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Investigation of How IT Leadership Impacts IT-Business Alignment through Shared Domain Knowledge and Knowledge Integration

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Abstract

Using full range leadership model and the knowledge integration view of organizations, we develop and test a model linking IT leadership to IT-business alignment. Specifically, we examine how transformational IT leadership behaviors influence IT-business alignment through mechanisms that develop shared domain knowledge between IT and business personnel and mechanisms that integrate specialized IT and business knowledge. We also examine how the former mechanisms influence the efficiency of the latter. This study contributes to the existing literature by suggesting transformational leadership and mechanisms related to knowledge integration as key factors in IT-business alignment.

Keywords: *IT leadership, transformational leadership, IT-business alignment, knowledge-based view of organizations, alignment mechanisms*

Introduction

In the past decade, Information Technology (IT) has become more strategic and business-focused than tactical and operation-focused (e.g., efficiency, service delivery, and cost reduction). Correspondingly, organizations' IT investments have increased (Kappelman et al. 2013), and ensuring IT investment that improves organizational performance is considered as one of the top priorities for today's IT executives (Alter 2007). However, organizations often fail to realize the overall benefits from IT, resulting in taking a more conservative approach in IT investment (Kappelman et al. 2014). One of the main reasons behind this failure is due to the lack of IT-business alignment (Kappelman et al. 2013; Sabherwal and Chan 2001).

Despite theory and practice echoing the importance of IT-business alignment, why has it remained a continuing challenge (Kappelman et al. 2014)? It probably has because IT and business units lack understanding of each other's roles and responsibilities (Reich and Benbasat 2000) and incongruent objectives and methodologies to evaluate alignment (Ullah and Lai 2013). To ensure and sustain alignment, IT and business units must change their mindsets and routines to integrate their specialized knowledge (Chan and Horner-Reich 2007; Grant 1996a; Preston and Karahanna 2009). However, appropriate leadership that can help overcome this challenge may be missing in organizations (Chan et al. 2006).

In this study, we examine IT leadership in IT-business alignment from the knowledge integration perspective as we view the integration of specialized IT knowledge with that of business to contribute to an organization's production activities as key for achieving sustainable IT-business alignment. Using Bass' (1998) transformational leadership theory and Grant's knowledge-based theory of organization (1996a), we propose a model of how transformational IT leadership behaviors influence IT-business alignment through their effect on organizational mechanisms that develop shared domain knowledge between IT and business as well as those that help IT and business integrate their specialized knowledge. We also emphasize the effect of former mechanisms on the efficiency of latter (Grant 1996b).

This study contributes to the existing literature by developing a more comprehensive model according to which transformational leadership and mechanisms related to knowledge integration are key to achieving IT-business alignment. It provides support for the model using cross-industry data collected from IT personnel, IT executives, and business executives. It also provides practical insights about the development/sustainment of IT-business alignment through appropriate leadership and mechanisms related to knowledge integration. In the next section, we develop a model and present our hypotheses followed by research methodology, data analysis, results, and concluding remarks.

Literature Review

IT Leadership

Drawn from prior literature, we define *IT leadership as a set of behaviors influencing IT unit and stakeholders to manage or alter IT resources and IT-related processes directed to enhancing organizational performance.* Specifically, an IT leader's influence behaviors are conceptualized using the Full Range Leadership Model (FRLM), which features transformational, transactional, or laissez-faire as three types of leadership behaviors (Antonakis et al. 2003).

FRLM and Transformational Leadership

Transactional leaders motivate followers by engaging in transactional relationships in which they exchange rewards for performance. Specifically, transactional leaders display contingent rewards (CR) and management by exception-active (MBEA) or passive behaviors (MBEP). Transformational leaders influence followers by setting more challenging expectations, creating mutual respect, and focusing on followers' needs and higher motives. Specifically, transformational leaders display inspirational motivation (IM), idealized influence (II), intellectual stimulation (IS), and individualized consideration (IC). Laissez-faire leadership represents the absence of any transaction. The leader avoids making decisions, abdicates responsibility and does not use her/his authority. In general, research shows that transformational, CR and MBEA behaviors predict follower satisfaction with the leader, follower motivation, and leader effectiveness; CR and MBEA behaviors also predict a leader's job performance (Judge and Piccolo 2004).

