

# Business-IT Alignment Maturity in the US and China: Perspectives of IT and non-IT Employees

*Full Paper*

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## Abstract

Business-IT alignment has always been one of top concerns in IS management and strategic planning. This study evaluated the business-IT alignment maturity levels in the U.S. and China from the perspectives of IT and non-IT employees. The alignment in the U.S. was found to be more mature than in China. Additionally, data revealed that the alignment maturity level was higher in the U.S. from the viewpoint of IT employees than from those of non-IT employees, although there was no significant difference between IT and non-IT employees in China. Furthermore, results indicated that alignment in manufacturing and retail industries were more mature in the U.S. than in China. The IT industry had the highest alignment maturity level in both countries.

## Keywords

Business-IT Alignment, Alignment Maturity, Operational Level Alignment, Cross-Culture Research, U.S. and China

## Introduction

Aligning Information Technology (IT) and business is a pervasive and persistent problem (Luftman et al., 2015). According to Luftman, "Business-IT alignment refers to applying Information Technology (IT) in an appropriate and timely way, in harmony with business strategies, goals and needs." (Luftman, 2000). It addresses how effectively and efficiently IT systems and business systems fit together. In other words, mature alignment is meant to build a relationship wherein IT and business functions can harmoniously adapt to each other's strategies.

The importance of business-IT alignment has been well-known and studied since the late 1970s. Companies endeavor to interlink technology and business in light of evolving technology and their dynamic business strategies (Luftman and Brier, 1999). With economic development, companies change not only their business scope, but also their IT infrastructure (Weill & Broadbent, 1998), which leads to a continuous adjustment between IT and business alignment. Practitioners and academics have proposed various models and methodologies for addressing the question of how to align IT services and business goals (Luftman et al., 2015). However, the exploration and detection of business-IT alignment remain elusive (Luftman & Kempaiah, 2007). Many companies today still suffer from misalignment, which results in project cancellation, failed systems that do not meet business needs, user dissatisfaction, and high IT costs, among other challenges (Chen, 2010).

The importance of alignment has been widely discussed and well documented. Achieving alignment contributes to chief executives' better understanding of the value of IT and positive participation in IT decision-making (Holland & Skarke, 2008); facilitates better understanding and improvement of the business-IT relationship; creates the perception of high business value and positive IT impact (Chen, 2010); improves organizational performance (Tallon et al., 2000); and increases the return on IT investment (Byrd, 2006).

This study investigates business–IT alignment in the U.S. and China for the purpose of answering the following research questions:

1. What are the current business–IT alignment maturity levels of companies in the U.S. and China from the perspectives of IT and non-IT employees?
2. Is there a significant alignment maturity difference between the U.S. and China?
3. Is there a significant difference in the views of IT and non-IT employees regarding alignment maturity?
4. Is there a significant alignment maturity difference among various industries, IT’s organizational structures, and the CIO’s reporting structures in the US and China?

## **Literature Review**

### ***Business-IT Alignment in the U.S.***

Over the years, the relevance of alignment between business and IT strategies has persisted as one of the top-ranked concerns for both academics and practitioners in the United States (Luftman et al., 2015). The issue of achieving IT-business alignment was first documented in the U.S. in late 1977 (McLean & Soden, 1977). The Society for Information Management (SIM) reported that it was one of the top ten IT management issues in the U.S. from 1980 through 1994. The annual SIM survey, which studies IT management issues and trends from the perspective of Chief Information Officers (CIO), indicates that since 1994, IT-business alignment has become a major issue of concern. From 2005 to now, it has been ranked among the top three issues (Kappelman et al., 2016).

### ***Business-IT Alignment in China***

As the world’s second largest economy, accounting for 15% of the global gross domestic product (<https://knoema.com/tlcnrcg/gdp-by-country-world-largest-economies-2016>, 2016), China cannot be ignored in business-IT alignment research for the following reasons.

