

Strategic Impact of Synergy Between Information Technology and Business Processes on the Performance of the Companies in India

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Abstract—Objective: With the changing trends in the new technologies and uncertainty in the market environment has really made the Indian companies competitive through new strategic initiatives faster than the competitors. In order for an organization to survive, business process transformation is not uncommon any more. Nevertheless, the transformation is a process fraught with risks. Meanwhile, there is a dilemma in business process management; namely, a firm's focus on productivity gains inhibited its flexibility and ability to innovate (Adler et al. 1999; Benner & Tushman, 2003). For instance, in the refractory industry, a firm's economic decline was directly associated with its efficiency and productivity conflicts.

In essence, the existence of this dilemma is mainly due to inability of firms to pursue dual conflict objectives simultaneously. This kind of capability, which is termed as “ambidexterity” by Tushman and O'Reilly (1996), is getting increasingly crucial to market competition for a firm.

Based on ambidexterity theory, developed an Ambidexterity Capability Model based on synergy of IT& Process, and test it with data from 72 firms in India, and further implications are discussed.

I. BACKGROUND OF THE STUDY

India's diverse **economy** encompasses traditional village farming, modern agriculture, handicrafts, a wide range of modern industries, and a multitude of services¹, Table 1 illustrates India's GDP growth rate from 2006-2008.

TABLE 1.

Year	GDP Growth (%)
2006	8.5
2007	9.0
2008	7.3

Sources: 2009 CIA world factbook

Three main sectors which contribute to the Indian economy are agriculture, industrial and service account 18%, 29% and 54% of the GDP². Industrial sector has lot more contribution to the India's Economic. Industrial goods are defined as companies which buy products and services to help them produce other goods and services². Industrial goods deals with³: accessory equipments (eg. hand tools, lift trucks), business service(eg. banking and maintenance), installations (eg. furnaces, refractory), parts, raw materials, semi manufactured goods and supplies(maintenance, repair and operating supplies). Installations takes place were furnaces

are built with metallic and non metallic parts with the application of heat resisting non metallic materials which are called "Refractories"⁴. As such steel plants, cement rotary kilns or a glass melting furnaces could never produce finished goods without the application of Refractory products. The below table 2 indicates Refractory products in India directly assist in the current production of steel, cement clinker, glass and non-ferrous metals in the country as well as outside the country.

TABLE 2. CONTRIBUTION OF REFRACTORY PRODUCTS IN DIFFERENT INDUSTRIES ARE AS FOLLOWS

	Steel	Cement	Glass	Ceramics	Non Ferrous	Others
International	70%	12%	3-4%	6%	2-3%	4%
Domestic	74%	7%	4%	3%	3%	6%

Source: IRMA, Aug 2007

Even though, the contribution of Refractory industry in India is 4% of the Global Market⁷, but Refractory industries have been in good progress for exporting its products eg. export has increased from Rs. 314 Crores in 2006-2007 to about Rs. 452 Crores in 2007-2008⁸(IRMA).

TABLE 3 ILLUSTRATES THE SHARE OF REFRACTORY INDUSTRIES OF DIFFERENT REGIONS IN THE WORLD MARKET⁹.

Region	Market Share(%)
Asia/Pacific	40
Eastern Europe	23
Latin America	4
NAFTA(USA, Canada and Mexico)	14
Western Europe	15
Others (Africa and middle east)	4

Sources: Iron & steel review ,2009

So to cope up with the present competitive market, India's refractory makers are increasing their production capacities to

1. http://www.theodora.com/wfbcurent/india/india_economy.html

2. www.traveldocs.com/in/economy.htm

3. Managerial Economics, M.M Varma & R.K Agarwal ,pp-26-59

4. Sheppard, Laural M.. 2000. "Trends in Refractories Technology: Highlights of the AcerS Annual Meeting." Refractories Applications.

