Developing a socio-technical framework for business-IT alignment

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Abstract

Purpose – The purpose of this study is to develop a framework for evaluating business-IT alignment. Specifically, the authors emphasize internal business-IT alignment between business and IS groups, which is a typical setting in recent boundary-less, networked business environments.

Design/methodology/approach – Based on the previous studies, a socio-technical approach was developed to explain how the functional integration in the business-IT alignment process could be accomplished in collaborative environments. The study investigates the relationship among social alignment, technical alignment, IS effectiveness, and business performance.

Findings – The results indicated that alignment between business and IS groups increased IS effectiveness and business performance. Business-IT alignment resulting from socio-technical arrangements in firms' infrastructure has positive impacts on business performance.

Research limitations/implications – This study is limited by control issues in terms of the impact of the confounding variables on business performance. Future studies need to validate the research model across industries. The study results imply that business-IT alignment is a multidimensional concept that includes social and technical activities explaining the way people and information technology institutionalize business value.

Originality/value – By establishing a socio-technical framework of business-IT alignment, this study proposes a conceptual framework for business-IT alignment that accounts for not only improved technical performance, but also improved human performance as well. This study emphasizes the importance of addressing internal socio-technical collaboration in modern business environments.

Keywords Communication technologies, Strategic planning

Paper type Research paper

1. Introduction

IT investment has been an important issue to senior executives as IT investment is one of the major budget items in most businesses. Management literature has shown contradictory results on the impact of IT investments on performance (Sircar *et al.*, 2000) meaning that IT investment can improve business performance under certain

conditions such as business-IT alignment. Business-IT alignment is one of the most important requirements that convert the IT-driven value into business performance. The concept of business-IT alignment became a key concept in management as it could provide insights into the link between IT investment and business performance. For example, business-IT alignment is a critical success factor in large IT projects such as ERP implementations (Chakraborty and Sharma, 2007).

However, due to the ambiguity and complexity of the alignment mechanism, previous studies showed difficulties in developing the constructs of business-IT alignment (Reich and Benbasat, 2000) and a comprehensive model for the alignment process (Reich and Benbasat, 2000; Sabherwal and Chan, 2001). As a result, there has been lack of comprehensive conceptual models and empirical studies that investigate the impact of business-IT alignment on business performance in a dynamic business environment.

New business environments are lowering firms' boundaries to business partners and customers due to improved information technology and flexible and secure service-oriented architecture infrastructure. To cope with collaborative environments, accomplishing functional integration using business-IT alignment is critical. In this study, the socio-technical alignment framework was employed to explain how business-IT alignment could be accomplished in group collaborative environments. Specifically, we emphasize internal business-IT alignment between business and IS groups, which is typical setting in a boundary-less, networked business environment. The rest of paper includes Theoretical development, Method, Results and discussion.

2. Theoretical development of business-IT alignment

2.1 Frameworks of business-IT alignment

Business-IT alignment is both an internal and external process across an organization or organizations. Firms can create sustainable competitive advantages through external alignment with business environment and internal alignment with resources and infrastructure. Normative integrated models of business-IT alignment usually include multiple variables that determine the level of external and internal alignments. Henderson and Venkatraman's strategic alignment model (1992, 1993) emphasized cross-domain relationship in external and internal alignments. Henderson and Venkatraman (1992, 1993) argued that strategic alignment emerges as an interaction among business strategy, IT strategy, organizational infrastructure and process, and IS infrastructure and process domains. External alignment results from the strategic fit of economic factors between an industry and an organization. Internal alignment results from the functional integration among organizational factors such as both business and IS resources, capability, infrastructure, and processes. In this study, since new business environments are becoming more collaborative, the scope of internal alignment expands to include business partners or customers.

Business-IT alignment studies in management literature have followed multiple frameworks, for example, contingency and resource-based perspectives. Contingency theory considers business-IT alignment as a state that determines strategic arrangements and organizational structures in the process of interaction with business environment. The studies based on the contingency approach suggest understanding the business-IT alignment process as a part of the strategy formation process to maximize business performance. Meanwhile the resource-based view

emphasizes an organization's resources and capabilities as sources of competitive advantage. Different IT assets and endowments can explain how firms can create sustainable competitive advantage and why firms differ in business performance.