China’s continuously and rapidly growing economy and its participation in global competition compel Chinese companies to significantly increase their investment in IT in order to boost their productivity. IT as a critical resource has become widespread in China in the most recent two decades (Davison et al., 2008). IT applications in China have begun to move away from traditional transaction processing systems to comprehensive, large-scale information systems such as enterprise resource planning (ERP) and supply chain management (Chen, 2010). The success of these systems requires a high level of coordination and collaboration between IT and business units, which necessitates business-IT alignment research in China.

According to Hofstede’s four cultural dimensions, the Chinese culture demonstrates high power distance, low individualism, average masculinity, and low uncertainty avoidance, distinguishing it from Western cultures (Chen, 2010). For information systems (IS) management, Chinese managers are characterized by reliance on informal information, centralized decision-making, high context communication, and intuitive decision-making (Martinsons & Westwood, 1997). These unique Chinese culture characteristics may differentiate business-IT alignment in China from that in other cultures. Published IS research in China has focused disproportionately on technical and operational issues, while empirical studies on organizational and strategic issues are rare (Ji et al., 2007). Therefore, business-IT alignment studies can provide useful ideas for Chinese organizations seeking to improve their IS and organization management (Chen, 2010).

### ***Perspectives of Employees***

Despite the existence of various business–IT alignment models, most of them focus on the conceptualization and fit between a firm’s IT and business strategies, and most are founded on the perspectives of top IT and management executives. Alignment is scarcely explored across different organizational levels such as the operational level (Gutierrez & Lycett, 2014).

Even if an IT project is conceived at strategic level and aligned with business goals, the original objectives for which the project was conceived can be lost as it moves down through operational levels (Lycett et al., 2004). Employees who implement business and IT strategies at the operational level are critical in the assessment of alignment. Addressing alignment at the implementation level will ensure effectiveness and efficiency in supporting and shaping business and IT collaborations on daily basis (Gutierrez & Lycett, 2014). Therefore, this research focuses on employees' views of alignment in the implementation process.

Business implementers tend to be more concerned with operational, management, and budget issues, while IT implementers tend to be more concerned with technical issues (Srivannaboom, 2006). Additionally, business and IT employees each have distinct domain knowledge, experiences, learning and knowing mechanisms (Preston & Karahanna, 2009), which may differentiate their understanding of projects and strategies. Therefore, we investigate business-IT alignment from the perspective of both IT and non-IT employees.

### ***IT Organizational Structure, CIO Reporting Structure, and Industry***

Research has shown association between various IT organizational and CIO reporting structures and various business-IT alignment maturity levels in the U.S. (Luftman & Kempaiah, 2007). Therefore, we also examine alignment association with IT organizational structure and CIO reporting structure in the U.S. and China. Many IS alignment studies examine a single industry, which may be ineffective in generalizing across different industries (Luftman et al., 2015). This research investigates the attainment of different business-IT alignment maturity levels across various industries.

## **Research Model**

### ***Background and Literature***

Business-IT alignment researchers have proposed various models to help in the understanding of linkages and partnerships of business and IT. Among them, the most cited model is Luftman's (2000) Strategic Alignment Maturity (SAM) model, with more than 500 citations in Google Scholar. As the most receptive metric by researchers and practitioners (Luftman et al 2008), it assesses the extent to which business and IT functions align. This model provides organizations with a guideline not only to assess the maturity of their alignment, but also to identify a path of progression to a higher level of alignment.

Using this model, benchmarks for business-IT alignment were created based on the assessments of global companies, such as 50 Global 2000 organizations in 2003 by Luftman (Luftman, 2003), and 197 Global 1000 organizations in 2007 by Luftman and Kempaiah, and recommendations for improving alignment were offered. The most recent benchmark for global companies was level 3 in 2007 (Luftman & Kempaiah, 2007), and the most recent benchmark for Chinese companies was level 2 in 2009 (Chen, 2010), but there is no separate benchmark for U.S. companies. With the rapid development of the economy and IT in the past 10 years, new benchmarks for the U.S. and China need to be identified.

