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Responding to Technology-Enabled Organizational Transformation

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ABSTRACT

As a result of the emergence of the Internet and net-enabled business processes, many industries have experienced a period of *IT-enabled transformation* in which organizations and business operations changed very rapidly. A natural question that arises is *how can firms survive and even thrive during such transformations?* In addressing this question, we show how a firm's *strategic change orientation*—a meta-construct consisting of *technological opportunism, market orientation,* and *entrepreneurial orientation*—can influence the assimilation of IT and the resulting performance of business processes. We identify and examine two separate change enablers through which this influence occurs: (1) the development of *IT capabilities;* (2) the creation of a positive *climate for IT use*. These two change enablers influence the assimilation of technology within the organization and the resulting business process performance. We test the proposed model using a survey of 153 organizations in the retail auto industry, a compelling example of an industry that has undergone an IT-enabled transformation. Results explain 34% of the variance in process performance, and 34% of the variance in financial performance.

Keywords

Assimilation, transformation, system usage, business process performance, CRM

INTRODUCTION

"The information superhighway, it turns out, goes right past a car dealership. A long-overdue revolution in auto retailing has arrived."

-Fortune Magazine, March 4, 1996

The emergence of the Internet and net-enhanced business processes has had a transformational impact on many industries, meaning that they have substantially altered business processes and the nature of competition. In response to these IT-enabled transformations, organizations have had to develop new ways to interact with and provide value to customers while facing both new online competitors and new arenas for competition. These transformations have thus created opportunities and challenges for organizations, placing otherwise stable industries into periods of extensive operational change and intense competition (Crowston and Myers, 2004; McAfee and Brynjolfsson, 2008). The concept of technology as a transforming force in the competitive relationships among firms is by no means new, but rather can be traced back to the Schumpeterian idea of creative destruction (Shumpeter, 1942). However, with the increasing prominence of IT in firm business processes and as a force in many industries, there is a need for researchers to better understand how organizations can effectively navigate an IT-enabled industry transformation (Agarwal and Lucas, 2005).

Existing research has identified the transformational aspects of radical IT innovations on individuals (e.g., Barrett and Walsham, 1999; Robey and Sahay, 1996; Winter and Taylor, 1996), organizations (e.g., Cross and Earl, 1997; Markus and Benjamin, 1997; Straub and Watson, 2001; Yates and VanMaanen, 1996), and society (e.g., Aupperle, 1996; Campbell-Kelly, 1996; Davenport and Stoddard, 1994; El Sawy, Malhotra, Gosain and Young, 1999). Although this research provides useful insights into the characteristics and impacts of transformational technologies, much less is known about the general organizational properties that enable effective responses to the competitive challenges posed by IT-enabled transformations. In addition, as effective responses to IT-enabled transformations are those which create value for organizations, there is a need to incorporate our understanding of how organizations respond to IT-enabled transformations into the broader IT-value literature while providing actionable recommendations to managers and organizations.

This research examines how an organization's strategic orientation towards change can influences its development of enabling resources/capabilities which in turn influence the assimilation of technology and the resulting business process performance. We examine three related aspects of the organization's strategic orientation towards change, including *entrepreneurial orientation*, *technological opportunism,* and *market orientation*, to illustrate that responding to change may be initiated through different processes within the organization. These three constructs together make up the *strategic change orientation (SCO)* of the firm. Further, we link the SCO to the development of resources and capabilities, referred to as *change enablers,* which facilitate the assimilation of new technologies. We identify both *IT capabilities* and *climate for IT use* as key enablers which facilitate the assimilation process. Finally, we examine the complementary nature of automation and IT usage as different dimensions of assimilation which jointly influence business process performance. The overall conceptual framework describing the link between SCO and business process performance is shown in Figure 1.

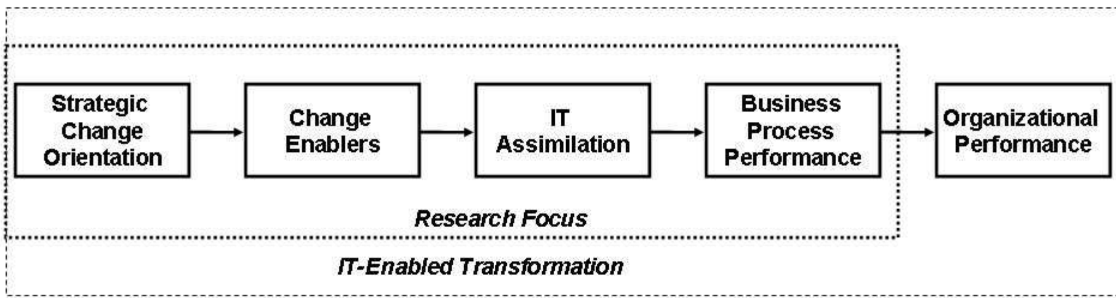

Figure 1. Conceptual Framework

We test the proposed model in the context of the retail auto industry, a compelling example of an industry that has undergone an IT-enabled transformation, examining the assimilation of customer management systems across 153 dealerships and two business units (sales and service). While the transformation of the industry has been initiated by a variety of technologies—including the Internet, online infomediaries, and dealer websites—customer management systems represent a key technology which helps organizations to manage the transformation. Overall, findings indicate that an organization's SCO can be an important determinant of how the organization assimilates technology into business processes and generates value. In developing this understanding, we integrate several different streams of research to explain differences in organizational assimilation and benefits from customer-focused information systems.

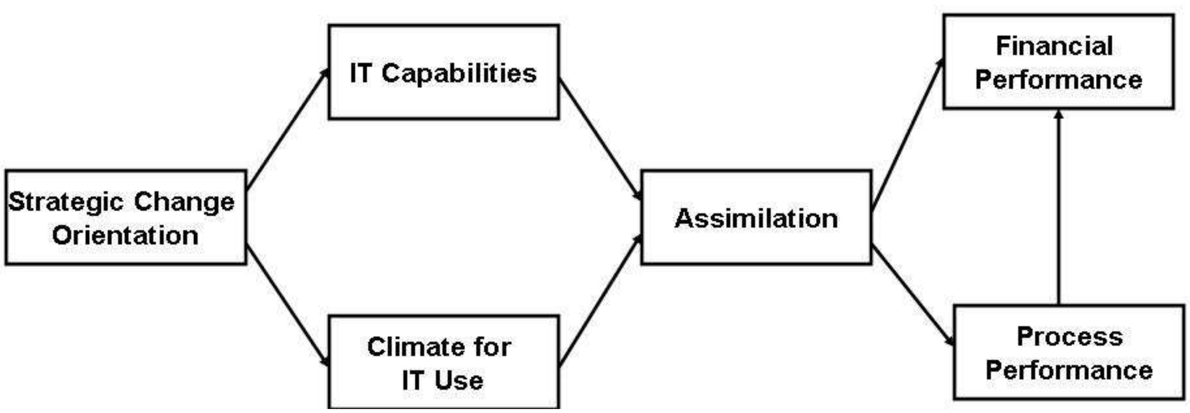

Figure 2. Research Model

RESEARCH MODEL AND HYPOTHESES

This section provides the theoretical background and justification for the model outlined in Figure 2. In supporting this model, we integrate the streams of research outlined earlier to predict both the level of assimilation and the resulting business process performance.

