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Investigating the structural linkage between IT capability and organizational agility: A study on Indian financial enterprises

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Abstract

Purpose – Information technology (IT) is normally regarded as an enabling factor for making firms agile. Usually, it has been realized that greater IT spending enhances a firm's agility. However, the role of IT as an obstructing factor towards organizational agility cannot be overlooked. Taking this commonly perceived but less-studied IT-agility contradiction into account, the purpose of this paper is to investigate whether IT can augment or impede organizational agility. This research which is conducted in context to privately owned Indian financial enterprises proposes the premise that effective IT resource management is imperative for organizations to thrive for greater firm-wide IT capability for enhanced agility.

Design/methodology/approach – Primary data collected from 300 business and IT executives working in various privately owned financial enterprises across India are used for this study and a structural equation modelling is employed to assess the IT-agility link.

Findings – The findings of the study are two-folded. First, this study concludes that IT capability acts as an enabler for business process and market responsive organizational agility. Second, if IT spending is not properly translated into creating superior capability, huge and impudent IT investments will impede the overall organizational agility.

Originality/value – This paper investigates both exogenous variable (IT capability) and endogenous variable (organizational agility) in terms of second-order reflective measures and establishes a significant structural link between both the dimensions of IT capability (managerial and technical) and organizational agility (business process and market responsive). This analysis illustrates the moderating effect of IT spending on each of these relationships, thereby greatly contributes and extends the existing IT capability-agility related information systems literature.

Keywords IT capability, Organizational agility, IT-agility link, IT spending, Structural modelling, Interaction-moderation

Paper type Research paper

1. Introduction

Agility is the call for recent times and firms need to be agile and learn the tactics to effectively manage the unprecedented levels of changes created due to globalization, hyper-competition, technological advancement, growing market uncertainty and survive amongst the competitors by exploiting prominent business opportunities (Prahalad, 2009). Information technology (IT) has become an indispensable component in building a firm's ability to identify and act in response to market-related changes. In response to the continually unfolding market place, firms invest in IT to become agile by pursuing fast and innovative initiatives. Despite this, there is a lack of agreement in the information system (IS) literature representing the facilitating role of

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IT capability for enhanced organizational agility. IT enables agility by accelerating decision making, effective communication, and swiftly reacting towards the changing business environment.

It is also observed by few researchers that even IT may hamper and at times slow down organizational agility (Overby *et al.*, 2006), due to somewhat IS-related steady physical and technological artifacts (Galliers, 2007). Unresponsive legacy IT systems, and inflexible IT architectures can relatively act as a disabler of organizational agility (van Oosterhout *et al.*, 2006). Hence, IT may constrain the firm's ability to respond to threats or opportunities (Bharadwaj, 2000). In addition, exceeding business process and IT investments may ironically generate inadvertent technology traps over time (Grover and Malhotra, 1999). Investment in enterprise systems using large integrated systems may result business agility (Goodhue *et al.*, 2009) and rigidity (Galliers, 2007). These assorted observations emphasise on proper application of IT which can enhance and in some cases hamper the firm's agility.

Although technological transformation in areas like web services, and service-oriented architectures are quite evident in recent times, an important question may be raised as whether firms lack agility due to inflexible technology or whether ineffective IT management allows IT rigidity to persist and in turn adversely affect agility. Studies in IT governance have identified different IT management issues such as improper strategic planning, poor cost control mechanism, and inefficient project management which can lead to inflexibility in IT (Bharadwaj, 2000; Weill and Ross, 2004). As managerial as well as technical issues can result rigidity in IT, firms must learn to take the best out of flexible IT resources so as to attain agility (Sambamurthy *et al.*, 2003). IT capability has the ability to provide up-to-date information to the firm so that it can swiftly respond to changing market situations (Wu *et al.*, 2006), known as market responsive agility (MRA) (Bi *et al.*, 2011). According to the resource-based view (RBV) concept some studies highlight the importance of business process agility (BPA) as a critical aspect of internal business process towards attaining greater performance (Weill *et al.*, 2002; Sambamurthy *et al.*, 2003).

1.1 Paper overview

This research primarily focuses on developing and testing a model describing the link between managerial and technical IT capabilities to the market responsive and business process organizational agilities. Notwithstanding IT capability is extremely helpful for the firms to experience greater business value by means of better profitability, improved productivity, operational cost cut, competitive advantage, and other measures of firm performance (Chen *et al.*, 2015), still there is not much of discussion on its relationship with agility in contemporary business environments (Kohli and Grover, 2008; Lu and Ramamurthy, 2011). Literature supports few of the studies empirically investigating this association (Tallon, 2007; Lu and Ramamurthy, 2011). Still there is a need for deeply examining the relationships between the constructs of IT capability and organizational agility. As a manifestation of the value of IT investment, this model is developed based on the prior conceptual and empirical investigations. Hence this study addresses the following two folded research questions:

RQ1. Do managerial and technical IT capabilities enable or inhibit the business process and market responsive organizational agilities?

RQ2. What is the influence of IT spending on these IT capabilities and organizational agilities association?

2. Theoretical overview and hypotheses

A detailed study of the previous literatures (Overby *et al.*, 2006; Tallon, 2007; Lu and Ramamurthy, 2011; Bi *et al.*, 2012; Chakravarty *et al.*, 2013; Chen *et al.*, 2014) suggests that the IT and organizational agility-related studies are progressively increasing. For example, Overby *et al.* (2006) have addressed the sensing and responding components of organizational agility and proposed that these can be attained from effective deployment of IT and digital options. Tallon (2007) has examined the effect managerial and technical IT capabilities on the BPA along with the moderating influence of environmental dynamism. Lu and Ramamurthy (2011) have investigated the moderating influence of IT spending on the IT capability-agility (market capitalizing and operational adjustment) relationship. According to Bi *et al.* (2012), efficient utilization of IT and supply chain capabilities result market responsive organizational agility. A meticulous investigation of these literatures indicates that studies involving organizational agility as an outcome variable are limited (Overby *et al.*, 2006; Tallon, 2007; Lu and Ramamurthy, 2011; Bi *et al.*, 2012) and till now, a very few empirical analyses are done on the IT capability-agility link.