Luftman's (2000) Strategic Alignment Maturity consists of six organizational dimensions: communication; value; governance; partnership; scope and architecture; and skills. Luftman & Kempaiah (2007) define them this way:

“Communication measures the effectiveness of the exchange of ideas, knowledge, and information between IT and business organizations; Value demonstrate the contributions of information technology and the IT organization to the business in terms that both the business and IT understand and accept; Governance defines who has the authority to make IT decisions and what processes IT and business managers use at strategic, tactical, and operational levels to set IT priorities to allocate IT resources; Partnership gauges the relationship between a business and IT organization, including IT's role in defining the business's strategies, the degree of trust between the two organizations, and how each perceives the other's contribution; Scope and Architecture measures IT's provision of a flexible infrastructure, its evaluation and application of emerging technologies, its enabling or driving business

process changes, and its delivery of valuable customized solutions to internal business units and external customers or partners; Skills measures human resources practices, and the organization’s readiness for change, capability for learning, and ability to leverage new ideas.” (Luftman & Kempaiah, 2007).

Prior research has examined linkages between business-IT alignment and communication (Preston & Frolick, 2008), value (Sinan & Weill, 2007), governance (Wu et al., 2015), partnership (Huang & Hu, 2007), and skills (Chan et al., 2006). Moreover, Luftman’s (2000) Strategic Alignment Maturity (SAM) model has been widely validated at the strategic – firm level and tactical – business level, but never at the operational - project level (Belfo & Sousa, 2012). Hence, this research validates the SAM model on the operational level, based on the views of IT and non-IT employees.

**Research Model**

This research is founded on Luftman’s (2000) Strategic Alignment Maturity model and its five-level criteria to measure business-IT alignment maturity of companies in the U.S. and China from the perspectives of IT and non-IT employees, respectively. Therefore, we propose the following hypothesis,

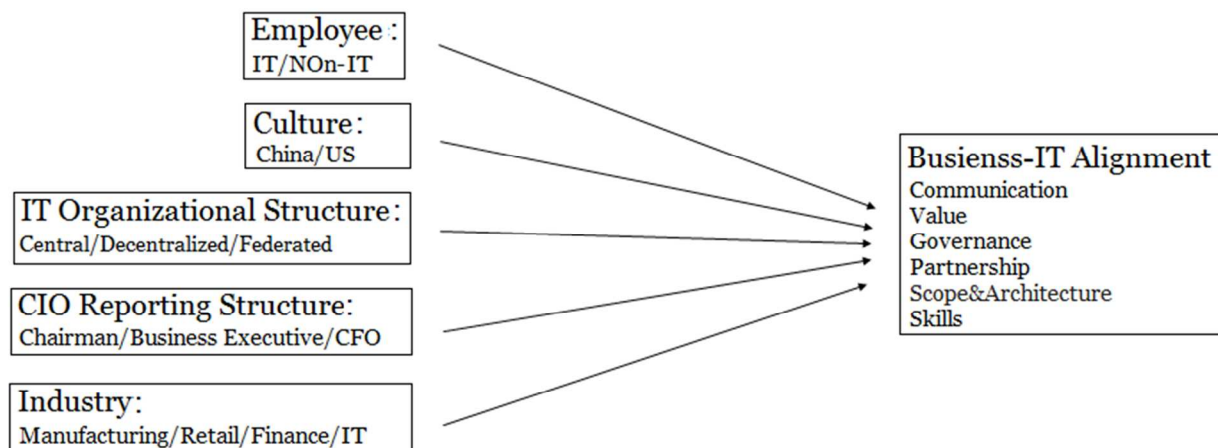
- H1: The business-IT alignment maturity levels from the perspectives of IT and non-IT employees are different in China.
- H2: The business-IT alignment maturity levels from the perspectives of IT and non-IT employees are different in the US.
- H3: The business-IT alignment maturity levels are different between US and China.

