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The Road to Business-IT Alignment: A Case Study of Two Chinese Companies

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Abstract:

Business information technology alignment (BITA) has been found to improve firm performance. Yet little is known about the process through which firms achieve BITA. Less is known about this process in China, the fastest-growing economy in the world. We conducted case studies with two Chinese firms. We first used the Strategic Alignment Maturity assessment model to evaluate these two firms' BITA degree. Then we applied punctuated equilibrium Theory to study the firms' dynamic BITA changing process. The results reveal BITA revolutions and identify their external and internal antecedents. Consistent with prior research, we find that the competitive environment, macro environment, performance deterioration, leadership change, and perception transformation contribute to revolutionary changes of BITA. More important, we find some unique impetuses of revolutionary changes of BITA in China, which include government support, organizational inertia, and social culture preferences. Theoretical and managerial implications of these findings are discussed.

Keywords: business-information technology alignment; revolutionary change; punctuated equilibrium; Strategic Alignment Maturity

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I. INTRODUCTION

In the past three decades, business-information technology alignment (BITA), which refers to the degree of fit and integration among business strategy, IT strategy, business structure, and IT structure [Henderson and Venkatraman, 1993], has consistently been rated one of the top concerns in surveys of information technology practitioners and company executives [Luftman and Ben-Zvi, 2010; Watson et al., 1997]. Researchers have paid close attention to various issues of BITA [Chan and Reich, 2007; Sabherwal and Chan, 2001; Segars and Grover, 1998], such as BITA models [Baets, 1992; Henderson and Venkatraman, 1993; Macdonald, 1991], antecedents of BITA [Chan et al., 2006; Luftman et al., 1999; Reich and Benbasat, 2000], and BITA outcomes [Byrd et al., 2006; Croteau and Raymond, 2004; Kearns and Sabherwal, 2007a]. Theoretical and empirical studies in organization and information systems fields both suggest that BITA has positive impacts on a firm's performance [Chan et al., 2006; Kearns and Sabherwal, 2007b; Oh and Pinsonneault, 2007]. Unfortunately, firms seem to find it difficult or even impossible to realize BITA due to high environmental velocity and nonstop technology advancement.

To understand the difficulty of achieving BITA, a dynamic view of BITA has gained popularity in recent IS research [Chan and Reich, 2007]. It recognizes that BITA is not a static event but a process of continuous adaptations and changes [Henderson and Venkatraman, 1993]. Based on punctuated equilibrium theory [Gersick, 1991], BITA is thought to result from two types of changes: long periods of relatively stable changes and short periods of quick and revolutionary changes. The revolutionary change is important because it assists the firm to break organizational inertia and better respond to emerging challenges. Although the dynamic view of BITA is theoretically attractive, the process of BITA realization is vaguely understood and more empirical efforts are needed to shed light in this area.

Past BITA research was mainly conducted in developed countries. Research of BITA in developing countries is in great demand as such studies may find new insights to complement the current BITA literature. China is an ideal place to conduct such research as it is the largest developing country and the fastest-growing major economy in the world with an average annual gross domestic product (GDP) growth rate over 10 percent in the past thirty years. Despite the impact of the global economic crisis, China became the second largest economy entity with a GDP of \$5.87 trillion and an annual GDP growth rate of 8.7 percent in 2009 [Troilo and Sun, 2010]. The boom of China makes it practically significant and theoretically interesting to investigate how Chinese firms align their business and IT strategies to adapt to China's rapid development and the turbulent global economic environment.

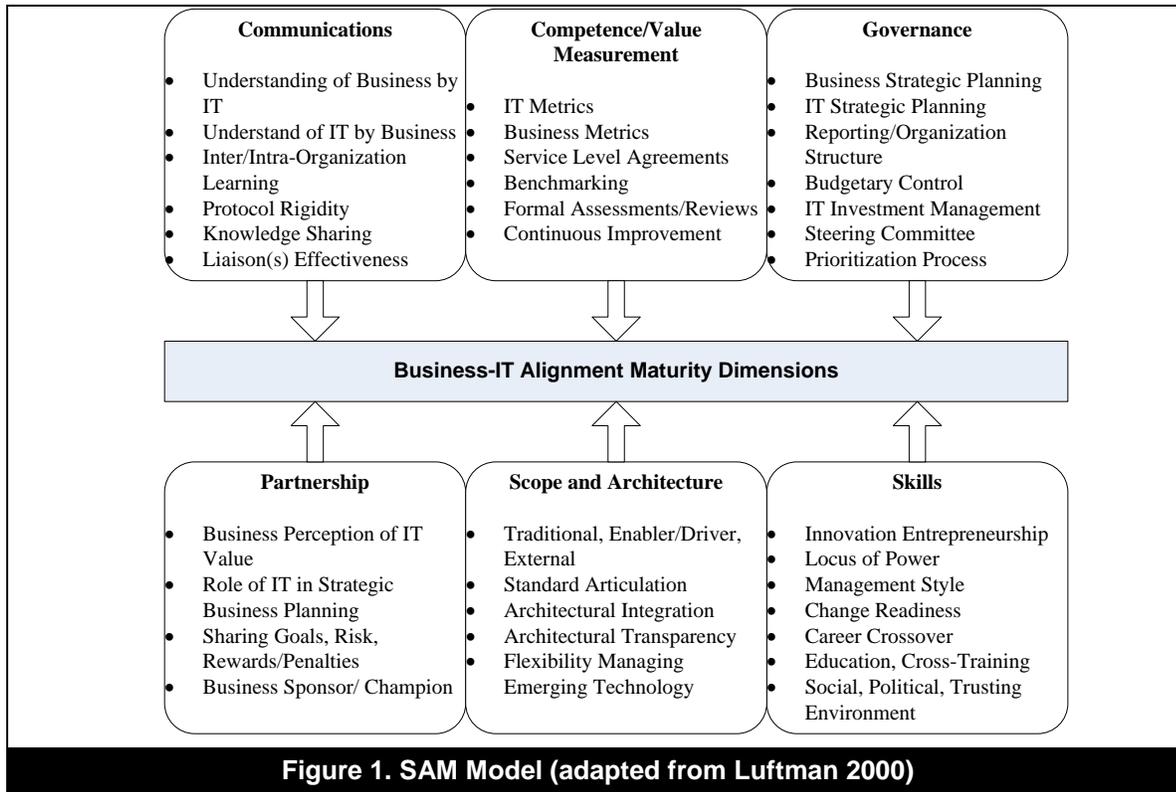
Moreover, China provides a unique context to reexamine existing theories that are mostly developed and validated in developed countries. First, firms in China have different technological and managerial foundations from their counterparts in developed countries. Firms in developed countries have already accomplished industrialization and are implementing enterprise digitization with advanced technologies based on sound management practices. But firms in China are experiencing industrialization and digitization simultaneously in order to attend to global competition [Luftman and Ben-Zvi, 2010]. This unique context might cause Chinese firms to initiate BITA changes in ways different from their counterparts in developed countries. Second, the Chinese social culture and policy orientation differ from those of developed countries [Zhang et al., 2009]. The social culture of China is characterized by high power distance, little individualism, and a comparatively long-term orientation [Martinsons et al., 2009], and China's current policy is focused on maintaining a harmonious society. Differences between cultures and policies make it necessary to understand how institutional and cultural factors influence IT-related organizational change in China [Martinsons and Davison, 2007]. In summary, because of China's booming economy and unique social cultural environments, it is practically and theoretically justifiable to study the dynamics of BITA in China. In this article, we attempt to depict the road to BITA in the Chinese context. Specifically, we assess two Chinese companies' strategic BITA maturity based on the Strategic Alignment Maturity (SAM) model [Luftman, 2000; Luftman et al., 2008; Luftman and Kempaiah, 2007] and understand the dynamics of BITA based on punctuated equilibrium theory. Following the framework developed by Sabherwal et al. [2001] we examine the revolutionary changes of BITA and identify various factors influencing such changes.

The article is organized as follows. In the next section, we present the theoretical background. We then outline the research methodology and measurement. After that, we present and discuss the main research findings. Finally, we conclude the article and provide future research directions.

II. THEORETICAL BACKGROUND

Strategic Alignment Maturity Assessment Model

Luftman's Strategic Alignment Maturity (SAM) model is an effective descriptive and prescriptive tool assisting IT and business executives in dealing with BITA. The SAM model [Luftman, 2000; Luftman and Kempaiah, 2007] consists of thirty-nine factors (business practices) grouped into the six dimensions including communications, competency/value measurement, governance, partnership, scope and architecture, and skills (Figure 1). These six dimensions can then be placed in a five-level maturity model, where Level 5 represents the highest maturity. Participants rate their organization's behavior in each of these thirty-nine areas using a 5-point Likert scale, where 1 means very ineffective and 5 means very effective.