The suitability of any type of leadership behavior, however, depends on a variety of factors, including what the leader seeks to affect (e.g., creativity, level of participation) and the setting in which s/he exercises leadership (e.g., profit versus non-profit) (Judge and Piccolo 2004). Given that achieving IT-business alignment is likely to involve transforming the mindsets of IT and business personnel about their roles and responsibilities in the implementation and assimilation of IT, transformational leadership is likely to be most useful of the different styles in FRLM. Such leadership is likely to enable others to think broadly and seek innovative ways to advance business (Bass 1998).

Transformational leaders transform the basis of motivation for their followers by offering a vision that inspires followers to pursue higher-order intrinsic goals (Bass et al. 2003). Four sets of behaviors underlie transformational leadership, briefly described earlier as the 4Is: IM, II, IS, and IC. The 4Is tend to be highly correlated in practice working in tandem and reinforcing each other. They are effective at introducing, empowering, and institutionalizing organizational change and innovation as well as developing learning systems and capabilities at the organizational and individual levels that facilitate continuous innovation (Vera and Crossan 2004).

As part of IM behaviors, a transformational leader articulates a compelling vision to which followers can relate their work and make it intrinsically meaningful. The leader infuses challenge into followers' work by setting high expectations and expressing confidence in their ability to achieve those expectations. The leader champions teamwork and the power of the collective, thereby helping followers identify with the organization.

A transformational leader also displays II such as admirable capabilities and values, including a strong conviction to her/his vision and ideals and a consistency between words and actions. Thus, followers attribute idealized qualities (e.g., ethical, trustworthy, confident) and charisma to the leader, make the leader their role model, and follow her/his vision.

A transformational leader displays IS behaviors by challenging assumptions, reframing problems, and approaching familiar and future situations in new ways. The leader elicits different perspectives by setting up systems that facilitate the creation and communication of different perspectives and by doing away with old and irrelevant ideas. The leader also encourages followers to engage in similar behaviors, does not minimize their ideas, and helps followers become more creative and independent thinkers.

IC behaviors focus on individual followers' needs for achievement and growth. The leader continuously engages followers and spends time listening to, coaching, and mentoring them. The leader creates new learning opportunities and a supportive climate in which followers can grow. Besides valuing the diverse needs and abilities of others, an individually considerate leader helps followers appreciate the value of this diversity (Bass 1998).

IT-Business Alignment

Most prior IS literature view IT-business alignment as a 'fit' (Gerow et al. 2014; Ullah and Lai 2013). Specifically, based on Henderson and Venkatraman's (1999) strategic alignment model (SAM), this fit has been investigated as strategic or intellectual fit (between organization's and IT's mission, objectives, and plans), structural fit (between business and IT decision-making), operational fit (between organizational and IT infrastructure), and social fit (between business and IT in understanding business and IT missions) dimensions (Chan and Horner-Reich 2007; Gerow et al. 2014; Preston and Karahanna 2009; Ullah and Lai 2013). IT-business alignment has also been defined as conformance of IT unit's structure to organizational strategy (Karimi et al. 1996), executives' perception of business value (Tallon et al. 2000), relationship of IT planning to organizational strategy (Chan 2002), and fit between IT and business strategies (Preston and Karahanna 2009; Tallon 2007). We define *IT-business alignment as a sustainable fit between IT and business strategies or the degree to which a business' mission, objectives, and plans are shared and supported by IT strategy for the long term* (Chan and Horner-Reich 2007; Preston and Karahanna 2009).

IT-business alignment is critical for an organization's financial performance and growth such as productivity and customer benefits (Gerow et al. 2014; Tallon 2007). Commitment of the top

management, CIO's relationship with CEO and participation in strategic planning, common understanding of the role of IT, and organizational mechanisms to create shared understanding are identified as key factors of successful IT-business alignment (Chan et al. 2006; Preston and Karahanna 2009).