This study also detects the impacts of industry, IT organizational structure and CIO reporting structure on the business-IT alignment maturity. Therefore, we propose the following hypothesis,

- H4: There is different alignment maturities for various IT’s organizational structures in the US and China.
- H5: There is different alignment maturities for various CIO’s reporting structures in the US and China.
- H6: There is different alignment maturities for various industries in the US and China.

The research model is proposed in Table 1.

**Table 1. Research Model**



The three IT organizational structures explored in this paper are centralized, decentralized, and federated. In centralized IT organizations, all IT resources report to one unit, usually led by the CIO; in decentralized IT organizations, each business unit has its own IT organization; in federated IT organization, some parts of IT are centralized and other parts are decentralized (Luftman and Kempaiah, 2007). Prior research

found that federated IT structures are associated with higher alignment maturity than either centralized or decentralized structures (Luftman & Kempaiah, 2007).

This study explores three categories of CIO reporting structures: reporting to the CEO/president/chairman; reporting to a business executive, and reporting to the CFO. In past research, companies whose CIOs reported directly to the CEO/president/chairman were found to have significantly higher alignment maturity than companies with other reporting structures (Luftman & Kempaiah, 2007).

## Methodology

### *Pretest and Pilot Test*

Our study employed the instruments proposed by Sledgianowski (2006) with 22 items. This model adopted Luftman's (2000) Strategic Alignment Maturity model, originally with 39 items, and removed 17 items for significant improvement of data fit (Sledgianowski et al., 2006).

One Information Systems professor, one CEO, and one CIO from the U.S. were invited to review the survey questionnaire, to which they made slight modifications. One of the authors of this paper translated the survey from English to Chinese. Five academic and industrial professionals in China were invited to review the instrument in Chinese. Based on their comments, the Chinese survey was refined, translated back to English, and made compliant with the original English version. The refined survey was then distributed to four IT and four non-IT participants from four companies in the U.S., and five IT and five non-IT participants from five companies in China for a pilot test. Both the English and Chinese surveys were finalized based on two rounds of feedback.

### *Data collection*

Extant research has revealed that multinational operating companies in China have significantly different business-IT alignment maturity levels when compared to domestic companies in China (Chen, 2010). Hence, after the pretest and pilot test, 100 surveys were sent only to domestic companies in China through emails. Similarly, 100 surveys were sent only to domestic companies in the U.S. through emails. Finally, 55 usable responses from the U.S. with response rate of 55%, and 72 usable responses from China with response rate of 72% were employed for analysis. The collected data for analysis includes at least one IT and one non-IT employee from each company. The sizes of the companies are summarized in Table 2. The distribution of IT and non-IT responses is displayed in Table 3.

**Table 2. Company Size Distribution**

Company size: Number of employees	1-50	51-100	101-500	501-1000	Above 1000	Total
U.S.	3	3	3	0	12	21
China	3	2	5	2	20	32

**Table 3. The distribution of IT and non-IT responses**

	IT	Non-IT	Total
US	30 (at least one for each company)	25 (at least one for each company)	55
China	36 (at least one for each company)	36 (at least one for each company)	72

### *Measurement Validation*

Confirmatory factor analysis (CFA) was conducted to assess the internal reliability, convergent validity, and discriminant validity of the measurement. CFA indicated that all item loadings were between 0.68 and 0.89, which were all greater than critical value of 0.6, confirming that all items of the instrument were representative of their respective latent constructs.

Cronbach's alpha was used to establish internal consistency. The coefficients for the different variables ranged between 0.73 and 0.91, which were greater than the critical value of 0.7. Thus, all measures were considered internally reliable.