Punctuated Equilibrium Theory and Revolutionary Changes

Punctuated equilibrium theory [Gersick, 1991; Romanelli and Tushman, 1994] and coevolutionary theory are two prevailing theories employed to explain BITA dynamics. Both are useful for studying BITA as a process. They share a common foundation in evolutionary dynamics borrowed from the natural science. The merit of coevolutionary theory lies in its capability to describe and explain the adaptive, gradual, and incremental change. This type of change is believed to be most typical among Chinese firms before 1970s [Perkins, 1988]. During that period, China was under a planned economy. Companies had no autonomy to compete in a free market. Top managers in Chinese firms usually kept the status quo to satisfy the government requirement. Since China's reform and open-door policy in the 1980s, the environment has become hypercompetitive, dynamic, or turbulent. This later period has witnessed the increasing emergence of dramatic, discontinuous, and metamorphic change in firms' strategies, structures, technologies, processes, and core values. It resulted in new organizational forms and configurations. Such dynamic changes seriously undermine the explanatory capability of coevolutionary theory. In contrast, punctuated equilibrium theory takes dynamism and turbulence into account and is particularly powerful in explaining the contemporary BITA phenomenon.

Punctuated equilibrium theory originates from the field of biological evolution [Eldredge and Gould, 1972]. Different from the Darwinian model positing that the evolution procedure is continuous and gradual, the punctuated equilibrium model posits that the gradual evolutionary periods are "punctuated" by periods of sudden, rapid, revolutionary change.

The use of punctuated equilibrium theory to describe and explain the nature of change and evolution that naturally occur in formal organizations was first proposed by Tushman and Romanelli [1985]. The theory assumes that



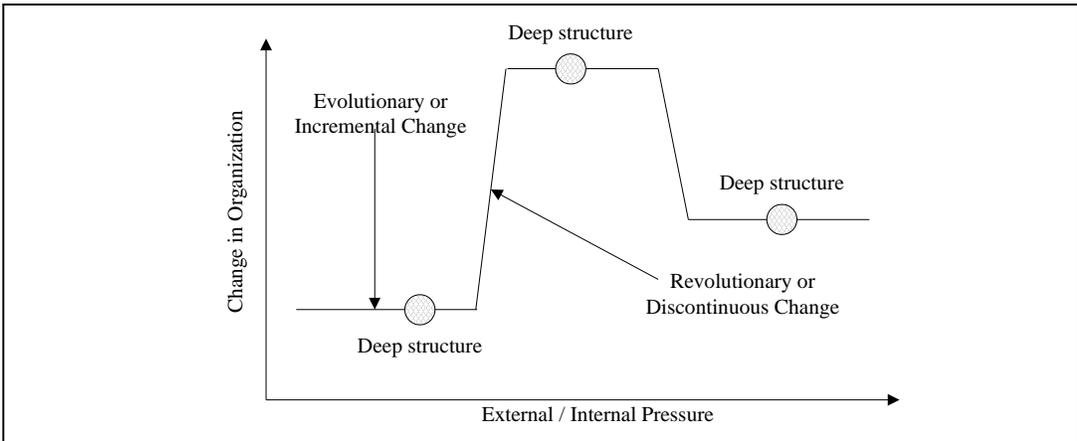


Figure 2. Pattern of Changes in the Punctuated Equilibrium Model

changes in organizations consist of two phases—evolutionary and revolutionary (cf. Figure 2). The evolutionary phase is characterized by a gradual and incremental change that spans a relatively long period. Deep structure refers to the collection of a firm’s fundamental components such as organizational strategy, structure, technology, system, and power structure [Romanelli and Tushman, 1994; Tushman and Romanelli, 1985]. Deep structure is stable, remains in equilibrium in this phase [Gersick, 1991]. In contrast, the revolutionary phase is characterized by a dramatic, discontinuous, and metamorphic change that occurs suddenly. It involves a reformulation of the firm’s deep structure. If the revolutionary change is profound enough, the organization’s core value or culture can be possibly changed. A revolutionary change usually happens during a punctuation period. A punctuation can be identified when a precipitating event resulted in a pervasive change which occurred across the entire organization over a relatively short period of time [Street et al., 2010]. Revolutionary changes can bring benefits to firms in the long term as firms can break their previous deep structures to better respond to external and/or internal changes. As suggested by punctuated equilibrium theory, a firm’s BITA path can switch from long periods of evolutionary change to short periods of revolutionary change or vice versa [Sabherwal et al., 2001; Street et al., 2009]. The deep structure reflects a firm’s fundamental choices of the basic parts into which its units will be organized and the activity patterns and principles of interaction that will maintain its existence [Gersick, 1991]. When studying the dynamics of BITA, the BITA profile, which consists of business strategy and structure and IT strategy and structure, can be considered as the deep structure. If all or most of the dimensions of the BITA profile have changed, a revolutionary change can be identified. Otherwise, an evolutionary change is evident [Sabherwal et al., 2001].

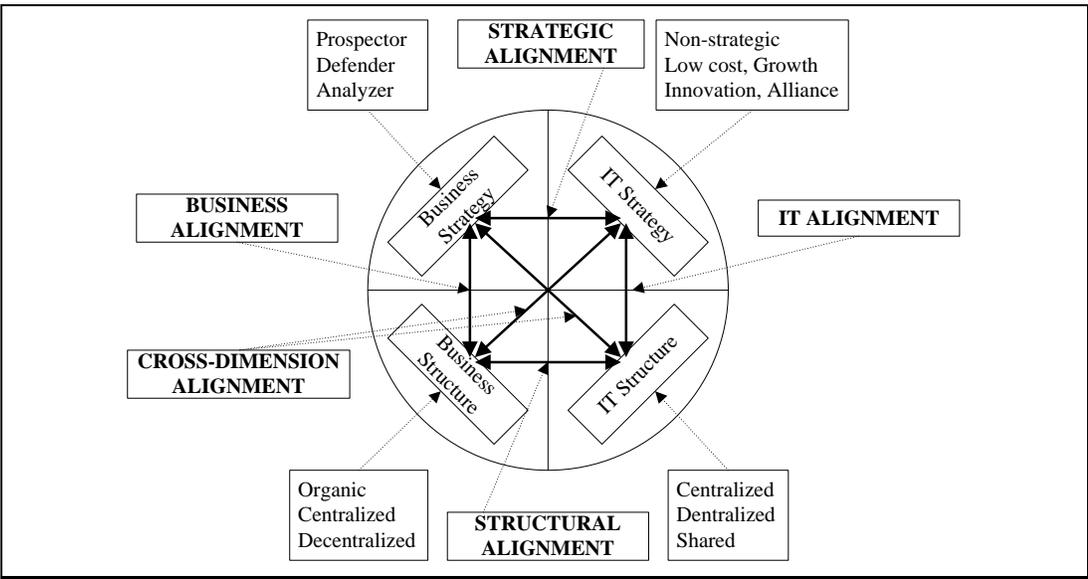


Figure 3. BITA Profile (adapted from Sabherwal et al., 2001)

BITA Profile

Following Sabherwal et al. [2001], we define the BITA profile as the deep structure of a firm’s BITA. As shown in Figure 3, the BITA profile consists of four dimensions: business strategy and structure and IT strategy and structure.

It needs to be noted that a total of twelve perspectives (which encompass three of the four domains) have been identified and described in the literature [Luftman et al., 1995; Papp, 1995; Papp, 1999]. These perspectives offer managers a method by which they may assess or achieve alignment [Avison et al., 2004]. As we need to assess companies' alignment status at different stages over a relatively long time period, we chose to use the original four dimensions to keep our assessing method more efficient. Alignment can be achieved between any two dimensions, giving rise to six different types of alignment: (1) *strategic alignment* between business strategy and IT strategy, (2) *business alignment* between business strategy and business structure, (3) *IT alignment* between IT strategy and IT structure, (4) *structural alignment* between business structure IT structure, and two *cross-dimension alignment* between: (5) business structure and IT strategy; and (6) business strategy and IT structure. The degree of an alignment could be high, medium, or low, depending on different attributes of the two underlying dimensions. Sabherwal et al. [2001], developed criteria to assess the degree of alignment between two dimensions of the BITA profile. For example, if a firm chooses defender as its business strategy, the firm should select centralized business structure, centralized IS structure, and low cost as its IS strategy to be in a non-conflict situation. If a firm selects prospector as its business strategy, it should choose decentralized business structure, decentralized IS structure, and differentiation, growth, alliance, or innovation as its IS strategy to achieve a high degree of alignment.