7. Internet Sources: www.irmaindia.org

8. IRMA Journal Vol XXXVIII, No3, Sep 2005 9. Iron & steel review oct-2000, page 49

meet the future demand. Moreover the aggregate production capacity of refractory in India is around 1,500,000 metric tonnes per year-actual production however is between 700,000 and 1,000,000 metric tones ¹⁰ per annum and in worldwide refractory market estimated to be 22 to 25 million tones - as opposed to a production capacity of approximately 40 million tonnes.¹¹

So refractory makers are expecting future demand of the products due to the new upcoming of four Greenfield and one expansion project each of Tata Steel, Essar, Posco, Arcelor Mittal and SAIL set to take off in Orissa in the next three to four years. So the future scenarios of these refractory manufacturers, mostly dependent on steel, cement and glass plant projects, which would keep in meeting the demand points and stand more viable logistically too.

Orissa is one of the state has quite a few reputed refractory manufacturers capable of making quality refractory products to stand themselves to compete not only domestically but also globally with their specialty products.

Tata Ref Ltd, OCL Ltd, IFGL Ref Ltd, Sarvesh Refractories Pvt. Ltd, and Manishri Refractories and Ceramics Ltd are the major players who are operating in the state for a long time. And moreover establishing themselves with their products not only in the domestic market as well as globally.

Influx of Chinese refractory is a major concern for these refractory manufacturers in India. But with current import trends from China, these refractory manufacturers looking worried as around 20 percent of the refractory produced in India are imported and most of the imported refractories are sourced from China, according to a spokesperson from the Indian refractory manufacturer's association (IRMA). However, imports stood at a staggering high at Rs 818 crores in 2007-08 came from China, which could pose a threat for the domestic refractory makers ¹². In the below

TABLE 4. LIST THE CONSUMPTION OF REFRACTORY INDUSTRY -WISE. OTHER THAN STEEL, ALUMINUM AND CEMENT, CONSUMPTION OF REFRACTORY IN OTHER INDUSTRY IS INSIGNIFICANT.

Industry	Refractory Consumptions per ton
Steel	12 kg
Aluminum	4-5 kg
Cement	0.8-0.9 kg

Sources: Steel Insights

II. RESEARCH MODEL AND HYPOTHESES

From above discussion, the impact of the synergy of IT and business process on its ambidexterity capability appears rather significant when we look at an organization from a process level perspective. On the one hand, the close linkage of IT and business process which facilitates collaboration of process activities leads to alignment capability; On the other hand, emerging IT can be utilized to modularize process as much as possible. IT could enable the activities composed

various processes can be swapped, bought, and sold like parts of a machine (Merrifield et al. 2008), and hence enhance adaptation capability of an organization to fulfill the adaptation. In the meantime, due to the dynamic property of ambidexterity capability, according to Pavlou and El Sawy(2006), it would get more substantial in the context of turbulent environment.

So we have considered two Hypothesis for the depth study H1 and H2 as showed in Figure 1.

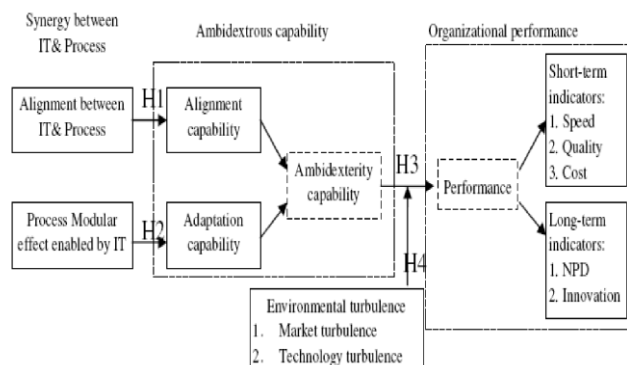


Fig. 1. H1 and H2

Hypothesis 1: Alignment between IT and business process will have a positive impact on organizational alignment capability.

A. Modular Effect of IT on Business Process

The effects of IT on business process have been manifested as reduced cycle times, improved responsiveness, and service enhancement as a result of reengineered processes and redesigned organizational structures. While the effects listed above might impact the adaptability of an organization in some sense, all of them focus on the role of IT on the management of existing processes. According to the definition of this study, adaptation capability indicates the ability of reconfiguring resource to adapt changing environment to embrace the challenge in the future. As a consequence, we contend that modular effect of IT on business process appears especially salient in this regard.