Strategic Change Orientation

SCO and IT Capabilities

SCO is expected to positively influence the level of IT capabilities. The primary theoretical understanding of how organizations develop capabilities is through the concept of dynamic capabilities. Dynamic capabilities refer to those firm capabilities that enable organizations to integrate, build, and reconfigure to address changes in the competitive environment (Teece, Pisano and Shuen, 1997). This perspective has provided an important way for researchers to understand how firms develop IT-related capabilities in the midst of continually changing technologies (Daniel and Wilson, 2003; Sambamurthy, Bharadwaj and Grover, 2003; Wheeler, 2002; Zhu and Kraemer, 2002).

While the conceptualization of dynamic capabilities as a mechanism through which organizations develop capabilities has been extensively utilized, limited research has identified specific constructs which constitute dynamic capabilities. Here, we argue that SCO constitutes a dynamic capability because of its role in initiating changes. The presence of stimuli associated with the IT-enabled transformation will enable firms high in SCO to develop IT capabilities. In other words, the strategic processes associated with SCO will lead organizations to build the IT capabilities necessary to meet the challenges and opportunities of the competitive environment. As a result, we hypothesize:

H1: SCO is positively associated with IT-capabilities.

SCO and Climate for IT Use

Climate, as noted earlier, can be generally characterized as the message the employees receive from the organization. When introducing IT to a particular situation, research has found that contextual factors can make a tremendous difference in both how the technology is perceived and how it is appropriated by members of the organization (Barely, 1990; DeSanctis and Poole, 1994; Fulk, 1993). As a result, when technology becomes prevalent in a new context, the messages the members of the organization receive about this technology, which form the climate for IT use, can be expected to originate from other more fundamental organizational characteristics captured by SCO. For example, if an organization high in market orientation had already established the importance of meeting customer needs, a CRM software package identified as a way to meet customer needs would more likely lead to a positive climate. Similar arguments would hold for both technological opportunism and entrepreneurial orientation. Therefore, we expect:

H2: SCO is positively associated with the climate for IT use.

IT Capabilities and IT Assimilation

IT capabilities and the broader theoretical lens of the resource based view (RBV) of the firm have provided researchers with an important way to understand how the effective management of technology can lead to improved business performance (Bharadwaj, 2000). IT capabilities have been argued to be multidimensional (for a review, see Wade and Hulland, 2004), and the two dimensions examined here—IT management capabilities and IT infrastructure—influence assimilation in different ways. IT management capabilities may improve assimilation of the technology through improved system planning or implementation (Clemons and Row, 1991; Mata, Fuerst and Barney, 1995). These capabilities allow organizations to more effectively bring IT-related innovations from the decision to adopt the technology through to full organizational assimilation.

IT infrastructure has also been found to be a critical firm capability necessary to fully take advantage of new technologies (Armstrong and Sambamurthy, 1999; Keen, 1991; Weill and Broadbent, 1998). IT infrastructure can be categorized as a strategic option or real option (Bowman and Hurry, 1993). The options lens provides a way for managers to view IT investments when the level of uncertainty is high, investments are irreversible, and projects are flexible in nature (Dixit and Pindyck, 1994). The option enabled by infrastructure technology is the option to implement more complex technologies in the future, such as customer-focused information systems. A strong infrastructure may also enable the organizations to assimilate complex technologies more rapidly and at lower cost. Infrastructure may enable greater integration between systems and fewer user problems related to system failure and or unavailability. Together, IT management capabilities and IT infrastructure provide an important way of characterizing the IT capabilities of an organization and are expected to influence the level of IT assimilation that occurs. As a result, we hypothesize:

H3a: IT capabilities are positively associated with IT use.

H3b: IT capabilities are positively associated with IT automation.

Climate for IT Use and Assimilation

As indicated, climate originated as a way to conceptualize the message those in the organization receive relative to a specific action. A positive climate for IT use will improve assimilation in two key ways. First, because the general attitude of the organization toward a given technology improves with a more positive climate, the degree to which the individuals within that organization will use the systems involved will increase. Research on individual-level IT adoption has consistently shown subjective norm to be an important influence of an individual's use of the technology (Agarwal, 2000; Karahanna and Limayem, 2000; Venkatesh, Morris, Davis and Davis, 2003). This collective effect, captured on the organizational level through climate for IT use, is expected to influence overall assimilation levels. Second, as much of the investment in configuration, integration, and automation will only provide payback to the organization if associated systems are used by individuals, a positive climate for IT use will lead organizations to increase their investment in automated processes with the expectations of greater returns from use. In other words, organizations with more positive climates for IT use will invest more in assimilation because they expect the technology to be used and provide value. For these reasons, we hypothesize:

H4a: Climate for IT use is positively associated with IT use.

H4b: Climate for IT use is positively associated with IT automation.

Assimilation and Performance

The extent of assimilation is also expected to be positively associated with performance. This general point has been made in the study of individual use of IT (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003), IT appropriation or structuration (DeSanctis and Poole, 1994; Orlikowski, 1992, 2000), and technology assimilation (Armstrong and Sambamurthy, 1999; Chatterjee, Grewal and Sambamurthy, 2002; Fichman and Kemerer, 1999; Gallivan, 2001). Individuals, groups, and organizations must use technology in order for the technology to have an impact on organizations. As noted by Orlikowski (1992, p. 410), "On its own technology is of no import; it plays no meaningful role in human affairs. It is only through the appropriation of technology by humans (whether for productive or symbolic ends) that it plays a significant role and exerts influence." Further, empirical studies have found the extent of IT assimilation and use to be an important mediator in the value generated by an IT system (Devaraj and Kohli, 2003; Zhu and Kraemer, 2005). Therefore, we hypothesize:

H5a: IT use is positively associated with process performance.

H5b: IT use is positively associated with financial performance.

H6a: IT automation is positively associated with process performance.