III. METHODOLOGY

We conducted two retrospective case studies to assess Chinese companies' SAM level, depict the dynamics of BITA, and investigate the factors driving revolutionary changes of BITA. Considering accessibility and cross-case diversity, two Chinese firms, AMY, a small-medium size franchise company, and SDMC, a large size State Owned Enterprise (SOE), were investigated. (See detailed background information about AMY and SDMC in Appendix A.)

Data Collection

SAM Assessment

To assess the current SAM level of AMY and SDMC, a questionnaire was developed based on Luftman's SAM model [Luftman, 2000; Luftman et al., 2008]. To reduce response bias, we selected two top managers in each company, one from business and the other one from IT, to fill out the questionnaire. Specifically, the COO and CIO of AMY and the CFO and CIO of SDMC filled out the questionnaire. All of the four top managers are male, aged 40 to 52 with an average of 45.5. Their average work experience is 22.3 years, and all of them had a degree of MBA or EMBA. They all have worked for different positions in the current companies and their average work tenure in the current companies is 15.8 years. This indicates that they have adequate understanding of their companies' SAM level.

Dynamics of BITA

Following established case study guidelines [Eisenhardt, 1989; Yin, 2003], primary data from interviews and secondary data from internal files (e.g., company reports, diagrams, meeting agendas, and memos) and external sources (e.g., newspapers and magazine articles) were collected for each company. Two rounds of interviews were conducted with directors and/or senior managers, department managers, CIOs, and divisional IT executives in the two firms. The first round interviews were conducted primarily for identifying BITA phases and drawing the BITA profile in each phase for each firm. After the BITA profiles were obtained, different types of revolutionary changes were identified. BITA profile changes between different phases were made during punctuation periods among these phases. Then, we conducted the second-round interviews and investigated the factors affecting the revolutionary changes of BITA.

Before conducting the interviews, we created a case study protocol which contains a semi-structured questionnaire (see Appendix B), procedures, and general rules. The questionnaire contains questions on the general background of the firms, the phases of IT investment, attributes of the four dimensions of the BITA profiles in each phase, and both internal and external critical events happened during two phases. Forty respondents were interviewed by the authors, twelve from AMY and twenty-eight from SDMC (see Table 1). As shown by Table 1, these participants from both business and IT areas at different management levels. The respondents were aged 35 to 59, and their work experience ranged from 12 years to 38 years. Among these respondents, 11 were female, 95 percent had received at least some college education, and 42.5 percent had a degree of MBA or EMBA. It took four months to conduct the two rounds of interviews. Each personal interview took half an hour to two hours. Some key informants were interviewed multiple times in case the preliminary data analysis revealed the need for clarification. We also searched the Internet for additional information for each firm. All of the interviews were tape-recorded and transcribed unless the interviewees refused to be recorded. Detailed field notes were taken for each interview by two authors for those interviews that could not be recorded. We also created a case study database which contains raw materials (e.g., research field notes, documents collected during the data collection phase), coded data, coding scheme, memos and other analytic materials, and data displays.

Table 1: Number and Type of Interview

Position	AMY	SDMC
Director or senior manager	4	8
Department manager	3	10
CIO	2	3
Divisional IT executive	3	7
Total	12	28

To improve accuracy of the retrospective research, we followed the guidelines recommended by Huber and Power [1985] to conduct interviews. First, we requested the interviewees to help us draw all dimensions of the BITA profiles in each phase in the first round of interviews. Then, we interviewed directors and/or senior managers together with CIOs to help us investigate the factors affecting the revolutionary changes in BITA in the second round of interviews. To obtain data on the historical changes in BITA profiles, we contacted and interviewed several retired or relocated directors, senior managers, department managers, CIOs, and IT professionals. Triangulation was used to ensure data validity by comparing the interview data collected from different respondents, as well as the secondary data. If discrepancies were found, we interviewed additional respondents to resolve the discrepancies.

Operationalization of Constructs

A challenge for a case study is the difficulty of operationalizing theoretical constructs. To overcome this challenge, we developed detailed operationalization rules to measure each of the four dimensions of BITA profile. As Table 2 shows, all of the dimensions are categorical variables: business strategy, business structure, and IT structure have three possible types and IT strategy has four possible types.

Table 2: Operationalization of BITA Dimensions

Dimension	Type	Measures
Business strategy	Prospector	It is aggressive, innovative, and willing to take risks in introducing new products and entering new market. Its R&D investments and environmental scanning are relatively high compared with its competitors.
	Defender	It is risk-averse, engineering-oriented and aims at maintaining its current position in a relatively stable market.
	Analyzer	It adopts a second but better orientation based on the trade-off between minimization of risks and maximization of business opportunities.
Business structure	Hybrid	Its complexity, formalization, and stability are relatively low.
	Decentralized	Its formalization is low, whereas its complexity and stability are high. Business units have decision rights.
	Centralized	Its formalization is high, whereas its complexity and stability are low. Business units have no decision rights.
IS Strategy	Non-strategic	The CIO is excluded from the top management team, and IT plays a supportive role in the business strategy.
	Low cost	The main purpose of IT investment is to cut costs.
	Growth	The main purpose of IT investment is for organizational growth. For example, IT is used to differentiate the firm from competitors, to create new products and/or transform business structures and processes, or to ally with suppliers, customers, and other entities.
	Low-cost+growth	The IS strategy aims to cut costs <i>and</i> achieve growth.
IS structure	Centralized	IT decision rights belong to top management.
	Decentralized	IT decision rights belong to business units.
	Shared	IT decision rights are shared between top management and business units.

First, business strategy is identified by the typology of Miles and Snow [1978]. It is measured by a firm's aggressiveness, which is embodied by its focus on introducing new products and entering new markets, the percentage of investments in R&D and environmental scanning, and attitudes toward risk and business opportunities. Recent research on small banks provides more detailed examples of different strategy typologies [Dorociak, 2007]. A firm can be identified as a prospector, a defender, or an analyzer by mapping its behavioral distances to ideal Defender, Prospector, and Analyzer characteristics. A prospector has strong innovative capabilities and frequently introduces new products and enters new markets; a defender is engineering-oriented and

aims at maintaining its position in a relatively stable market; an analyzer adopts a “second but better” orientation based on the trade-off between the minimization of risk and the maximization of business opportunities.

Second, business structure depicts the decision-making processes of a firm. Based on complexity, formalization, and stability [Bergeron et al., 2004; Brown and Magill, 1994; Sabherwal et al., 2001], it can be classified as centralized, decentralized, and hybrid. Business structure was determined based on the interviews and organization structure diagrams of each firm.

Third, IS strategy is assessed by examining the ways in which IS was being sought to impact the organization and the presence of CIO in top management team [Bergeron et al., 2004; Sabherwal et al., 2001; Sabherwal and King, 1992]. Based on Sabherwal et al. [2001], IS strategy can have four types: (1) non-strategic IS, (2) low-cost, (3) growth, and (4) a combination of low-cost and growth.

Finally, IT structure refers to IT governance archetypes in firms [Xue et al., 2008]. Based on the location of IT decision rights, whether it is the top management, business units, or shared by the two groups, IT structure can be classified as centralized, decentralized, or shared [Agarwal and Sambamurthy, 2002; Brown, 1999; Brown and Magill, 1994; Sabherwal et al., 2001]. IT structure was determined based on interviews and organization structure diagrams of each firm.

Data Analysis

To analyze the SAM levels, we calculated the average scores from both business and IT top managers' assessments on the six dimensions (communications, competency/value measurement, governance, partnership, scope and architecture, and skills) as suggested by Luftman et al. [2008]. In each firm, we examined the way in which the BITA profile changed over time and the factors affected the dynamics of BITA, through a rigorous analysis of extensive interviews, company documentations, and external media files. As Yin [2003] recommended, analytic generalization was employed to increase the generalizability of our findings. A three-step procedure was followed to analyze the data.

Step 1: Identify the four dimensions of BITA based on Table 3.

Step 2: Draw dynamics of BITA in each firm. Based on punctuated equilibrium theory and the method used by Sabherwal et al. [2001], we determine whether an BITA change is evolutionary or revolutionary using the following rules.