IT-Business Alignment Mechanisms

IT-business alignment is a sustainable fit between IT and business strategies, but it requires a constant interplay, collaboration, coordination of inherent activities, and sharing of key information between IT and business units (Agarwal and Sambamurthy 2002). This interplay can be enabled by a variety of organizational venues that allow multi-directional interactions between IT and business units. Specifically, Grant's (1996a) knowledge-based theory of the organization suggests that organizations exist to integrate non-overlapping knowledge of individual specialists. According to this view, mechanisms to integrate specialized IT and business knowledge are likely to be critical for achieving IT-business alignment. They are expected to be effective in facilitating mutual understanding, adjustment and teamwork between IT and business units (Gittell 2005) so that non-overlapping knowledge of specialized personnel can be applied to the organization's production activities. In addition, mechanisms that help IT and business units develop common knowledge which spans IT and business domains is likely to be relevant by facilitating knowledge integration (Grant 1996a).

Knowledge Integration Mechanisms

Both creating shared domain knowledge and having the organizational capability to apply such knowledge to the production of goods and services are important (Grant 1996a). Accordingly, the organization should foster such capability and provide conduits through which IT and business knowledge can be integrated and applied to the production of IT applications and services for successful business performance (Grant 1996a). With these, the organization reconciles divergent perspectives, stimulates inter-department priorities, enables IT's awareness of organizational goals, and promotes business units' involvement in IT planning (Luftman and Brier 1999; Sabherwal and Kirs 1994). We refer to such mechanisms as *knowledge integration mechanisms, which are the means to facilitate the application of specialized knowledge of IT and business personnel to an organization's production activities.*

These mechanisms include IT personnel as liaison located within business units, cross-business training for IT personnel, opportunities for IT personnel to make lateral transfers to business units, the use of cross-functional IT project teams or steering committees to govern IT resources, and regular meetings between IT and business personnel and external stakeholders. IT's involvement in business planning and resolution of business problems, and collaborative governance of mission critical IT resources streamlined with key businesses are good examples of knowledge integration mechanisms. With these in place, IT and business units develop consensus on the strategic role of IT and partner in taking actions to advance business objectives (Sabherwal and Becerra-Fernandez 2005).

Mechanisms to Develop Shared Domain Knowledge

Knowing each other's work and processes intimately will speed up how IT and business units communicate and create synergy to advance business objectives (Reich and Benbasat 2000). However, understanding various business operations as well as IT technical knowledge presents a tough challenge due to the tacit nature of such specific knowledge and can be a barrier to communication (Johnson and Lederer 2005). Thus, IT and business need to create inherent familiarity with each other's domains and also create a common language to convey each other's function-specific needs and challenges (Preston and Karahanna 2009; Ullah and Lai 2013).

We refer to these as *mechanisms that develop shared domain knowledge. They are the means by which IT and business personnel acquire specialized knowledge about the other's domain.* Business personnel attending IT training/skill development sessions and meeting with IT on a regular basis are good examples. In so doing, an IT unit would be capable of profoundly discussing business implications of IT as well as other issues and priorities to other business units and providing its point of view during discussions of problems and new initiatives. Likewise, a business unit would be capable of proposing innovative IT applications and having a meaningful discussion with IT about available options and their

consequences.

Research Model and Hypotheses

This section presents the research model and hypotheses (Figure 1). We propose that transformational IT leadership will affect mechanisms to develop shared domain knowledge: such a leader focuses on developing others' thinking and capabilities that enable them to carry out the leader's vision of integrating IT with business. Furthermore, we expect that mechanisms to develop shared domain knowledge are a precursor to knowledge integration mechanisms because without common specialized knowledge, integration (i.e., application of synthesized knowledge between IT and business) cannot proceed.

