week, an email reminder was sent out to non-respondents. The date of invitation, the date of participation, and the user ID were logged to ensure that each panelist only completed the online survey once. Finally, 458 responses from the survey were gathered, leading to a response rate of 22.5 percent. The comparatively high response rate might be grounded to the fact that all participants completing the questionnaire received airline and hotel discount vouchers as incentive for their participation. Of the 458 complete responses, 203 were non-Grid adopter and 66 questionnaires exhibited missing values and were thus excluded. This leads to a final sample of 189 valid responses. Further details on the sample characteristics are depicted in Table 1.

Table 1. Sample Characteristics

<u>*Country:*</u>		<u>*Number of employees:*</u>	
U.S.	189 (100.0%)	1,001 – 5,000	28 (14.8%)
		5,001 – 10,000	27 (14.3%)
		10,001 – 50,000	50 (26.5%)
		50,000+	84 (44.4%)
<u>*Respondent's position:*</u>		<u>*Year of first Grid adoption:*</u>	
CTO, COO, CIO	30 (15.9%)	<2000	12 (6.3%)
Chief Systems Architect	11 (5.8%)	2000-2001	8 (4.2%)
Other IT decision maker	148 (78.3%)	2002-2003	6 (3.2%)
		2004-2005	23 (12.2%)
		2006-2007	57 (30.2%)
		2008-2009	83 (43.9%)

Measurement Model Validation

Overall, the conceptual model encompasses eight reflective and one formative construct (ASSM) (see Table 2). All measures were informed by the extant literature and adapted to the specific context (see Tables 2-4). Additionally, due to feedback from a panel of domain experts, some minor adjustments were made to the length of survey instruments and the wording of the items. BPO was operationalized as second-order reflective model, since the three dimensions are likely to substantially covary (Karimi et al. 2007a; Karimi et al. 2007b). The results for the AM and RM process were mean aggregated for each of the three dimensions to form an overall IT alignment measure.

Table 2. Constructs

Construct	Abbreviation	Number of Items	Scale	Source
Mimetic Pressure **(reflective)**	**MP**	3	7-point Likert	– Liang et al. (2007)
Coercive Pressure **(reflective)**	**CP**	3	7-point Likert	– Liang et al. (2007)
Normative Pressure **(reflective)**	**NP**	3	7-point Likert	– Liang et al. (2007)
Environmental Turbulence **(reflective)**	**ET**	3	7-point Likert	– Pavlou et al. (2006) – Jaworski and Kohli (1993)
Top Management Support **(reflective)**	**TMS**	5	7-point Likert	– Ragu-Nathan et al. (2004)
Middle Management Capability **(reflective)**	**MMC**	5	7-point Likert	– Dong et al. (2009) – Pavlou et al. (2006)
Organizational Inertia (**reflective**)	**OI**	2	7-point Likert	– Zhu et al. (2006a) – Zhu et al. (2006b)
Grid Assimilation **(formative)**	**ASSM**	2	7-level Guttman	– Rai et al. (2009)
Business Process Outcomes (**reflective second-order**)	**BPO**	3/3/4	7-level Likert	– Karimi et al. (2007a; 2007b)

Table 3. Measurement Scales of Latent Constructs

Mimetic Pressure (1 = strongly disagree; 7 = strongly agree)	
MP1	Our main competitors who have adopted Grid technology have greatly benefited
MP2	Our main competitors who have adopted Grid technology are favourably perceived by others in the same industry
MP3	Our main competitors who have adopted Grid technology are favourably perceived by their suppliers and customers
Coercive Pressure (1 = strongly disagree; 7 = strongly agree)	
CP1	The increasing regulatory pressure requires our firm to use Grid technology
CP2	The increasing customer demand requires our firm to use Grid technology
CP3	The competitive conditions require our firm to use Grid technology
Normative Pressure (1 = strongly disagree; 7 = strongly agree)	
NP1	Our firm's IT services providers have already adopted Grid technology