2.1 IT capability

From the RBV perspective, resources are essential for attaining competitive advantage and this theory highlights IT as a key player in making the firms to be more diversified and assist in gaining superior long-term organizational performance (Kim *et al.*, 2011; Ray *et al.*, 2012). Drawing on the RBV rationale, IT capability is recognised as an important organizational capability that has the ability to organize and utilise IT-based resources in arrangement with other organizational resources and capabilities for attaining superior performance and the key elements under IT capability constituted human IT resources, IT infrastructure, and IT-enabled intangible assets (Bharadwaj, 2000). Some studies support effective IT management as a specific IT capability, that results in building competitive advantage (Fink, 2011; Chen *et al.*, 2015). However, the concept of business value of IT may reveal that specific IT capabilities only produce short-term competitive advantage and the interrelationships among, these specific IT capabilities is overlooked (Lu and Ramamurthy, 2011).

Prior studies have explained the interrelatedness among the technical, managerial or human capital as crucial IT capabilities. According to Byrd and Turner (2001), technical capabilities along with IT infrastructure mediate the relationship between IT skills capabilities and competitive advantage. Managerial capabilities tend to have an important impact on the technical skills utilizing hardware, software, and shared networks to reduce the risk of technological rigidity which may in turn adversely affect the overall organizational agility. Therefore, this study in particular showcases the inter-connection between managerial and technical IT capabilities, where managerial capabilities are related to IT governance and technical capabilities involve in IT infrastructure (Tallon, 2007).

2.2 Organizational agility

"Organizational agility" is recognised as a key competence for any organization that deals with persistent business environmental changes and high competitive pressure. The term "agile" from an organizational context mainly delineates firms that have the ability to cope with and perform well in the fast changing environments (Dove, 2001; Sambamurthy *et al.*, 2003). So, organizational agility is described as the ability of the

organization to adjust, which is an essential attribute of agility and represents the proficiency with which an adaptive transformation takes place (Dove *et al.*, 1996). A large group of IS researchers have discussed the concept of agility through their researches (Overby *et al.*, 2006; Galliers, 2007). In order to respond to continually changing, unanticipated customer demands in a fluctuating market environment, organizations have to be quick in accumulating their technical skill, workforces, and management expertise with effective IT infrastructure.

2.2.1 BPA. Various research suggest the internal business processes may be realized as essential elements connecting IT capability and organizational performance (Weill *et al.*, 2002; Dehning *et al.*, 2007) and firms utilize their internal business processes to quickly handle the market or demand changes (Dove, 2001). This is regarded as a firm's BPA, that emphasizes flexible and swiftly responding activities as a basis for facilitating rapid and continuous transformation of innovative initiatives in the face of changes (Sambamurthy *et al.*, 2003).

2.2.2 MRA. To address changing customer demands and competitor's strategy, firms must be able to speedily respond to unprecedented market-related changes by continuously monitoring and quickly improving their products and services. This is considered as the MRA highlighting an aggressive, competitive and growth-oriented entrepreneurial mindset about strategic decision making in uncertain business circumstances (Sambamurthy *et al.*, 2003; Volberda, 1996). Both types of agilities bring about a sense of consistent willingness of the firms towards change, and IT can eventually build the necessary digital platform to develop these agilities (Sambamurthy *et al.*, 2003). Therefore, it is imperative to investigate the inter-connection between them.

2.3 IT-agility link (IT as enabler)

Although literature supports myriad of studies confirming IT as an enabler of business agility, majority of the research are conceptual or case study related. For example a conceptual research conducted by Weill *et al.* (2002) suggests the positive impact of IT infrastructure capability on strategic agility by analysing various IT infrastructure services to determine three pivotal business initiatives such as supply-side, internally focused, and demand-side. A survey-based case analysis administered by Zhang and Sharifi (2007) highlights IS as one of the agility enablers by utilizing cluster analysis to determine different subsets of strategic agility, however, the direct link between IS and agility was not established.

2.4 IT-agility link (IT as disabler)

Few authors also represent IT as disabler of flexibility suggesting IT by itself is inflexible (Allen and Boynton, 1991). They have proposed the "low-road" and "high-road" approach as the two critical IS architectural solutions to illustrate a two-folded problem of "speed and flexibility" and "low-cost and efficiency". Rettig (2007) studied on enterprise softwares describing them as essential IT capabilities, proposed that data integration and process automation may generate rigidity and hinder agility as any changes relating to technology are extremely complex and uncertain.

2.5 IT-agility link (IT enhances as well as impedes agility)

Previous literature explains that IT helps in broadening the reach and richness of firm's knowledge and business operations to enhance the overall enterprise agility, yet improper management and ineffective IT utilization may hinder agility

(Overby *et al.*, 2006). Gosain *et al.* (2005) have studied inter-organizational systems to determine supply chain flexibility. Their investigation revealed that modular design of interrelated business activities and connectivity among structured data are involved in positively affecting supply chain flexibility, whereas a broad range of information sharing hinders the supply chain flexibility. Another case-related study conducted by van Oosterhout *et al.* (2006), posit regarding rigid IT architectures as an outcome of inflexible legacy IT systems and act as a disabler of agility in the face of uncertain and consistent changes. However, a flexible business process and IS architecture are involved in superior business agility.

2.6 Managerial IT capabilities and agility

Firms following an IT governance model have the ability to deploy IT to resolve business-related problems by setting collaborative strategic goals among business and IS executives and these types of firms are expected to be always prepared for any unanticipated changes (Weill *et al.*, 2002; Weill and Ross, 2004). A closer business – IT collaboration can empower the business executives to get well informed about how changes have an effect on IT. Flexible IT planning is important for the business executives to perform essential internal business activities effectively and to develop innovative products and services faster than the competitors. The facilitating role of IT to impact the overall business operations and finding ways to reengineer the internal business activities to better serve the market place can be properly assessed by efficiently appraising the outcome of IT investment (Table I). Hence, based on this argument the following hypotheses are proposed:

H1a. Managerial IT capabilities have a significant positive impact on BPA.

H1b. Managerial IT capabilities have a significant positive impact on MRA.

Industry	Frequency	Percentage	Participants (matched survey)	Frequency	Percentage
Banking	243	81	Business executives		
			General managers	43	14.34
			Regional managers	59	19.66
			Branch managers	103	34.34
			Insurance managers	78	26.00
			Other managers	17	5.66
Insurance	49	16	Total	300	100
Others	8	3	IT executives		
			Chief information officers	54	18.00
			IT directors	71	23.67
			IT managers	134	44.66
			Other IT executives	41	13.67
Company age (in years)			Total	300	100
Less than 5 years	2	0.6			
5-10 years	44	14.8			
More than 10 years	254	84.6			

Notes: $n = 300$. Others include credit unions, credit card companies, stock brokerages, consumer finance companies, etc.