Convergent validity of the measures was obtained by testing to see if the factor loadings and the average variance extracted (AVE) of each construct were above the acceptable limit of 0.5. The factor loading of each item were greater than 0.7 and significant at the  $p < 0.01$  level, and the AVE of each latent construct was greater than 0.5. Therefore, they established convergent validity of the measurement.

Discriminant validity of the measures was obtained by testing to see if the AVE of each construct was greater than the variance among all constructs. To examine that, testing was done to see if the square root of the AVE was greater than the correlations between the focal construct and all other constructs in the model. These analyses established the discriminant validity of the instrument.

## Results

Hotelling's  $T^2$  tests were conducted to examine if there was significant difference between IT and non-IT employees, and between China and the U.S. on each of the six alignment dimensions. Hotelling's  $T^2$  was applied, because each dimension was measured by multiple indicators. The overall maturity levels of China and U.S. were based on the average of the six dimensions. Additionally, T-test was conducted to examine if China and U.S. have significant different overall maturity levels. The detailed alignment maturity level results are displayed in Table 4.

In China, the perspective of overall alignment maturity level was higher among non-IT employees than among IT employee but the difference was not significant. Therefore, our H1 is not supported. It showed only that the dimension of Communication had significantly higher maturity among the perspectives of non-IT employees when compared to the perspectives of IT employees.

Conversely, in the U.S., maturity in all dimensions were higher among the IT employees than non-IT employees, and the differences were significant, except on the dimension of Scope and Architecture. Therefore, our H2 is generally supported. The  $T^2$  test also indicated that the overall alignment maturity was significantly higher for IT employees.

**Table 4. Alignment Maturity Level Results**

	Business-IT Alignment Maturity						
	China			U.S.			China:U.S.
	IT	Non-IT	T <sup>2</sup>	IT	Non-IT	T <sup>2</sup>	T <sup>2</sup>
<b>Communications</b>	2.70	2.84	17.483597*	3.50	3.11	16.671911*	15.469406*
<b>Value</b>	3.05	2.98	9.1839532	3.69	3.32	18.832067*	13.764819*
<b>Governance</b>	3.09	2.95	7.0374536	3.72	3.16	34.033852*	10.53315*
<b>Partnership</b>	3.27	3.39	3.6424359	4.05	3.54	21.759333*	13.629426*
<b>Scope and Architecture</b>	2.78	2.91	3.6435749	3.59	3.47	3.0515556	8.8132449*
<b>Skills</b>	2.96	3.12	7.3474366	3.40	3.02	10.190455*	12.009911*
<b>Overall</b>	2.99	3.03	8.8435785	3.66	3.27	17.892554*	43.754815*
<b>Total</b>	3.01			3.46			0.006272**

\* Value is significant greater than the critical value of Hotelling's  $T^2$  test at the level of 0.05 with its degree of freedom and number of variables. \*\* Value is significant for t-test at the level of 0.05.

Compared to China, the U.S. had significantly higher alignment maturity in all six dimensions. The overall business-IT alignment maturities of the U.S. and China were 3.46 and 3.01, respectively, and the difference was significant as indicated by both the t-test and Hotelling's  $T^2$  test. Therefore, H3 is supported.

The relationship between IT organizational structures and alignment maturity was investigated. Among all surveyed companies in China, 80% employed central structure, while 20% employed federated structure. No Chinese company in our data sample used decentralized structure. Of all the companies in the U.S., 41% used central structure; 13% used decentralized structure, and 46% used federated structure. Table 5 summarizes the specific maturity levels, and p-values of t-tests between the two countries. Federated IT organizational structure corresponded with a significantly higher business-IT alignment maturity than the other structures in both the U.S. and China. Federated structure corresponded with higher alignment maturity in China than in the U.S., but the difference was not significant, while central structure corresponded to a significant higher alignment maturity in the US than in China. Therefore, H4 is generally supported.

