Effects of Organizational Capabilities on Organizational Performance: Empirical Evidences from Indian Banking Industry

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Effects of Organizational Capabilities on Organizational Performance: Empirical Evidences from Indian Banking Industry

Dissertation submitted in partial fulfillment

of the requirements of the degree of

Doctor of Philosophy

in

Management

by

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(Roll Number: 512SM304)

based on research carried out

under the supervision of

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September
2017

School of Management

National Institute of Technology Rourkela

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September 20, 2017

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This is to certify that the work presented in the dissertation entitled *Effects of Organizational Capabilities on Organizational Performance: Empirical Evidences from Indian Banking Industry* submitted by *Sukanya Panda,* Roll Number 512SM304, is a record of original research carried out by her under my supervision and guidance in partial fulfillment of the requirements of the degree of *Doctor of Philosophy* in *School of Management*. Neither this dissertation nor any part of it has been submitted earlier for any degree or diploma to any institute or university in India or abroad.

Santanu Kumar Rath
Professor

Dedication

This work is dedicated to both of my grandfathers Late Mr. Basudev Dash and Late Mr. Bhaskar Chandra Panda who have always inspired me to study hard and dream big.

Declaration of Originality

I, *Sukanya Panda*, Roll Number *512SM304* hereby declare that this dissertation entitled *Effects of Organizational Capabilities on Organizational Performance: Empirical Evidences from Indian Banking Industry* presents my original work carried out as a doctoral student of NIT Rourkela and, to the best of my knowledge, contains no material previously published or written by another person, nor any material presented by me for the award of any degree or diploma of NIT Rourkela or any other institution. Any contribution made to this research by others, with whom I have worked at NIT Rourkela or elsewhere, is explicitly acknowledged in the dissertation. Works of other authors cited in this dissertation have been duly acknowledged under the sections "Reference". I have also submitted my original research records to the scrutiny committee for evaluation of my dissertation.

I am fully aware that in case of any non-compliance detected in future, the Senate of NIT Rourkela may withdraw the degree awarded to me on the basis of the present dissertation.

Sept. 20, 2017
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Sukanya Panda

Acknowledgements

Undertaking this PhD has been a truly life-changing experience for me and it would not have been possible to do without the support and guidance that I received from many people.

I would like to express my special appreciation and thanks to my supervisor Prof. Santanu Kumar Rath for encouraging my research and for allowing me to grow as a researcher. His persistent support, encouragement, and profound insights have enlightened and enriched my path of learning. He has always motivated me to bring quality in my research work. He is a father figure and has always supported me during the critical phases of my research. Being a new mother and simultaneously doing research was not easy. I am extremely grateful to him for offering me immense flexibility in my work, so that I could balance both my responsibilities as a mother and a researcher.

I would also like to express my gratitude to my Doctoral Scrutiny Committee members Prof. Chandan Kumar Sahoo, Prof. Dinabandhu Bag, Prof. Rajeev Kumar Panda, and Late Prof. Sanjay Kumar Jena for their kind co-operation and valuable suggestions throughout my research work. I would like to thank all my fellow research colleagues for their care and moral support in all these years. I also thank Mr Naik and Mr Sahani for their administrative assistance. I do acknowledge the academic resources that I have received from School of Management, National Institute of Technology (NIT), Rourkela.

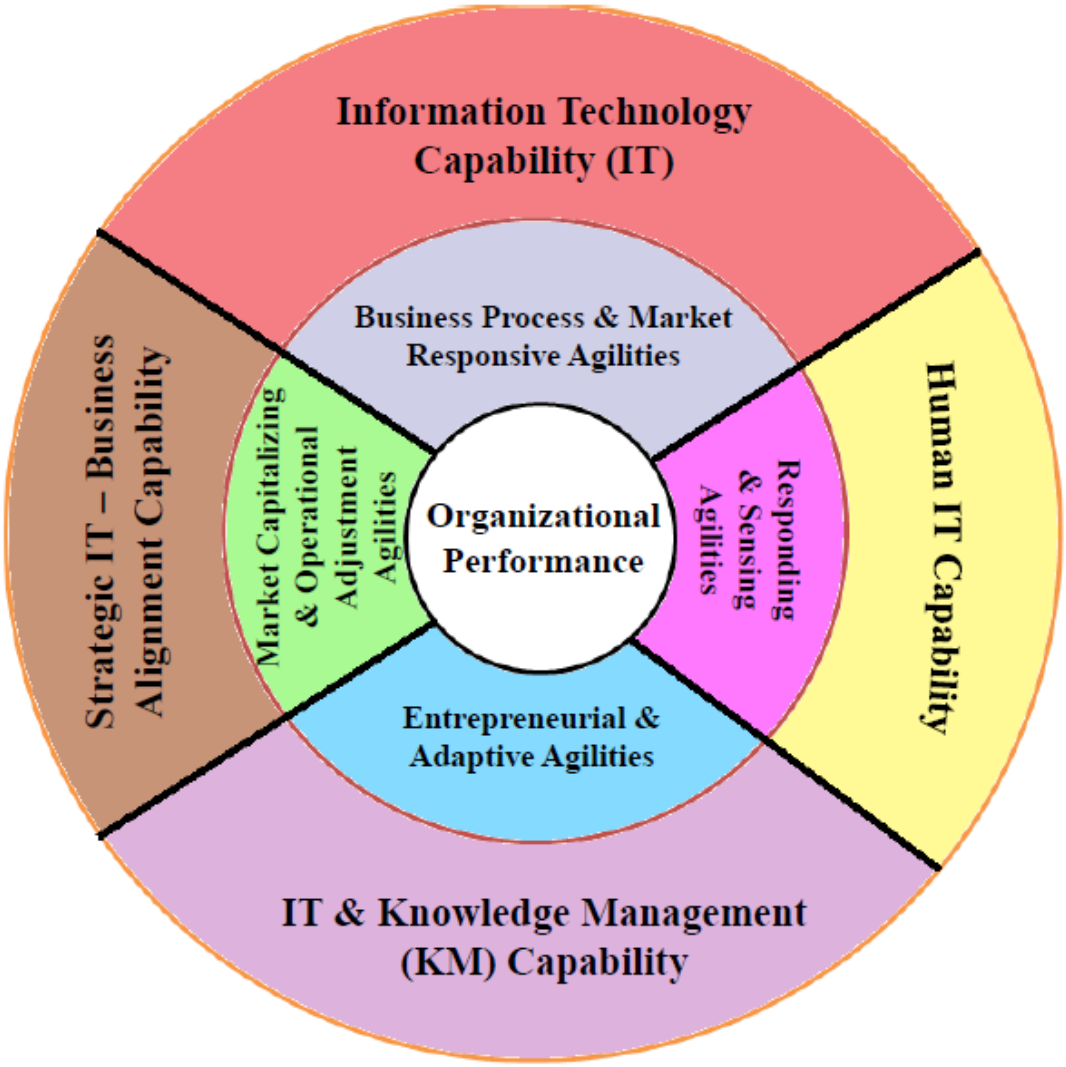
I will forever be thankful to my parents Mr Sukanta Sundar Panda and Mrs Kalpana Panda, my little brother Biswadipti Panda, my parents-in-laws Mr Bhimasen Dash and Mrs Janaki Devi for their blessings and moral support.