Table I.
Sample profile

2.7 Technical IT capabilities and agility

The IS literature has witnessed various studies establishing the correlation between technical IT capabilities and organizational agility (Weill *et al.*, 2002; Weill and Broadbent, 1998). The RBV theory depicts the utilization of rare and not so easily duplicated technical IT skills to create an advantage in dealing with a firm's reaction towards uncertainty. To obtain an edge over the competitors, firms need to learn to generate the necessary technical IT capabilities from the existing available organizational resources. Firms with an effective implementation of IT governance dealing with strong managerial IT capabilities are expected to possess a wide range of technical IT skills to build a flexible IT infrastructure corresponding to unprecedented levels of changes (Bharadwaj, 2000). Therefore the following hypotheses are developed to exhibit the technical IT capabilities and agility link:

H2a. Technical IT capabilities have a significant positive impact on BPA.

H2b. Technical IT capabilities have a significant positive impact on MRA.

2.8 Impact of IT spending on IT-agility link

Prior research acknowledge IT investment as one of the primary initiatives to develop a flexible IT-based business process which in turn positively impact the business performance (Dehning *et al.*, 2007). Prudently targeted IT investment enables the firm to build up its appropriate IT capability, which may well-inform the firm regarding changing market situations (Wu *et al.*, 2006). Therefore, the mutual impact of IT spending and IT capability enhance agility (Table II).

There is, however, a contradiction to the above stated argument, implying huge investment in IT may not always stimulate agility. According to Carr (2003), IT has become very popular and its prevalence is well recognized in almost every types of business operations, hence losing its ability to create long-term competitive advantage. Studies have supported the effectiveness of IT investment to be appropriately channelled for fostering and developing necessary IT capability to augment agility and superior firm performance (Bhatt and Grover, 2005; Lu and Ramamurthy, 2011).

Constructs	Indicators	Supporting literature
Managerial IT capability	1. IT-business partnership	Bassellier and Benbasat (2004)
	2. Strategic IT planning	Sambamurthy *et al.* (2003)
	3. Post-implementation IT reviews	Tallon (2007)
Technical IT capability	1. Network connectivity and hardware compatibility	Tallon (2007)
	2. IT infrastructure	Bharadwaj (2000)
	3. IT skills adaptability	
Business process agility	1. Customization of product and services	Tallon (2007)
	2. Effective IT deployment	Chen *et al.* (2014)
	3. Introduction of new pricing schedules	Roldán *et al.* (2015)
Market responsive agility	1. Effective and quick response to changing customers demand and competitors' strategy	Bi *et al.* (2011)
	2. Development and marketing of new products and services	Wu *et al.* (2006)
	3. Reengineering of organizations to serve the market place	Bi *et al.* (2012)

Table II.
List of latent constructs along with indicators

Firms having superior managerial and technical IT capabilities recognize IT as a resourceful asset and are better positioned to properly exhibit a sense of balance towards IT investment to build IT-based digital platform so as to respond the market related as well as internal business process-oriented changes. This research addresses ability of the firm to react the market-related changes as MRA and readiness towards quickly responding to business processes as BPA. Hence based on this argument the following hypotheses are postulated:

H3. IT spending positively moderates the relationship between managerial IT capability and BPA.

H4. IT spending positively moderates the relationship between managerial IT capability and MRA.

H5. IT spending positively moderates the relationship between technical IT capability and BPA.

H6. IT spending positively moderates the relationship between technical IT capability and MRA.

All the above-mentioned six hypotheses are illustrated in the research model (Figure 1) developed for this study.

3. Research methods

3.1 Sample framework and data collection

The IT-agility link was studied in previous researches where medium sized public or private firms (Lu and Ramamurthy, 2011), large sized Fortune 1,000 firms (Ravichandran and Lertwongsatien, 2005), manufacturing units (Bhatt and Grover, 2005; Chen *et al.*, 2014), small to medium enterprises (Bi *et al.*, 2011, 2012) were targeted as samples. This study underscores the impact of IT capability on overall agility of privately owned financial enterprises such as privately owned banks, insurance companies, and other financial services providing groups functioning in the state of Odisha, in Eastern India and the scope of the study is limited to the IT and business executives working in the middle and senior level of management. Since, IT capability-related research on these groups is very thin on the ground and there is a little research on the benefits of utilizing managerial and technical IT capabilities to achieve market responsive and BPA, therefore the proposed model for this study is tested using financial units as samples.

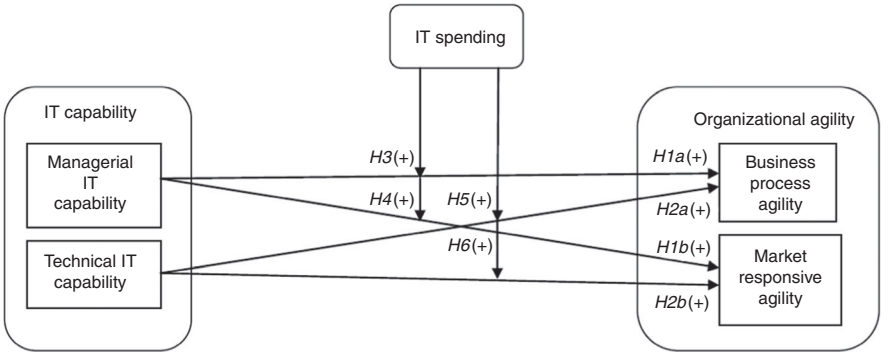

Figure 1.
A conceptual model representing the relationship between IT capabilities and organizational agility

Around 495 numbers of branches of different private banks, and insurance companies were contacted for this research and a total of 930 structured questionnaires were distributed out of which 470 responses returned, but 300 were found to be useable for further analysis representing 32 per cent valid response rate. The sample size has been created using Slovin's formula with an expected population of about 5,000. The sample framework of 300 participants certainly exceeds the calculated amount of 263 with a margin of error 0.06. This reflects that at 94 per cent confidence level the sample represents the whole population. Moreover, the test of normality conducted in SPSS suggests that all the parameters taken for the study are normally distributed (as all $p_s > 0.05$) with the samples exhibiting not significantly different characteristics from the population. The Hoelter index (Table III) indicates that the sample size is appropriate to conduct the study.