**Table 5. IT Organizational Structure and Alignment Maturity**

IT organizational structures	Comparison of Business-IT Alignment Maturity		
	China	U.S.	U.S.: China (p value)
Central	2.76	3.19	0.0003789*
Decentralized	N/A	3.63	N/A
Federated	3.98	3.89	0.06177

\*\* Value is significant for t-test at the level of 0.05.

In China, 47% of CIOs reported to CEOs; 11% reported to business executives; 2% reported to CFOs; and 20% did not indicate CIO reporting structure. In the US, 30% CIOs reported to CEOs; 16% reported to business executives; 7% reported to CFOs; and 47% did not indicate the reporting structure. Table 6 summarizes the specific alignment maturity and p-values of the t-tests. The structure of CIO reporting to CEO corresponded a higher alignment maturity than the other structures in both the U.S. and China. Additionally, the US had higher alignment maturity than China on all three CIO reporting structures, but only the CIO reporting to CEO structure was significantly different between the two countries. Therefore, H5 is partially supported.

**Table 6. CIO Reporting Structures and Alignment Maturity**

CIO reporting structures	Comparison of Business-IT Alignment Maturity		
	China	U.S.	U.S.: China(P-value)
CEO/President/Chairman	3.17	3.94	0.004231*
Business Executive	2.87	3.12	0.06729
CFO	2.99	3.07	0.1363

\*Value is significant for t-test at the level of 0.05.

Our data collection was spread across four industries: manufacturing, retail, finance, and IT. Responses from China were distributed as follows: 27% from manufacturing; 13% from retail; 18% from finance; and 28% from IT. Responses from the U.S. were distributed as follows: 21% from manufacturing; 14% from retail; 28% from finance; and 21% from IT. As summarized in table 7, the industries of IT and finance had the highest and second highest alignment maturities in both the U.S. and China. All alignment maturity levels were higher in the US than in China, but the differences were significant only for industries of manufacturing and retail as indicated by t-tests. The average alignment maturity of the IT industry was about equal in both the U.S. and China. Therefore, H6 is partially supported.

**Table 7. Industry and Alignment Maturity**

Industry	Comparison of Business-IT Alignment Maturity		
	China	U.S.	U.S.: China (P-value)
<b>Manufacturing</b>	2.44	3.06	0.007092*
<b>Retail</b>	2.43	2.98	0.04088*
<b>Finance</b>	3.12	3.43	0.2726
<b>IT</b>	3.67	3.68	0.4194

\*\* Value is significant for t-test at the level of 0.05.

## Discussion

Results of this study indicate a significantly higher alignment maturity in the U.S. than in China from the perspectives of employees. Economy, technology, and culture can be the factors in the differentiation of alignment maturity. Regarding economy, the U.S. is a developed country, while China is a developing country. With more experience in business development, U.S. companies may be able to better align their business strategies with IT. In terms of technology, U.S. companies have experienced a wider, deeper and longer relationship with technical knowledge than Chinese companies, which may make U.S. companies better equipped to align their IT strategies with business. Culturally, the Chinese are characterized by high power distance, low individualism, average masculinity, and low uncertainty avoidance, which distinguishes them from Western cultures (Chen, 2010). Chinese managers were also found to be characterized by reliance on informal information; centralized decision-making; high context communication; and intuitive decision-making (Martinsons & Westwood, 1997). Informal information may be not as precise as formal information, which could cause top managers make inappropriate decisions; or informal information could be incorrectly distributed through the organization, which may negatively impact communications and partnership between IT and non-IT staffs. The centralized and intuitive decision-making of top Chinese managers may cause either business strategy or IT strategy to be lacking in sound planning, which could decrease IT and business value, impair governance, and limit the scope of IT and business. Those factors might explain the lower business-IT maturity in Chinese companies compared to U.S. companies. However, results have shown that the alignment maturity has improved in China from level 2 in 2009 (Chen, 2010) to level 3 in 2016. Thus, with the broad development of economy and technology, Chinese companies seem to be making progress in aligning business and IT.