Words are insufficient to express my earnest appreciation to my husband Prof. Priyabrat Dash and my beautiful daughter Aanya for their unconditional love and motivation. Aanya baby, I know you are too young to understand this, but truly you inspire me every day to grow as a better person.

Above all, I owe it all to Almighty God for granting me the wisdom, health and strength to undertake this research task and enabling me to its completion.

Sukanya Panda

General Overview of Research



[Note: The centre represents the Dependent Variable (Organizational Performance), the middle circle illustrates the Mediator Variable (Various dimensions of Agility), and the outer circle exhibits the Independent Variable (IT, Human IT, KM, and Strategic IT-business alignment capabilities)].

Abstract

On the basis of the hierarchy of capabilities, various organizational capabilities such as information technology (IT) capability, human IT capability, knowledge management (KM) capability (lower-order capabilities) and strategic IT-business alignment capability, organizational agility (higher-order capabilities) usually influence the organizational performance. However, in the extant literature there is uncertainty and debate about the conceptualization of these relationships. This study intends to investigate the effects organizational capabilities on attaining organizational agility, which in turn leads to enhanced organizational performance. Thus, primarily this research addresses four objectives i.e., first, to investigate the IT capability-agility-performance linkages, second, to examine the human IT capability-agility-performance relationships, third, to assess the IT capability-KM capability-agility-performance associations, and fourth, to explore the strategic IT-business alignment capability-agility-performance connections. All these organizational capabilities have been operationalized based on the concepts of resources-based-view (RBV), knowledge-based-view (KBV), and dynamic-capability-view (DCV) principles. RBV deals with valuable, rare, inimitable and non-substitutable (VRIN) resources, and in this respect IT and human IT capabilities have been studied. Further, KBV theory asserts that knowledge is the most critical strategic resource, and based on this the KM capability has been examined. The DCV rationale takes into account for dynamic and fast-changing environmental uncertainties on the basis of which strategic IT-business alignment capability and organizational agility have been assessed. An integrated model has been developed depicting the associations among the lower-order capabilities, higher-order capabilities, and organizational performance.

For effective operationalization of the study variables both primary and secondary data have been collected for this study. This research utilizes a matched-pair survey design to collect responses from the business and IT executives of various public and private sector banking firms functioning in Odisha, a state situated in eastern India. The scope of this study is limited to these respondents working in the middle to senior level of management. The business executives constitute the general managers, deputy general managers, assistant general managers, etc. and the IT executives comprised of chief information officers (CIOs), IT directors, IT project managers, etc. This study has utilized both the online and offline methods to distribute a total of

950 numbers of structured questionnaires among these participants. The business executives were contacted in person and the questionnaires were distributed using hand delivery method. The contact information and e-mail addresses of the IT executives were collected from them and the questionnaires were sent using online survey forms. Out of 950 numbers of questionnaires 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate. These collected responses were analyzed using the SPSS (version 20), AMOS (version 20), and SPSS-PROCESS Macro. The proposed research models were validated by means of various statistical methods such as multivariate techniques and structural equation modeling (SEM).

This research greatly contributes to the existing literature with the key findings such as, first, IT capability is an essential organizational capability that enables banking firms to be agile and facilitates greater performance in the long run. Second, although, in recent times banks are significantly investing in IT infrastructure, the effectiveness of IT investment needs to be appropriately channeled for fostering and developing necessary IT capability to augment agility and performance. Third, akin to IT capability, human IT capability is an important organizational capability that enhances the IT personnel's skills/expertise so as to augment agility and generate greater performance. Fourth, organizational IT investment should more focus on building necessary technology management skills of the IT personnel to develop effective market intelligence for quicker identification of changes in customers' preferences and competitors' strategies. Fifth, KM capability complements IT capability and in the face of uncertain environments, banking firms need to utilize IT and KM-based resources to attain agility and IT-enabled as well as KM-enabled performance. Sixth, strategic IT-business alignment is a dynamic capability that enables the banks to develop coherence between the resources, competencies, and capabilities with an aim to improve agility and performance. Seventh, when environmental uncertainties are higher, the strength of the relationship between strategic alignment capability and agility is diminished due to various resource constraints that the IT and business units face in developing economies.

Keywords: Organizational capabilities; IT capability; Human IT capability; KM capability; Strategic IT-business alignment capability; Organizational agility; Organizational performance; Banking industry; India.

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Abbreviations

AA	Adaptive Agility
AEPS	Aadhaar-Enabled Payments System
AGFI	Adjusted Goodness of Fit
AMOS	Analysis of Moment Structure
AMP	Aadhaar Merchant Pay
ATM	Automated Teller Machines
AVE	Average Variance Extracted
BHIM	Bharat Interface For Money
BI	Business Intelligence
BPA	Business Process Agility
CAPIS	Competitive Advantage Provided by IS
CBS	Core Banking Solution
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CIO	Chief Information Officer
CMB	Common Method Bias
CR	Composite Reliability
CRM	Customer Relationship Management
DCV	Dynamic Capability View
DF	Degrees of Freedom
EA	Entrepreneurial Agility
ECS	Electronic Clearing Service
EFA	Exploratory Factor Analysis
HR	Human Resources
GFI	Goodness of Fit Index
ICICI	Industrial Credit and Investment Corporation
ICT	Information and Communication Technology
IDRBT	Institute for Development and Research in Banking Technology
IMPS	Immediate Payment Service
IS	Information System
IT	Information Technology
KAM	Knowledge Assessment Methodology
KBV	Knowledge Based View
KM	Knowledge Management
KMO	Kaiser–Meyer–Olkin
KPMG	Klynveld Peat Marwick Goerdeler
KS	Knowledge Sharing
LLCI	Lower Limit Confidence Interval
MaxR	Maximum Reliability
MBS	Mobile Banking Solutions
MCA	Market Capitalizing Agility
MRA	Market Responsive Agility
MSA	Measure of Sampling Adequacy
MSV	Maximum Shared Variance
NEFT	National Electronic Fund Transfer
NFI	Normed Fit Index
NNFI	Non Normed Fit Index
OAA	Operational Adjustment Agility

PCA	Principal Component Analysis
PGFI	Parsimonious Goodness of Fit Index
PNFI	Parsimonious Normed Fit Index
RA	Responding Agility
RBI	Reserve Bank of India
RBV	Resource Based View
RMS	Risk Management Solutions
RMSEA	Root Mean Square Error of Approximation
ROA	Return On Assets
ROI	Return On Investment
ROS	Return On Sales
RTGS	Real Time Gross Settlement
SA	Sensing Agility
SAM	Strategic Alignment Model
SAMM	Strategic Alignment Maturity Model
SMS	Short Message Service
SBI	State Bank of India
SEM	Structural Equation Modelling
SLBC	State Level Bankers Committee
SPSS	Statistical Package for Social Sciences
TLI	Tucker Lewis Index
ULCI	Upper Limit Confidence Interval
UPI	Unified Payments Interface
U.S.A.	United States of America
VIF	Variance Inflation Factor
VRIN	Valuable Rare Inimitable Non-substitutable
WBI	World Bank Institute