A social phenomenon has multiple dimensions, and so does alignment. Both the external and internal alignments are critical in understanding the impacts and processes of business-IT alignment, the theoretical framework should be capable of explaining both internal and external alignment process. Both resource-based view and contingency perspectives must be considered in framework development. The resource-based view that considers IT itself as a strategic resource and the contingency perspective that considers strategic value of IT under the heading of good fit are complementary, rather than competing approaches (Oh and Pinsonneault, 2007).

We understand business-IT alignment as a part of firm's strategy formation process, which defines an organization's strategy over time. A dynamic alignment process takes somewhat longer to occur than the static alignment process. In this paper, we employed the socio-technical systems (STS) approach under the resource-based view and contingency frameworks to consider an organization as a combination of social and technical parts. The STS approach involves a framework, which requires that organizations consider effectiveness of socio-technical collaboration to achieve increased performance under business environmental constraints. Moreover, the STS perspective is useful in explaining today's working environment, which is a global networked team activity of humans and computers.

2.2 Social and technical dimension of business-IT alignment

Some IS scholars have adopted the content-process approach to investigate the impact of business-IT alignment on an organization: content (what is realized) and process (what is intended and pursued). The need for integrative models combining content and process dimensions (White and Hamermesh, 1981) and conceptual integrative paradigms (Blair and Boal, 1991) was often raised. Henderson and Venkatraman's model (1992, 1993) followed the content-process paradigm-strategic fits in strategy-structure-performance internally and externally, and the dynamic alignment processes between business and IT through continuous adaptations. Reich and Benbasat (1996) adopted Horovitz (1984) framework for their alignment research and developed the dual perspective of alignment – social and intellectual dimension of business-IT alignment. In their study, the social dimension of alignment concentrates on the people in the organization and the intellectual dimension of alignment emphasizes the content of plans and planning methodologies (Reich and Benbasat, 2000).

Reich and Benbasat (1996) pointed out that both the intellectual and social dimensions are necessary in alignment study to account for the comprehensive alignment mechanism in organizations and obtain meaningful management implications from both perspectives. Alone, neither the social nor intellectual dimension of alignment is sufficient to explain the entire spectrum of the alignment mechanism in organizations.

The social ecology of an organization and IT infrastructure affect the alignment process between business and IT. The success of any organization has been increasingly dependent on the people who work for the organization and information systems. In this sense, this study emphasizes social and technical dimensions of

business-IT alignment. The content-process paradigm fits well with the socio-technical dimension of business-IT alignment approach.

A firm has a different competitive advantage when it has different IT resources and capabilities. The level of functional integration is often somewhat firm-specific in nature, and in the long term creates sustainable competitive advantages and results in increased business performance. Meanwhile, business-IT alignment provides direction and organizational flexibility to allow business to respond to environmental threats and opportunities (Avison *et al.*, 2004). Firms can obtain the strategic direction from the strategic dimension of business-IT alignment and the flexibility from the social and technical dimension of business-IT alignment, which are the benefits firms can receive from the business-IT alignment process. Good IT management practice aligns the business and IT infrastructure domains (Reich and Benbasat, 1996). The social phenomenon of business and IT alignment includes the development of IT to produce the social and technical business values by aligning business and IT infrastructure: for example, aligning organizational infrastructure (administrative infrastructure, administrative process, and administrative skills) and IS infrastructure (IT architecture, IT process, and IT skills) (Henderson and Venkatraman, 1993). Business-IT alignment allows a company to leverage organizational knowledge and expertise inherent in the existing management infrastructure resulting in a competitive advantage that will positively affect business performance (Gandolfi, 2007).