H6b: IT automation is positively associated with financial performance.

In addition to a direct effect, we further expect that automation and usage will exhibit complementarities, such that usage will have a greater impact on performance in the presence of automation. As lower level tasks are automated, the usage level becomes more value added and worthwhile, increasing the performance benefits for a given level of use. Thus, we expect:

H7a: IT use and IT automation will exhibit complementarities, such that the relationship between IT use and process performance will be stronger when automation is high than when automation is low.

H7b: IT use and IT automation will exhibit complementarities, such that the relationship between IT use and financial performance will be stronger when automation is high than when automation is low.

Process Performance and Financial Performance

An additional relationship between business process performance and financial performance is expected. Process performance benefits the organizational efficiency through increased productivity and improved inventory management. These intermediate process-related outcomes also have a relationship to financial performance, as improved productivity and lower inventory costs are also likely to result in improved financial performance. As a result, we hypothesize:

H8: Process performance is positively associated with financial performance.

RESEARCH METHODOLOGY

Sampling and Data Collection

To facilitate the execution of this study, we partnered with a large online infomediary and CRM software provider for the retail auto industry, which we refer to hereafter as NetAuto. This partnership allowed access to senior level individuals within organizations which had implemented CRM software packages, and the organization had an existing mechanism to distribute and collect surveys. The subject pool included the sales, service, and general managers of auto retailers, identified from a listing of NetAuto's customers and public listings of auto retailers. Analysis was conducted on the level of the business unit, with sales and service business units measured separately. The population of dealerships selected with validated contact information was 893. An email was sent to each individual asking them to participate in the study. In the email, we included a brief description of the study, informed them that the survey will take approximately 15-20 minutes to complete, and provided the hyperlink to the online survey. The first thing the respondent saw when directed to the survey was the informed consent form. After reading the consent form and selecting "I Agree," the dealership general manager, sales manager, or service manager began the survey. In an effort to improve the response to the survey, participants were offered a chance to be randomly selected for a prize of an IPOD Nano (4 were given away) and offered a summary of the results of the survey when completed. In addition, reminder letters were sent 2 weeks and 4 weeks after the initial contact, and follow-up phone calls were conducted during the 3 months following the initial contact.

Measures

Constructs were measured using scales that have been validated in previous research or developed in conjunction with industry professionals in order to ensure content validity. Unless specifically indicated otherwise, we measured items on a 7-point Likert scale with anchors 1 = "strongly disagree" and 7 = "strongly agree." A complete description of the measures have been omitted because of space constraints, but a full listing of the survey items and sources are found in Appendix A.

From the original 893 individuals contacted, 153 useable responses were received, representing a response rate of 17%. Of the respondents, 106 answered questions related to the performance of the sales area and 47 related to the service area. The average number of employees among the respondent organization was 70.1 (SD=58.9). To address concerns of non-response bias (Armstrong and Overton, 1977), we compared the responses of those individuals who responded after the initial email to those who had responded after the phone follow-up. We did not find a statistical difference between these two groups.

Analysis

To establish the convergent and divergent validity of the constructs and to examine the statistical significance of the proposed relationships, we used PLS. PLS has advantages over traditional regression-based analysis and covariance-based structural models because it has minimal requirements for sample size and makes few normality assumptions (Chin, 1998). Our analysis involved three stages. We first examined the convergent and discriminant validity of the constructs through the measurement model. We then examined the extent of common method bias, finally we examined the full set of structural relationships.

Measurement Model

Descriptive statistics for the constructs are shown in Table 1. Construct validity analysis with PLS was completed in accordance with the recommendations of Gefen and Straub (2005). All first order factors were modeled as reflective. Convergent validity accesses the degree to which the item measures represent a single construct. Outer model loadings greater than 0.70 are considered to indicate adequate convergent validity (Fornell and Larcker, 1981). As shown in Appendix B, outer model loadings for each item were greater than 0.7, with most greater than 0.8. Additional measures of convergent validity shown in Table 1 include Cronbach's alpha and the reliability coefficient (P_c), each further supporting the convergent validity of the item measures.

Discriminant validity assesses the degree to which item measures represent unique constructs. Using PLS, discriminant validity is assessed through two criteria (Chin, 1998; Gefen and Straub, 2005): (1) cross loadings for the item-factor correlation table should be small and (2) the square root of the average variance extracted should be larger than the inter-construct correlations. As is shown by the item-factor correlations in Appendix C and the correlations shown in Table 2, the measures show an adequate level of discriminant validity. In sum, the results of the measurement model display an adequate level of convergent and discriminant validity.

Variable	Mean	Std	Chronbach Alpha	P_c
SCO: Technological Opportunism (TO)	4.976	1.485	0.930	0.944
SCO: Market Orientation (MO)	6.215	0.941	0.824	0.876
SCO: Entrepreneurial Orientation (EO)	5.125	1.307	0.801	0.872
ITCAP: IT Management Capabilities (ITMAN)	5.186	1.342	0.907	0.934
ITCAP: IT Infrastructure Capabilities (ITIN)	5.567	1.324	0.943	0.958
Climate for IT Use (CLIM)	5.077	1.496	0.915	0.940
Assimilation: Automation (AUTO)	3.394	1.187	0.846	0.897
Assimilation: Use (USE)	5.269	1.724	0.891	0.926
Process Performance (PP)	5.347	1.151	0.828	0.970
Financial Performance Control (FPC)	4.631	1.362	0.936	0.956
Financial Performance (FP)	5.308	1.289	0.910	0.901

Note: P_c = Composite Reliability = $(\Sigma\lambda_i)^2/[(\Sigma\lambda_i)^2+\Sigma(1-\lambda_i^2)]$ where λ_i is the factor loading.

Table 1. Descriptive Statistics for Survey Measures

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	TO	**0.809**										
2	MO	0.518	**0.639**									
3	EO	0.621	0.523	**0.631**								
4	ITMN	0.607	0.461	0.505	**0.781**							
5	INFR	0.372	0.399	0.436	0.367	**0.850**						
6	CLIM	0.578	0.576	0.544	0.497	0.621	**0.797**					
7	USE	0.513	0.474	0.392	0.530	0.462	0.563	**0.758**				
8	AUTO	0.372	0.374	0.281	0.386	0.327	0.450	0.612	**0.678**			
9	CFP	0.180	0.139	0.154	0.207	0.028	0.041	0.117	0.091	**0.941**		
10	FP	0.389	0.289	0.298	0.388	0.226	0.255	0.355	0.205	0.468	**0.915**	
11	PROP	0.364	0.360	0.350	0.542	0.378	0.501	0.539	0.498	0.186	0.306	**0.720**

Note: The bold values along the diagonal are the square root of the AVE (Average Variance Extracted).