Chapter 1

Introduction

This research intends to investigate the relationships among various organizational capabilities and performance of diverse banking firms operating in India. Based on the hierarchy and embeddedness framework of capabilities, the present study takes into account for several lower-order and higher-order capabilities to examine their effects on organizational performance. To be specific, this research conceptualizes the lower-order capabilities as information technology (IT) capability, human IT capability, and knowledge management (KM) capability and the higher-order capabilities as strategic IT-business alignment capability, and organizational agility. Although, the extant literature has documented the critical contribution of each organizational capability towards augmented performance, yet very few studies have explained about the process involving into it (Bi et al. 2011; Cai et al. 2013; Chen et al. 2014; Fink and Neumann, 2009; Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2011). Therefore, instead of only tracing a direct link between organizational capabilities and performance, the present study explores how IT capability, human IT capability, KM capability, and strategic IT-business alignment capability impact organizational agility to achieve augmented organizational performance. Since organizational performance is a multifaceted construct, various financial (e.g., return on investment, return on assets, profitability, etc.) and non-financial measures (e.g., customer loyalty, competitive advantages, business sustainability, etc.) have been examined in this research. Further, the organizational capabilities-agility-performance related studies have been predominantly conducted in the context of advanced countries, however, from a developing country perspective these researches are found to be very thin on the ground. In countries like India, banks play a pivotal role in driving substantial economic growth. Process reengineering and innovativeness achieved due to IT is better and bigger in banking sectors than any other industries in India. Like any other developing country, in India also the banking firms are dealing with increasing competitive stress due to technological advancements, changing customer requirements, globalization, etc. In a global scenario banking sector spends an average of 4.7% to 9.4% of the operating income on IT as compared to other sectors such as insurance companies (3.3%) and airlines (2.6%) (Gopalan et al. 2012). Indian banks invest in IT and knowledge resources, and also strategize for effective IT-business alignment to promote banking agility in

the face of unprecedented environmental uncertainties so as to enhance overall banking efficiency. This has motivated the author to conduct the study to explore how Indian banking firms utilize their IT, human IT, KM capabilities along with alignment strategies to attain greater agility which in-turn leads to improved performance.

1.1 Background of the Research

Since the liberalization era in early 1990, the Indian banking firms have been adopting contemporary outlooks and tech-savvy approaches for traditional banking. In recent times banking firms face severe domestic and global competition due to quickly changing market trends, and economic downturn. However, they have learned to effectively utilize their essential tangible (IT) and intangible (knowledge) resources along with superior strategic IT-business alignment skills to cope with such capricious circumstances. Banking firms are striving to achieve agility so as to cost efficiently and rapidly adapt into business environmental changes and come up with effective responses to survive and succeed. Agile banks aim for rapid product development which is backed by a transparent strategy of handling product complexity. By doing so, banks are able to attract new customers and simultaneously improve the quality of existing customers' experience. Thus, agile banks outperform the less-agile ones and ensure higher growth. In this respect, it is crucial to assess the performance impacts of various organizational capabilities with special focus on IT capability, human IT capability, KM capability, and strategic IT-business alignment capability employed by the Indian banking firms through the mediating influence of agility.

1.2 Rationale of the Research

In recent times, the impacts of global marketplace, changing digital business, demographic shifts, varied stakeholder expectations, and insipid growth in banking industry throughout the world are propelling the banking firms to quest after higher profitability and performance. According to Ernst and Young (2015), currently banks are adopting advanced technologies, better shaped innovative strategies, and operating models to survive, grow, and attain outstanding performance. Their report suggest that "*the most successful institutions will be those that can reinvent themselves to overcome the pressures of today while becoming flexible enough to respond to the world of tomorrow*". Therefore, the executives, managers, and other decision makers need to rethink and ascertain the pivotal drivers of banks' performance.

In the face of today's competitive business landscape, banking industry has been widely acknowledged as the barometer of India's economy, which is considered as one of the most vibrant global economies (KPMG-ICC Report, 2013). In the past two decades, Indian banking industry has shown rapid expansion due to the effects of liberalization, globalization, and the lunch of various policies and reforms namely, Indian Financial and Banking Sector Reforms (1991). On November 8, 2016, the government of India had announced demonetization of ₹ 500 and ₹ 1000 bank notes, which is considered as a historic measure, with profound implications for the economy. According to the Economic Survey (2016-2017), presently it is more important to reduce the cash in an economy, i.e., to create a less-cash or cash-lite economy which can have significant long-term benefits. Concerning to the same, the focus is on to incentivize a digital economy with advanced IT applications. In this respect, the Bharat Interface For Money (BHIM) app for smart phones has been launched. It is based on the Unified Payments Interface (UPI), which has created interoperability of digital transactions. Further [1a]Aadhaar Merchant Pay (AMP) has been launched for those who do not have phones. It enables anyone with just an Aadhaar number and a bank account to make a merchant payment using his/her biometric identification. For the digitally excluded category, transactions via the Aadhaar-Enabled Payments System (AEPS) have been increasing in an accelerated pace. Although, the effects of demonetization are expected to be positive in the long-run, it may impose short-term costs on the economy (Economic Survey, 2016-2017). During this economic revival circumstances, the banking industry has also realized the competitive pressure due to globalized market competitions, which have compelled the banking firms to maintain competitiveness and sustain performance. Therefore, it is vital to examine the performance factors of the banking firms in this tumultuous business milieu.

Since early nineties, the concept of organizational capability has been studied as a predominant theoretical framework in the management literature. According to Collis (1994) it can be defined in three broad categories, each of which is subsumed in the larger set of all tangible and intangible resources. The first category of capabilities basically reflects the ability of the firm to perform the basic functional activities. For example, dealing with customers and external clients, performing daily routine banking transactions, etc. The second category of

[1a] Aadhaar is an individual identification number issued by the Government of India for the purpose of establishing the unique identity of every single person.

capabilities exhibits dynamic improvement to the basic activities of the firm. For example, process or product innovations, responsiveness to market trends, short development cycles, etc. The third category of capabilities shares more metaphysical strategic insights, which enable firms to identify the inherent values of other resources or to develop novel strategies before competitors. For example, firms' ability to deploy resources and develop capabilities. Following these three categories of definitions, this research underscores IT, human IT, KM, and strategic IT-business alignment capabilities as the key organizational capability constituents which enable the organization to deploy the lower order IT and knowledge resources with higher-order strategic IT-business alignment capability to achieve another higher-order capability i.e., organizational agility, which in-turn enhances performance. Further, based on the theories of the resource-based-view (RBV), knowledge-based-view (KBV), and dynamic-capability-view (DCV) of organizations, this research examines IT and human IT capabilities based on RBV, KM capability based on KBV, and strategic IT-business alignment capability and organizational agility based on DCV theories. According to Barney (1991), RBV fundamentally deals with the valuable, rare, inimitable and non-substitutable (VRIN) resources, while extending this theory, the KBV theory asserts that knowledge is the most critical strategic resource (Conner and Prahalad, 2002; Curado, 2006; Theriou et al. 2009). Since these RBV and KBV principles only deal with the internal mechanisms, the DCV theorists emphasize the role of external environment and take into account for dynamic and fast-changing environmental uncertainties (Teece et al. 1997; Wu, 2010; Zahra et al. 2006). Presently, banks are functioning in a dynamic volatile environment and thus, it is essential for them to learn how to effectually manage their organizational capabilities to sustain augmented performance.