Numerous studies have been performed social, technical, strategic, or integrated dimension of business-IT alignment – social dimension (Reich and Benbasat, 1996, 2000), technical dimension (Zigurs and Buckland, 1998; Brown and Magill, 1994), strategic dimension (Sabherwal and Chan, 2001; Palmer and Markus, 2000), and integrated dimension (Chan *et al.*, 1997; Henderson and Venkatraman, 1993). The social dimension of business-IT alignment emphasizes human interactions between business and IS domains. The technical dimension of business-IT alignment emphasizes the functional fit between IT infrastructure and processes. The strategic dimension of business-IT alignment emphasizes strategic fit between business and IS strategies. Integrated dimension of business-IT alignment focuses on the source of competitive advantage from a cross-domain framework perspective and investigate how to maximize the return on IT investment. In this study, we emphasize social and technical dimension of business-IT alignment as described below:

- *The social dimension of business-IT alignment* emphasizes synergy process of human actors in the alignment mechanism. The social dimension approach views a social system as a comprehensive whole, where the various elements interact with one another, rather than as a random collection of disparate elements (Gupta and Govindarajan, 2000). Previous literature considers the social dimension of business-IT alignment as consensus on the IS role (Pyburn, 1983), mutual understanding and commitment to the business and IT mission, objectives, and plans (Reich and Benbasat, 1996), and the maturity level of communication and partnership among business and IT organization (Luftman and Kempaiah, 2007). The social dimension of business-IT alignment is the level of functional integration of human components in the business and IS process to achieve organization's goal.

- *The technical dimension of business-IT alignment* emphasizes the functional integration between business and IT domain. Research into the technical

dimension of alignment explores the potential outcomes and implications of business-IT alignment as it specifically relates to the functional fit of institutional or technical infrastructure and architectures. Previous research suggested functional integrations between business governance and IT governance and administrative infrastructure and IS architectures (Henderson and Venkatraman, 1993). Luftman (2003) argued the maturity level of governance and architecture among business and IT organizations as alignment maturity components. The technical dimension of business-IT alignment is the level of functional integration of governance and infrastructure between business and IS domains in achieving organization's goals.

2.3 Research model and hypotheses

An increased IT investment does not always result in better organizational performance. There have been many studies that assessed the relationship between IT investments and organizational performance and found mixed empirical results. To precisely assess the value of IT investments, researchers need to consider the "missing link" between IT investments and organizational performance that causes the mixed empirical results by considering mediating variables (Devaraj and Kohli, 2003). Business-IT alignment is one of the missing links.

Resources and capabilities are somewhat firm-specific in nature and can explain the heterogeneity in organizational performance among distinct economic entities. An organization's resources and capabilities are the sources of competitive advantage. A firm differs from its competitors in terms of competitive advantage because it has a different status of business-IT alignment, which results in different organizational performance.

The quality of business-IT alignment is a moderator between IT investment and organizational performance (Weill, 1992). The increased IT investment often creates IT driven competitive advantages, which will be converted into increased business performance. A higher quality of business-IT alignment is expected to promote the conversion process from business value to increased business performance using more effectively aligned assets and information systems.

IS effectiveness is a mediating factor between business-IT alignment and business performance (Chan *et al.*, 1997). In this process, social alignment and technical alignment directly affects IS effectiveness. Luftman (2003) proposed six maturity components of business-IT alignment including communications, partnership, skills, governance, scope and architecture, and value. Our research suggest that high quality of business-IT alignment through communications, partnership, and IT skills among organization members will increase IS effectiveness by adding IS flexibility to an organization's social infrastructure. We propose that a high quality of business-IT alignment through governance, and technology scope and architecture will increase IS effectiveness by adding IS flexibility to an organization's technical infrastructure. IS groups in the companies that have more mature IS decision-making process have a greater chance to participate in IS decision-making processes and better access to IS executives (Sabherwal and King, 1995). We hypothesize that the greater level of business-IT alignment will result in greater IS effectiveness, which is a positive IT impact on the organization. Therefore, the following hypotheses *H1* and *H2* are proposed:

H1. The social dimension of business-IT alignment will positively influence IS effectiveness.

H2 The technical dimension of business-IT alignment will positively influence IS effectiveness.