- (1) Complete revolutionary change: all four dimensions of the BITA profiles were changed in the same period.
- (2) Incomplete revolutionary change: only three of the four dimensions of the BITA profiles were changed concurrently.
- (3) Evolutionary change: only minor modifications along one or more dimensions of the BITA profile were changed.
- (4) Post-revolutionary change: one or two of the four dimensions of the BITA profiles change after (1) or (2).

Step 3: Investigate factors that affected the revolutionary changes of BITA. Once the revolutionary changes of BITA are identified, we investigated factors that affected the revolutionary changes of BITA, which include the external (e.g., competitive environment, macro-environment, and impacts of external stock-holders) and the internal factors (e.g., pressure of performance, changes in membership of top management, and changes of the impacts of IT).

IV. RESULTS

In this section, we show the SAM assessment of AMY and SDMC, describe the dynamics of BITA of the two firms revealed from the interviews and firm documents and analyze the factors that possibly affected the revolutionary changes of BITA.

SAM Assessment

As shown in Figure 4, the scores from COO and CIO of AMY have a good convergence (the biggest difference between their evaluations is the Scope and Architecture dimension, which is 0.56, all the others are below 0.5). Average scores of the six dimensions range from 3.00 to 4.00. The highest score was Governance, and the lowest score was Communication. The average overall SAM score for AMY was 3.41, which indicates that the SAM of AMY was at Level 3.

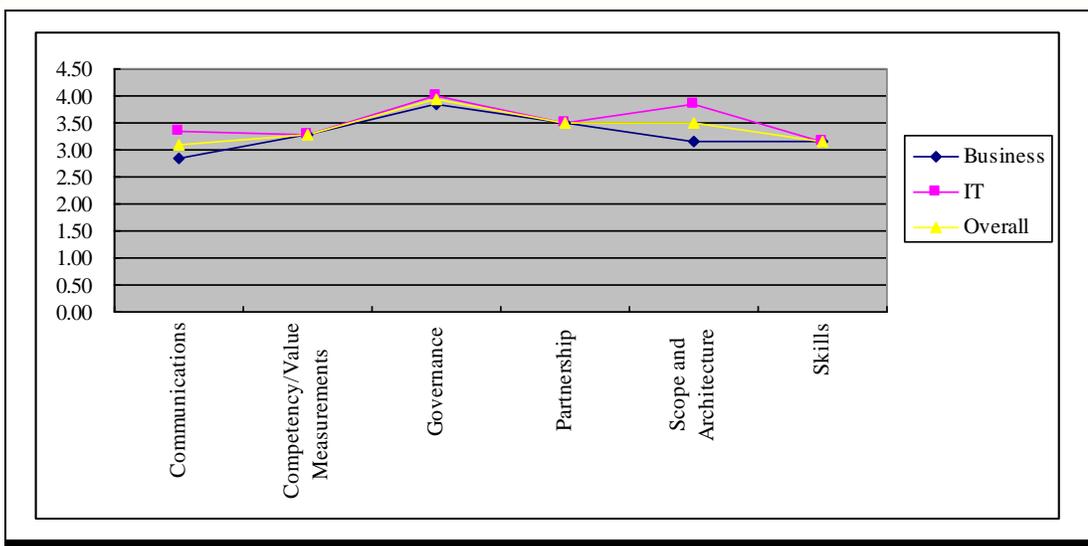


Figure 4. SAM Assessment of AMY

As shown in Figure 4, the scores from CFO and CIO of SDMC also have a good convergence (the biggest difference between their evaluations is in the Skills dimension, which is 0.58). All of the others are below 0.5). Average scores of the six dimensions range from 1.50 to 2.50, and the average overall SAM score for SDMC was 2.12, indicating that the SAM of SDMC was at Level 2.

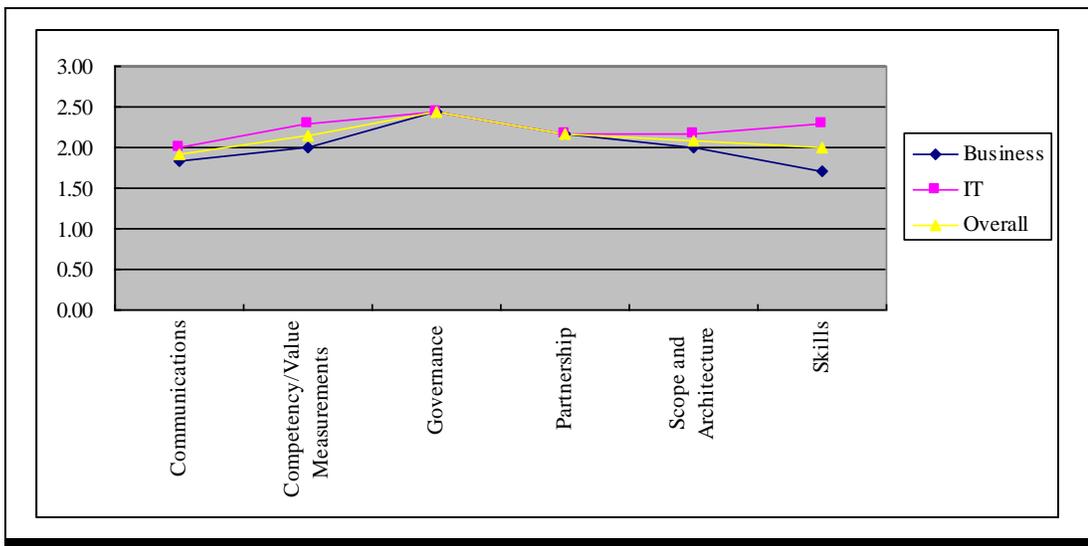


Figure 5. SAM Assessment of SDMC

Dynamics of BITA

In China, changes in the IS domain usually occur in the process of enterprise digitization, and organizational changes in the business domain often occur simultaneously during this process. In this study, we divide the time span into phases based on the process of enterprise digitization. The AMY case study covers the period from 1998 to 2010. We divide the period into two phases: Phase 0 (1998–April, 2000) and Phase 1 (April, 2001–2010). In Phase 0, AMY did not have an enterprise wide information system. In Phase 1, it implemented a B2B e-commerce system. The SDMC case covers the period from 1980 to 2010. We divide the period into three phases: Phase 0 (1980–September, 1995), Phase 1 (August, 1997–October, 2001), and Phase 2 (May, 2002–2010). In Phase 0, SDMC did not have an enterprise-wide information system. In Phase 1, it upgraded its MRP core software and implemented information systems in many functions. In Phase 2, it implemented an Enterprise Resource Planning system.

AMY

In Phase 0, AMY kept searching for market opportunities and adopted a proactive stance in the competitive environment. Its business strategy was *prospector*. AMY operated using a two-level hierarchical management

model, in which the top-level was the parent company and the bottom-level was a group of subsidiary companies. Each subsidiary company had its independent decision-making on stocking and sales. Hence, the business structure of AMY in this phase was *decentralized*. Just as a senior business manager said:

Because AMY was found by many mechanical and electronic firms, at the beginning each firm was in charge of operating one subsidiary company. Each subsidiary company has its sole right of autonomy, its own warehouse, and procurement channel.

IT was used only for inventory management for the purpose of sharing the inventory information among all subsidiary companies. Since IT played a supportive rather than a strategic role, IT was *non-strategic*. IT structure was *centralized* given that all IT-related decisions were made at the parent company level.