Table 2. Correlations Among Major Constructs

Common Method Bias

Use of a single survey to collect both independent and dependant variables introduces the possibility of common method bias. In order to examine the extent to which a common method bias may influences results, we employed a single-common-method factor approach for PLS (see Liang and Xue, 2007). This approach utilizes a single factor linked to all other constructs.

Results from this analysis are show in Appendix D. Overall, the average variance explained by the substantive factors (constructs of interest) was 76.7% while the average variance explained by the method was 0.6%. In addition, few of the method factors were significant. This results in a ratio of the substantive to method variance of 127:1, indicating that common method bias is likely not a significant problem in this study.

Structural Model

In the PLS structural model, path coefficients can be interpreted in the same way as beta coefficients for regression analysis. SCO was modeled as a formative construct while IT capabilities was modeled as reflective. As mentioned in the theory, SCO can originate in any of the three strategic orientations, leading to a conceptualization that is formative in nature. Dimensions of IT capabilities and assimilation, on the other hand, are expected to capture underlying qualities of the organization and are thus modeled as reflective. To measure the interaction effect between usage and automation, we followed the procedure outlined by Chin et al. (Chin, Marcolin and Newsted, 2003). We first mean centered all item variables and then calculated interactions between the four measures of use and the four measures of automation, leading to ten total indicators for the interaction factor.

The majority of the hypothesized relationships were supported by the results, which are reported fully in Figure 3. SCO was highly related to IT capabilities (H1; p<0.001; 49% of variance explained) and climate for IT use (H2; p<0.001; 49% of variance explained). IT capabilities were positively related to use (H3a; p<0.001) as was climate (H4a; p<0.001), explaining a total 46% of the variance. IT capabilities were positively related to automation (H3b; p<0.05) as was the climate (H4b; p<0.001), explaining 25% of the total variance. Use was related to both process performance (H5a; p<0.01) as was automation (H6a; p<0.01). Use was positively related to financial performance (H5b; p<0.001) but automation was not (H6b). The interaction between usage and automation was positively related to financial performance (H7b; p<0.05) but not to process performance (H7a). The relationship between process performance and financial performance was in the hypothesized direction but not significant (H8). Overall the model explained 34% of the variance in process performance and 34% of the variance in financial performance. Controls for sales vs. service were significant for use (p<0.001) but not for automation, financial, or process performance. The relationship between prior financial performance and financial performance was also significant (p<0.001). In sum, all hypotheses except H5b, H6b, and H8 were supported.

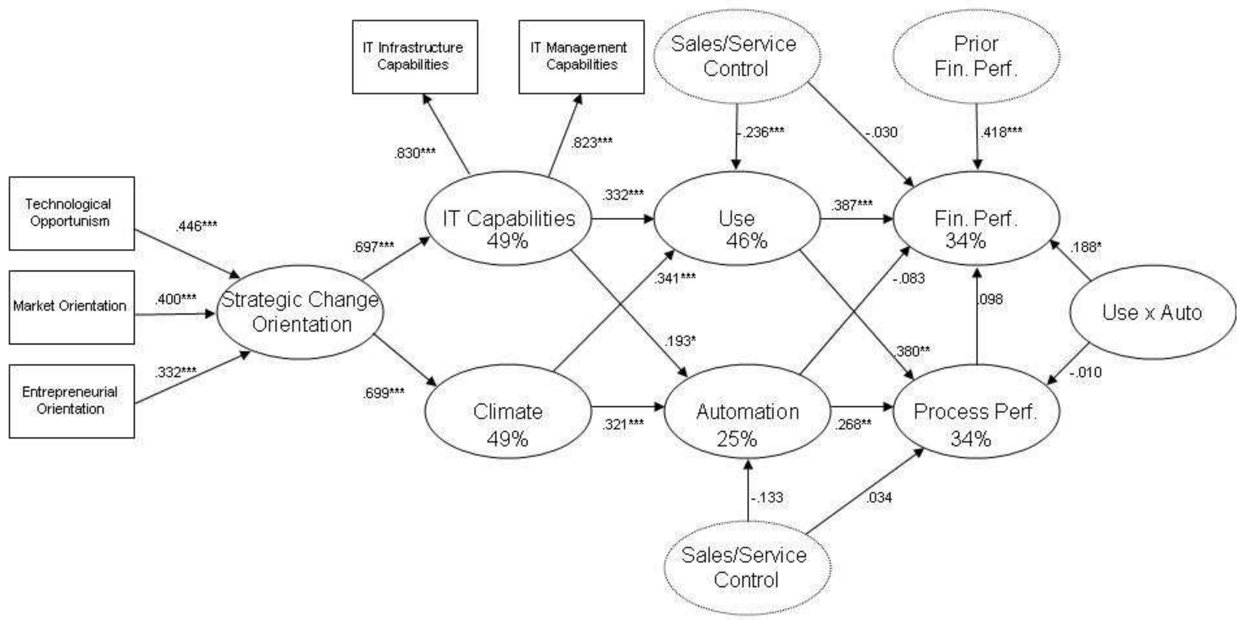

Figure 3. Research Model

DISCUSSION

A great deal of research has established the positive link between IT investment and firm performance (for a review, see Kohli and Devaraj, 2003). However, the mechanisms through which value gets created and the organizational characteristics which enable some organizations to obtain more value than others are still topics of open interest for researchers and practitioners alike. In this work, we have integrated research from multiple theoretical foundations as a way to understand how organizations effectively respond to an IT-enabled transformation. Within a general theoretical framework linking strategic orientation, change enablers, assimilation, and performance, we are able to identify theoretical mechanisms through which strategic orientation can have a performance impact. In doing so, we also identify and empirically measure organizational traits which improve the assimilation and resulting benefits from a given technology investment.

SCO has provided a useful construct through which to understand how strategic characteristics of the organization may influence performance during an IT-enabled transformation. Technological opportunism, market orientation, and entrepreneurial orientations are highly related constructs that capture aspects of how organizations respond to change. Though organizations may respond for different reasons when faced with a competitive challenge, jointly understanding those characteristics which provide the underlying motivation to change is important to both manage change and understand the relevant benefits and challenges.