The previous literature support various organizational capabilities-agility-performance related studies conducted mostly in the advanced countries such as, U.S.A. { Bharadwaj, (2000): IT capability-performance relationship; Lu and Ramamurthy, (2011): IT capability-agility linkage; Tallon and Pinsonneault, (2011): Strategic IT-business alignment capability-agility-performance relationship}, China {Cai et al. (2013): IT capability-KM capability-agility-performance linkage; Chen et al. (2014): IT capability-agility-performance association; Liu et al. (2013): IT capability-agility-performance association; Mao et al. (2015a): IT capability-KM capability-agility link}, Australia {Bi et al. (2013): IT capability-agility relationship}, Israel {Fink and Neumann, (2007): Human IT capability-agility relationship}, etc. Although, Yayla

and Hu, (2012) have investigated the strategic IT-business alignment capability-performance linkage in a developing country setting i.e., Turkey, this kind of study has not been previously conducted in the context of India. Notwithstanding, the Indian banking firms have been utilizing core banking system (CBS), KM systems, and other banking solutions for quite a long time so far, the research focusing on the relationship between various organizational capabilities (i.e., IT, human IT, KM, strategic alignment, agility) and performance has been very rarely investigated. Therefore, it is important to study how these firms exploit diverse organizational capabilities to realize enhanced agility and performance.

1.3 Scope of the Research

This research primarily investigates the impact of various organizational capabilities such as IT capability, human IT capability, KM capability, and strategic IT-business alignment capability on organizational agility, which in-turn leads to superior organizational performance. With an aim to establish significant relationships among these variables this study focuses on the IT and business executives working in the middle to senior level of management of the commercial banks (particularly the public and private sector banks) functioning in Odisha, a state situated in eastern India.

1.4 Objectives of the Research

The central theme of investigation of this research showcases how IT capability, human IT capability, KM capability, and strategic IT-business alignment capability impact organizational agility to achieve augmented organizational performance. Therefore, the present research addresses the following research objectives:

Objective 1. To investigate the effect of IT capability on organizational performance through the mediating role of organizational agility along with the moderating effect of IT spending.

This research objective tries to answer the following research questions.

1.1 Does IT capability (studied as managerial and technical IT capabilities) enable or inhibit agility {(studied as business process agility (BPA) and market responsive agility (MRA)}?

1.2 Does IT capability (in terms of managerial and technical IT capabilities) enable or inhibit performance?

1.3 Does agility (in terms of BPA and MRA) enable or inhibit performance?

1.4 What is the moderating influence of IT spending on the IT capability (as managerial and technical IT capabilities) and agility (as BPA and MRA) association?

1.5 What is the mediating role of agility (both BPA and MRA) on the relationship between IT capability (both managerial and technical IT capabilities) and performance?

1.6 What is the moderated-mediating role of IT spending on the direct and indirect (via mediator) relationship between IT capability (as managerial and technical IT capabilities) and performance?

Objective 2. To examine the impact of human IT capability on organizational performance through the mediating role of organizational agility along with the moderating influence of IT spending.

This research objective seeks to answer the following research questions.

2.1 Does human IT capability (studied as business functions, interpersonal management, and technology management skills) enable or inhibit organizational agility {(studied as sensing agility (SA) and responding agility (RA)}?

2.2 Does human IT capability (in terms of business functions, interpersonal management, and technology management skills) enable or inhibit performance?

2.3 Does agility (in terms of SA and RA) enable or inhibit performance?

2.4 What is the moderating influence of IT spending on the human IT capability (as business functions, interpersonal management, and technology management skills) and agility (as SA and RA) association?

2.5 What is the mediating role of agility (both SA and RA) on the relationship between human IT capability (in terms of business functions, interpersonal management, and technology management skills) and performance?

2.6 What is the moderated-mediating role of IT spending on the direct and indirect (via mediator) relationship between human IT capability (in terms of business functions, interpersonal management, and technology management skills) and performance?

Objective 3. To explore the performance impacts of IT and KM capabilities through the mediating role of organizational agility along with the moderating influence of environmental uncertainty.

This research objective attempts to answer the following research questions.

3.1 Do IT and KM capabilities enable or inhibit agility {(studied as adaptive agility (AA) and entrepreneurial agility (EA)}?

3.2 Do IT and KM capabilities enable or inhibit performance?

3.3 Does agility (in terms of AA and EA) enable or inhibit performance?

3.4 What is the moderating influence of environmental uncertainty on the IT capability-AA-EA, and KM capability-AA-EA relationships?

3.5 What is the mediating role of agility (both AA and EA) on the IT capability-performance and KM capability-performance linkages?

3.6 What is the moderated-mediating role of environmental uncertainty on the direct and indirect (via mediator) relationship between IT capability and performance, and KM capability and performance?

Objective 4. To assess the effect of strategic IT-business alignment capability on organizational performance through the mediating role of organizational agility along with the moderating impact of environmental uncertainty.

This research objective strives for answering the following research questions.

4.1 Does strategic IT-business alignment capability enable or inhibit agility {(studied as market capitalizing agility (MCA) and operational adjustment agility (OAA)}?

4.2 Does strategic IT-business alignment capability enable or inhibit performance?

4.3 Does agility (in terms of MCA and OAA) enable or inhibit performance?

4.4 What is the moderating influence of environmental uncertainty on the strategic IT-business alignment capability and agility (as MCA and OAA) relationships?

4.5 What is the mediating role of agility (both MCA and OAA) on the strategic IT-business alignment capability-performance linkage?

4.6 What is the moderated-mediating role of environmental uncertainty on the direct and indirect (via mediator) relationship between strategic IT-business alignment capability and performance?

Each of these research objectives has been addressed in chapters no. 5, 6, 7, and 8 with meticulous empirical analyses to find suitable answers to the corresponding research questions. The overall thesis structure is presented in the subsequent section.

1.5 Thesis Structure

The entire research work has been systematically presented in nine chapters. The contents of all these chapters are exhibited as following.