Table 3: BITA Profiles in Each Phase of AMY and SDMC

BITA Profile	AMY		SDMC		
	Phase 0	Phase 1	Phase 0	Phase 1	Phase 2
Overall Alignment	2H, 4L=L	2H, 4M=H	H, 5L=L	2H, 4M=H	1H, 4M, 1L=M
Strategic Alignment	L	M	L	M	M
Business Strategy	Prospector	Defender	Prospector	Defender	Prospector
IT Strategy	Non-strategy	Low cost + growth	Non-strategy	Low cost + growth	Low cost + growth
Business Alignment	H	H	L	H	L
Business Strategy	Prospector	Defender	Prospector	Defender	Prospector
Business Structure	Decentralized	Centralized	Centralized	Centralized	Centralized
Structural Alignment	L	M	H	M	M
Business Structure	Decentralized	Centralized	Centralized	Centralized	Centralized
IT Structure	Centralized	Shared	Centralized	Shared	Shared
IT Alignment	H	H	L	H	H
IT Strategy	Non-strategy	Low cost+ growth	Non-strategy	Low cost + growth	Low cost + growth
IT Structure	Centralized	Shared	Centralized	Shared	Shared
Cross Alignment 1	L	M	L	M	M
IT Strategy	Non-strategy	Low cost + growth,	Non-strategy	Low cost + growth	Low cost + growth
Business Structure	Decentralized	Centralized	Centralized	Centralized	Centralized
Cross Alignment 2	L	M	L	M	M
Business Strategy	Prospector	Defender	Prospector	Defender	Prospector
IT Structure	Centralized	Shared	Centralized	Shared	Shared

In Phase 1, many private firms and large international logistics firms entered the business area where AMY operated after China's accession into the WTO, which led to a more competitive environment. The oversupply of mechanical and electrical products strengthened the bargaining power of customers and altered the industrial structure. In this environment, AMY's inefficient traditional sales management led to excessive overstock. In 1999, AMY lost over 40 million RMB because of overstock. The top management of AMY started to realize the potential of IT on cost containment and firm development. AMY developed a B2B e-commerce system based on a comprehensive survey of the market and an analysis of customer requirements. The online platform greatly reduced AMY's operational expenses, and helped AMY reach more customers. It also differentiated AMY from its competitors who mostly relied on traditional communication and distribution channels to reach suppliers and customers. Hence, the IT strategy of AMY in this phase was *low cost + growth*. The IT structure was *shared* since IT-related decisions were jointly made by top management and the IT function. As the CIO recalled:

At that time, all our competitors sold their mechanical and electrical products in the same style, i.e., each firm had its own shops, agencies, and distribution centers. So we wanted to do something different. We planned for trading our products through the Internet. After a comprehensive and meticulous survey, a B2B e-commerce system named "Ai Mu Yi online" was implemented on April 2001, and we created a separated IS organization to manage and maintain the system.



After implementing the e-commerce systems, the top management of AMY recognized that the new system offered a great opportunity to reduce cost and maintain its current market position. In order to seize the opportunity thoroughly, a new business plan was made in late 2000. As a result of this plan, AMY switched its business strategy from prospector to *defender*. Meanwhile, AMY transformed its business structure, abolished the independent decision-making rights of each subsidiary company, changed the pattern of two-level hierarchical management, and implemented multiple shops, agencies, and distribution channels. A central distribution center was established to separate procurement and sales. All of the products had to be purchased through the distribution center, and then were sold to individual customers by each subsidiary company. The business structure of AMY in this phase became *centralized*, as described by its CEO:

As the competition became fiercer, the performance of our firm was getting worse and worse. We were forced to change our business strategy to maintain our market position. Meanwhile, AMY withdrew the procurement right of each subsidiary company, and set up a distribution center to purchase all of our products and manage the inventory.

Refer to Table 3 for the BITA profiles of AMY in Phase 0 and Phase 1.

SDMC

Based on the property and application of diesel engines, the industry of diesel engine can be classified into four sub-industries, i.e., single-cylinder, multi-cylinder with small diameter, multi-cylinder with medium diameter, and multi-cylinder with large diameter. SDMC is a multi-cylinder with medium diameter diesel engine manufacturer. In Phase 0, SDMC, whose major products was G135, C114, and C121, was the dominant player in the multi-cylinder with medium diameter diesel engine industry. In order to keep its market position, SDMC invested heavily in new product development. The business strategy of SDMC was, thus, *prospector*. Due to the impacts of previous planned economy in China, the business structure of SDMC was the traditional *centralized* system which was prevailing during that time period in China. IT was used only in very few functions without strategic considerations, and the structure of IT was also *centralized*. As one of the department managers noted:

We were the biggest supplier of multi-cylinder with medium diameter diesel engine at that time, and our main products have a market share of over 60%. As far as I know, IT was used only in the design and financial departments.

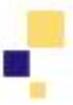
One vice director also commented:

As a state-owned enterprise, the Communist Party Committee was in charge of everything, for example, the production plan, the housing plan, the promotion policy, and even Planned Parenthood.

In Phase 1, the Chinese government enacted policies to require diesel engine manufacturers to produce high-power, low-pollution engines. Some of SDMC's products could not meet the new technical standard. Meanwhile, some rivals started to partner with automobile manufacturers to improve their competitiveness, which resulted in the reduction of both market share and profit of SDMC. In 1999, the comprehensive index of SDMC in the diesel engine society went down from No.1 to No. 5. SDMC was forced to transform its business strategy from prospector to *defender* without any change of its business structure in 2000. In this phase, enterprise digitization became a trend in China [Xue et al., 2005]. SDMC was approved to be one of the demonstration enterprises in the national 863-CIMS project (acronym for Computer Integrated Manufacturing Systems). SDMC applied IT applications to production scheduling and mold designing, intending to reduce operational costs and improve new product development capabilities. Therefore, the IT strategy was *low cost + growth*. Meanwhile, the functions of its management and computer center were unified to one new function named as management and information center, which managed all of the IT assets and charged all IT-related decisions with top management. Thus, the IT structure of SDMC was *shared* in this phase. As a senior manager recalled:

In the past few years, our sales income and profit went down sharply. We should find some ways to stop this. We realized that we need good integrated computer systems, and we couldn't follow the way we walked along before. So we set up a management and information center to plan and implement enterprise digitization.

In Phase 2, since the Chinese government used currency and finance policies to spur domestic demands, the investment on infrastructure in China was increasing every year. To seize the emerging opportunities, SDMC proactively entered new markets, and quickly launched two new product series. Its business strategy once again became *prospector*, while the other three dimensions of the BITA profile remained the same. As a department manager stated:



In order to deal with the deflation, our government implemented many positive and effective policies to enlarge consumptions. Then, the economic situation warmed up, and the demand of diesel engines increased rapidly. We, thus, increased the investment on R&D to develop new series of diesel engines.

The BITA profiles of AMY and SDMC in each phase were drawn after the first-round interviews. The degree (high, medium, or low) of the alignment between any two dimensions of BITA profiles was determined based on the criteria developed by Sabherwal et al. [2001]. The overall alignment was rated as “high” if the number of “high” alignment types was larger than the number of “low” ones, as “low” if the number of “low” alignment is larger than the number of “high” ones, and as “medium” if the number of “high” alignment is the same as the number of the “low” ones [Bergeron et al., 2004].

As shown in Table 3, the strategic alignment of AMY in Phase 0 is low, the business alignment is high, the structural alignment is low, the IT alignment is high, the cross alignment 1 is low, and the cross alignment 2 is low. There are two “high” and four “low” in the six types of alignment, the overall alignment of AMY in Phase 0 is low because the number of low alignment is larger than the number of high ones. In Phase 1, the overall alignment of AMY is high because the number of high alignment is larger than the number of low ones. By using the same method, the overall alignment of SDMC is low in Phase 0, high in Phase 1, and medium in Phase 2.

Identification of Revolutionary Changes of BITA

As Figure 6 shows, all of the four BITA profile dimensions in AMY are different between Phase 0 and Phase 1. Therefore, there was a complete revolutionary change when AMY’s BITA evolved from Phase 0 to Phase 1.

As Figure 7 shows, SDMC has experienced an incomplete revolutionary change of BITA from Phase 0 to Phase 1. After this revolutionary change, the business strategy of SDMC changed from defender to prospector while the other three dimensions were unchanged. Thus, there was a post-revolutionary change of BITA in SDMC from Phase 1 to Phase 2.