Positive IT impact on an organization will increase business performance by building sustainable business value and converting it to increased business performance. There are numerous studies that support the positive impact of business-IT alignment on business performance (Sabherwal and Chan, 2001) and the positive impact of IS effectiveness on business performance due to business-IT alignment between business and IS strategies (Chan *et al.*, 1997). We propose that the greater level of IS effectiveness will result in greater business performance. Therefore, the following hypothesis *H3* is proposed:

H3. IS effectiveness will positively influence business performance.

Based on the related studies, the research model developed as shown in Figure 1 presents four constructs:

(1) social alignment;

(2) technical alignment;

(3) IS effectiveness; and

(4) business performance.

3. Methodology
3.1 Data collection
We collected data from executives and senior-, middle-, and entry-level managers of business and IT groups. Survey questionnaires were distributed in person to senior managers of the business and IT groups, who in turn distributed them to executives, managers and other staff. The respondents were informed that the survey participation was voluntary and the individual responses were confidential. A total of 350 questionnaires were distributed and 316 were collected. The response rate was high because the people coordinating the survey were in charge of the business unit or department in most cases. The respondents included 151 business groups and 162 IS group managers from 12 companies.
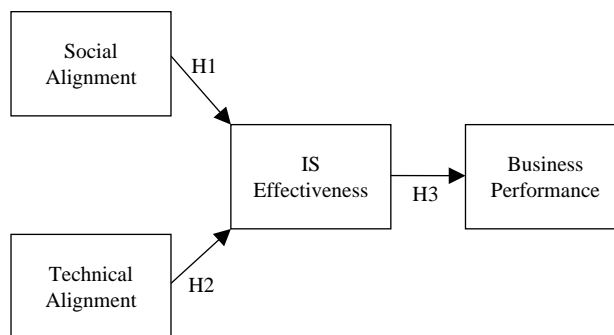

Figure 1.
Research model

The ratio of line to IT subjects was relatively balanced and controlled. The positions of the subjects were 16.8 percent (staff), 33.2 percent (entry-level manager), 26.3 percent (middle manager), 12.3 percent (senior manager), 7.0 percent (top manager), and 0.6 percent (others). The study targeted various industries for generalization and external validity. While random sampling would have been ideal for the sake of external validity, quota sampling was used due to the nature of this study.

Twelve well-known global firms in South Korea were selected: four construction, four manufacturing, two finance, and two computer and systems integration companies. The firms were selected from various industries because they often use the most advanced information and communication technology in the world, especially in the most critical areas: high-speed internet and mobile communication for business (Lee, 2003).

The firms that participated in the research were selected according to the following criteria:

(1) they have multiple numbers of business units; and

(2) they have the authority to develop their own business strategy and corresponding IS strategy and applications.

In general, large companies have multiple strategies and corresponding IS structures.

3.2 Measurement

The survey questionnaire contained four constructs:

(1) social alignment;

(2) technical alignment;

(3) IS effectiveness; and

(4) business performance.

It used a five-point Likert-type scale (e.g. anchored at "strongly disagree" as one and "strongly agree" as five or "not at all" as one and "to a great extent" as five). The measurement of each construct was based on measures validated in previous studies and was further refined and validated via pilot tests.

To determine the number of items and content for pilot item pools, 12 experts in the area of academic research and IT business completed the initial pilot survey and provided their comments. This step assured content validity by assessing the semantic correspondence between measurement items contained in the item pool and the underlying variables they were intended to measure. Upon review of the results, the questionnaire items were refined (Appendix 1).