NP2	Our firm's business partners have already adopted Grid technology
NP3	The government's promotion of IT influences our firm to use Grid technology
Environmental Turbulence (1 = strongly disagree; 7 = strongly agree)	
ET1	Environmental changes in our industry are very difficult to forecast
ET2	In our kind of business, customers' product preferences change a lot over time
ET3	New product introductions are very frequent in our market
Top Management Support (1 = strongly disagree; 7 = strongly agree)	
TMS1	Top management understands the importance of our Grid infrastructures
TMS2	Top management supports our Grid development projects
TMS3	Top management considers our Grid infrastructures as a strategic resource
TMS4	Top management understands the benefits of our Grid infrastructures
TMS5	Top management keeps the pressure on operating units to use our Grid infrastructures
Middle Management Capability (1 = strongly disagree; 7 = strongly agree)	
MMC1	Middle management effectively monitors the progress of Grid implementation
MMC2	Middle management is actively involved in Grid-related activities at the operational level
MMC3	Middle management effectively administers relevant tasks and functions with regard to the Grid implementation process.
MMC4	Middle management is capable to manage organizational change and business process restructuring induced by Grid implementation
MMC5	Middle management is capable to acquire expertise critical for managing Grid implementation
Organizational Inertia (1 = strongly disagree; 7 = strongly agree)	
OI1	I am confronted with making required organizational changes for Grid infrastructure implementation
OI2	I am confronted with integrating Grid technology into the overall firm strategy and business processes
Business Process Outcomes (1 = strongly disagree; 7 = strongly agree)	
Process Efficiency	
EFC1	Grid implementation has improved the efficiency of our PROCESS
EFC2	Grid implementation has lowered our costs in PROCESS
EFC3	Grid implementation has decreased the time-to-market of new financial products due to an improved PROCESS
Process Effectiveness	
EFT1	Grid implementation has improved our effectiveness in the PROCESS
EFT2	The functionalities of the Grid adequately meet the requirements of managing ASSETS/RISK
EFT3	Grid implementation has improved our quality of managing ASSETS/RISK
Process Flexibility	
FLX1	Grid implementation has given us more ways to customize our PROCESS
FLX2	Grid implementation has made our firm more agile due to an improved PROCESS
FLX3	Grid implementation has made us more adaptive to a changing business environment due to an improved PROCESS
FLX4	Grid implementation has improved the flexibility of our PROCESS
PROCESS = Asset Management Process / Risk Management Process	

Table 4. 7-point Guttman Scale for Enterprise IT Infrastructure Assimilation		
Stage	**Criteria to enter stage**	**Survey items**
1. Awareness	Key decision makers are aware of Grid technology.	Are you aware of initial or prior Grid-related activities at site?
2. Interest	The organization is committed to actively learn more about Grid technology for their PROCESS.	Are you aware of plans to use a Grid environment for PROCESS within the next 12 months?
3. Evaluation/trial	The organization has acquired specific innovation-related products and has initiated evaluation or trial for their PROCESS.	Is any Grid environment for PROCESS currently being evaluated or trialed?
4. Commitment	The organization has committed to use Grid technology in a significant way for their PROCESS.	Are any Grid application development projects for PROCESS planned, in progress, implemented or cancelled?
5. Limited deployment	The organization has established a program of regular, but limited, use of Grid technology for part of their PROCESS.	Are more than 5% but less than 25% of the business applications for PROCESS running on a Grid?
6. Partial deployment	The organization has established a program of regular, but limited, use of Grid technology for their PROCESS.	Are more than 25% but less than 50% of the business applications for PROCESS running on a Grid?
7. General deployment	The organization has reached a state where Grid technology is substantially used for their PROCESS.	Are more than 50% of the business applications for PROCESS running on a Grid?
PROCESS = Asset Management Process / Risk Management Process		

To further validate the reflectively measured constructs, (1) the construct reliability, (2) the convergent validity, and (3) the discriminant validity were assessed. Construct reliability was tested by computing the average variance extracted (AVE) and the composite reliability (CR) score (see Table 5). All estimated values exceeded the proposed threshold of 0.5 for AVE and 0.7 for CR. In addition, Cronbach's alpha was also computed and all coefficients except for ET were above the suggested lower boundary of 0.7. Since the CR value of ET is above the recommended threshold of 0.7 and the cross-loadings on other constructs are low, we deemed it a minor issue. Second, convergent validity was assessed by considering the loadings which were all highly significant at least at the 0.001 level and all above the proposed threshold of 0.707 (Chin 1998). Finally, discriminant validity was evaluated by computing the intercorrelations between the latent variables. Consistent with the Fornell and Larcker (1981) criterion, the square root of the AVE of each construct is higher than the correlations between the construct and the other constructs in the model (see Table 5). Furthermore, a table of the cross-loadings of the different items emphasizes that the loadings on the referring construct are higher than on all other constructs (see Appendix A). As far as the formative ASSM construct is concerned, all weights are above 0.2 and significant (Chin 1998). Furthermore, the estimated variance inflation factors (VIF) for the ASSM items (ASSM1: 1.686, ASSM2: 1.686) are all below 3.3 indicating no serious concern of multicollinearity (Diamantopoulos and Siguaw 2006). In sum, we found evidence that suggests a good reliability as well as good convergent validity and discriminant validity.