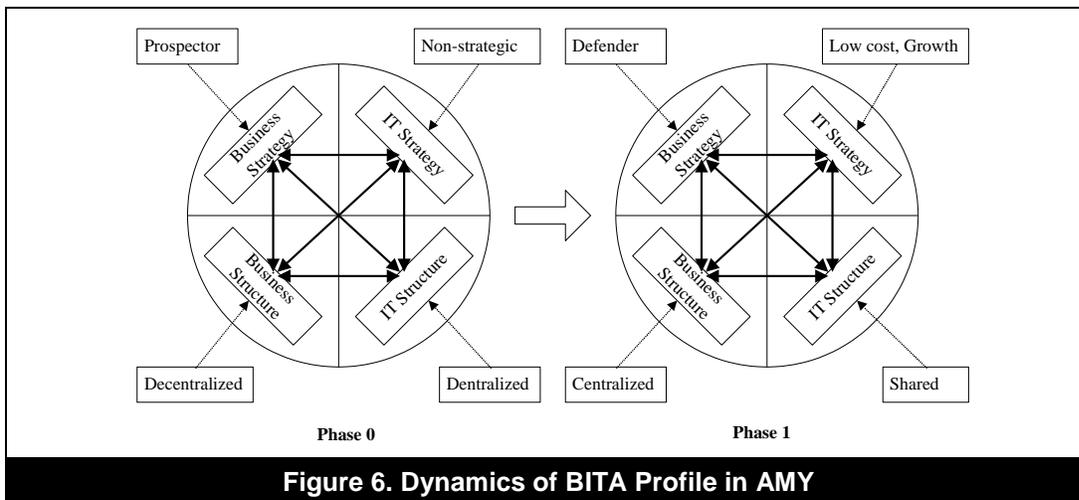


Figure 6. Dynamics of BITA Profile in AMY

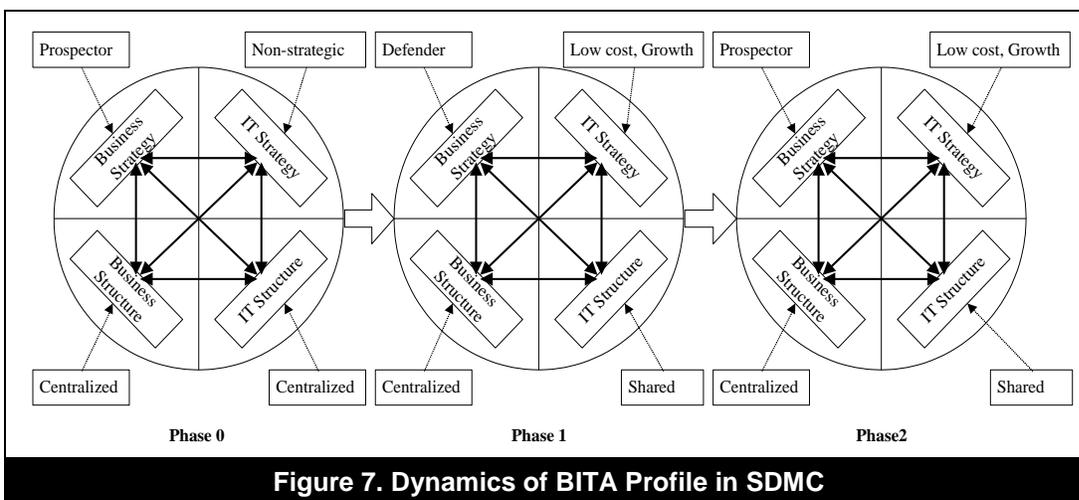


Figure 7. Dynamics of BITA Profile in SDMC

Antecedents of Revolutionary Changes of BITA

AMY

Our analyses suggest that several external and internal factors have possibly contributed to the revolutionary change of BITA in AMY (Table 4). After *China's accession into the WTO* in 2001, numerous foreign companies entered China and swarmed the mechanical and electrical products market, resulting in intensified *competition*. The industrial structure was transformed as the supply of mechanical and electrical products surpassed the demand and buyers' bargaining power was heightened. AMY started to see a slow turnaround and its products were *overstocked*. Meanwhile, many customers placed orders without fulfilling their promise to make the payment, creating lots of *unpaid accounts receivable*. As a result, the *performance* of AMY deteriorated. Seeking solutions to salvage its business, the top management of AMY changed its business strategy from prospector to defender and its business structure from decentralized to centralized so that its operation costs could be reduced and its market share be maintained. As an executive recalled:

With China's entry into the WTO, all of the firms in this industry had a tough time. AMY could not get away from this situation, either. The stocks raised, account receivable increased, and profit diminished. Fortunately, our top management found the best way to change this situation.

Moreover, AMY's top management realized the *importance of information technology*, and planned to implement a B2B e-commercial system to cut down costs further and promote company growth. However, the value of IT was questioned by many academics and executives at that time. Some consultants and IT professionals suggested this B2B project be delayed because they thought the investment was too high, while the chance of success was rather slim. With a financial support of two million RMB from the *local government*, AMY finally decided to implement the system, and a CIO was hired to oversee the system implementation. Major IT decisions were jointly made by top management and the CIO. Consequently, the IT strategy became low cost + growth, and the IT structure became shared. As the CIO stated:

Yes, they considered information technology as a strategic weapon in the contemporary competitive environment, and they wanted to change their business model via Internet technologies. Since I'm quite familiar with enterprise digitization, they hired me to do the planning and implementation of "Ai Mu Yi Online" ... and I think many internal factors such as entrepreneurship, the organizational culture, and top management team's recognition of the importance of IT were the determinants of the recreation of AMY.

We also found that AMY, as a young firm, was innovative and risk tolerant. Its *organizational inertia* was low and it was open-minded toward changes. As the CEO said:

Our top management team and I all wanted to improve firm performance and looked for effective measures to change the current situation. All of us agreed that IT and Internet should be strategic weapons in contemporary time and those weapons could offer new opportunities to enlarge our market share. Many consultants and IT professionals suggested that the IT project should be rethought cautiously or canceled. They told me that this project needed over 30 millions RMB in the early days and the success ratio of IT projects was quite low. We didn't give up this innovative idea. We wanted to have a try even if the possibility of failure was rather high.

SDMC

Antecedents of the revolutionary change of BITA in SDMC from Phase 0 to Phase 1 also included external and internal factors (Table 4). Due to heightened *competition*, the *new national policy* of high-power and low-pollution on diesel engines, and *rivals' strategy* of partnering with automobile manufactures, SDMC suffered from *declining market share* and *profits*. During that time, the Chinese government initiated the *863-CIMS project* to promote enterprise digitization. Recognizing the strategic value of IT, SDMC applied to participate in the project and was approved to become one of the demonstration enterprises and secured financial support from the government. As a senior business manager noted:

It was a quite hard time for our company. Competitors' strategies made us no longer the dominant player in this industry. Almost everything got worse, for example, market share shrank, profit decreased, and rank in guild dropped greatly. We were forced to search for some effective ways to change this situation...., in my opinion, those external factors played a crucial role in pushing us to change.

Organizational inertia was an important factor affecting the revolutionary change of BITA. Since SDMC had a high level of organizational inertia, its business structure remained as centralized even after all other BITA dimensions were changed. As a department manager stated:

As one of the largest SOEs, SDMC got used to operate in the planned economics, and everyone in our firm preferred to avoid uncertainties. Even in the declining time, we were reluctant to make any changes in business operations actively. The competitive strategies of our main rival and the new standard of diesel engine forced us to change our business strategy.

Culture refers to collective programming of the mind that distinguishes not only societies (or nations), but also industries, professions, and organizations [Cho et al., 1998]. In the traditional Chinese culture, Confucius considered it important to maintain a state of harmonious equilibrium in society. We found that the ideology of harmony was obvious and influenced the decisions about organizational change. As the chairman of the Communist Party Committee said:

As you see what is wrote on the wall in front of you, Harmony, Honesty, Pragmatism, and Service are the core components of our enterprise spirit. Harmony is the first and the most important part in our enterprise spirit. China is working hard to build a harmonious society. SDMC, as one of the largest state-owned enterprises, has indispensable responsibility and obligation to contribute to realizing the harmonious society. We thought that redesigning our business structure would cause employee's resistance to implementing the new business and IT strategy, and increase many uncertainties we couldn't forecast. Employee's resistance and many uncertainties are inhibitors of building the harmonious society, so we finally decided to keep our centralized business structure.

Table 4: Antecedents of Revolutionary Changes of BITA in AMY and SDMC

Antecedents		AMY	SDMC
External	Competitive environment	Fierce competition	Fierce competition Rivals' business strategy changes
	Macro-environment	Transformed industrial structure China's WTO accession	New policy about diesel engines
	Social culture preference	High power distance	Focus on harmony
	Government support	Local government	863-CIMS project
Internal	Performance deterioration	Overstock Unpaid accounts receivable	Lowered ranking Shrinking market share Reduced profits
	Leadership changes	Hiring a CIO	n/a
	Perception transformation	Realized the importance of IT	Realized the importance of IT
	Organizational inertia	Low	High

V. DISCUSSION

BITA Maturity Level

The results show that the maturity level of BITA in AMY has reached level 3 while SDMC reached level 2. Luftman's early study in the US found out most US companies were at Level 2 [Luftman, 2000] and his recent study found out most Global 1000 companies fall at Level 3 [Luftman and Kempaiah, 2007]. Therefore, in terms of BITA maturity, SDMC and AMY are comparable to general American companies and elite Global 1000 companies, respectively.