Hypothesis 2: The modular effect of IT on business process will have a positive impact on organizational adaptation capability.

III. RESEARCH METHODOLOGY

The survey methodology was used to collect data for testing the research hypotheses. This methodology was chosen because it enhances generalizability of results (Dooley 2001).

A. Operationalization of Constructs

Where available, the constructs were measured using questions adapted from prior studies to enhance validity. For new measures and for those that required significant changes, standard scale development procedures were used (Churchill 1979). We discuss these constructs below respectively.

10. Internet sources: www.irmaindia.org

11. Iron and steel review, oct-2000 page 49.

12. steelworld, March 2009, pp-19

B. Alignment between IT and business process

Tallon(2007) measures alignment between IT and business process by using profile deviation and moderation.

Based on different strategic focus, Tallon(2007) propose an ideal IT use profiles for the purpose of alignment between IT and business process, as shown in table 5. Take operational excellence (column 2) as an example, when a firm focuses on its operational excellence, we notice that the value of "supplier relation"(line 2) is "1", which means that it should

pay more attention to the alignment between supplier relations and IT. By contrast, the facts that the value of "sales and marketing support" is "-1" means that the misalignment of this process and IT may not impact the organizational performance.

In present study, we adopt the profile deviation method to calculate the alignment between IT and business process. According to the result calculated, we allocate different scores (1-7) to each firm.

TABLE 5. IDEAL IT USE PROFILES IN SUPPORT OF BUSINESS PROCESS ACTIVITIES

Business Processes	Operational Excellence	Customer Intimacy	Product Leadership
Supplier relation	1	-1	0
Prod. & operation	1	0	-1
Product & service enhancement	-1	0	1
Sales & mark. supply	-1	1	0
Customer relations	-1	1	0

Notes: On a process-by-process basis, "1", "0," and "-1" ratings denote above average, average, and below average use of IT, respectively, as each value discipline is compared in turn with other value disciplines.

C. Survey Administration

The field study was conducted in Orissa, India from August to October 2008. All participators were all levels of managers from different size and types of businesses, many of which were factory located in Orissa. Items associated with these constructs used a seven-item Likert type scale where respondents were asked to state their agreement with a given statement on a scale that ranged from "strongly agree" to "strongly disagree".

About 200 invitation e-mails were then sent, explaining the study's purpose and requesting participation. The e-mail body assured recipients that the responses would be treated confidentially and that the results would only be reported in aggregate. The respondents were asked to click on the URL link provided in the e-mail message that linked to an online instrument. No specific incentive was provided to participants for completing the survey other than promising them a copy of the report that summarized the study's results (more than 80% of the respondents requested this report).

Eventually, we received a total of 80 combined responses via return mail, Web, and e-mail. There were 72 usable responses received, resulting in about a 36 percent response rate.

Our sample represented a wide range of companies manufacturing refractory in India. In revenue regard, about 40 percent of the firms were under 100 crores, 36 percent ranged from 100 crores to 500 crores, and the rest were above 500 crores.

IV. SCALE VALIDATION

The scales were validated using the standard procedures recommended in the literature (Straub 1989). Items of scales in a related domain were pooled and factor analyzed to assess their convergent and discriminant validity. An iterative process of dropping items with high loadings on multiple factors or with loadings on factors other than the one representing the scale they pertain to, and reassessing the factor loadings, was followed in refining the scales. Overall, six items were dropped to yield a set of scales that had

adequate convergent and discriminant validity (Table 6).

TABLE 6. FACTOR ANALYSIS

Items	Component						
	1	2	3	4	5	6	7
MODUL01	0.775						
MODUL04	0.810						
MODUL05	0.695						
MODUL06	0.780						
ALIGN01		0.704					
ALIGN02		0.806					
ALIGN03		0.847					
ALIGN04		0.776					
ALIGN05		0.553					
ADAPT01			0.768				
ADAPT02			0.772				
ADAPT03			0.735				
ADAPT04			0.814				
ADAPT05			0.665				
TECH01				0.763			
TECH02				0.771			
TECH05				0.690			
MARK01					0.797		
MARK02					0.819		
MARK04					0.713		
PER_L01						0.816	
PER_L02						0.852	
PER_L03						0.820	
PER_S01							0.777
PER_S02							0.849
PER_S03							0.861
PER_S04							0.876
PER_S05							0.792

The reliability of these refined scales was then assessed. As shown in Appendix A, Cronbach's alpha values for all scales were found to be greater than 0.70, the threshold recommended by the literature.