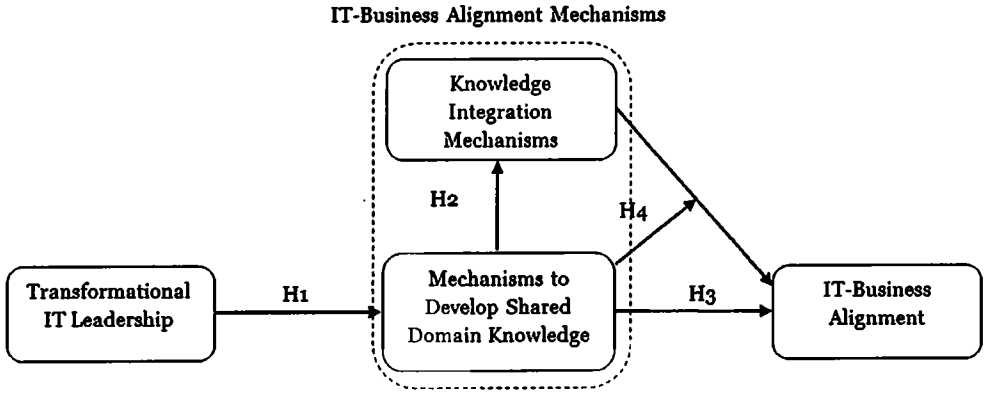

Figure 1. Research Model

Transformational IT leadership is expected to promote mechanisms to develop shared domain knowledge. A transformational IT leader has a compelling vision of how IT can significantly contribute to the organization's overall goals (IM). To implement this IT vision and as part of IC, which focuses on understanding others and facilitating their growth and development, such a leader is likely to spend time learning about business and coaching others, including business executives, so that they understand IT and its specific applications to business. By doing so, the leader is likely to model behaviors that others are motivated to emulate (II). Consequently, IT and business personnel will be motivated to learn about each other's domains. Again, as part of IC, a transformational leader is likely to provide opportunities for such learning to occur. Thus, we hypothesize the following:

> *H1: Transformational IT leadership behaviors will positively affect mechanisms to develop shared domain knowledge.*

Having pre-existing language and common knowledge is an essential prerequisite of communication between IT and business units (Preston and Karahanna 2009). Shared domain knowledge enables IT and business personnel to "participate in the others' key processes and to respect each other's unique contribution and challenges" (Reich and Benbasat 2000, p. 86). Additionally, when IT and business personnel talk the same language, they perceive greater social similarity making them more willing to take advantage of what the other party has to offer for developing and utilizing IT that improves business performance. Coupled with knowledge of the work and needs of the other party, perception of greater social similarity makes IT and business personnel more willing to intervene in the other party's work and provide input related to IT development and utilization. For instance, business managers who have an understanding of the IT development process may intervene to contribute domain knowledge at critical points in the process ensuring the development of an IT system that is aligned with business goals.

IS literature supports these arguments. For instance, when top managers possess IT knowledge, IT managers can participate in business planning and business managers can participate in strategic IT planning (Kearns and Sabherwal 2007). Similarly, the business competency of an IT unit and the business units' perception of IT are important in determining the extent of IT-business planning integration (Bassellier et al. 2003; Teo and King 1997). Thus, mechanisms that help IT and business units develop specialized, overlapping knowledge about each other's domains are likely to lead to activities that help IT and developing integrate their knowledge. Thus, we hypothesize the following:

H2: Mechanisms to develop shared domain knowledge will positively affect knowledge integration mechanisms.

Mechanisms to develop shared domain knowledge are likely to directly affect IT-business alignment. When both IT and business units acquire specialized knowledge of each other's domains and become cognizant of each other's priorities and initiatives (Preston and Karahanna 2009), they become more capable of taking decisions involving knowledge of each other's domains independently (Chan and Horner-Reich 2007; Ullah and Lai 2013). Thus, IT is more likely to be able to incorporate the business viewpoint and strategy when considering IT applications. Likewise, business units are more likely to be able to consider the intricacies of technology and their implications for business when determining ways to advance their strategy using IT. Such behaviors are likely to lead to greater IT-business alignment. Accordingly, we hypothesize the following:

H3: Mechanisms to develop shared domain knowledge will positively affect IT-Business alignment.