A matched-pair field survey was conducted to collect the data, where both online and offline modes have been used to distribute the questionnaires. The responses from the IT executives were collected by sending e-mailed questionnaires and bank and insurance managers were surveyed by visiting them personally. The contact information and e-mail id of the IT executives were collected from them. A total of 573 e-mail addresses were accumulated but about 467 of them were found to be correct addresses. IT executives were e-mailed questionnaires highlighting the academic nature of the study and procedure to answer questions. Some of the IT executives had not responded after the very first e-mail, due to prior travel commitments, corporate policy, or unavailability of time. Therefore reminder e-mails were sent after two weeks to the IT executives who have claimed a time pressure by asking them if they could avail themselves for the study. To test the issue of non-response bias, a *t*-test on each of the studied constructs between the early (i.e. the responses collected immediately after the initial e-mail invitation was sent) and late (i.e. the responses collected after the reminder e-mails) responses was conducted, but could not exhibit a significant differences (as all $p_s > 0.05$), thereby highlighting the absence of non-response bias problem. The entire study was completed over the period of three months (September-November, 2014).

3.2 Development of instruments

Owing to prior literature, a multi-item reflective measurement scale was used with slightly modified items to fit the context of this study. A five-point Likert-type rating scale was incorporated to accumulate the responses relating to the multi-item measures with anchors representing ranges from strongly disagree (1) to strongly agree (5). All the items utilized for this study are adapted from previous studies which ascertains the validity of these measures. However, a series of tests to ascertain content validity, construct validity, and reliability (Straub, 1989) have also been performed.

Table III.
Fit indices of measurement and structural model

	Measurement model	Structural model
(χ^2/df)	2.72	4.41
RMSEA	0.07	0.08
GFI	0.91	0.91
CFI	0.94	0.92
IFI	0.94	0.92
Hoelter	155 ($p < 0.01$)	104 ($p < 0.01$)

3.3 Development of constructs

In order to operationalize the research model, the required primary constructs for IT capability and organizational agility were adapted and developed from a vigorous study of the prior literature.

3.3.1 IT capability. IT capability is broadly categorised as managerial and technical capabilities (Tallon, 2007), where each of the constructs is operationalized with three indicators.

3.3.1.1 Managerial IT capabilities. Previous studies recognized partnerships between IT and business as collaborative relationship that represents a scenario of IT executives getting involved in resolving complicated business-related problems, corporate planning, strategy making, etc. and business managers participating in overall IT management, IT decision making, effective IT planning, etc. Studies performed by Bassellier and Benbasat (2004), and Reich and Benbasat (2000), suggest the mutual effort exerted by both IT and business executives on jointly solving IT and business issues, promoting strategic deployment of IT, and establishing a shared vision for both business and IT. Therefore partnerships between business and IT executives are selected as the first indicator of managerial IT capabilities (Reich and Benbasat, 2000). This item was evaluated by targeting both business and IT executives. The second item strategic IT planning corresponds to a firm's intention to strategically utilise IT to assess existing objectives set for IT relating to cost cut, quality, speed, efficiency of business operations, extending market reach, and suitable IT implementation to change market policies (Tallon, 2007). Since, post-implementation IT reviews are essential to the IT executives for evaluating their overall effectiveness, it is selected as the final indicator of managerial IT capabilities (Tallon *et al.*, 2000). The second and third components are examined by targeting only IT executives. All these selected items have their origin from the prior literature, satisfying the accuracy, validity, and reliability.

3.3.1.2 Technical IT capabilities. As this construct focuses on flexible and easily adaptable IT infrastructures, henceforth the first identified measure is comprised of network connectivity and hardware compatibility (Tallon, 2007), which can be viewed as the reach and range (Keen, 1991) of an agile IT infrastructure. According to Tallon (2007), IT infrastructure may include another component named as software modularity which highlights quick development and redesign of software so as to easily achieve reengineered or customized IT applications. These are pointed at fostering IT systems devoid of legacy IT or proprietary systems that are usually associated with rigidity. Lastly, effective IT skills contribute towards building necessary constituents for IT adaptability, which act as prominent enablers of firms' flexibility generated by their physical IT infrastructure. So, IT skills adaptability is taken as the last indicator for technical IT capabilities. Previous literature has also validated these items suggesting their precision, reliability, and accuracy (Tallon, 2007). IT executives were best suited as the target respondents for these items.

3.3.2 Organizational agility. Organizational agility is considered as the major outcome of the study which can be operationalised in terms of MRA and BPA comprising of three items each.

3.3.2.1 BPA. Previous literature suggests that this construct mainly represents specific business processes (Raschke, 2010). According to Raschke (2010), business processes agility denotes the ability to add and/or reconfigure internal business processes by speedily adding innovative capabilities to the set of existing business process

capabilities to meet the future requirements of the firm. These studies were conducted on a process-level prospective. Prior studies also highlight business processes agility from a firm-level approach (Tallon, 2007; Chen *et al.*, 2014). They have explained the importance of studying agility from an enterprise context as process-level approach may neglect the synergies generated by any unexpected correlations among the different processes. Moreover, IT capability created over a business level may prudently effect on the business processes agility. This study adapts the measurements suggested by Chen *et al.* (2014) and few of them were slightly modified to fit into the present research.

The indicators for business processes agility are customization of product and services to suit individual customers demand, deployment of IT for producing innovative, faster and cheaper products and services to better serve customers and quickly responding to new product and services launched by competitors, and lastly introduction of new pricing schedules relating to changes in competitors price.

3.3.2.2 MRA. Most of the previous MRA-related studies were done on a firm-level explaining it as a driver towards widening a firm's market outlets, enhanced profitability, and thereby providing increased market shares and augmented performance (Wu *et al.*, 2006; Bi *et al.*, 2011, 2012).

How quickly and effectively organizations respond to changing customers demand and competitors' strategy, develop and market new products and services, reinvent/reengineer organizations to serve the market place are measured under MRA (Bi *et al.*, 2011, 2012). As these measures are based on prior literature, their accuracy and validity are pre-tested. The business executives were selected to access both types of agility.

3.3.3 IT spending. IT spending is treated as a moderator variable that may influence the relationship between IT capability and organizational agility. From Indian banking context Ramesh and Daler (2012) have discussed the impact of IT spending on various IT-enabled services. This construct is measured by three indicators such as spending on IT infrastructure, IT innovations (new services and capabilities), and spending on internal IT services (personnel).

4. Results and hypotheses testing

4.1 Validation of instruments

The accumulated data were first examined through exploratory factor analysis (EFA) utilizing SPSS (20.0) and five numbers of components were extracted based on the eigen value greater than 1 involving varimax rotation and then confirmatory factor analysis (CFA) was performed along with the interaction moderation analysis using AMOS (20.0). The five-construct model is a representation of two reflective second-order factors namely IT capability (managerial and technical IT capabilities) as the exogenous variable, and organizational agility (market responsive and BPA) as the endogenous variable and one first-order factor IT spending denoting the moderator variable. A series of tests were conducted to confirm reliability, validity, and good data fit. The EFA and descriptive statistics of the model constructs are shown in Table IV. The developed instruments were further validated through testing construct reliability, convergent validity, and discriminant validity as discussed in subsequent sections.