Social alignment was assessed by the level of functional integration of human components in the business and IS process to achieve an organization's goals. The survey measurement of social alignment contained the concepts of teamwork quality and mutual trust between business and IT groups. The measurements for the construct of teamwork quality (Lee, 2001; Schultz and Evans, 2002) and mutual trust (Morgan and Hunt, 1994; Morris and Cadogan, 2001) were adapted and modified. Technical alignment was assessed by the level of functional integration of governance and infrastructure between business and IS domains in achieving organization's goals. For the survey measurement of technical alignment, the scale articulated by

Henderson *et al.* (1992) was adapted and modified. IS effectiveness measurement included two dimensions of DeLone and McLean (2003) IS success model. The instrument assessed two key categories of IS success: user satisfaction and organizational impact (net benefit of IS). Business performance was operationalized as the perceived level of growth and profitability of the business based on the measure developed by Venkatraman (1989) and refined by Chan *et al.* (1997). Using the perceived measure of business performance is appropriate (Sabherwal and Chan, 2001) because objective performance indicators from internal sources (Dess and Robinson, 1984) or secondary sources (Venkatraman and Ramanujam, 1986) are highly correlated to the managerial assessments of company performance.

4. Results and discussion

4.1 Results

The data from the responses to the survey were analyzed using the structural equation modeling (SEM) technique by using the LISREL 8.54 program. All reliability and factor analyses were conducted using SPSS 14.0.

Out of the 316 returned questionnaires, ten uncompleted questionnaires were discarded from the data analysis. A total effective sample size of 270 was obtained after using the listwise deletion option, which is higher than the desirable sample size considering the number of parameters (Kline, 1998). The histograms of observed variables showed the existence of univariate normality. We did not find any serious multicollinearity signs in standardized regression weights and variance estimates. Nor did we find any correlation coefficients in covariance matrix of latent variables considered as high multicollinearity (Kline, 1998).

The data analysis and testing of the hypotheses consisted of the following steps:

(1) measurement model analysis including exploratory factor analysis to identify the factor structure and check validities and reliability analysis; and

(2) structural equation modeling analysis for hypotheses tests.

Principal component analysis revealed four factors with eigenvalues greater than 1 explaining 71 percent of the variance except the fourth factor showing slightly low eigenvalue (0.99). However, the sharp decrease in eigenvalues after the fourth factors suggests four factor structure in measurement model. The varimax-rotated factors corresponded to social alignment, IS effectiveness, business performance, and technical alignment, respectively, as ones in the hypothesized model, which support discriminant validity (Appendix 2). The factor loadings for each item were higher than the cutoff point of 0.50 in ML estimates (λ) and have higher t values than the cutoff point of 2 in t values, which support convergent validity.

All of the Cronbach's coefficient α values were above 0.7 (social alignment $= 0.85$, technical alignment $= 0.87$, IS effectiveness $= 0.88$, and business performance $= 0.86$). The results revealed that the internal consistency of the measurement used in this study was acceptable and reliable (Nunnally and Bernstein, 1994). Additional information including mean, standard deviation, covariance, and reliability are shown in Table I.

The measurement model fits the data well and the fit indices of social alignment, technical alignment, IS effectiveness, and business performance support single factor constructs: GFI was higher than the recommended 0.90 or above (0.98, 0.99, 0.96

and 0.96) and SRMR was less than the recommended 0.08 or below (0.03, 0.01, 0.03 and 0.04), respectively.

The structural equation model includes all latent variables in the hypothesized model such as social alignment, technical alignment, IS effectiveness, and business performance. The structural equation modeling analysis was conducted to investigate the causal relations between constructs. The overall validity of the research model was evaluated by goodness of fit indices. The overall goodness of fit indices represent a good model fit (GFI = 0.91, AGFI = 0.87, NFI = 0.97, NNFI = 0.98, and CFI = 0.98), which supports the validity of the research model (Chin and Todd, 1995; Kline, 1998, Jöreskog and Sörbom, 1989).

All the path coefficients were statistically significant ($p < 0.01$) and were greater than 0.30, which is considered meaningful and "theoretically interesting" (Chin, 1998), except the coefficient between social alignment and IS effectiveness ($\gamma = 0.27$, $p < 0.01$).

Social alignment has a positive impact on IS effectiveness ($\gamma = 0.27$, $p < 0.01$; *H1* supported). Technical alignment has a positive impact on IS effectiveness ($\gamma = 0.53$, $p < 0.01$; *H2* supported). IS effectiveness has a positive impact on business performance ($\beta = 0.68$, $p < 0.01$; *H3* supported). The result of structural analysis are summarized in Table II and hypotheses testing displayed in Figure 2.