Knowledge integration mechanisms are expected to help IT-business alignment. Effective utilization of IT requires more than mere technical knowledge of hardware and software. It requires long term strategizing and identification of opportunities to utilize current IT to complement the core values of the organization (Sabherwal and Becerra-Fernandez 2005). It requires knowing how technology works and fits into the organization's current and future needs. Mechanisms that seek to integrate the knowledge of IT and business specialists provide these. These mechanisms require a certain level of specialized knowledge common to both IT and business personnel in order to enable meaningful communication between them. High levels of common knowledge, however, are likely to render the knowledge integration mechanisms as less effective. Grant (1996b) points out this paradox. Since the purpose of knowledge integration mechanisms is to integrate knowledge that exists in separate personnel, if these personnel have identical knowledge, the integration mechanisms become less relevant. In essence, the effectiveness of the knowledge integration mechanism will diminish with greater presence of mechanisms to develop shared domain knowledge. Too much knowledge of each other's domains could lead to unnecessary conflict when IT and business personnel try to integrate their knowledge. Thus, we hypothesize the following:

H4: Mechanisms to develop shared domain knowledge will moderate the effect of knowledge integration mechanisms on IT-business alignment: the effect of knowledge integration mechanisms on IT-business alignment will be weaker with greater presence of mechanisms to develop shared domain knowledge.

Research Method and Data Analysis

Methodology

A web-based questionnaire was administered to 69 organizations across various industries with different sizes (e.g., number of total employees and total sales), types of ownership (e.g., privately-owned, publicly-owned, or government agencies), and organizational goals (e.g., profit or non-profit): 672 organizations were contacted through email to take the survey, giving a response rate of 10.3%, which is reasonable since data was collected from 3 different sources within the same organization – IT leader, top management team, and IT personnel – to reduce common method variance and increase the validity of results as 'matched' pair provide richer responses and do a better job at accommodating 'fit'-based IT-business alignment models(Bagozzi and Yi 1993; Gerow et al. 2014). Descriptive statistics about the sample are shown in Table 1. We tested for non-response bias through a series of two-tailed t-tests suggested over two groups of responses (early vs. late) and found no statistically significant differences in means between the two (Goodstatdt et al. 1977). We also collected responses on individual (IT personnel's gender, level of education, tenure on their current position and organization) and organizational (number of total employees and total sales) variables to control external variances. Partial Least Squares (PLS) was used to test our research model.

Ownership	Frequencies	Percent
Publicly-traded	22	31.9%
Privately-owned	27	39.1%
Government- or State-owned	13	18.8%
Other	7	10.1%
Total	69	100.0%

Industry	Frequencies	Percent
Financial Services	7	10.1%
Manufacturing	9	13.0%
Transportation	4	5.8%
Education	8	11.6%
Technology	6	8.7%
Pharmaceutical	1	1.4%
Healthcare	11	15.9%
Government	5	7.2%
Other	18	26.1%
Total	69	100.0%

Total No. of Employees	Frequencies	Percent
< 300	22	31.9%
301 – 700	9	13.0%
701 – 1,000	7	10.1%
1,001 – 5,000	19	27.5%
5,001 – 25,000	10	14.5%
> 25,000	2	2.9%
Missing	0	0.0%
Total	69	100.0%

Total Annual Sales (in $ million)	Frequencies	Percent
< 20	10	14.5%
21 – 50	6	8.7%
51 – 100	9	13.0%
101 – 500	19	27.5%
501 – 1,000	10	14.5%
> 1,000	11	15.9%
Missing	4	5.8%
Total	69	100.0%

Table 1. Descriptive Statistics about Data Sample (N=69)

Construct Operationalization

All constructs in the survey were measured using multi-item scales based on Likert-type items. Where available, we adapted existing validated measures; elsewhere we developed measures based on prior IS literature and practitioner materials. Table 2 indicates the scales used in this study and their sources followed by inter-correlations among constructs in Table 3. For transformational IT leadership, we used four scales consistent with literature: IM, II, IS, and IC. For the knowledge integration mechanisms, we employed two scales (structural mechanisms that facilitate interaction between IT and business mechanisms that involve IT in business) as these enable the integration of specialized IT and business knowledge. For IT-business alignment, we followed the process outlined in Sabherwal and Chan (2001) and used responses to items about IT and business strategy to compute the distance between existing and ideal IT strategy that follows from given business strategy. Note that we chose to use scales instead of individual items as indicators in our PLS model in order to increase the efficiency of testing the significance of the interaction effect in our model (Goodhue et al. 2007).