Chapter 1: Introduction

This is the introductory chapter which primarily discusses about the purpose of the study. Further, it also contains the background, rationale, scope, research objectives along with research questions, and the thesis structure.

Chapter 2: Literature Review

This chapter provides a theoretical background of various organizational capabilities based on the hierarchical framework and embeddedness view of capabilities. It precisely discusses a wide range of prior studies conducted on various organizational capabilities (with special focus on IT capability, human IT capability, KM capability, and strategic IT-business alignment capability) towards realization of greater agility and improved performance. In addition, it also highlights previous researches, which demonstrate the contradicting relationships among these variables. Further, the research gaps identified from the extant literature have been discussed.

Chapter 3: Overview of Indian Banking Industry

This chapter provides a summery on the Indian banking industry and highlights on various IT, KM, and strategic IT-business alignment initiatives practiced by

the Indian banking firms. Further, this chapter underscores the importance of studying various organizational capabilities such as IT capability, human IT capability, KM capability, strategic IT-business alignment capability in the context of Indian banking industry.

Chapter 4: Research Design and Methodology

This chapter narrates the overall strategy employed to address the research objectives and answer the research questions in a coherent and logical way.

Chapter 5: Effect of Information Technology (IT) Capability on Organizational Performance: The mediating role of Organizational Agility

This chapter fundamentally deals with the first objective of this research and aims to investigate the effect of IT capability on organizational performance through the mediating role of organizational agility along with the moderating effect of IT spending.

Chapter 6: Effect of Human Information Technology (IT) Capability on Organizational Performance: The mediating role of Organizational Agility

This chapter basically discusses the second objective of this research and intends to examine the impact of human IT capability on organizational performance through the mediating role of organizational agility along with the moderating influence of IT spending.

Chapter 7: Effects of Information Technology (IT) and Knowledge Management (KM) Capabilities on Organizational performance: The mediating role of Organizational Agility

This chapter primarily addresses the third objective of this research and explores the performance impacts of IT and KM capabilities through the mediating role of organizational agility along with the moderating influence of environmental uncertainty.

Chapter 8: Effect of Strategic Information Technology (IT)-Business Alignment Capability on Organizational performance: The mediating role of Organizational Agility

This chapter mainly concerns with the fourth objective of this research and assesses the effect of strategic IT-business alignment capability on organizational performance through the mediating role of organizational agility along with the moderating impact of environmental uncertainty.

Chapter 9: Conclusion

This is the concluding chapter and illustrates the summery, recommendations, theoretical contributions, practical implications, research limitations, conclusions, and scope for future research.

Chapter 2
Literature Review

This chapter provides a theoretical background of various organizational capabilities (based on the hierarchy of capabilities) with special focus on information technology (IT) capability, human IT capability, knowledge management (KM) capability, and strategic IT-business alignment capability. In addition, their relationships with organizational agility (or simply agility) and organizational performance (or simply performance) have also been thoroughly researched. After a detailed study of the prior literature, the research gaps associated with each capability-agility-performance association has been identified and an integrated research model containing four such kind of relationships has been proposed (Figure 2.1). Individual capability-agility-performance linkages have been meticulously studied in four subsequent chapters (chapters 5 to 8), where chapter 5 investigates IT capability-agility (business process and market responsive)-performance relationship, chapter 6 examines human IT capability-agility (sensing and responding)-performance association, chapter 7 analyzes IT capability-KM capability-agility (adaptive and entrepreneurial)-performance linkage, and chapter 8 assesses strategic IT-business alignment-agility (operational adjustment and market capitalizing)-performance connection. Based on prior literatures, individual research model (which is part of the proposed integrated research model) is hypothesized and validated through a precise empirical analysis of primary data.

2.1 Hierarchy of Organizational Capabilities

Previous research scholars suggest that organizational capabilities can be conceptualized based on a frame work of hierarchy, where lower-level capabilities influence higher-level capabilities and finally lead to greater performance (Cai et al. 2013; Grewal and Slotegraaf, 2007; Liu et al. 2013; Sirmon et al. 2007). Grewal and Slotegraaf (2007:455) have proposed the "*paradox of embeddedness*", which suggests to generate high embeddedness across multilevel (lower and higher) organizational capabilities to enhance performance. Based on this hierarchical framework and embeddedness view of organizational capabilities, this study conceptualizes IT capability, human IT capability, KM capability as lower-level capabilities, which influence the higher-level capability such as agility to attain superior performance. These lower-level capabilities are studied on the principles resource-based-view (RBV) and knowledge-based-view

(KBV). The strategic IT-business alignment capability is studied as the higher-level capability influencing another higher-level capability i.e., agility to enhance performance and studied on the principles of dynamic-capability-view (DCV). Therefore, the chapter 5, 6, and 7 represent a multilevel hierarchical model of performance, while chapter 8 depicts a higher-level model of performance. Prior studies conceptualizing IT capability, human IT capability, KM capability, and strategic IT-business alignment capability based on the hierarchy of organizational capabilities are presented in table no. 2.1.