4.2 Test for construct reliability

This test was performed to evaluate the internal consistency of the items suggesting the extent to which items are free from random error. First, reliability of all five constructs were tested based on examining the composite reliability value.

Costructs	Items	Factor loadings	Minimum	Maximum	Mean	SD
Managerial IT capabilities	MAGITCAP1	0.79	1.00	5.00	3.52	0.96
	MAGITCAP2	0.79	1.00	5.00	3.54	0.99
	MAGITCAP3	0.76	2.00	5.00	3.52	0.95
Technical IT capabilities	TECHITCAP1	0.81	1.00	5.00	3.62	0.94
	TECHITCAP2	0.76	1.00	5.00	3.78	0.98
	TECHITCAP3	0.51	2.00	5.00	3.64	0.98
Business process agility	BUSPROAGI1	0.73	1.00	5.00	3.49	1.08
	BUSPROAGI2	0.72	1.00	5.00	3.49	1.06
	BUSPROAGI3	0.73	1.00	5.00	3.47	0.98
Market responsive agility	MARRESAGI1	0.75	2.00	5.00	3.60	0.91
	MARRESAGI2	0.56	2.00	5.00	3.72	0.93
	MARRESAGI3	0.55	1.00	5.00	3.60	0.96
IT spending	ITSPEND1	0.84	1.00	5.00	3.75	1.03
	ITSPEND2	0.78	2.00	5.00	3.55	0.95
	ITSPEND3	0.74	1.00	5.00	3.62	0.92

Table IV.
Results showing exploratory factor analysis and descriptive statistics

The composite reliability reflects the internal consistency of the individual constructs and the calculated values exceeds the recommended value of 0.7 (Nunnally and Bernstein, 1994). Second, drawing on the value of Cronbach's α, the unique and distinct items assigned under each construct were tested for their reliability. Each constructs shows the Cronbach's α value within the range of 0.75-0.95, which is above the threshold value of 0.7 as suggested by Hair *et al.* (2006) and this proves that the items selected under each construct are highly reliable.

4.3 Test for convergent validity

First the convergent validity was tested by calculating the average variance extracted (AVE) values for each construct and this study estimates the value of AVE for each construct greater than the recommended value of 0.5 (Hair *et al.*, 2006), which suggests that the individual latent factor is properly explained by its observed variables. Second, based on the findings suggested by Anderson and Gerbing (1988), convergent validity was determined by estimating the significant factor loadings of distinct items on their designated constructs. As shown in Table V the calculated standardised estimates inferred from CFA (Bentler, 1989) conducted on the five-factor model validates that convergent validity issue is not a potential risk for the constructs.

4.4 Test for discriminant validity

According to Churchill (1979), discriminant validity can be determined when the unique and distinctive values of all the measures merge at their individual true scores. The AVE is the most appropriate determinant for discriminant validity which reflects the amount of variance extracted for individual latent construct (Fornell and Larcker, 1981). Discriminant validity can be examined whether the square root of the AVE for each construct was larger than the inter-construct correlation. As represented in Table V the square root of the AVE for each construct was found to be greater than its correlation with other constructs. The estimated values of maximum shared square variance and average shared square variance were found to be less than the AVE values (Table V) (Hair *et al.*, 2010). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issue.

Table V.
Results showing confirmatory factor analysis and correlation and reliability of latent constructs

Model constructs	Items	Standardised loadings	Cronbach's α	Composite reliability	AVE	MSV	ASV	1	2	3	4	5
1. Managerial IT capability	MAGITCAP1	0.97***	0.95	0.95	0.86	0.21	0.08	*0.93*				
	MAGITCAP2	0.95***										
	MAGITCAP3	0.87***										
2. Technical IT capabilities	TECHITCAP1	0.93***	0.74	0.77	0.53	0.05	0.01	0.01	*0.73*			
	TECHITCAP2	0.58***										
	TECHITCAP3	0.64***										
3. Business process agility	BUSPROAGI1	0.74***	0.85	0.85	0.67	0.39	0.13	0.33	0.14	*0.81*		
	BUSPROAGI2	0.87***										
	BUSPROAGI3	0.83***										
4. Market sesponsive agility	MARRESAGI1	0.74***	0.75	0.76	0.51	0.39	0.17	0.46	0.22	0.62	*0.71*	
	MARRESAGI2	0.66***										
	MARRESAGI3	0.75***										
5. IT spending	ITSPEND1	0.88***	0.78	0.78	0.55	0.03	0.01	0.02	0.05	−0.07	−0.19	*0.74*
	ITSPEND2	0.64***										
	ITSPEND3	0.70***										

Notes: Diagonal elements are the square roots of average variance extracted. ***$p < 0.001$

4.5 Test for common-method bias (CMB)

This study utilizes different categories of respondents (i.e. business and IT executives) to accumulate the responses. The questionnaires relating to primary exogenous variables, i.e., managerial and technical IT capabilities were administered among the IT executives, however, both business and IT executives were chosen for one of the items under managerial IT capabilities (i.e. IT-business partnership), where CMB may be an issue. Therefore, to minimize the risk of apprehension about assessment and social desirability, respondents were assured of the confidentiality and anonymity of answers. The questionnaires for the endogenous variables, i.e., BPA and MRA target only the business executives which minimises the threat of CMB.

The extent of CMB is empirically tested first by using Harman's single factor method in SPSS, second, CFA and common latent factor (CLF) method in AMOS. An EFA containing all 15 indicators was carried out in SPSS by constraining the number of components extracted to be one and this single factor accounted for only 29 per cent of variance, which shows the absence of common method biasness. If CMB was a problem it would have explained more than 50 per cent of the variance (Podsakoff *et al.*, 2003). CFA was performed to test this single factor model containing all the 15 items using AMOS (Kearns and Sabherwal, 2007). Results culminated in a poor fitting model exhibiting all the key indices as $\chi^2 = 1{,}319.03$, df = 90, CFI = 0.48, NFI = 0.46, and GFI = 0.59, IFI = 0.48, AGFI = 0.45, RMSEA = 0.21. These results represent that the studied variables are free from CMB issue.

The EFA was again carried out containing all 15 factors, where five components were extracted based on eigen value greater than one. CFA was conducted on this five-component model and the standardised regression weights were calculated. Then a CLF was introduced to this model and again the CFA was performed. The standardised regression weights of the model with CLF and without CLF were compared and minute differences were observed (less than 0.2). Based on these tests it is illustrated that CMB is unlikely to be a potential threat to the data used for this study.