Table 5. Descriptive Statistics, Reliabilities, and Correlations

Construct	Mean	SD	AVE	Alpha	CR	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
MP (1)	4.65	1.17	0.87	0.93	0.95	**0.93**								
CP (2)	4.93	1.27	0.73	0.83	0.89	**0.55**	**0.85**							
NP (3)	4.68	1.18	0.75	0.84	0.90	**0.42**	**0.64**	**0.87**						
ET (4)	5.32	1.03	0.57	0.63	0.80	**0.28**	**0.36**	**0.27**	**0.75**					
TMS (5)	5.10	1.30	0.82	0.95	0.96	**0.35**	**0.41**	**0.35**	**0.25**	**0.92**				
MMC (6)	5.14	1.13	0.73	0.93	0.95	**0.22**	**0.35**	**0.39**	**0.29**	**0.56**	**0.85**			
OI (7)	4.73	1.35	0.90	0.85	0.86	**0.19**	**0.40**	**0.39**	**0.25**	**0.22**	**0.33**	**0.95**		
ASSM (8)	4.42	2.02	n/a	n/a	n/a	**0.26**	**0.24**	**0.36**	0.07	**0.46**	**0.32**	**0.31**	n/a	
BPO (9)	3.82	2.21	0.83	0.96	0.97	**0.26**	**0.31**	**0.43**	0.12	**0.45**	**0.34**	**0.32**	**0.75**	**0.91**

AVE = Average Variance Extracted, Alpha = Cronbach's alpha, CR = Composite Reliability

Square root of AVE shown on diagonal, formative measure used for ASSM, Bolded correlations significant at p<.05 (two-tailed)

Since all self-reported data can potentially be affected by common method bias arising from different sources, such as social desirability and consistency motif (Podsakoff et al. 2003), we conducted an additional common method bias analysis following the approach introduced by Liang et al. (2007). Therefore, we included a common method factor in our PLS model whose indicators included all the principal constructs' indicators and calculated each indicator's variances substantively explained by the principal construct and by the method. The results show that the average substantively explained variance of the indicators is 0.77, while the average method variance is 0.002. In addition, most method factor loadings are not significant. Based on both of these results, we concluded that there is unlikely to be a serious concern of common method bias for this study.

Model Validation and Discussion

The research model was operationalized as structural equation model (SEM) and analyzed using a components-based approach with a 500 sample bootstrapping technique for model assessment (Chin 1998). In general, SEM allows the simultaneous modeling of relationships among multiple independent and dependent constructs (Gerbing

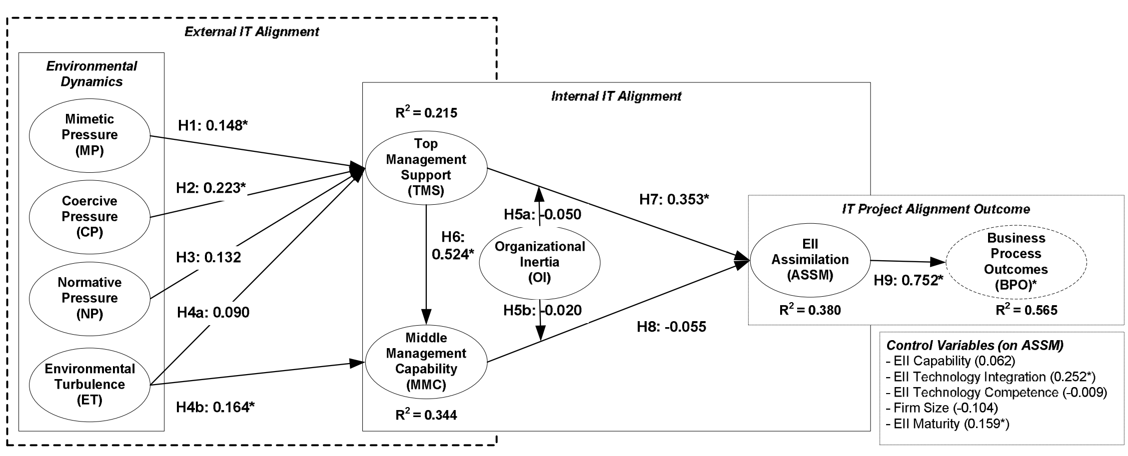

Figure 2. PLS Estimates, * second-order reflective construct

and Anderson 1988). As second-generation modeling technique, it permits the representation of complex relationships between latent variables by utilization of hierarchical or non-hierarchical, recursive or non-recursive structural equations (Bullock et al. 1994). SmartPLS (Version 2.0 M3) was used as data analysis tool. All statistical tests were assessed with one-tailed t-tests because of the unidirectional nature of our hypotheses. Due to the measurement model of both formative and reflective constructs with mixed scales (Chin 1998) and a data set of 189 responses, we deemed a partial least square based approach instead of a covariance-based approach as appropriate. Figure 2 depicts the estimates obtained from our PLS analyses. The R^2 values of 0.565 (BPO) and 0.380 (ASSM) indicate that the model explains a moderate amount of variance of the dependent variables (Chin 1998). The results support or partially support six of the proposed nine hypotheses: Except for normative pressure (H3), all other pressures (H1, H2) have a significant impact ($p<.05$) on top management support. As further expression of the importance of the external IT alignment dimension, environmental turbulence significantly affects only the tactical level (H4b), whereas the link to top management support (H4a) is insignificant ($p>.10$).