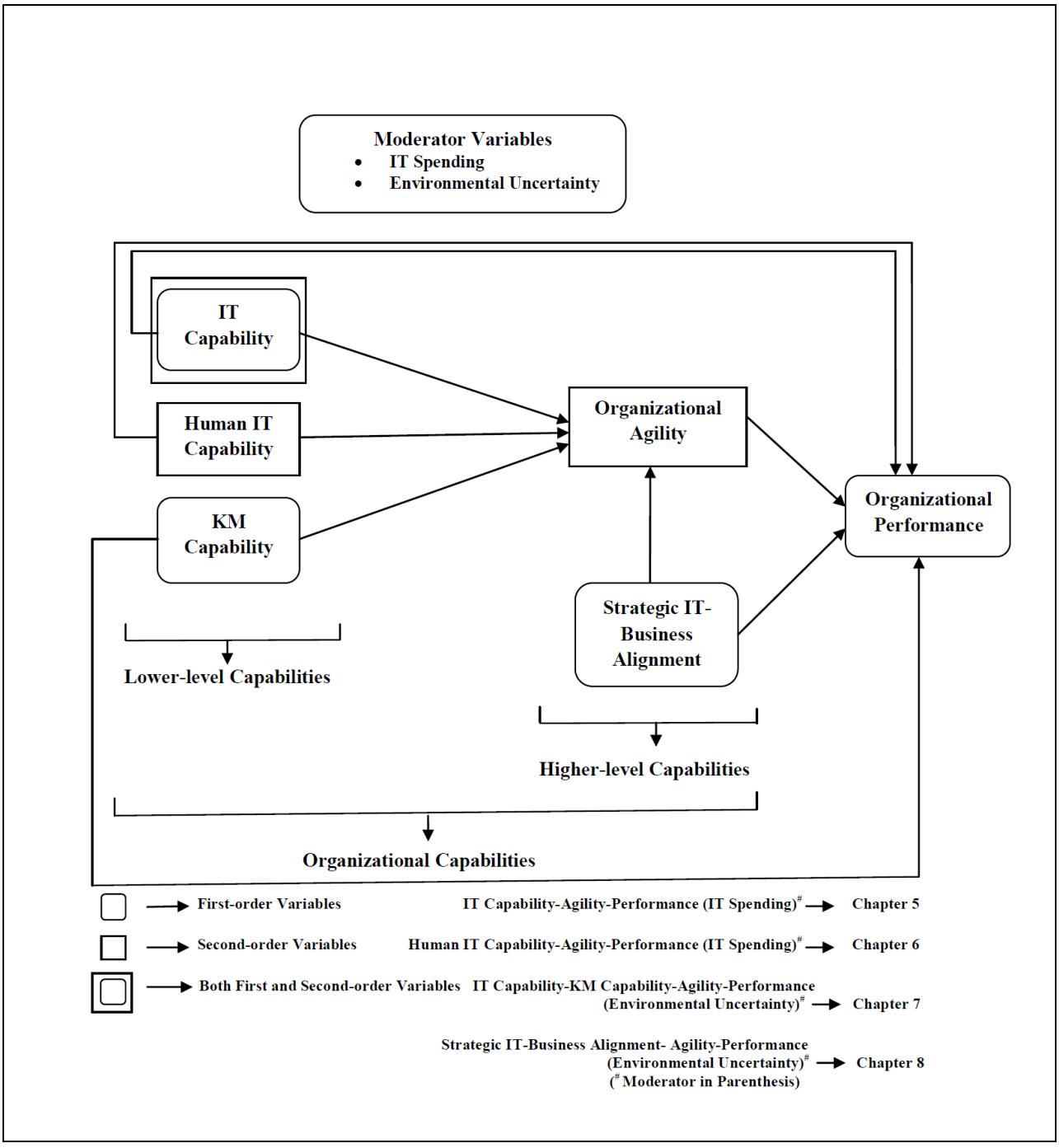


Figure 2.1 Integrated Research Model

Table 2.1 Prior Studies Conceptualizing IT capability, Human IT capability, KM capability, and Strategic IT-Business alignment capability on Hierarchy of Organizational Capabilities

Reference	Lower-Level Capability	Higher-Level Capability	Remarks
Grant, (1996)	Individual Knowledge	Knowledge Integration	Higher level organizational capabilities involve integration of multiple lower-level knowledge bases and offer a more cogent explanation of organizational competence to achieve competitive advantage.
Fink and Neumann, (2009)	Human and technical IT infrastructure elements	IT-enabled flexibility	IT personnel's knowledge and skills determine the range of physical and managerial capabilities, where the range of physical capabilities was negatively affected by business skills and was not at all affected by behavioral skills.
Tallon and Pinsonneault, (2011)	No lower-level capability	Strategic IT alignment and Organizational agility	In the face of tremendous change and uncertainty in environment, alignment and agility are considered as critical and concurrent organizational goals. Strategic IT alignment is an integral aspect for organizations to strategize for and justify agility so as to improve long-term performance.
Cai et al. (2013)	IT capability, KM capability	Organizational agility	Both IT capability and KM capability are crucial to agility in context to a

			favorable organizational climate and enhance organizational performance.
Liu et al. (2013)	IT capability (flexible IT infrastructure and IT assimilation)	Absorptive capacity and Supply chain agility	Both absorptive capacity, and supply chain agility fully mediate the IT capability-firm performance relationship.
Pelletier and Raymond, (2014)	No lower-level capability	Strategic IT-business alignment	Strategic IT-business alignment is modeled as a process of reconfiguration of the organizational IT and other resources, competencies and capabilities, and provides alternative for investigating and managing the process of alignment.

2.2 Resource-Based-View (RBV) of Organization

The concept of RBV owes its origin since 1959, where for the very first time the importance of resources were recognized to organization's competitive position (Penrose, 1959). Penrose (1959) argued that resources can contribute to organization's competitive position, only when these are exploited in such a manner that their valuable services are made available to the organization. Further, Rubin (1973) explained that merely possessing resources is not beneficial, rather organizations need to process raw resources to make them valuable and useful. Based on these arguments, organizations achieve greater outcomes by identifying and acquiring critical resources to produce products of high demands (Wernerfelt, 1984). Later on Prahalad and Hamel (1994) emphasized on the exploitative nature of the organization's core competences to generate radical new products to beat competition. All these previous researches suffered from the limitations of not providing any testable propositions for empirical scholars. Hence, addressing these limitations Barney (1991) formalized a comprehensive and thus, empirically testable theoretical framework. He has articulated about valuable, rare, inimitable and non-substitutable

(VRIN) resources as the basis of organizational competitiveness. Further, various research scholars have argued that organizations with VRIN resources should able to make the best use of these resources to confer competitive advantage which is related to organizational performance (Grant, 1991; Newbert, 2007; Terziovski, 2010). Moreover, according to Russo and Fouts (1997), the latent value of the resources can be exploited by effectively leveraging the organizational capabilities.

2.2.1 Knowledge-Based-View (KBV) of Organization: An extension of RBV

Although, the RBV researchers have recognized the important role of knowledge in attaining competitive advantage (Barney, 1991, 1996; Wernerfelt, 1984), knowledge-based theorists argue that RBV considers knowledge as a very generic resource and does not offer any special properties, and above all it does not differentiate between diverse range of knowledge-based capabilities (Kaplan et al. 2001). Therefore, extending the RBV concept the KBV researchers assert that knowledge is the most critical strategic resource for organizations and also a source of competitive advantage (Conner and Prahalad, 2002; Curado, 2006; Theriou et al. 2009). Based on the KBV approach, organizations are considered as bodies that create, assimilate, and distribute knowledge (Miller 2002; Narasimha, 2000) and their competitive success depends on the capability to develop innovative knowledge-based resources which can create core competencies (Pemberton and Stonehouse, 2000). In addition, some KBV scholars also underscore the non-observable (intangible) factors (i.e., knowledge) having a direct impact on organizational performance (Blackler, 2002; Dess et al.1995; McEvily and Chakravarthy, 2002; Nonaka, 1991). These scholars have emphasized on creating knowledge-based organizations with special focus on generating the knowledge-based competitive advantage. According to Zack (2003) knowledge-based organizations not only highlight the knowledge content of their products and services but also consider knowledge as the intangible asset entailing them to understand what the organizations do, how it is done, and why it is done that way.