The measurement and full structural models were validated through multiple indices such as ratio of χ^2 to degrees of freedom (χ^2/df) (Jöreskog, 1978), goodness of fit index (GFI), incremental fit index (IFI), comparative fit index (CFI), and root mean-square error of approximation (RMSEA) (Hair *et al.*, 2006). Following Carmines and Melver (1981), the ratio of χ^2/df value below 3 explains a good fit, however, depending on the sample size this can vary from a range as high as 5.0 (Wheaton *et al.*, 1977) to as low as 2.0 (Tabachnick and Fidell, 2007). Byrne (1994) has suggested a value of 0.90 or higher for GFI, CFI, and IFI to be considered as sound fit. An RMSEA within the range of 0.05-0.10 was considered an indication of fair fit up until the early nineties and any values exceeding 0.10 indicated poor fit (MacCallum *et al.*, 1996). Later on RMSEA in the range of 0.08-0.10 was indicated as a mediocre fit and below 0.08 shows a good fit (MacCallum *et al.*, 1996; Hair *et al.*, 2006). All of these fit indices calculated for both the measurement and structural models were found to meet up these standards as shown in Table III.

The structural linkage between constructs of IT capability and organizational agility are represented in Figure 2. The interaction moderation effect of IT spending with managerial and technical IT capabilities on the business and MRA is shown in Figures 3 and 4.

From Figures 2-4 the following inferences can be derived as shown in Table VI.

5. Research synthesis

As mentioned in the previous sections, this research is based on satisfying two sets of objectives: to investigate whether managerial and technical IT capabilities enable or

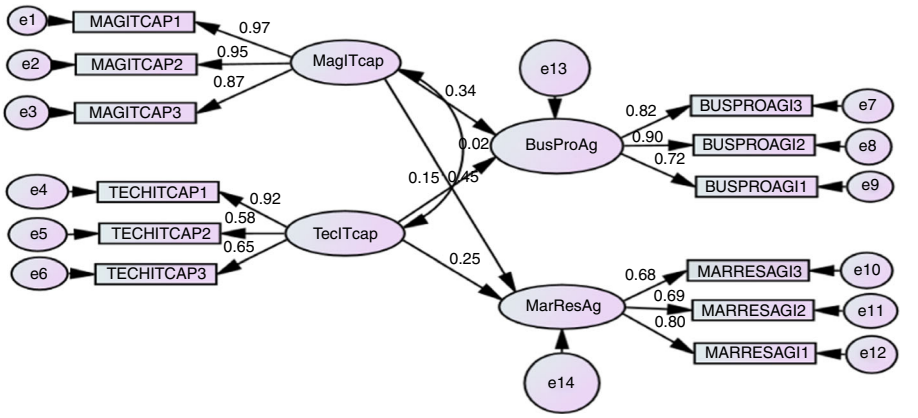

Figure 2.
Structural linkage between IT capability and organizational agility constructs

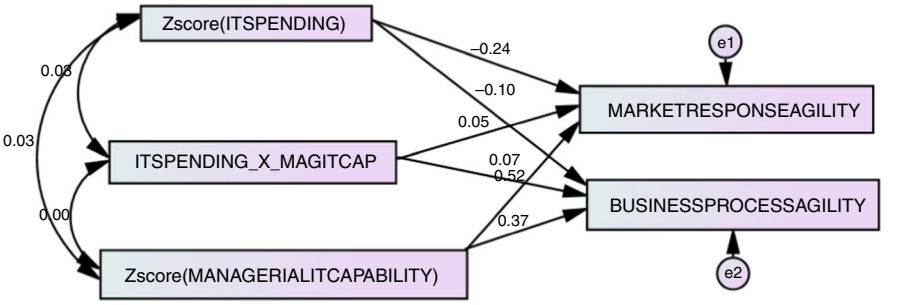

Figure 3.
Interaction effect of IT spending and managerial IT capability on business process and market responsive agility

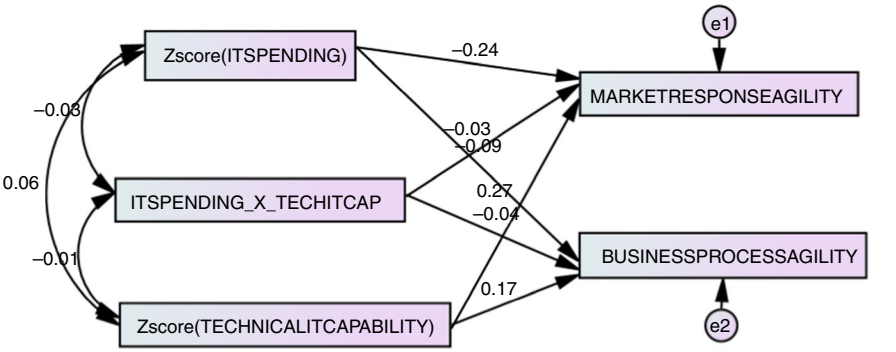

Figure 4.
Interaction effect of IT spending and technical IT capability on business process and market responsive agility

inhibit business process and market responsive organizational agilities, and to examine the influence of IT spending on the IT-agility relationship.

This study infers that IT capability dimensions namely managerial and technical IT capabilities enhance both market responsive as well as business process organizational agilities and IT spending strengthens the positive link between managerial IT capability and both types of agility, however, it weakens the positive relationship established between technical IT capability and both categories of agility. From Figure 2 it is evident that the regression lines drawn from managerial and

Proposed hypotheses	Standardised estimates	Predicted sign	Inferences
H1a: Managerial IT capabilities→business process agility	0.34***	Positive	Supported
H1b: Managerial IT capabilities→market responsive agility	0.45***	Positive	Supported
H2a: Technical IT capabilities→business process agility	0.15***	Positive	Supported
H2b: Technical IT capabilities→market responsive agility	0.25***	Positive	Supported
H3: IT spending→managerial IT capability and business process agility	0.05***	Positive	Supported
H4: IT spending→managerial IT capability and market responsive agility	0.07***	Positive	Supported
H5: IT spending→technical IT capability and business process agility	−0.03	Positive	Not supported
H5: IT spending→technical IT capability and market responsive agility	−0.04	Positive	Not supported

Note: ***$p < 0.001$

Table VI. Results showing hypotheses testing

technical IT capabilities towards business and market responsive agilities are showing positive coefficients, which satisfies hypothesis *H1a*, *H1b*, *H2a*, *H2b*. Figure 3 represents the positive relationship established between the interaction of IT spending and managerial IT capabilities with both types of agility, therefore the proposed hypotheses *H3* and *H4* are supported. On the other hand, as shown in Figure 4 the interaction between IT spending and technical IT capabilities exhibits a negative relationship with both business and market responsive agilities, which contradicts the proposed hypotheses *H5* and *H6*. It is evident that, these findings provide a strong empirical support for examining the crucial role of IT capability in directing and transforming IT investment to facilitate agility. With a robust investigation on the positive IT-agility link, this study stresses upon producing IT's business value by explaining how IT-enabled capabilities establish flexible and responsive business operations to compete in persistent market-related changes. Graphs showcasing the interaction effects are plotted in the subsequent Figures 5-8.