Emphasizing on the internal IT alignment dimension, top management support strongly drives the evolution and development of tactical middle management capability (H6). Although theory suggests that both the strategic and tactical level are faced with organizational inertia, our results do not support the presence of a significant interaction effect of OI (H5a/H5b). When it comes to the determinants driving the advance in the EII assimilation process, the role of top management for safeguarding assimilation progress becomes evident (H7). Finally, our results suggest that IT project alignment eventually leads to increased business process outcomes (H9) as surrogate measure of IT alignment success. Among the control variables, only EII maturity operationalized as years elapsed since first Grid adoption and EII technology integration exhibit a significant (positive) path towards EII assimilation, which is consistent with literature (Fichman 2001; Zhu et al. 2006b). With respect to the internal IT alignment dimension, our analyses suggest that top management exhibits a dual role in the internal IT alignment process: first, it is vastly responsible for the evolution of middle management capability (H6 - strategic-to-tactical alignment) and the safeguarding of IT project progress (H7). In contrary, we could not find a significant relationship between middle management capability and EII assimilation (H8). This is counterintuitive and might arise from the fact that our sample is dominated by upper middle management respondents and exhibits a rather small percentage of top managers (15.9%). This strengthens the analyses on the strategic level since most responses reflect a third-party appraisal on the behavior of top management. But the other way round, the analyses on the tactical level become more heterogeneous. This could have affected our analyses leading to the aforementioned results. Ideally, our sample would consist of matched pairs of top and middle management responses.

Except for the relationship between NP and TMS (H3), our results confirm the hypothesized relationships between institutional pressures and top management as depicted in prior studies (Liang et al. 2007). In sum, external dynamics significantly impact on both the strategic as well as the tactical level (external IT alignment dimension). As part of our extended conceptualization of environmental dynamics with respect to the integration of environmental turbulence, we found one explanation for the rejection of H3 (NP on TMS). Though one could argue that environmental turbulence affects both strategic and tactical management due to its strategic and tactical implications, our results suggest that this kind of environmental dynamics is only absorbed by tactical middle management (H4b). The same applies for the link between NP and MMC which was not originally hypothesized. If also both the links from NP towards TMS and MMC are analyzed, the link to TMS still remains insignificant ($p>.10$), whereas the link from NP towards MMC becomes significant ($ß=0.192$, $p<.05$) suggesting the absorption of NP by the tactical management level. This makes sense from a theoretical perspective: normative pressure basically stems from professionalization tendencies transferred by industry associations, best practices frameworks, and peers within the value chain. In project reality, most often tactical middle management attends professional trainings and implements best practices frameworks, such as ValIT and CoBit. In essence, our analyses suggest that the prevalent emphasis on top management as the major human agency in IS research could be extended by looking in more detail at the role of middle management as a second and complementary agency level of management. Liang et al. (2007) comment on this: "*Indeed, literature on innovation assimilation largely views top management as the agency responsible for changing the norms, values, and culture within an organization […]*". A more nuanced integration of different human agency levels could extend the valuable understanding of institutional theory in prominent contexts, such as alignment or assimilation research. For further studies, a detailed mediation analysis of the role of the tactical middle management level could be a valuable starting point to better understand the mechanism of the conversion of institutional pressures to the organizational context. Finally, our surrogate IT project alignment success measure indicates that there is a strong and significant ($p<0.001$) impact of EII assimilation on business process outcomes suggesting a positive impact of IT project alignment.

Conclusion, Limitations, and Further Research

Our research contributes to alignment theory, assimilation theory, and organizational theory on management interactions in the following way: first, our validated model emphasizes the value of a horizontally integrated (integration of environmental dynamics) and vertically integrated IT project alignment model (strategic-to-tactical). Especially the horizontal integration contributes to extant utilizations of institutional theory in assimilation and IT alignment research. Previous inconsistencies on the mediating mechanisms behind normative pressure in the technological assimilation process can be potentially overcome by integrating middle management as second human agency for institutional pressure. Second, our results extend Spreitzer and Quinn's (1996) research on the vertical linkages between superiors and middle management by applying their basic conceptualization to a well-specified context of top management and middle management interactions in the EII assimilation process.

As with all research, there are several limitations to consider that concurrently represent venues for further research: first, our sample consists only of firms with more than 1,000 employees, thus potentially limiting the generalizability of the results. Moreover, a group comparison of smaller and larger firms could reveal new insights since the organizational structures with regard to hierarchical levels differ significantly among firms of different size. Second, the responses of our survey represent the IT delivery side which might overweight a technologically driven perspective. Here, dyadic data of matching responses of the IT department with the business department could overcome this situation. Finally, our analyses focus on the financial services industry which might be idiosyncratic with respect to an above-average level of environmental turbulence. Concurrently, our findings represent a venue for further research that could draw a more nuanced picture of the role of environmental dynamism in technological diffusion and IT alignment processes. Here, longitudinal studies could significantly extend existing conceptualizations of the mechanism that lead to IT alignment and the conversion of environmental dynamics to the organization. Finally, our results inform prevalent IT alignment conceptualizations by integrating well-established concepts from institutional and assimilation theory.