	Measures	Scales	Respondents
Transformational IT Leadership	Multifactor Leadership Questionnaire (Avolio and Bass 2004)	1. Idealized Influence 2. Inspirational Motivation 3. Intellectual Stimulation 4. Individualized Influence	IT Personnel (i.e., IT Leader's Direct Reports)
Knowledge Integration Mechanisms	Newly developed scales using 9-items	1. Structural Mechanisms that Facilitate Interaction between IT and Business 2. Mechanisms that Involve IT in Business	IT Leaders (CIO, VP of IT, Director of IT)
Mechanisms to Develop Shared Domain Knowledge	Newly developed scales using 5-items	1. Mechanisms that Enable Development of Shared Domain Knowledge between IT and Business	
Business Strategy	Sabherwal & Chan (2001)	1. Defender 2. Prospector 3. Analyzer 4. Reactor	Top Management Team Members (i.e., VPs of other than IT unit/department)
IT Strategy	Sabherwal & Chan (2001)	1. IT for Efficiency 2. IT for Flexibility 3. IT for Comprehensiveness 4. No IT Strategy	IT Leaders (CIO, VP of IT, Director of IT)

Table 2. Survey Measures, Items and Respondents

	TRB	KIM	MSD	IBA
Transformational CIO Leadership Behaviors (TRB)	1.000	---	---	---
Knowledge Integration Mechanisms (KIM)	.227	1.000	---	---
Mechanisms to Develop Shared Domain Knowledge (MSD)	.279	.569	1.000	---
IT-Business Alignment (IBA)	.048	.394	.507	1.000

Table 3. Inter-correlations Among Constructs

Data Analyses and Results

Table 4 reports composite reliability (CR) and average variance extracted (AVE) as above acceptable levels (.8 for CR and .5 for AVE), thereby providing evidence of reliability and validity of our measures (Fornell and Larcker 1981).

	AVE	Composite Reliability
Transformational CIO Leadership Behaviors	.703	.903
Knowledge Integration Mechanisms	.676	.805
Mechanisms to Develop Shared Domain Knowledge	1.000	1.000
IT-Business Alignment	1.000	1.000

Table 4. Psychometric Properties of Constructs

The result of our analysis in Figure 2 showed that transformational IT leadership behaviors were positively related to mechanisms to develop shared domain knowledge (β = .296, p < .05). Similarly, mechanisms to develop shared domain knowledge were positively related to knowledge integration mechanisms (β = .558, p < .01). Moreover, as expected, mechanisms to develop shared domain knowledge were positively related to IT-business alignment (β = .418, p < .01). Finally, mechanisms to develop shared domain knowledge interacted with knowledge integration mechanisms to influence IT-business alignment (β = -.310, p < .01). To assess the nature of this interaction, subsamples (n = 35 and 34) obtained after a median split and representing high and low levels of mechanisms to develop shared domain knowledge were analyzed. At low levels of mechanisms to develop shared domain knowledge, knowledge integration mechanisms had a positive effect on IT-business alignment (β = .396, p < .01) and this effect reversed in sign in the other subsample (β = -.256, p < .05). These results provide empirical support for all of our hypotheses.

We repeated each of our analyses using covariates to control for the number of employees and sales (organization-level) as well as gender, level of education, and years of tenure at their current positions and organizations (individual-level). None of the covariates influenced either alignment mechanisms or alignment, nor did they alter the effects of leadership styles on alignment mechanisms or of alignment mechanisms on alignment. All our hypotheses except H2 involved independent and dependent constructs measured differently (see Table 2), which alleviates common method bias concern in the tests of

hypotheses. Regarding testing for H2, we performed a common method bias test suggested by Liang et al. (2007) and found no evidence of such a bias.