The next sections represent numerous theoretical and practical contributions of this study.

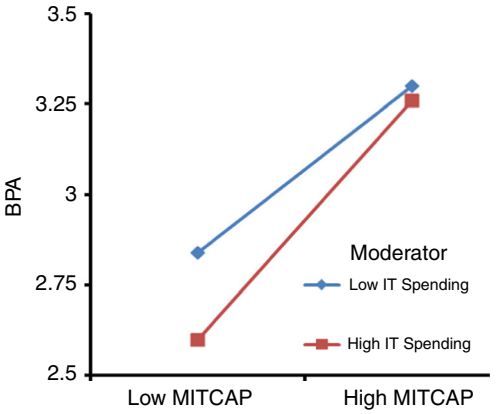

Figure 5. The strengthening role of IT spending on the positive relationship between managerial IT capability (MITCAP), and business process agility (BPA)

5.1 Theoretical contribution

This research greatly contributes to the IS literature by investigating the relationship between IT capability and organizational agility and successfully demonstrating the role of IT as an enabling factor for agility. IT capability and organizational agility are tested in terms of second-order reflective measures and an examination of their interrelationships provide extension to the existing concept of IT-agility link. Previous studies have shown how properly managed IT capability generates business value (Barua *et al.*, 1995) and inferences derived from this research also support IT capability as a pivotal concept in fostering business value generated by means of effective IT implementation corresponding to agility as a critical index for IT's business value (Kohli and Grover, 2008).

One of the findings of this research suggests successful integration of IT and business planning to make the best out of the rare and scarce IT resources for augmenting agility and creating greater business value. Moreover, firms must have appropriate planning for effective IT usage to experience superior operational excellence by providing error free higher quality products and services at lower costs. Inference derived from this study highlight that IT performance of important IS projects needs to be accurately assessed at regular intervals, so that firms realize and

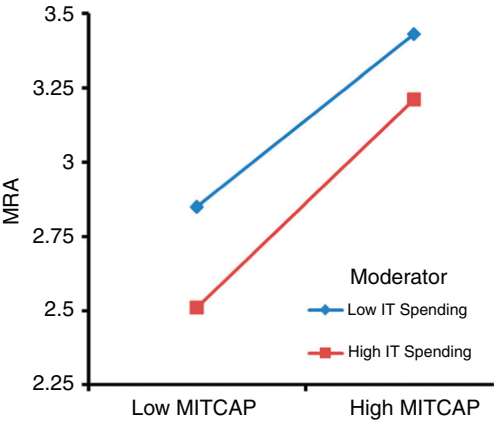

Figure 6.
The strengthening role of IT spending on the positive relationship between managerial IT capability (MITCAP), and market response agility (MRA)

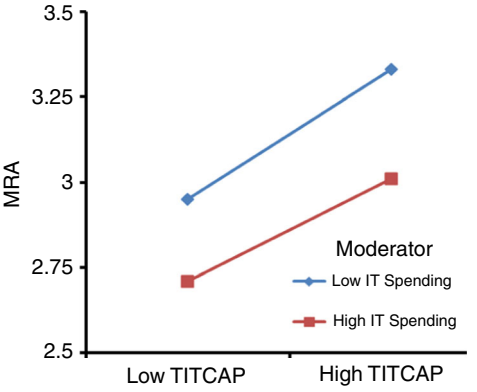

Figure 7.
The dampening role of IT spending on the positive relationship between technical IT capability (TITCAP) and market response agility (MRA)

better understand the contribution of IT towards building a stable and robust foundation for agility.

There is an obvious contribution of efficient technical IT capabilities in terms of systems integration, ability of expanding or contracting the network reach, software development, and extending the adaptability of IT personnel by acquiring a wide range of IT skills to make the firms comprehend IT's business value for fostering agility. Putting all together, firms that are well equipped with both managerial and technical IT capabilities are successful in building an efficient and flexible IT platform to sense and readily respond to market changes. These firms can make their internal business operations flexible so that they can properly deploy IT to customize their product and services according to the requirements of the clients and can also change the product pricing comparing to the competitors. To quickly exploit market-related changes, they should effectively and speedily focus on responding to changing customers demand and competitors' strategy so that they can include cost effective features to their product and services. This will facilitate developing and better marketing of new products and services, sharing customer or competitor-oriented timely information with business managers and other decision makers to promote an entrepreneurial mindset, and estimating the need for reengineering or redesigning of organizations to serve the market place. Overall, the findings deduced from this study stress upon creating efficient IT capabilities by the firms to sense and quickly respond to available market opportunities.

This study explores the interaction effect of IT capability measures with other organizational resources, namely, IT spending and investigates the interactive effect on items studied under organizational agility and suggests that firms should spend more on IT to generate necessary IT capabilities which in turn enhance agility. As IT is deep-rooted in the firm's internal business processes, first firms need to recognize the importance of required IT capabilities and then necessary steps can be taken to develop them to take the advantages of greater business value (Kohli and Grover, 2008).

However, this study also infers and illustrates the contradictory effect of IT investment on agility. When firms only focus on investing in IT infrastructure such as hardware, software, communication networks, delivery channels, etc. overshadowing managerial IT aspects, then IT spending does not build the necessary IT capabilities to increase the overall agility. Hence, this research supports the research work that argue

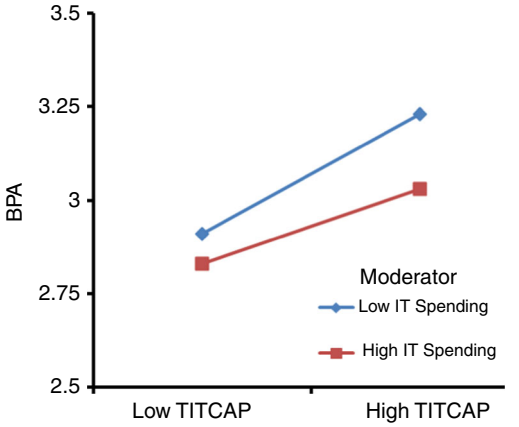

Figure 8.
The dampening role of IT spending on the positive relationship between technical IT capability (TITCAP) and business process agility (BPA)

that firms should not overestimate and overspend on IT which may in turn lead the business to be less competitive in the market, moreover reducing the overall performance (Carr, 2003). One of the intriguing findings underlines the effect of huge IT investments on impeding the firms to be less responsive to the market changes and thereby hampering the agility (Weill *et al.*, 2002).