For practitioners, our study results emphasize the importance of top management support in the emergence of middle management capability and resulting internal IT project alignment as antecedent of IT project success. Thus, a close collaboration and exchange of top management and middle management, e.g., as integral part of collaborative strategy meetings, would eventually foster middle managements' understanding of the organizational strategy and foster the development of middle management capability. Concurrently, due to its complementary role in sustaining IT project success, more responsibility could be delegated to tactical middle management. This is also consistent with emerging concepts from organizational theory, such as organizational mindfulness (Weick and Sutcliffe 2007), that posit the migration of decision making with problems to the "operational frontline". Finally, middle management is very important for the external IT alignment dimension with regard to the conversion of environmental dynamics (normative pressure and environmental turbulence) in the IT project context. As such, it is still undervalued by recent research studies. In essence, both a close collaboration of top management and middle management is required to safeguard the effective aligned conversion of environmental dynamics to the EII assimilation process.

References

Ang, S., and Cummings, L.L. 1997. "Strategic Response to Institutional Influences on Information Systems Outsourcing," *Organization Science* (8:3), pp. 235-256.

Ansoff, H.I., and Sullivan, P.A. 1993. "Optimizing Profitability in Turbulent Environments: A Formula for Strategic Success," *Long Range Planning* (26:5), pp. 11-23.

Ariyachandra, T.R., and Frolick, M.N. 2008. "Critical Success Factors in Business Performance Management - Striving for Success," *Information Systems Management* (25:2), pp. 113-120.

Armstrong, C.P., and Sambamurthy, V. 1999. "Information Technology Assimilation in Firms: The Influence of Senior Leadership and IT Infrastructures," *Information Systems Research* (10:4), pp. 304-327.

Bela, H., and Venkatesh, V. 2007. "Assimilation of Interorganizational Business Process Standards," *Information Systems Research* (18:3), pp. 340-362.

Bikhchandani, S., Hirshleifer, D., and Welch, I. 1992. "A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades," *Journal of Political Economy* (100:5), pp. 992-1026.

Bullock, H.E., Harlow, L.L., and Mulaik, S.A. 1994. "Causation Issues in Structural Equation Modeling Research," *Structured Equation Modeling* (1:3), pp. 253-267.

Cepeda, G., and Vera, D. 2007. "Dynamic Capabilities and Operational Capabilities: A Knowledge Management Perspective," *Journal of Business Research* (60:5), pp. 426-437.

Chan, Y.E., Huff, S.L., Barclay, D.W., and Copeland, D.G. 1997. "Business Strategic Orientation, Information Systems Strategic Orientation, and Strategic Alignment," *Information Systems Research* (8:2), pp. 125-150.

Chan, Y.E., and Reich, B.H. 2007. "IT Alignment: What have we learned?," *Journal of Information Technology* (22:4), pp. 297-315.

Chatterjee, D., Grewal, R., and Sambamurthy, V. 2002. "Shaping up for E-Commerce: Institutional Enablers of the Organizational Assimilation of Web Technologies," *MIS Quarterly* (26:2), pp. 65-89.

Chin, W.W. 1998. "The Partial Least Squares Approach to Structural Equation Modeling," in *Modern Methods for Business Research,* G.A. Marcoulides (ed.), Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 295-336.

Corrocher, N., and Fontana, R. 2008. "Objectives, Obstacles´and Drivers of ICT Adoption: What do IT Managers perceive?," *Information Economics and Policy* (20:3), pp. 229-242.

Cragg, P., King, M., and Hussin, H. 2002. "IT Alignment and Firm Performance in Small Manufacturing Firms," *Strategic Information Systems* (11:2), pp. 109-132.

Davamanirajan, P., Kauffman, R.J., Kriebel, C.H., and Mukhopadhyay, T. 2006. "Systems Design, Process Performance, and Economic Outcomes in International Banking," *Journal of Management Information Systems* (23:2), pp. 65-90.

Davenport, T. 1993. *Process Innovation: Reengineering Work Through IT*, Harvard Business School Press, Boston.

Diamantopoulos, A., and Siguaw, J.A. 2006. "Formative versus Reflective Indicators in Organizational Measure Development: A Comparison and Empirical Illustration," *British Journal of Management* (17:4), pp. 263-282.

DiMaggio, P.W., and Powell, W.W. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review* (48:2), pp. 147-160.

Dong, S., Xu, S.X., and Zhu, K.X. 2009. "Information Technology in Supply Chains: The Value of IT-enabled Resources under Competition," *Information Systems Research* (20:1), pp. 18-32.