Implications for Theory

In addition to providing a look into those organizational characteristics which promote performance during an IT-enabled transformation, this work may also provide an integrated way of understanding the assimilation of different technologies within organizations. This can also be understood as an organizational-level model of IT use. The likely progression of an organizational-level model of IT use can be understood through the extensive work on technology adoption and use at the individual level. The technology acceptance mode (TAM) was integrated with social aspects of the theory of reasoned action (TRA), the performance aspects of social cognitive theory (SCT), and other contributing research to eventually emerge as the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2003). Similarly, a unified model explaining why organizations use IT—i.e., an organizational level model of use—will likely incorporate many of the constructs identified here. In sum, we argue that this research provides an important extension to the understanding of IT use as an organizational-level construct.

SUMMARY

Information technology can have an important influence on competition in many industries, and effectively responding to IT-enabled transformations can be critical to firm performance. By understanding better how organizations can respond to IT-enabled transformations, we can provide both practical recommendations to managers and technology vendors while improving the value organizations derive from IT. This research integrates theoretical perspectives which capture both the willingness and the ability of the organization to respond to change.

Appendix A. Measures

Technological Opportunism (TO) *(1 = strongly disagree; 7 = strongly agree)*
Srinivasan et al. (2002)

1. We are often one of the first in our industry to find new technology that may potentially affect our business.
2. We are always on the look-out for information on new technology for our business.
3. We periodically measure how changes in technology affect our business.
4. We generally respond very quickly to technological changes in the industry.

Market Orientation (MO) *(1 = strongly disagree; 7 = strongly agree)*
Navar and Slater (1990)

1. Our competitive advantage is based on understanding and meeting our customers' needs.
2. Our managers understand how employees can provide value to customers.
3. We frequently measure customer satisfaction.
4. We pay close attention to after-sales service and maintenance.

Entrepreneurial Orientation (EO) *(1 = strongly disagree; 7 = strongly agree)*
Covin and Slevin (1989)

1. Top management regularly discusses competitors' strength and weaknesses.
2. We share resources with all areas of the dealership.
3. The top management of the dealership has a strong emphasis on technological innovation.
4. We are very often the first business to introduce new services to customers.

IT Management Capabilities (ITMN) *(1 = strongly disagree; 7 = strongly agree)*
Bharadwaj et al. (1998)
Our dealership's technology manager(s)...

1. ...has specifically explained our technology management practices.
2. ...effectively plans for security control, standards compliance, and disaster recovery (loss of information, etc.).
3. ...employs the same technology policies throughout the dealership.
4. ...has established effective partnerships with technology providers (such as lead management systems)

IT Infrastructure Capabilities (INFR) *(1 = strongly disagree; 7 = strongly agree)*
Bharadwaj et al. (1998)
Our dealership's information technology (i.e., computers, networks, etc.)…

1. …meet the business needs.
2. …has an adequate number of computers with sufficient performance to meet user needs.
3. …is reliable and efficient.
4. …is flexible enough to meet the business needs.

Climate for IT Use (CLIM) *(1 = low; 7 = high)*
Adopted from Schneider et al. (1998)
1. The efforts to ensure employees use customer management system(s)?
2. The recognition and rewards employees receive for using the customer management system(s)?
3. The leadership shown by management in supporting the use of customer management system(s)?
4. The effectiveness of technology hardware, training, and other resources provided to promote the use of customer management system(s)?

Use (USE) *(1=not used at all; 7=used very extensively)*
Our dealership uses customer management system(s) to…
1. …record interactions with customers (i.e., phone calls, customer needs).
2. …schedule follow-up with customers (through phone calls, personal email).
3. …understand the overall state of the sales process (i.e., total leads, lead status).
4. …review and report ROI (return on investment) by lead source.

Automation (AUTO) *(0=don't intend to implement, 1= not yet begun, 3 = standard implementation, 5 = advanced implementation)*
1. Automated regular email communications with leads.
2. Automated scheduling of tasks for members of the sales force.
3. Automated assignment of incoming leads to the appropriate person.
4. Automated tracking of responses to marketing promotions (from mailings and email).

Financial Performance *(1 = much worse than competitors; 7 = much better than competitors)*
Please describe your dealership's vehicle sales performance relative to competitors (same manufacturer and same region):
Financial Performance Control (CFP)
1. 1992-1994-Vehicle sales-Sales growth
2. 1992-1994-Vehicle sales-Profit Level and ROI

Financial Performance (FP)
1. 2002-2004-Vehicle sales-Sales growth
2. 2002-2004- Vehicle sales-Profit Level and ROI

Process Performance (PP) *(1 = created no value; 7 = created significant value)*
Please describe the extent customer management systems have affected vehicle sales:
1. The level of service provided to customers.
2. The productivity of salespersons.
3. The effective management of inventory.

Appendix B. Loading of the Indicator Variables (Composite Reliability) (AVE)

	Indicator	Mean	SD	Loading	T-value
Technological Opportunism (0.944) (0.809)	TO1	4.85	1.87	0.915	64.716
	TO2	5.29	1.63	0.905	50.287
	TO3	4.88	1.67	0.871	37.349
	TO4	4.70	1.69	0.906	48.671
Market Orientation (0.976) (0.639)	MO1	6.30	1.08	0.800	15.691
	MO2	6.21	1.11	0.820	20.397
	MO3	6.39	1.13	0.774	14.321
	MO4	6.09	1.19	0.801	19.692
Entrepreneurial Orientation (0.872) (0.631)	EO1	5.31	1.49	0.841	29.193
	EO2	5.20	1.67	0.830	35.661
	EO3	5.01	1.75	0.741	18.697
	EO4	5.05	1.66	0.761	18.872
IT Management Capabilities (0.934) (0.781)	ITMN1	4.98	1.59	0.866	43.273
	ITMN2	5.07	1.61	0.874	27.429
	ITMN3	5.27	1.44	0.932	60.157
	ITMN4	5.50	1.43	0.863	29.187
IT Infrastructure Capabilities (0.958) (0.850)	INFR1	5.62	1.39	0.914	47.042
	INFR2	5.54	1.45	0.899	29.763
	INFR3	5.56	1.45	0.935	58.663
	INFR4	5.64	1.41	0.940	55.550
Climate for IT Use (0.940) (0.797)	CLIM1	5.45	1.68	0.912	48.950
	CLIM2	4.50	1.75	0.843	28.366
	CLIM3	5.33	1.65	0.932	60.924
	CLIM4	5.09	1.63	0.883	27.977
Use (0.926) (0.758)	USE1	5.07	2.18	0.848	22.740
	USE2	5.55	1.87	0.914	39.852
	USE3	5.48	1.90	0.912	47.769
	USE4	5.05	2.00	0.804	19.116
Automation (0.897) (0.678)	AUTO1	3.55	1.36	0.769	12.618
	AUTO2	3.25	1.58	0.819	18.426
	AUTO3	3.67	1.37	0.871	28.663
	AUTO4	3.09	1.46	0.847	24.591
Financial Performance Control (0.970) (0.941)	CFP1	4.60	1.49	0.964	68.704
	CFP2	4.67	1.32	0.976	183.284
Financial Performance (0.965) (0.915)	FP1	5.28	1.34	0.960	106.710
	FP2	5.37	1.34	0.953	91.684
Process Performance (0.882) (0.720)	PROP1	5.42	1.28	0.925	33.116
	PROP2	5.52	1.25	0.959	76.524
	PROP3	5.09	1.62	0.619	5.228
Sales/Service	BUS	0.31	0.46	1	0