As such, variances among the items in this scale may not be as homogeneous as would be expected in the other scales, leading to a marginally lower alpha.

V. RESULTS

Ordinary least squares (OLS) regression analysis was used to test the hypotheses, and Table 7 shows the results of the regression analyses. As shown in Table 7, organizational alignment is significantly impacted by alignment of IT and business process, while organizational adaptability is significantly impacted by process modularization. Hypothesis 1 and 2 are supported. As a result, we may safely draw a conclusion that organizational ambidexterity is significantly influenced by synergy of IT and business process.

TABLE 7 RESULTS OF REGRESSION ANALYSIS

Hypothesis/Variabl e	Short-term perf.	Long-term perform.	Org. Alignment	Org. Adapt.	Short-term perf.	Long-term perform.
	Std. Esti. p-value	Std. Esti. p-value	Std. Esti. p-value	Std. Esti. p-value	Std. Esti. p-value	Std. Esti. p-value
Intercept	4.548***	4.292***	3.694***	2.499***	4.519***	4.192***
Alignment of IT & Process (H1)			0.140***			
Process Modularity (H2)				0.402***		
Organizational alignment (H3a)	0.763***				0.720***	
Organizational Adaptability (H3b)		0.383***				0.456***
Size of Firms	-0.113	-0.027			-0.107	-0.044
Org. Align. × Tech. Turb. (H4a)	.141	.752			-0.194**	.057
Org. Align. × market Turbulence (H4b)					0.103	.420
Org. Adapt. × Tech. Turbul. (H4c)						0.552***
Org. Adaptability ×market Turb. (H4d)						.000
R ²	0.357	0.102	0.339	0.154	0.356	0.358
Adjusted R ²	.339	.076	.330	.142	.338	.320
F-Model p-value	19.184	3.918	35.953	12.762	19.112	9.351
Max VIF	1.024				1.063	

*p < .10, **p < .05, ***p < .01 (All tests are two-tailed)

VI. DISCUSSION AND LIMITATIONS

This paper investigates how synergy of IT and business process impacts organizational ambidexterity capability, which in turn impacts organizational performance, and ambidexterity theory is introduced to explicate the process. We posited that environmental technological turbulence moderates the ambidexterity and performance, which market turbulence does not. We use the survey data from 72 firms in India to test the model proposed. The outcome appears to be supported mostly.

Firstly, we find that IT has the potential to improve firm performance when it is combined with business process which is also a critical resource of a firm. The synergy of IT and business produces organizational ambidexterity capability which is conducive to organizational performance. We may safely come to a conclusion that the two resources are complementary.

Secondly, the results reveal that the alignment of IT and process is beneficial to the alignment capability of an organization, while the modularization of process enabled by IT makes an organization more adaptive. It enlightens us that different combination of IT and business process may result in different effect.

VII. CONCLUSION

In a market with increasingly tense and fierce competition, an organization typically faces up with the dilemma of perusing a couple of conflicting goals, such as manufacturing efficiency and flexibility, capability exploitation and exploration, etc., consequently it needs own ambidexterity capability. Drawing on Ambidexterity Theory, the study develops an Ambidexterity Capability Model, which analyzes the source of organizational ambidexterity capability from a process level. And we posit that it is the synergy of IT and business process that leads to organizational alignment as well as adaptation capability.

This research contributes to the growing body of conceptual and empirical literature on alignment and IT business value in three ways. First, to the best of our knowledge, this is the first time that ambidexterity theory is

introduced to explicate IT business value creation, which supplies a new perspective for the topic. Second, we extend ambidexterity theory and deeply analyze and interpret the fundamental concepts from a process level.

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