Dutton, J.E., and Ashford, S.J. 1993. "Selling Issues to Top Management," *Academy of Management Review* (18:3), pp. 397-428.

Earl, M.J. 1989. *Management Strategies for Information Technology*, Prentice-Hall, London.

Fichman, R.G. 1999. "The Diffusion and Assimilation of Information Technology Innovations," in *Framing the Domains of IT Management: Projecting the Future through the Past,* R.W. Zmud (ed.), Cincinnati, Ohio, USA: Pinnaflex Educational Resources, pp. 105-127.

Fichman, R.G. 2001. "The Role of Aggregation in the Measurement of IT-related Organizational Innovation," *MIS Quarterly* (25:4), pp. 427-455.

Floyd, S.W., and Wooldridge, B. 1997. "Middle Management Strategic Influence and Organizational Performance," *Journal of Management Studies* (34:3), pp. 465-485.

Fornell, C., and Larcker, D.F. 1981. "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error: Algebra and Statistics," *Journal of Marketing Research* (18:1), pp. 382-388.

Foster, I., and Kesselman, C. 1999. *The Grid: Blueprint for a New Computing Infrastructure*, Morgan Kaufmann, San Francisco, USA.

Galliers, R.D. 2004. "Reflections on Information Systems Strategizing," in *The Social Study of Information and Communication Technology,* C. Avgerou, C. Ciborra and F. Land (eds.), London: Oxford University Press, pp. 231-262.

Gerbing, D.W., and Anderson, J.C. 1988. "An Updated Paradigm for Scale Development Incorporating Unidimensionality and Its Assessment," *Journal of Marketing Research* (25:2), pp. 186-192.

Gilbert, M., and Cordey-Hayes, M. 1996. "Understanding the Process of Knowledge Transfer to Achieve Successful Technological Innovation," *Technovation* (16:6), pp. 301-312.

Gutierrez, A., and Serrano, A. 2008. "Assessing Strategic, Tactical and Operational Alignment Factors for SMEs: Alignment Across the Organisation's Value Chain," *International Journal of Value Chain Management* (2:1), pp. 33-56.

Henderson, J.C., and Venkatraman, N. 1993. "Strategic Alignment: Leveraging Information Technology for Transforming Organizations," *IBM Systems Journal* (32:1), pp. 4-16.

Iansiti, M. 1998. *Technology Integration: Making Critical Choices in a Dynamic World*, Harvard Business Press, Boston, MA, USA.

IMF 2009. "Global Financial Stability Report - Responding to the Financial Crisis and Measuring Systemic Risk," http://www.imf.org/external/pubs/ft/gfsr/2009/01/pdf/text.pdf (last accessed 2010-04-28).

ISACA 2009. "ISACA Survey on the Value of IT Investments," http://www.isaca.org/AMTemplate.cfm?Section=Val_IT1&Template=/ContentManagement/ContentDisplay.cfm&ContentID=51737 (last accessed 2010-04-28).

Jap, S.D. 2001. "Perspectives on Joint Competitive Advantages in Buyer - Supplier Relationships," *International Journal of Research in Marketing* (18:1-2), pp. 19-35.

Jaworski, B.J., and Kohli, A.K. 1993. "Market Orientation: Antecedents and Consequences," *Journal of Marketing* (57:3), pp. 53-70.

Jiang, J.J., Klein, G., and Means, T.L. 2000. "Project Risk Impact on Software Development Team Performance," *Project Management Journal* (31:4), pp. 19-26.

Kanter, R.M. 1983. *The Change Masters*, Basic Books, New York.

Karimi, J., Somers, T.M., and Bhattacherjee, A. 2007a. "The Impact of ERP Implementation on Business Process Outcomes: A Factor-Based Study," *Journal of Management Information Systems* (24:1), pp. 101-134.

Karimi, J., Somers, T.M., and Bhattacherjee, A. 2007b. "The Role of Information Systems Resources in ERP Capability Building and Business Process Outcomes," *Journal of Management Information Systems* (24:2), pp. 221-260.

Kearns, G.S., and Lederer, A.L. 2003. "A Resource-Based View of Strategic IT Alignment: How Knowledge Sharing Creates Competitive Advantage," *Decision Sciences* (34:1), pp. 1-29.

Kelly, D., and Amburgey, T.L. 1991. "Organizational Inertia and Momentum: A Dynamic Model of Strategic Change " *Academy of Management Journal* (34:3), pp. 591-612.

Kim, H.W., and Kankanhalli, A. 2009. "Investigating User Resistance to Information Systems Implementation: A Status Quo Perspective," *MIS Quarterly* (33:3), pp. 567-582.

Liang, H., Nilesh, S., Hu, Q., and Xue, Y. 2007. "Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management," *MIS Quarterly* (31:1), pp. 59-87.