Appendix C. Item Loadings and Cross Loadings

Item	TO	MO	EO	ITMN	INFR	CLIM	USE	AUTO	CFP	FP	PROP
SQRT(AVE)	**0.899**	**0.799**	**0.794**	**0.884**	**0.922**	**0.893**	**0.871**	**0.823**	**0.970**	**0.957**	**0.849**
TO1	**0.915**	0.494	0.551	0.535	0.351	0.545	0.485	0.373	0.213	0.350	0.315
TO2	**0.905**	0.455	0.538	0.563	0.318	0.496	0.461	0.331	0.143	0.294	0.329
TO3	**0.869**	0.478	0.581	0.486	0.330	0.512	0.500	0.300	0.111	0.394	0.271
TO4	**0.908**	0.437	0.563	0.600	0.339	0.526	0.401	0.332	0.178	0.363	0.393
MO1	0.438	**0.808**	0.355	0.449	0.370	0.456	0.463	0.243	0.139	0.293	0.250
MO2	0.443	**0.829**	0.553	0.315	0.463	0.588	0.461	0.434	0.075	0.208	0.378
MO3	0.400	**0.759**	0.273	0.396	0.086	0.311	0.337	0.241	0.212	0.298	0.229
MO4	0.370	**0.797**	0.447	0.327	0.285	0.438	0.228	0.248	0.043	0.139	0.272
EO1	0.528	0.473	**0.840**	0.459	0.353	0.409	0.288	0.241	0.162	0.282	0.319
EO2	0.605	0.420	**0.833**	0.516	0.418	0.476	0.324	0.212	0.115	0.219	0.329
EO3	0.323	0.376	**0.741**	0.228	0.335	0.402	0.307	0.171	0.131	0.197	0.158
EO4	0.479	0.388	**0.760**	0.360	0.270	0.441	0.331	0.269	0.083	0.247	0.284
ITMN1	0.645	0.378	0.508	**0.866**	0.257	0.413	0.446	0.331	0.208	0.401	0.402
ITMN2	0.477	0.340	0.399	**0.874**	0.302	0.444	0.446	0.293	0.202	0.274	0.545
ITMN3	0.512	0.419	0.446	**0.932**	0.402	0.435	0.443	0.328	0.181	0.365	0.467
ITMN4	0.525	0.490	0.438	**0.862**	0.325	0.467	0.542	0.415	0.146	0.333	0.504
INFR1	0.384	0.350	0.485	0.373	**0.914**	0.599	0.410	0.260	0.076	0.216	0.339
INFR2	0.341	0.377	0.332	0.314	**0.899**	0.542	0.408	0.304	-0.009	0.156	0.363
INFR3	0.307	0.406	0.360	0.367	**0.935**	0.586	0.451	0.351	0.022	0.221	0.367
INFR4	0.341	0.337	0.430	0.298	**0.940**	0.562	0.432	0.290	0.012	0.241	0.325
CLIM1	0.545	0.542	0.420	0.443	0.532	**0.912**	0.490	0.431	-0.030	0.204	0.425
CLIM2	0.458	0.433	0.579	0.370	0.523	**0.842**	0.437	0.338	0.069	0.201	0.435
CLIM3	0.553	0.570	0.462	0.478	0.591	**0.931**	0.537	0.425	0.021	0.226	0.452
CLIM4	0.505	0.503	0.496	0.477	0.569	**0.884**	0.540	0.408	0.090	0.278	0.477
USE1	0.415	0.302	0.284	0.402	0.378	0.479	**0.842**	0.466	0.077	0.210	0.424
USE2	0.450	0.462	0.289	0.462	0.372	0.523	**0.916**	0.560	0.100	0.328	0.489
USE3	0.538	0.420	0.373	0.519	0.473	0.520	**0.912**	0.585	0.092	0.375	0.521
USE4	0.366	0.467	0.425	0.454	0.375	0.433	**0.807**	0.512	0.145	0.310	0.433
AUTO1	0.297	0.235	0.176	0.250	0.141	0.239	0.458	**0.769**	0.160	0.136	0.383
AUTO2	0.301	0.405	0.235	0.299	0.333	0.462	0.498	**0.819**	0.062	0.198	0.410
AUTO3	0.291	0.306	0.185	0.295	0.206	0.336	0.506	**0.871**	0.031	0.114	0.420
AUTO4	0.338	0.284	0.317	0.415	0.371	0.427	0.555	**0.847**	0.059	0.218	0.430
CFP1	0.174	0.110	0.096	0.140	-0.005	0.040	0.073	0.055	**0.964**	0.403	0.129
CFP2	0.175	0.156	0.193	0.251	0.052	0.040	0.148	0.114	**0.976**	0.496	0.222
FP1	0.377	0.267	0.247	0.355	0.202	0.231	0.291	0.164	0.486	**0.957**	0.280
FP2	0.368	0.287	0.323	0.387	0.231	0.258	0.389	0.228	0.410	**0.957**	0.306
PROP1	0.299	0.286	0.307	0.496	0.322	0.409	0.470	0.382	0.139	0.257	**0.895**
PROP2	0.357	0.351	0.308	0.533	0.359	0.477	0.566	0.513	0.203	0.364	**0.937**
PROP3	0.286	0.300	0.308	0.361	0.302	0.420	0.327	0.384	0.131	0.130	**0.764**