According to Luftman and Kempaiah [2007], organizations at Level 2 are committed to begin the process for Strategic Alignment Maturity. However, BITA is usually confined within local situations or functional areas such as Marketing, Finance, and Human Resources. Due to limited awareness by the business and IT communities in different functions, cross-functional alignment can be difficult to achieve. The local BITA is typically not leveraged by the entire enterprise. This is typical for SDMC, because its BITA is inside functional areas. Although it is a centralized SOE, its IT function's role is to help each business function realize BITA while a larger enterprise-side BITA plan is lacking.

Organizations at Level 3 have established a focused BITA maturity. This level of maturity concentrates governance, processes and communications towards specific business objectives. IT and business are intermingled. Level 3 leverages IT assets on an enterprise-wide basis and systems demonstrate planned, managed direction toward using information to support business decisions. The IT infrastructure is evolving with key partners. AMY is at Level 3 because its business and IT were redesigned to complement each other based on a rational analysis of the internal and external environment.

Different Roads for Two Companies

Each company took a different road to its current level of BITA. AMY's BITA revolution was IT-led: its IT strategy was changed first, followed by the change of business strategy, business structure, and IT structure. In contrast, SDMC's BITA revolution was business-led: its business strategy was the first dimension to change, and IT strategy was then changed, followed by IT structure. The different revolutionary paths seem to have different effects on firms' BITA. At AMY, the competitive potential pattern reconfigured its BITA profile completely and helped it realize a new business model. At SDMC, the technology transformation pattern also increase the overall alignment, but this pattern failed in creating a new business model. This is possibly because of the underlying role of IT in the planning and implementation of business strategy. When business strategy is the driving force of BITA and IT plays a supportive role for business strategy, it seems difficult to create a totally new business model because the precedent business model more or less restrict the innovativeness of the new one. On the other hand, when IT is the driving force of BITA, it is more likely to create a totally new business model because the emphasis of IT can offset the inheritance tendency toward the old business model.

Moreover, since AMY has a higher BITA maturity level than SDMC, it seems that a higher BITA maturity level can be achieved when the BITA revolution is led by IT. However, there are other possible contributing factors for BITA maturity. For example, AMY has a higher BITA maturity maybe because it is smaller in size, more dynamic, and less controlled by the government and thus easier to redesign business and IT strategies than SDMC. Our finding suggests that IT-led revolution to BITA is at least a possible and promising approach for companies to achieve BITA.

Antecedents of BITA Revolution

Low alignment leads to poor performance and firms often resolve this problem by redesigning their strategies and structures [Gresov, 1989; Luftman and Kempaiah, 2007; Sledgianowski and Luftman, 2001]. Many factors influence the revolutionary change of BITA as well as the improvement of the SAM level. Consistent with the literature, we find that the revolutionary change of BITA tends to be triggered by deteriorating firm performance. Both cases reveal that BITA evolutions are punctuated by revolutionary changes in BITA profiles and the revolution occurred after the firm experienced a sudden performance decline. AMY's performance declined because international competitors entered the local market after China's WTO accession and its traditional sales management could not adapt to this change. SDMC's performance declined because a new national policy disqualified many of its products and competitors adopted new strategies to take away its market shares. Facing serious threats, both firms implemented revolutionary changes to survive the difficult time.

Our study also reveals some antecedents to BITA revolution that are unique to the Chinese context. China is in the middle of high speed economic boom, yet its market economy is still heavily influenced by the government. For example, government played an important role in the revolutionary changes of AMY and SDMC. The impetus of AMY's BITA revolution was a local government fund; while the impetus of SDMC's BITA revolution was the CIMS-863 program. Although both received financial support from the government, it should be noted that the local government fund was much more flexible than the CIMS-863 fund, because the latter is a national demonstration project that had political implications. When SDMC made IT investments, it needed to meet the government's implicit requirements that may or may not be consistent with the company's BITA requirements. This is probably another reason that SDMC has a lower BITA maturity level than AMY.

Organizational inertia is another unique antecedent to BITA revolution in China. Although organizational inertia is a commonly recognized barrier to organizational change [Zhou and Wu, 2009], China's history of planned economy adds some Chinese flavor to this concept. This is particularly true for large SOEs that have been controlled by the government for a long time. Despite SOEs have much more autonomy now than the past, their management teams tend to have a conservative mindset when organizational changes are needed. For example, SDMC, as a large SOE, was reluctant to revolutionarily achieve BITA. This can also be explained by using Luftman's SAM model. The innovative entrepreneurship and change readiness skills are still lacking in some Chinese SOEs. Personnel training is needed to address this problem. Offering change readiness programs will be able to provide training and necessary skills to implement change at both functional unit and corporate levels.

Moreover, we found that the social cultural preference rooted in China's traditional and contemporary values have influences on BITA revolutions. First, Chinese people are characterized by a high level of uncertainty avoidance. They do not welcome sudden, dramatic changes. Second, the current Chinese government advocates a "harmonious society" to reduce social conflicts. This ideology favors incremental evolutions rather than drastic revolutions. Therefore, many Chinese companies, particularly SOEs, are unlikely to have complete BITA revolutions. For example, SDMC's company motto includes "harmony," and it would be heedful when making any changes that could cause employee complaints and resistance. However, the AMY's case shows that these external cultural values can be offset by a strong internal organizational culture that favors innovation and change.

VI. IMPLICATIONS

There are several implications for this study. First, Luftman's SAM model was used to assess two Chinese companies' BITA maturity level. The results show that different BITA maturity for AMY and SDMC, which suggests that the SAM could be a useful tool to evaluate where one firm is and what it needs to do to attain and sustain BITA as well as to benchmark companies across industries and geographies. As prior studies [Luftman and Kempaiah, 2007] indicated, there is a positive relationship between BITA and firm performance, suggesting BITA is a possible antecedent of improved firm performance. Luftman [2000] contend that the SAM model is an effective descriptive and prescriptive tool to evaluate a firm's BITA maturity, which is an important step in identifying the specific action necessary to ensure IT is being used to appropriately enable or drive the business strategy and operation.

Table 5: Differences Between SAM Model and BITA Profile

Differences	SAM Model	BITA Profile
Goal	Assess organization's business & IT alignment level	Assess organizations' business & IT alignment level
Number of Dimensions	Six (Communications, competency/value measurement, governance, partnership, scope and architecture, and skills)	Four (Business strategy, business structure, IT strategy, and IT structure)
Outcome	Five maturity levels (Initial/Ad Hoc, Committed, Established Focused, Improved/Managed, and Optimized)	Six types of alignment (Strategic, business, structural, IT, cross 1, and cross 2)
Object of analysis	Organizational behaviors and activities associated with BITA	Attributes of the BITA dimensions

Luftman's SAM model and the BITA profile were used to assess the extent of alignment between business and IT. They assess a firm's BITA level from different, yet complementary angles. The most important difference between the two is the object of analysis. The SAM model focuses on organizational behaviors and activities associated with BITA, so we use it as the starting point to assess the maturity level of a firm's BITA. The BITA profile's object of analysis is attributes of the BITA dimensions, which makes it easier to deduce ideal alignment profile of BITA, judge the overall BITA level, and discern what kinds of change happens during two adjacent phases of BITA dynamics; so we use it to analyze the deep structure change in punctuated equilibrium to identify revolutionary change of BITA. The differences between these two metrics are shown in Table 5. In summary, the BITA profile helps us identify the company's overall alignment level at different stages While the SAM model provides a more detailed evaluation that is more practical oriented.

Theoretical Implications

The prior literature suggests that there is no universal pattern to realize BITA [Campbell et al., 2005; Henderson and Venkatraman, 1993]. The alignment approaches identified in prior research differ in predominant focus of information technology, organizational objectives, IT executive roles, and dominant criteria for performance assessment. Traditionally, IT strategy has been treated as a functional level strategy that should be aligned with the firm's business strategy. Our findings suggest that as IT significantly transforms business processes in an industry, IT strategy can be changed first and drive the subsequent change in business strategy. In addition, we find that contextual specifics influence which approach to take, and firms with different industry types and organizational objectives could realize strategic alignment and improve their performance through different approaches. AMY is a retailer of mechanical and electrical products, and belongs to the information-intensity service industry. In this kind of industry type, the main business functions and processes can be mostly or completely digitalized, which makes it possible for AMY to first change its IT strategy. SDMC is a traditional manufacturer of diesel engine. In the manufacturing industry, core business processes and capabilities are hard to be digitalized, and IT plays a supporting role in formulating and implementing the business strategy. That is why SDMC's IT strategy was changed after its business strategy to achieve alignment. We also find that both firms improved their firm performance significantly, suggesting that both approaches can be successful.