From a global perspective, according to Ackermann *et al.* (2007), Indian private banks bear about 40 and 60 per cent lower labour cost compared to the Asia-Pacific and European banks, respectively, which is considered to be 10 per cent of the total IT spending as opposed to 20 per cent for banks in Asia-Pacific and 30 per cent for European ones. Top performing privately owned Indian banks such as Industrial Credit and Investment Corporation of India, Axis bank, etc. showcased their unique business model that highlights marginal IT investment by counting upon low-cost, third-party direct-selling agents. Technology has been adopted by these banking groups nearly more than a decade ago but for the past few years only there have been a massive transformation where IT has been continually acting as an enabler and driver for change.

The results provide enough evidence supporting these techno-savvy enterprises having adopted alternative delivery channels such as automated teller machines, internet, social and mobile banking, core banking system, customer relationship management initiatives, etc. to better serve customers in a highly volatile business environment and thereby enhancing both types of agilities. Moreover, these enterprises have gained immense reputation among other public type, and regional rural banks for their strong IT governance that inculcate efficient in-house IT skills and lead these banks to make selective outsourcing and generate superior value by dealing with lower-rate charging IT vendors (Ackermann *et al.*, 2007). Putting all together, privately owned Indian financial units are making their IT spending more profitable by simultaneously focusing on technological as well as business strategies and maintain greater value creation by building superior IT capability.

5.2 Contribution into practice

The findings of this research provide several implications for business managers and decision makers. First, the study underpins effective IT deployment towards developing efficient IT capabilities to gain greater agility. Firms must develop their internal efficiencies through developed managerial and technical IT capabilities to enhance overall agility. It is crucial for every firm to effectively manage and integrate IT with business processes with a strategic outlook towards IT planning. The results also emphasize the influence of a strong IT governance on augmented agility than any other conventional factors namely IT operations, the age of IT platform, and overall IT investment. As the privately owned banking and financial groups across India have experienced an arrangement of extensive changes by making a completely ideal transformation in the working and transmission of services by successful utilization of IT, the business and IT executives, managers, and decision makers need to concentrate on creating synergy through appropriate business and IT collaboration by making effective utilization of integrated IT infrastructure to augment the firm's ability to sense and respond readily to any market changes. In most developing countries, banks encounter tremendous competitive stress as a result of changing customer requests, globalization, technological advances, etc. Therefore, efficient IT adoption and investment has the ability to make the Indian financial enterprises very dynamic.

Second, the study underscores that firms must pay attention on rational and wise IT investment decisions which can create adequate business value. From the interaction

moderation analysis between IT capabilities and IT spending it is evident that IT spending is properly channelled with managerial IT capabilities to strengthen the positive link between IT and agility. In other words, managerial IT capabilities in association with IT spending augment both business process and MRA. Therefore business managers and decision makers need to encourage IT investment by means of infrastructure, innovations, and personnel to build superior managerial IT capabilities, which in turn boost up both types of organizational agilities.

Third, it is inferred that the managerial aspects of IT should not be ignored, while firms are making impudent and huge IT investments on the IT infrastructure, delivery channels, etc. Hence forth, they should make wise IT investment decisions taking into account both the managerial and technical IT capabilities to enhance business process and market responsive agilities all together.

6. Conclusion

This study is one of the few studies that have empirically investigated the impact of IT capability on augmented organizational agility (Lu and Ramamurthy, 2011). This work has successfully inculcated a theoretical rational for analysing the critical contribution of IT capabilities in building greater firm agility. To be specific, the present study concludes that IT capability acts as an enabler for business process and market responsive agilities. The study also infers that, if IT spending is not properly translated into creating superior capability, huge IT investments will impede the overall organizational agility. As agility is the call for recent times, firms must concentrate on developing and cultivating efficient IT capabilities to foster superior agility without being trapped by the coarse effect of over IT investment. Finally, this study creates avenues for further discussion and facilitates the theoretical advancement to establish a thorough understanding about the relationship between IT capability and agility.

6.1 Limitations

It is inevitable for every research to have encountered with limitations. First, this study is conducted in the state of Odisha, Eastern part of India and confined to the privately owned financial groups functioning across India, therefore the derived results may not hold good for a wider population. Second, owing to previous literature, developing IT capabilities to recognize agility is a firm's long-term goal (Sambamurthy *et al.*, 2003), while this study is based on a cross-sectional research design, which limits its ability in establishing a causal relationship among the studied variables. Third, the measurements identified for this research are selected at the firm level, while capability building and realization of enhanced agility are initiated at the individual business processes levels in distinct departments or units. Fourth, business and IT executives are drawn from top and middle level of management, therefore how IT is implemented at the lower level of management to create suitable IT capability and augment agility is not properly explained. Lastly, the moderating impact of IT spending on the IT-agility link has been examined neglecting other elements such as environmental factors and distinctive control variables.

Since, the participants selected for the study suitably represent the whole population possessing a sound understanding about the organizational operations, and the target sample units are in business for more than 15 years, therefore the accumulated responses are of high standard. Therefore, in spite of the above mentioned shortcomings the generality of this work can be extended for a larger context.

6.2 Scope for future research

Further extensive research is needed to overcome the above-mentioned shortcomings. Evidences should be gathered from longitudinal or experimental research designs to further delineate the causal relationship between IT capability and organizational agility. To better understand this causation, future research may focus on studying IT capability as an enabler for superior agility and agile firms' ability to build greater IT capability. Investigating firm's effective IT utilization to develop capabilities and enhance agility at business process level as well as an enterprise level should be considered as better research prospective. This study treats IT capability and organizational agility as second-order latent constructs, while future research should examine alternative items to be explored conceptualizing these multifaceted latent constructs. Further studies may target similar types of respondents working in firms operating in different industries holding different ownership structures. For example, business and IT executives working in public sectors financial units, foreign banks, and regional rural groups and privately or publicly owned industries like manufacturing, transportation, etc. may also be selected to carry forward the research.

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