Appendix D. Common Method Bias Analysis

Construct	**Indicator**	**Substantive Factor (R1)**	**$R1^2$**	**Method Factor (R2)**	**$R2^2$**
Technological Opportunism	TO1	0.901***	0.812	0.018	0.000
	TO2	0.907***	0.823	0.001	0.000
	TO3	0.849***	0.721	0.024	0.001
	TO4	0.939***	0.882	-0.042	0.002
Market Orientation	MO1	0.755***	0.570	0.066	0.004
	MO2	0.660***	0.436	0.204**	0.042
	MO3	0.903***	0.815	-0.160**	0.026
	MO4	0.881***	0.776	-0.111*	0.012
Entrepreneurial Orientation	EO1	0.819***	0.671	0.018	0.000
	EO2	0.728***	0.530	0.118	0.014
	EO3	0.872***	0.760	-0.149*	0.022
	EO4	0.766***	0.587	0.005	0.000
IT Management Capabilities	ITMN1	0.858***	0.736	0.017	0.000
	ITMN2	0.927***	0.859	-0.069	0.005
	ITMN3	0.973***	0.947	-0.059	0.003
	ITMN4	0.772***	0.596	0.116*	0.013
IT Infrastructure Capabilities	INFR1	0.883***	0.780	0.044	0.002
	INFR2	0.965***	0.931	-0.036	0.001
	INFR3	0.914***	0.835	-0.021	0.000
	INFR4	0.926***	0.857	0.013	0.000
Climate for IT Use	CLIM1	0.960***	0.922	-0.059	0.003
	CLIM2	0.884***	0.781	-0.046	0.002
	CLIM3	0.918***	0.843	0.016	0.000
	CLIM4	0.809***	0.654	0.088	0.008
Use	USE1	0.937***	0.878	-0.116	0.013
	USE2	0.955***	0.912	-0.049	0.002
	USE3	0.819***	0.671	0.111*	0.012
	USE4	0.769***	0.591	0.053	0.003
Automation	AUTO1	0.849***	0.721	-0.099*	0.010
	AUTO2	0.755***	0.570	0.081	0.007
	AUTO3	0.945***	0.893	-0.097*	0.009
	AUTO4	0.757***	0.573	0.118**	0.014
Financial Perf. Control	CFP1	0.980***	0.960	-0.043*	0.002
	CFP2	0.961***	0.924	0.043*	0.002
Financial Performance	FP1	0.972***	0.945	-0.033	0.001
	FP2	0.941***	0.885	0.033	0.001
Process Performance	PROP1	0.920***	0.846	-0.042	0.002
	PROP2	0.864***	0.746	0.082*	0.007
	PROP3	0.824***	0.679	-0.047	0.002
Average		0.872	0.767	0.000	0.006

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

REFERENCES

Agarwal, R. (2000) Individual acceptance of it, *Framing the Domains of IT Management: Projecting the Future from the Past.*

Agarwal, R. and Lucas, H. C. (2005) The information systems identity crisis: Focusing on high visibility and high impact research, *MIS Quarterly,* 29, 3, 381-398.

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, 304-327.

Armstrong, S. J. and Overton, T. S. (1977) Estimating non-response bias in mail surveys, *Journal of Marketing Research,* 14, August, 396-402.

Attuahene-Gima, K. and Ko, A. (2001) An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation, *Organization Science,* 12, 1, 54-74.

Aupperle, K. E. (1996) Spontaneous organizational reconfiguration: A historical example based on Xenophon's anabasis, *Organization Science,* 7, 4, 445-460.

Barely, S. P. (1990) The alignment of technology and structure through roles and networks, *Administrative Sciences Quarterly*, 35, 61-103.

Barrett, M. and Walsham, G. (1999) Electronic trading and work transformation in the london insurance market, *Information Systems Research,* 10, 1, 1-22.

Barua, A., Konana, P., Whinston, A. B. and Yin, F. (2004) An empirical investigation of net-enabled business value, *MIS Quarterly,* 28, 4, 585-620.

Bharadwaj, A. S. (2000) A resource-based perspective on information technology capability and firm performance: An empirical investigation., *MIS Quarterly,* 24, 1, 169-197.

Bharadwaj, A. S., Sambamurthy, V. and Zmud, R. W. (1998) IT capabilities: Theoretical perspectives and empirical operationalization, 19th International Conference on Information Systems, Helsinki, Finland, 378-385.

Bowman, E. H. and Hurry, D. (1993) Strategy through the option lens: An integrated view of resource investments and the, *Academy of Management Review,* 18, 4, 760-783.

Campbell-Kelly, M. (1996) Information technology and organizational change in the british census, 1801-1911., *Information Systems Research,* 7, 1, 22.

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, 65-89.

Chin, W. W. (1998) Issues and opinion on structural equation modeling, *MIS Quarterly,* 22, 1, vii-xvi.

Chin, W. W., Marcolin, B. L. and Newsted, P. R. (2003) A partial least squares latent variable modeling approach for measuring interaction effects: Results from a monte carlo simulation study and an electronic-mail emotion/adoption study, *Information Systems Research,* 14, 2, 189.

Clemons, E. K. and Row, M. C. (1991) Sustaining it advantage: The role of structural differences., *MIS Quarterly,* 15, 3, 275.

Covin, J. G. and Slevin, D. P. (1989) Strategic management of small firms in hostile and benign environments, *Strategic Management Journal,* 10, 1, 75-87.

Cross, J. and Earl, M. J. (1997) Transformation of the it function at british petroleum., *MIS Quarterly,* 21, 4, 401.

Crowston, K. and Myers, M. D. (2004) Information technology and the transformation of industries: Three research perspectives, *Journal of Strategic Information Systems,* 13, 1, 5-28.

Daniel, E. M. and Wilson, H. N. (2003) The role of dynamic capabilities in e-business transformation, *European Journal Of Information Systems,* 12, 4, 282-296.

Davenport, T. H. and Stoddard, D. B. (1994) Reengineering: Business change of mythic proportions?, *MIS Quarterly,* 18, 2, 121.

Davis, F. D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly,* 13, 3, 319-339.

Day, G. (1994) The capabilities of market-driven organizations, *Journal of Marketing,* 58, 4, 37-52.

Desanctis, G. and Poole, M. S. (1994) Capturing the complexity in advanced technology use - adaptive structuration theory, *Organization Science,* 5, 2, 121-147.

Dess, G. G. and Robinson, R. B. (1984) Measuring organizational performance in the absence of objective measures - the case of the privately-held firm and conglomerate business unit, *Strategic Management Journal,* 5, 3, 265-273.

Devaraj, S. and Kohli, R. (2003) Performance impacts of information technology: Is actual usage the missing link?, *Management Science,* 49, 3, 273-289.

Dixit, A. and Pindyck, R. (1994) Investment under uncertainty, Princeton University Press, Princeton, NJ.

Dobni, C. B. and Luffman, G. (2003) Determining the scope and impact of market orientation profiles on strategy implementation and performance, *Strategic Management Journal,* 24, 6, 577-585.

El Sawy, O. A., Malhotra, A., Gosain, S. and Young, K. M. (1999) It-intensive value innovation in the electronic economy: Insights from marshall industries., *MIS Quarterly,* 23, 3, 305.