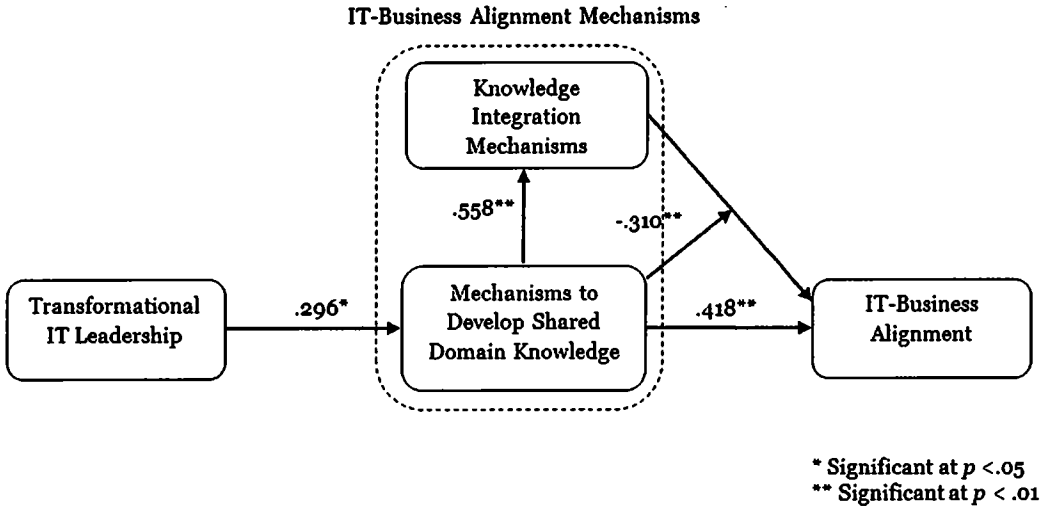

Figure 2. Result

Discussion and Concluding Remarks

IT-business alignment is a serious concern: IT's involvement in strategic planning is still lacking and IT's role in helping to shape business strategy is in question (Kappelman et al. 2014). In this regard, this study reiterates the importance of IT leadership in IT-business alignment and how IT leadership can be a determining factor from structural/intellectual and social dimensions of alignment (Chan and Horner-Reich 2007; Ullah and Lai 2013). Using a knowledge-based view of organizations, this study also suggests the relevance of mechanisms that help IT and business integrate their specialized knowledge and mechanisms that develop shared knowledge between IT and business in achieving IT-business alignment. Transformational IT leadership helps in the achievement of IT-business alignment by promoting mechanisms that help IT and business units develop shared knowledge. These mechanisms not only have a direct and positive impact on IT-business alignment, they also have a positive influence on knowledge integration mechanisms which, in turn, promote alignment. Mechanisms that develop shared domain knowledge between IT and business moderate the effect of knowledge integration mechanisms on alignment, with the latter mechanisms becoming less effective when mechanisms to develop shared domain knowledge are present to a greater degree. Thus, an IT leader must be careful in excessively promoting mechanisms to develop shared domain knowledge because doing so may put IT and business units in a stressful situation.

The IT leader must be aware that IT-business alignment requires 'empowering' IT and business units to engage in a collaborative effort. As we have found, the effect of IT leadership on IT-business alignment occurs through mechanisms related to knowledge integration. These mechanisms require participation from IT and business personnel, thus suggesting that alignment cannot occur merely through an IT leader's solitary acts. It requires organizational mechanisms that empower IT and business personnel to take responsibility for IT-business communication, developing shared domain knowledge, and making sure that IT is involved in business planning. By offering a clear and compelling vision of IT to others, by helping them develop the knowledge, skills, and abilities required for realizing the vision, and by personally engaging in what s/he expects others to do, a transformational IT leader empowers others to set up and enhance the mechanisms that lead to IT-business alignment.

This study is not free from limitations which must be acknowledged to correctly interpret our findings. We used one method for all data collection (a web-based questionnaire). Although we administered the survey to three different parties in an organization and tested for common method variance, common method variance may still have influenced our findings. Adding objective measures would have helped the study avoid this problem and allowed for more accurate assessment of the causal relationships in our model.

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