Construct	M	SD	1	2	3	4
Social alignment	3.15	0.69	(0.85)			
Technical alignment	3.33	0.69	0.77	(0.87)		
IS effectiveness	3.39	0.70	0.67	0.73	(0.88)	
Business performance	3.47	0.71	0.45	0.49	0.68	(0.86)

Notes: Intercovariances are presented in the lower triangle of the matrix. Cronbach's coefficient α is depicted in parentheses along the diagonal

Table I.
Mean, standard deviation, covariance, and reliability

Hypothesized paths	Standardized estimates	R^2
Social alignment → IS effectiveness	0.27**	0.56
Technical alignment → IS effectiveness	0.53**	0.56
IS effectiveness → business performance	0.68**	0.46
Goodness-of-fit statistics		
χ^2(df)	265 (115)	
χ^2/df	2.34	
GFI	0.91	
AGFI	0.87	
NFI	0.97	
NNFI	0.98	
CFI	0.98	

Notes: *$p < 0.05$; **$p < 0.01$

Table II.
Structural model results
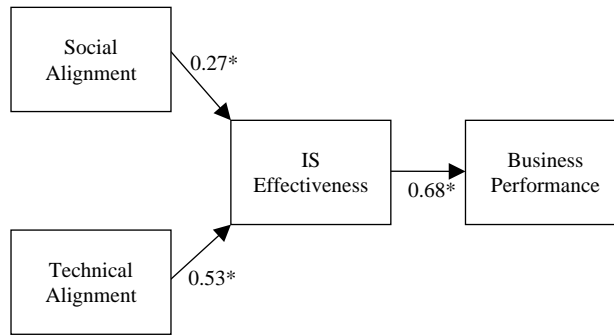
Note: *$p < .01$

4.2 Discussion

This study proposed and tested a model that investigates the relationship among social alignment, technical alignment, IS effectiveness, and business performance. This study can provide a comprehensive understanding of the concept of business-IT alignment by providing a balanced perspective on the business-IT alignment mechanism.

This study supports the existence of four constructs and indicates that the relationships among the constructs are significant. All the hypothesized constructs have positive relationships. First, this study supports two dimensions of the business-IT alignment construct: social and technical alignments. The results of this study supported a positive relationship of both the social and technical alignments toward IS effectiveness. Second, IS effectiveness is a result of business-IT alignment. IS effectiveness has a positive impact on business performance and plays an important role in mediating socio-technical alignment and transforming the business-IT driven value into increased business performance.

In discussing the importance of business-IT alignment, we often found that adopting new technology requires more than purchasing hardware. Management needs to begin with the end result in mind and use the appropriate business processes and business strategy to construct a solution. For example, when Charles Schwab adopted new technology, they took a balanced business-IT alignment approach with the telephone-based TeleBroker system, the e.schwab initiative and again on schwab.com (Luftman and Brier, 1999). Of course, technology alone did not drive the solution. Business-IT alignment is not serendipitous; IT and business must work together closely to ensure that new technology is addressing a business need, and as implemented will improve business performance. The failure to properly manage this business-IT collaboration process will result in a disconnect, and negatively affect business performance.

In sum, the study results imply that business-IT alignment is a multidimensional concept that includes social and technical activities explaining the way people and information technology institutionalize business value. By providing an integrated and realistic lens, instead of an overly simplified one that omits human actors in the scene or focuses only on strategic arrangements, this study provides practical implications.

This study is limited by control issues in terms of the impact of the confounding variables on business performance. The study controlled the ratio of subjects from

each business or IT group consistently to minimize the group effects. Because the study emphasized the impact of socio-technical arrangements between groups on business performance, we limited the subjects from each group in an organization to groups that contribute to the performance. However, we selected employees of major businesses in various industries, but did not investigate the industry-specific effect of business-IT alignment, which limits the generalization of the results.