Fichman, R. G. and Kemerer, C. F. (1999) The illusory diffusion of innovation: An examination of assimilation gaps, *Information Systems Research,* 10, 3, 255-275.

Fornell, C. and Larcker, D. (1981) Evaluating structural equation models with unobservable variables and measurement error, *Journal of Marketing Research,* 18 39-50.

Fulk, J. (1993) Social construction of communication technology, *Academy of Management Journal,* 36, 5, 921-950.

Gallivan, M. J. (2001) Organizational adoption and assimilation of complex technological innovations: Development and application of a new framework, *The DATA BASE for Advances in Information Systems,* 32, 3, 51-85.

Gefen, D. and Straub, D. W. (2005) A practical guide to factorial validity using pls-graph: Tutorial and annotated example, *Communications of the Association for Information Systems,* 16 91-109.

Gerhart, B., Wright, P. M. and Mcmahan, G. C. (2000) Measurement error in research on the human resources and firm performance relationship: Further evidence and analysis, *Personnel Psychology,* 53, 4, 855-872.

Guthrie, J. P. (2001) High-involvement work practices, turnover, and productivity: Evidence from new zealand, *Academy Of Management Journal,* 44, 1, 180-190.

Homburg, C. and Pflesser, C. (2000) A multiple-layer model of market-oriented organizational culture: Measurement issues and performance outcomes, *Journal of Marketing Research,* 37, 4, 449-462.

Karahanna, E. and Limayem, M. (2000) E-mail and v-mail usage: Generalizing across technologies, *Journal of Organizational Computing and Electronic Commerce,* 10, 1, 49-66.

Keen, P. G. W. (1991) Shaping the future, Harvard Business School Press, Boston, MA.

Kirca, A. H., Jayachandran, S. and Bearden, W. O. (2005) Market orientation: A meta-analytic review and assessment of its antecedents and impact on performance, *Journal Of Marketing,* 69, 2, 24-41.

Kohli, A. K. and Jaworski, B. J. (1990) Market orientation: The construct, research propositions, and managerial implications, *Journal of Marketing,* 54, 2, 1-18.

Kohli, R. and Devaraj, S. (2003) Measuring information technology payoff: A meta-analysis of structural variables in firm-level empirical research., *Information Systems Research,* 14, 2, 127.

Liang, H. and Xue, Y. (2007) Understanding and mitigating uncertainty in online exchange relationships: A principal–agent perspective, *MIS Quarterly,* 31, 1, 105-136.

Markus, M. L. and Benjamin, R. I. (1997) The magic bullet theory in it-enabled transformation, *Sloan Management Review,* 38 55.

Mata, F. J., Fuerst, W. L. and Barney, J. B. (1995) Information technology and sustained competitive advantage: A resource-based analysis., *MIS Quarterly,* 19, 4, 487.

Matsunoa, K., Mentzer, J. T. and Rentz, J. O. (2005) A conceptual and empirical comparison of three market orientation scales, *Journal of Business Research,* 58, 1, 1.

Mcafee, A. and Brynjolfsson, E. (2008) Investing in the it that makes a competitive difference, *Harvard Business Review,* 86 98-107.

Orlikowski, W. J. (1992) The duality of technology: Rethinking the concept of technology in organizations, *Organization Science,* 3, 3, 398-427.

Orlikowski, W. J. (2000) Using technology and constituting structures: A practice lens for studying technology in organizations, *Organization Science,* 11, 4, 404-428.

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, 625-653.

Robey, D. and Sahay, S. (1996) Transforming work through information technology: A comparative case study of geographic information systems in county government, *Information Systems Research,* 7, 1, 93-110.

Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003) Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms., *MIS Quarterly,* 27, 2, 237.

Schneider, B., White, S. S. and Paul, M. C. (1998) Linking service climate and the customer perceptions of service quality: Test of a causal model, *Journal of Applied Psychology,* 83, 2, 150-163.

Shumpeter, J. A. (1942) Capitalism, socialism, and democracy, Harper, New York.

Srinivasan, R., Lilien, G. L. and Rangaswamy, A. (2002) Technological opportunism and radical technology adoption: An application to e-business, *Journal of Marketing,* 66, 3, 47-60.

Straub, D. and Watson, R. (2001) Transformational issues in researching is and net-enabled organizations, *Information Systems Research,* 12, 4, 337-345.

Teece, D. J., Pisano, G. and Shuen, A. (1997) Dynamic capabilities and strategic management, *Strategic Management Journal,* 18, 7, 509-533.

Venkatesh, V. and Davis, F. D. (2000) A theoretical extension of the technology acceptance model: Four longitudinal field studies, *Management Science,* 46, 2, 186-204.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003) User acceptance of information technology: Toward a unified view, *MIS Quarterly,* 27, 3, 425-478.

Wade, M. and Hulland, J. (2004) Review: The resource-based view and information systems research: Review, extension, and suggestions for future research, *MIS Quarterly,* 28, 1, 107-142.

Wall, T. D., Michie, J., Patterson, M., Wood, S. J., Sheehan, M., Clegg, C. W. and West, M. (2004) On the validity of subjective measures of company performance, *Personnel Psychology,* 57, 1, 95-118.

Weill, P. and Broadbent, M. (1998) Leveraging the new infrastructure: How market leaders capitalize on information technology, Harvard Business School Press, Cambridge, MA.

Wheeler, B. C. (2002) Nebic: A dynamic capabilities theory for assessing net- enablement, *Information Systems Research,* 13, 2, 125-146.

Winter, S. J. and Taylor, S. L. (1996) The role of it in the transformation of work: A comparison of post-industrial, industrial, and proto-industrial organization, *Information Systems Research,* 7, 1, 5-21.

Yates, J. and Vanmaanen, J. (1996) Information technology and organizational transformation - editorial note, *Information Systems Research,* 7, 1, 1-4.

Youndt, M. A., Snell, S. A., Dean, J. W. and Lepak, D. P. (1996) Human resource management, manufacturing strategy, and firm performance, *Academy of Management Journal,* 39, 4, 836-866.

Zhou, K. Z., Yim, C. K. and Tse, D. K. (2005) The effects of strategic orientations on technology- and market-based breakthrough innovations, *Journal of Marketing,* 69, 2, 42-60.

Zhu, K. and Kraemer, K. L. (2002) E-commerce metrics for net-enhanced organizations: Assessing the value of e-commerce to firm performance in the manufacturing sector, *Information Systems Research,* 13, 3, 275-295.

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, 61-84.