Luftman, J., and Brier, T. 1999. "Achieving and Sustaining Business-IT-Alignment," *California Management Review* (42:1), pp. 109-122.

Luftman, J., Kempaiah, R., and Rigoni, E.H. 2009. "Key Issues for IT Executives 2008," *MIS Quarterly Executive* (8:3), pp. 151-159.

Meyer, J., and Rowan, B. 1977. "Institutional Organizations: Formal Structure as Myth and Ceremony," *The American Journal of Sociology* (83:2), pp. 340-363.

Mitchell, V. 2006. "Knowledge Integration and Information Technology Project Performance," *MIS Quarterly* (30:4), pp. 919-939.

Mizruchi, M., and Fein, L. 1999. "The Social Construction of Organizational Knowledge: A Study of the Uses of Coercive, Mimetic, and Normative Isomorphism," *Administrative Science Quarterly* (44:4), pp. 653-683.

Ottaviani, M., and Sorenson, P. 2000. "Herd Behavior and Investment," *American Economic Review* (90:3), pp. 695-704.

Parsons, T. 1960. *Structure and Process in Modern Societies*, The Free Press of Clencoe, New York.

Pavlou, P.A., and El Sawy, O.A. 2006. "From IT Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development," *Information Systems Research* (17:3), pp. 198-227.

Podsakoff, P.M., MacKenzie, S.B., Jeong-Yeon, L., and Podsakoff, N.P. 2003. "Common Method Biases in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," *Journal of Applied Psychology* (88:5), pp. 879-903.

Preston, D., and Karahanna, E. 2004. "Mechanisms for the Development of Shared Mental Models between the CIO and the Top Management Team", in *Proceedings of the 25th International Conference on Information Systems*, Washington, USA.

Preston, D.S., and Karahanna, E. 2009. "Antecedents of IS Strategic Alignment: A Nomological Network," *Information Systems Research* (20:2), pp. 159-179.

Ragu-Nathan, B.S., Apigian, C.H., Ragu-Nathan, T.S., and Tu, Q. 2004. "A Path Analytic Study of the Effect of Top Management Support for Information Systems Performance," *Omega* (32:6), pp. 459-471.

Rai, A., Brown, P., and Tang, X. 2009. "Organizational Assimilation of Electronic Procurement Innovations," *Journal of Management Information Systems* (26:1), pp. 257-296.

Ray, G., Muhanna, W.A., and Barney, J.B. 2005. "Information Technology and the Performance of the Customer Service Process: A Resource-Based Analysis," *MIS Quarterly* (29:4), pp. 625-652.

Reich, B.H., and Benbasat, I. 2000. "Factors that Influence the Social Dimension of Alignment between Business and Information Technology Objectives," *MIS Quarterly* (24:1), pp. 81-113.

RMA 2010. "Data Quality: Is the Glass half empty or half full?," http://www.rmahq.org/NR/rdonlyres/D9D80236-4C7A-4E8D-9B69-E123A7D7124E/0/Exec_summ_DQ_2010.pdf (last accessed 2010-04-28).

Rogers, E.M. 1995. *Diffusion of Innovations*, (4th Edition ed.) The Free Press, New York, NY.

SEC 2008. "Bank of America Corporation Form 10-K," http://www.sec.gov/archives/edgar/data/70858/000119312509041126/D10K.htm (last accessed 2010-04-28).

Sethi, R., Smith, D.C., and Park, W. 2001. "Cross-functional Product Development Teams, Creativity, and the Innovativeness of New Consumer Products," *Journal of Marketing Research* (38:1), pp. 73-85.

Sledgianowski, D., and Luftman, J. 2005. "IT-Business Strategic Alignment Maturity: A Case Study," *Journal of Cases on Information Technology* (7:2), pp. 102-120.

Spreitzer, G.M., and Quinn, R.E. 1996. "Empowering Middle Managers to Be Transformational Leaders," *Journal of Applied Behavioral Science* (32:3), pp. 237-261.

Swanson, E.B. 1994. "Information Systems Innovation among Organizations," *Management Science* (40:9), pp. 1069-1092.

Swanson, E.B., and Ramiller, N.C. 2004. "Innovating Mindfully with Information Technology," *MIS Quarterly* (28:4), pp. 553-583.

Tarafdar, M., and Qrunfleh, S. 2009. "IT-Business Alignment: A Two-Level Analysis," *Information Systems Management* (26:4), pp. 338-349.

Teece, D.J. 2007. "Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance," *Strategic Management Journal* (28:13), pp. 1319-1350.

Teece, D.J., Pisano, G., and Shuen, A. 1997. "Dynamic Capabilities and Strategic Management," *Strategic Management Journal* (18:7), pp. 509-533.

Teo, H.H., Wei, K.K., and Benbasat, I. 2003. "Predicting Intention to Adopt Interorganizational Linkages: An Institutional Perspective," *MIS Quarterly* (27:1), pp. 19-49.