Future studies need to validate the research model across industries. Some other factors may also affect the results of this research. For example, increased non-IS effectiveness, which was overlooked in this study, may better explain business performance than the increased IS effectiveness – either solely or in combination with IS effectiveness. Another interesting research topic is developing and extending socio-technical business-IT alignment model by including the strategic dimension of business-IT alignment, which we did not cover in this study.

5. Conclusion

This study extends and thus helps balance the concept of alignment. The study analyzes the business-IT alignment mechanism from both the social and technical activities that cover strategy formation and processes of individuals, groups and organizations. By establishing a socio-technical framework of business-IT alignment, this study proposes a conceptual framework for business-IT alignment that accounts for not only improved technical performance, but also improved human performance as well.

This study considers IS effectiveness as a business-IT alignment-driven business value that is mediated by social and technical alignment and directly linked to business performance. By discarding the direct link from alignment to business performance, which is a dominant pattern in alignment literature, this study magnifies implications as to how decisions regarding IT investment should be considered. Top management can consider IT investment as a way to create sustainable business-IT alignment driven business value, and to build core IT assets and capabilities that continuously improve organizational performance.

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Appendix 1. Questionnaire items

Social alignment

- SA1 – Line and IS groups have great confidence in each other.
- SA2 – Line group and IS group share the benefits that can be gained in the process of cooperation.
- SA3 – The level of overall teamwork between line and IS groups is high.
- SA4 – Team members in both line and IS groups are motivated to maintain the team.
- SA5 – Communication between line group and IS group is frequent.

Technical alignment

- TA1 – There is a good fit between IT governance (IT management design) and organizational structure.
- TA2 – Organizational structure and IT architecture (application, database, hardware, etc.) correspond to each other.
- TA3 – There is a good fit between IT architecture and IT plan.
- TA4 – Business process (work flow and process) and IT process (IS development process, data center operation, etc.) correspond to each other.

Information systems effectiveness

- IE1 – Our information systems increase the efficiency of business operation.
- IE2 – Our information systems improve decision-making processes.
- IE3 – Our information systems are helpful in creating and improving products and services.
- IE4 – Our information systems help me meet customer needs.

Business performance

- BP1 – Evaluate your organization's sales growth rate relative to the major competitors.
- BP2 – Evaluate your organization's market share gains relative to the major competitors.
- BP3 – Evaluate your organization's net profit position relative to the major competitors.
- BP4 – Evaluate your organization's competitiveness in terms of new product and service development last year.

Appendix 2. Factor structure

	Factors			
	1	2	3	4
Social alignment 2 (SA2)	*0.841*	0.087	0.058	0.133
Social alignment 3 (SA3)	*0.764*	0.118	0.118	0.308
Social alignment 4 (SA4)	*0.724*	0.152	0.190	0.262
Social alignment 1 (SA1)	*0.612*	0.453	0.093	0.282
Social alignment 5 (SA5)	*0.569*	0.430	0.096	0.201
IS effectiveness 3 (IE3)	0.197	*0.780*	0.231	0.264
IS effectiveness 4 (IE4)	0.26	*0.773*	0.214	0.104
IS effectiveness 2 (IE2)	0.127	*0.741*	0.294	0.337
IS effectiveness 1 (IE1)	0.149	*0.664*	0.356	0.340
Business performance 2 (BP2)	0.015	0.219	*0.811*	0.097
Business performance 1 (BP1)	0.164	0.125	*0.809*	0.193
Business performance 4 (BP4)	0.108	0.319	*0.797*	0.130
Business performance 3 (BP3)	0.153	0.152	*0.769*	0.166
Technical alignment 1 (TA1)	0.304	0.212	0.170	*0.807*
Technical alignment 2 (TA2)	0.216	0.277	0.193	*0.780*
Technical alignment 3 (TA3)	0.258	0.204	0.175	*0.753*
Technical alignment 4 (TA4)	0.379	0.286	0.163	*0.594*

Notes: Extraction method, principal component analysis; rotation method, varimax with Kaiser normalization

Table AI.
Rotated factor matrix

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