Results also reveal a significantly higher alignment from the perspectives of IT employees when compared to non-IT employees in the U.S., although the difference was not significant in China. In the U.S., IT employees were more satisfied than non-IT employees with the communication between the two groups.; In addition, IT employees had more favorable opinion than non-IT employees that IT created value, governed and allocated its resources well, and exhibited effective collaboration between IT and non IT staff. Compared to non-IT employees, IT employees thought they were better prepared for learning and managing organizational change. The finding that IT employees and non-IT employees had different perceptions about alignment point to a disconnect and the chasm between the two stakeholders. Future research is needed to investigate the causes of these differences and identify the means to diminish them.

Our study found that alignment in the manufacturing and retail industries are more mature in the U.S. than in China. The U.S. has invested in and utilized IT more pervasively than did China, possibly because there is enough manual labor in Chinese manufacturing and retail to prevent IT from becoming pervasive. A digital divide was found in rural China in manufacturing and retail industries (Fong, 2009). These factors could have an impact on business-IT alignment. Our research also found that business and IT have a better fit in finance and IT industries. The finance industry was one of the first to adopt and utilize IT, which may account for its higher alignment level. The business of the IT industry is IT itself, which could account for better understanding and easier alignment between business and IT.

Lastly, the federated IT organizational structure corresponded to a significant higher business-IT alignment maturity than other structures in both the U.S. and China. The federated structure is believed to make centralized structure and decentralized structures complement each other, obtaining more advantages than one alone, and eliminating some of their respective disadvantages. This result is consistent with extant research finding that a federated IT structure can enhance alignment (Luftman & Kempaiah, 2007). Similarly, the structure of CIO reporting to CEO corresponded a higher alignment maturity than other structures in both the U.S. and China, which also confirms previous research findings (Luftman & Kempaiah, 2007). It makes sense that when CEOs are more directly involved in IT implementations, the IT strategies may be better driven and aligned with business.



## Research Limitations and Future Research

The sample size used in this study was small, but included companies ranging from fewer than 50 employees to more than 1000 employees, with almost all IT organizational structures and CIO reporting structures represented across various industries. This made the findings generalizable to a variety of sizes companies.

We investigated four industries, which limits its generalizability to the alignment maturity for all companies in the U.S. or China. Other dominant industries of Chinese and American economies, such as education and healthcare, should be included in future research. Prior research indicates that multinational operating companies in China have significantly different alignment maturity as compared to domestic Chinese companies (Chen 2010). Multinational operating companies have unique resources and characteristics, which impact both business and IT strategies and result in business-IT alignment. Future research can observe multinational operating companies across different cultures and economies.

Our research measured alignment maturity from the perspectives of IT and non-IT employees. The perspectives of CIOs and CEOs should be surveyed to see if the business-IT alignment on the operational level is compliant with that on the strategic level.

Univariate analysis based on the average assessment of each response was used to compare the alignment maturity among various IT organizational structures, CIO reporting structures and industries. For a more nuanced comparison, multivariate analysis should be employed across the constructs of the Strategic Alignment Maturity model.

## Conclusion

This study evaluated the business-IT alignment maturity levels in the U.S. and China from the perspectives of IT and non-IT employees. Alignments in the U.S. was found to be more mature than those in China. Additionally, results showed that in the U.S., the alignment maturity level from the perspective of IT employees was higher, as compared to the views of non-IT employees, although there was no significant difference between the views of IT and non-IT employees in China. In addition, results showed that the alignment in manufacturing and retail industries were more mature in the U.S. than in China. The IT industry had the highest alignment maturity level in both countries. While these findings are initial and exploratory, they can serve as a catalyst to initiate discussion and investigation of business-IT alignment research on the operational level and in a variety of cultures. It is also hoped that this study will contribute to the growing literature on business-IT alignment literature and enable organizations to identify areas of improvement in their business-IT alignment maturity.

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