Sabherwal et al. [2001] argued that there are five possible antecedents of revolutionary change—environmental shift, sustained low performance, influential outsiders, new leadership, and perception transformation. We found that all of these five factors influenced the revolutionary changes of BITA in AMY and SDMC. We also found that government support played an important role in the revolutionary changes. At AMY, the financial support from the local government impelled the implementation of the B2B e-commerce system. At SDMC, government support lent importance to IT in the firm's business strategy and facilitated the formation of a new IT strategy. In addition, we found another antecedent, organizational inertia, which has not been discussed in prior business-IT alignment literature. Organizational inertia refers to the way the past impacts the present so that firms are inclined to keep their

status quo [Zhou and Wu, 2009]. In particular, we find that incumbent firms with strong inertia are reluctant to revolutionize their BITA, whereas entrepreneurial firms with low inertia tend to follow a complete revolutionary path. SDMC, a large SOE that is strongly institutionalized and has high organizational inertia, found it difficult to change its business structure and thus took an incomplete revolutionary change of BITA. In contrast, AMY, a new firm with entrepreneurial spirits, underwent a complete revolutionary change.

Martinsons et al. [2009] suggested that social culture, including power distance, individualism, uncertainty avoidance, and long-term orientation, influence IT-enabled organizational change. We found that some dimensions of social culture have effects on revolutionary changes of BITA. At AMY, subordinates were used to following orders, which indicate high power distance. In the early stage of the B2B system planning, there were doubts and countervails from employees and a few senior managers, and one senior manager left AMY because of dissatisfaction with the new IT strategy. However, once the new B2B system plan was approved, AMY's employees and managers became acquiescent to the top management's decision and concentrated on the implementation. Only four months were spent to implement this new plan and related organizational changes. This clearly indicates the importance of communication in organizations. Luftman's SAM model not only pointed out the importance of communication, but also tells us organizations can improve their communication via different channels (formal vs. informal, ad-hoc vs. regular) and different styles (one-way or two-way). For the Chinese culture, an informal communications style may be more appropriate. In contrast, SDMC treated harmony, which is akin to uncertainty avoidance, as the central part of its enterprise spirit. To maintain harmony, SDMC kept its business structure unchanged in the process of revolutionary change of BITA, although it was willing to reform other dimensions of the BITA profile. Therefore, it seems that the Chinese cultural characters have mixed influences on revolutionary changes in BITA—whereas high power distance tends to increase the efficiency of change implementations; the focus on harmony is likely to somewhat impede the degree of change.

Practical Implications

The findings of our research provide a few insights for practitioners. First, the business environment is constantly changing and firms must adapt to the changing environment to stay competitive. It is important to understand that firms not only make evolutionary changes to adjust current strategies and structures, but also employ revolutionary changes to create new strategies and structures. Our findings confirm that firms do revolutionary their BITA profiles during crises. As a BITA revolution involves changes of three or four dimensions of the BITA profile, many uncertainties and confusions will emerge during the transition time. This requires the firm to have a well-thought-out implementation plan to ensure the success of the BITA revolution.

Second, because BITA changes over time in given patterns and a number of factors can affect the revolutionary changes of BITA, managers may be able to identify the opportunity of revolutionary changes of BITA to break the deep structure that is no longer appropriate for the changed environment. Managers who play the boundary spanning role should continuously monitor external and internal factors and be entrepreneurial in seizing opportunities to create revolutionary changes.

Finally, the antecedents of revolutionary changes of BITA can help IS managers prepare for fine-tuning before, during, and after the revolutionary changes of BITA. Revolutionary changes mean significant changes of BITA profile. Thus, IS managers should pay more attention to the period of revolutionary changes than that of evolutionary changes. Changes in IT strategy and/or IT structure may challenge the original operations of IS managers and the role of IT organization in a firm.

Limitations and Future Research

This research has some limitations. First, the findings are based on case studies on two firms. Although the two firms are of different sizes and ages and from different industries, the generalizability of our findings is limited. More firms in different contexts should be investigated to provide additional insights into revolutionary changes of BITA and to delineate the influences of various antecedents. Second, the cases were studied retrospectively by means of interviews, firm documents, and media information. The findings can be validated by following revolutionary changes of BITA in real time. Finally, the antecedents identified in this study might not be exhaustive. There might be other antecedents of revolutionary changes of BITA that are salient in other contexts.

Several questions derived from this study could be interesting topics for future research. For example, how do certain factors and their magnitudes determine different patterns of revolutionary changes in different firms? What factors are the most critical drivers of the revolutionary changes of BITA? Will the revolution process influence the impacts of these factors on revolutionary changes of BITA? Our article provides some preliminary understandings of the dynamics of BITA, and hopefully future research can utilize our findings to answer these questions.

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APPENDIX A: BACKGROUND INFORMATION OF AMY AND SDMC

AMY

AMY resulted from the merging of fifteen mechanical and electronic firms in 1998. It is certified by ISO-9001:2000 for its products and services. Its business specializes in the sales of mechanical and electrical products in both domestic markets and overseas. It also undertakes engineering contracts, takes part in project bidding, and engages in the import and export business. AMY has established a real-time online trading platform since 2001, which is a B2B e-commerce system for trading mechanical and electrical products. The platform unifies domestic and foreign suppliers and holds millions of online products. In addition, AMY has established a large-scale distribution network to ship products, which can achieve real-time logistics, integrated service, and zero inventory for its customers. Through the implementation of the B2B platform, the revenue of AMY has increased from 114 to over 1 billion RMB, which is more than 20 percent each year.

SDMC

Founded in 1947, SDMC is one of the largest diesel engine manufacturers in China. It occupies 820,000 square meters with more than 4000 employees and over 3.7 billion RMB assets. The annual sales income of 2009 is about 330 million. It went public in December, 1993. During the past sixty years, SDMC has always adhered to its tenet of "creating new driving force for social progress, providing excellent products/services to customers, and being devoted to research, production, and manufacturing of professional diesel engines." Today, SDMC becomes an extra-large state-owned high-tech enterprise with businesses covering diesel engines, fuel-burning systems, diesel generator sets, and investments. It has five major product series and more than 300 variants. These products are widely used in heavy-duty vehicles, passenger cars, engineering machineries, ships, and mobile power stations and have been marketed to more than 50 countries and regions in the world. In 1994, it was the first company in China to get ISO9001 certificate. Later, SDMC passed both QS9000 and TS16949 certification conducted by TUV Rhineland.

APPENDIX B: INTERVIEW QUESTIONS

Part one: to identify the revolutionary changes in BITA

Background information

1. Could you please tell me the number of personnel, revenues, main business, and other related background information of your firms?
2. Could you please introduce the process of enterprise digitization?
3. Could you please tell me the related management changes enabled by enterprise digitization?

Business strategy (the following questions are asked for each phase)

1. Did your firm pursue new product and new market? Please explain.
2. What kind of strategies your firm used when introducing new product? Leader or follower? Please explain.
3. What was the percentage of the investment on R&D and environmental scanning in your firm? Do you think this

- investment amount was large enough comparing with your rivals in this industry? Why and why not?
4. What was your firm's attitude toward risk and business opportunities?

Business structure (the following questions are asked for each phase)

1. Did your firm have many regulations? Please explain.
2. Did the organization structure keep stable?
3. Did the staff have fixed rights and responsibilities in your firm? Please explain.
4. What was the report relationship between functions and the headquarter of your firm?
5. Were the functions in your firm artificial persons?
6. Did the functions in your firm have the independent right of decision-making? Please explain.
7. Could you please show us the business structure diagram of your firm?

IT strategy (the following questions are asked for each phase)

1. Did the CIO act as a member of top management team in your firm?
2. What was the role of IT in business strategy in your firm?
3. What was the main purpose of IT investment in your firm?
4. Could you please tell me about the IT applications used by your firm?

IT structure (the following questions are asked for each phase)

1. Could you please tell me about the CIO reporting structure and the role of CIO?
2. Could you please tell me about the distribution of IT functions in your firm?
3. How were the business functions responsible for their application software development and deployment?
4. Could you please tell me how IS management decisions were made in your firm?

Part two: to investigate the factors affecting the revolutionary changes of BITA

1. Could you please tell me the macro environment in this period?
2. Could you please tell me the situation of competitive environment in this period?
3. Could you please tell me the impacts of external stock-holders, such as the government, the local government, the guild, and other entities?
4. Could you please tell me about other external critical events during this period?
5. What was the performance of the firm in this period?
6. Were there some changes in the top management during this period? How?
7. Could you please describe the organizational culture of your firm?

Did your firm's understanding of information technology change in this period? How?

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