2.2.2 Dynamic-Capability-View (DCV) of Organization: An extension of RBV

DCV researchers have extended the RBV principles and argue that DCV addresses the necessity of capability building, effective integration, and reconfiguration of resources to adapt into

environmental uncertainties (Helfat and Peteraf, 2003, 2009; Teece et al. 1997). Further, some researchers also suggest that in the face of dynamic and fast-changing environment, compared to RBV, DCV explains organizational competitiveness more efficiently (Deeds et al. 2000; Lin and Wu, 2014; Teece et al. 1997; Wu, 2010; Zahra et al. 2006; Zollo and Winter, 2002; Zott, 2003). If the environment is stable, i.e., the external changes are easily predictable with a lower rate of change, then it is assumed that the organizational resources also remain stable. In contrast, if the organizations face fast paced changes with higher uncertain events, the resource advantages are expected to be eroded. In this context, organizations need to develop, adapt, and reconfigure resources (or dynamic capabilities) to gain such advantage (Ambrosini et al. 2009). Therefore, dynamic capabilities are not literally capabilities by themselves neither these are resources (Enriquez-De-La-O, 2015), rather they explain a process of suitably adapting, integrating, and reconfiguring both internal and external organizational resources, skills, and functional competences to cope with the environmental changes (Teece et al. 1997). Hence, DCV overpowers the static view of RBV and recognizes competitive advantage in a dynamic context. Moreover, previous literature suggest that like VRIN resources dynamic capabilities can also influence organizational performance (Lin and Wu, 2014; Vogel and Güttel, 2013).

It is important to highlight that although the RBV, KBV and DCV concepts are the most widely accepted theoretical frameworks in the strategic management literature, their popularity in the information system (IS) literature is also significant (Bharadwaj et al. 1999; Bharadwaj, 2000; Chen et al. 2014; Fink and Neumann, 2009; Jarvenpaa and Leidner, 1998; Lai et al. 2008; Lu and Ramamurthy, 2011; Sambamurthy et al. 2003; Stoel and Muhanna, 2009; Tallon and Pinsonneault, 2011; Wade and Hulland, 2004). According to Jarvenpaa and Leidner (1998) IS resources can become more relevant when perceived on the DCV as compared to their traditional elucidation in the context of the RBV. Further, Wade and Hulland (2004) suggest that the dominant theories from other areas (i.e., strategic management) may be used in the IS context to enrich the theoretical and conceptual foundations of various IS-based resources and capabilities (e.g., IT infrastructure). Therefore, based on the RBV, KBV, and DCV principles organizational capabilities such as IT capability, human IT capability, KM capability, and strategic IT-business alignment capability have been widely studied in the IS literature.

2.3 Organizational Capabilities

Although, exponents of RBV generally explain resources in terms of assets, knowledge, capabilities, and organizational processes, there is a distinction between resources and capabilities. Capabilities refer to an organization's ability to accumulate, integrate, and deploy essential organizational resources (Amit and Schoemaker 1993; Russo and Fouts 1997). Hence, following these thoughts capabilities can be considered as organization-specific and reflect the complex interactions between the organizational resources (Wang and Ahmed, 2007). Based on these previous researches, this study investigates IT capability, human IT capability, KM capability, and strategic IT-business alignment capability as critical components of organizational capabilities which depict the organization' ability to assemble, integrate, and deploy IT resources, human IT skills, knowledge resources, and dynamic capabilities (i.e., the process of strategic IT-business alignment) to make agile organizations, which in-turn enhances performance. The prior literature supporting these individual capabilities are explained in subsequent sections.

2.3.1 IT Capability

Bharadwaj (2000) has extended the traditional definition of organizational capabilities and with specific regards to the organization's IT functions, Bharadwaj (2000: 171) has defined IT capability as the organization's *"ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities"*. According to Bharadwaj (2000), IT-based resources can be classified as tangible resource (such as physical IT infrastructure), human IT resources (such as managerial and technical IT skills), and IT-enabled intangible resources (such as knowledge resources, customer orientation, synergy, etc.). All these IT capabilities are essential to attain competitive advantage and superior business value. Set against the principles of RBV, research conducted by Tallon (2008) suggests managerial and technical capabilities as vital components of IT capability and report that in a stable environmental setting technical IT capabilities are more important than managerial IT capabilities to make organizations more adaptive, while in a volatile environment the reverse is true. For better adaptiveness of organizations in volatile market, he has also suggested the importance of developing effective IT governance models. Sambamurthy et al. (2003) argue that IT can build up digital options and facilitate speedy decision making, better communication, and

quick response to changing environmental conditions. Lu and Ramamurthy (2011) have conceptualized IT capability as IT infrastructure capability (i.e., ability to effectively manage data, architectures, and communication networks), IT business spanning capability (i.e., exploitation of IT resources to enhance business objectives), and IT proactive stance (i.e., proactiveness of the organization to exploit existing IT resources or embrace innovative technology to create business opportunities). According to Chakravarty et al. (2013), IT capabilities enable and facilitate organizational flexibility and adaptiveness in hypercompetitive market environment. All these previous researches predominantly highlight the effective deployment of IT for achieving better adaptivesness in unstable market environments. In other words, these literature studies emphasize on the enabling role of IT capability on making organizations more agile facing unprecedented environmental changes. Further, it is also apparent that in these prior studies IT capability is conceptualized based on a technical-oriented approach (i.e., IT architecture, infrastructure, hardware, software, communication networks, etc.) and does not necessarily explain the human components of IT. The importance of human IT elements is explained in the following section.

2.3.2 Human IT Capability

Akin to the above mentioned argument about adaptiveness/agility of IT enabled resources and capabilities wide ranging researches suggest a more comprehensive approach that mixes the components of knowledge and skills along with the technical components of IT (Fink and Neumann, 2007, 2009; Overby et al. 2006; Ray et al. 2005). According to Fink and Neumann (2007), the technical-oriented approach demonstrates a narrow perspective and only regards IT as a platform to share data using networks and telecommunications across the organization (i.e., tangible IT components) and does not consider the human components (i.e., intangible IT components) of IT. Based on the principle of RBV, where recourses are the building blocks of capabilities a component-oriented approach is developed which represents a broader perspective and values both technical and human components as essential IT elements. The technical components are similar tangible resources as perceived in the technical-oriented approach and the human components reflect the knowledge and skills possessed by the organization's IT personnel (Bassellier and Benbasat, 2004; Lee et al. 2002). Further, a process-oriented approach exhibits a broader viewpoint and emphasizes on processes and activities that employ both

technical and human IT components to attain IT-enabled flexibility (Henderson and Venkatraman, 1993).

According to Byrd and Turner (2001), an organization's IT personnel's knowledge and skills enable the human IT resources' ability to enhance flexibility. Therefore, human IT resources with appropriate knowledge and skills are expected to make an organization take advantages of new opportunities. Following Lee et al. (1995), technical specialties knowledge and skills (e.g., knowledge and skills about operating systems, database management systems, programming languages, telecommunication-networks, etc.), technology management knowledge and skills (e.g., knowledge and skills to learn new technology), business functional knowledge and skills (knowledge and skills to learn about business functions), and interpersonal and management knowledge and skills (e.g., knowledge and skills required for cooperative and collaborative working) are critical requirements for the IS professionals. Further, Lee et al. (2002) have suggested that the business functions, and interpersonal and management skills are of higher-order, technology management knowledge is of medium-order, and technical specialty knowledge is of lower-order knowledge/skills. These previous studies are further extended by Fink and Neumann (2007) and describe technical capability, behavioral capability, and business capability as imperative human IT elements to attain IT-dependent organizational agility. It is evident that all these previous researches on human IT capability are inspired by the RBV conceptualization. Since specific knowledge and skill are key to the concept of KBV, their effective development, storage, sharing, and deployment are highly desired, which essentially depict the KM process. Hence, the following section briefly explains the KM capability from a KBV perspective.