Teo, T.S.H., and Ang, J.S.K. 1999. "Critical Success Factors in the Alignment of IS Plans with Business Plans," *International Journal of Information Management* (19:1), pp. 173-185.

Terziovski, M., Fitzpatrick, P., and O'Neill, P. 2003. "Successful Predictors of Business Process Reengineering (BPR) in Financial Services," *International Journal of Production Economics* (84:1), pp. 35-50.

Thompson, J.D. 1967. *Organizations in Action: Social Science Bases of Administrative Theory*, McGraw Hill, New York.

Tornatzky, L.G., and Fleischer, M. 1990. *The Deployment of Technology: The Processes of Technological Innovation*, Lexington Books, Massachusetts, Toronto.

Weick, K.E., and Sutcliffe, K.M. 2007. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*, Jossey-Bass, San Francisco.

Zahra, S.A., and George, G. 2002. "Absorptive Capacity: A Review, Reconceptualization, and Extension," *The Academy of Management Review* (27:2), pp. 185-203.

Zhu, K., Dong, S., Xu, S.X., and Kraemer, K.L. 2006a. "Innovation Diffusion in Global Contexts: Determinants of Post-adoption Digital Transformation of European Companies," *European Journal of Information Systems* (15:6), pp. 601-616.

Zhu, K., and Kraemer, K.L. 2005. "Post-Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry," *Information Systems Research* (16:1), pp. 61-84.

Zhu, K., Kraemer, K.L., and Xu, S. 2006b. "The Process of Innovation Assimilation by Firms in Different Countries: A Technology Diffusion Perspective on E-Business," *Management Science* (52:10), pp. 1557-1576.

Zhu, K., Kraemer, K.L., Xu, S., and Dedrick, J. 2004. "Information Technology Payoff in E-Business Environments: An International Perspective on Value Creation of E-Business in the Financial Services Industry," *Journal of Management Information Systems* (21:1), pp. 17-54.

Appendix A: Crossloadings (* formative measure)									
Construct	**MP**	**CP**	**NP**	**ET**	**TMS**	**MMC**	**OI**	**ASSM**	**BPO**
MP1	**0.91**	0.52	0.38	0.23	0.32	0.23	0.15	0.24	0.27
MP2	**0.95**	0.49	0.40	0.26	0.33	0.17	0.21	0.27	0.24
MP3	**0.94**	0.54	0.40	0.30	0.34	0.21	0.17	0.23	0.22
CP1	0.45	**0.79**	0.61	0.26	0.25	0.29	0.41	0.25	0.37
CP2	0.42	**0.90**	0.56	0.32	0.40	0.31	0.32	0.20	0.22
CP3	0.55	**0.88**	0.48	0.35	0.39	0.30	0.32	0.17	0.22
NP1	0.33	0.51	**0.87**	0.24	0.29	0.32	0.33	0.28	0.35
NP2	0.44	0.56	**0.90**	0.24	0.35	0.35	0.32	0.33	0.39
NP3	0.32	0.56	**0.83**	0.22	0.28	0.35	0.37	0.33	0.38
ET1	0.18	0.27	0.19	**0.76**	0.21	0.24	0.27	0.06	0.13
ET2	0.28	0.38	0.25	**0.78**	0.20	0.23	0.11	0.06	0.10
ET3	0.16	0.16	0.17	**0.72**	0.15	0.19	0.19	0.03	0.05
TMS1	0.28	0.34	0.28	0.21	**0.90**	0.54	0.22	0.43	0.46
TMS2	0.28	0.36	0.30	0.23	**0.92**	0.51	0.23	0.44	0.42
TMS3	0.39	0.41	0.36	0.29	**0.91**	0.52	0.20	0.37	0.39
TMS4	0.30	0.39	0.31	0.20	**0.94**	0.48	0.20	0.39	0.40
TMS5	0.34	0.41	0.36	0.20	**0.87**	0.52	0.15	0.44	0.40
MMC1	0.18	0.27	0.33	0.21	0.51	**0.88**	0.28	0.30	0.36
MMC2	0.18	0.28	0.33	0.21	0.47	**0.85**	0.31	0.30	0.30
MMC3	0.18	0.25	0.33	0.26	0.51	**0.91**	0.29	0.33	0.35
MMC4	0.25	0.37	0.39	0.33	0.47	**0.84**	0.23	0.21	0.24
MMC5	0.14	0.32	0.30	0.26	0.46	**0.81**	0.28	0.20	0.19
OI1	0.20	0.39	0.38	0.26	0.23	0.33	**0.94**	0.28	0.31
OI2	0.16	0.35	0.35	0.22	0.19	0.29	**0.95**	0.30	0.29
ASSM1*	0.22	0.21	0.31	0.08	0.36	0.20	0.31	**0.88**	0.68
ASSM2*	0.25	0.21	0.34	0.05	0.46	0.36	0.25	**0.93**	0.69