2.3.3 KM Capability

According to Allee (1998), KM capability is defined as the special knowledge and technology processed by an organization. Further, Parashar and Singh (2005) demonstrate that KM capability should be viewed as the sum total of both explicit and implicit knowledge resources which enable an organization to create and absorb new knowledge. In recent times, following the research work conducted by Curado (2008), Liu et al. (2014) have defined KM capability as the exploration and exploitation of knowledge, where exploration refers to organization' s ability to generate innovative knowledge and exploitation reflects ability to transfer and diffuse the existing knowledge. Previous literature suggests two different perspectives of knowledge

capability i.e., knowledge-infrastructure (e.g., the cultural, technical, and structural aspects of knowledge) and knowledge-process (e.g., process involving knowledge creation to knowledge utilization) (Gold et al. 2001; Zaim et al. 2007). However, the IS research has mostly documented the knowledge-process approach in contrast to the knowledge infrastructure approach (Alavi and Leidner, 2001; Tanriverdi, 2005).

Some researchers also emphasize on the importance of KM capability along with IT capability to realize augmented agility and performance (Cai et al. 2013; Mao et al. 2015a). Tanriverdi (2005) argued that although, the role of IT capability to enhance organizational performance is already established, KM can be considered as a crucial organizational capability through which IT can influence performance. Tanriverdi (2005) has explained the process of KM capability as knowledge creation (i.e., creating specific operational, managerial, and marketing knowledge and skills which can be utilized across multiple business units), knowledge transfer (i.e., transferring the relevant operational knowledge, customer-related knowledge, and managerial best practices among business units), knowledge integration (i.e., integrating pertinent operational knowledge, customer-related knowledge, and managerial policies and processes across multiple business units), and knowledge leverage (i.e., changing operational policies, marketing and product policies, and managerial policies and processes based on relevant lessons learned and customer knowledge discovered in other business units). Hence, both the IT and KM related resources conceptualized on the RBV and KBV are extremely essential to realize augmented agility and performance. Further, in the face of unanticipated environmental changes a more dynamic approach is warranted. Therefore, based on the principles of DCV, strategic IT-business alignment capability is regarded as a dynamic organizational capability to influence another higher-level dynamic capability i.e., agility to enhance organizational performance in volatile environmental conditions. Hence, the following section briefly explains the strategic IT-business alignment capability from the DCV perspective.

2.3.4 Strategic IT-Business Alignment Capability

The concept of strategic IT-business alignment is originated since Henderson and Venkatraman's (1989, 1992) propositions of the strategic alignment model (SAM) came into picture, which primarily describes four strategic choices namely, IT strategy, business strategy, organization infrastructure and processes, and IT infrastructure and processes. Based on the fundamental characteristics of strategic management, they have conceptualized the SAM model in terms of a

strategic fit between business strategy and IT infrastructure and processes. Further, Henderson and Venkatraman (1993) have defined strategic integration as the established link between IT and business strategies. However, all these prior studies have explained alignment as some form of "fit" and "strategic integration" and hence, do not provide concrete foundation to operationalize it as a construct for empirical studies. For better conceptualization, subsequent researches have investigated alignment as strategic plans (e.g., organization's intended plans) and realized strategy (e.g., what organizations really do) (Kearns and Lederer, 2003; Sabherwal and Chan, 2001). Later on Oh and Pinsonneault (2007) have demonstrated IT-business alignment based on a portfolio of diverse IT applications required to support actual business strategies.

Consistent with previous researches on the effect of IT at process level, scholars have started exploring the effect of strategic IT-business alignment capability on organizational performance at the process level (Tallon, 2008; Tallon and Pinsonneault, 2011). Additionally, other IS researchers suggest that when critical IT resources such as both technical (e.g., physical IT infrastructure) and human (technical and managerial IT knowledge and skills) IT infrastructures are effectively aligned with business strategy, organizations obtain superior performance (Gerow et al. 2014; Oh and Pinsonneault, 2007; Yayla and Hu, 2012). According to Coltman et al. (2015), the recent themes in IS research entail effective comprehension of the antecedents (i.e., shared understanding between IT and business, IT governance, IT architecture maturity, etc.) and consequences (i.e., enhanced business performance) of IT-business alignment. Based on the theory of DCV, recent research conducted by Luftman et al. (2015) has proposed a more dynamic view of alignment and discussed different activities that greatly contribute to the process of alignment. They have explained six dimensions promoting alignment such as (1) IT-business communication, (2) value analytics, (3) collaborative governance, (4) IT-business partnership, (5) scope of IT initiatives, and (6) development of IT skills. Each of these dimensions has been investigated as micro-level dynamic capabilities and their research has framed the strategic alignment maturity model (SAMM) to support IT-business alignment and encourage organizational performance.

2.3.5 Organizational Agility

A myriad of researches have studied organizational agility as a dynamic capability which enables an organization to cope with fast-paced, relentless, and turbulent environmental changes (Cai et al. 2013; Chakravarty et al. 2013; Chen and Siau, 2012; Chen et al. 2014; Dove, 2001; Fink and

Neumann, 2007; Lee et al. 2008; Liu et al. 2013; Lu and Ramamurthy, 2011; Mao et al. 2015a; Nazir and Pinsonneault, 2012; Overby et al. 2006; Sambamurthy et al. 2003; Tallon 2008, Tallon and Pinsonneault, 2011; van Oosterhout et al, 2006). Sambamurthy et al. (2003) theorize that IT can generate digital options in contemporary business firms to attain dynamic capabilities such as agility and entrepreneurial alertness which are considered as critical determinants of firm performance. Further, Overby et al. (2006) explicate IT and digital options as enablers of enterprise agility so that firms can quickly sense and readily respond to uncertain environmental changes. Tallon (2008) referred process agility as an ability with which organizations alter their business processes to cope with market related threats. According to Lu and Ramamurthy (2011), IT capability facilitates effective communication, speeds up decision making, and assists organizations to respond to environmental uncertainties, and thereby, enables agility. To face the hypercompetitive business environments Chakravarty et al. (2013) illustrate IT as an important competence to develop an imperative strategic capability i.e., organizational agility. Chen et al. (2014) have investigated the enabling role of IT capability on organizational performance via the indirect effect of business process agility.

In addition, Fink and Neumann, (2007) argue that the human components of IT capability (i.e., technical, behavioral, and business capabilities) of organization's IT personnel can greatly influence the IT-dependent organizational agility. They have categorized IT-dependent organizational agility as IT-dependent system agility (i.e., ability to deal with IS changes without incurring any penalty in time or cost), information agility (i.e., ability to accommodate change by offering faster information retrieval and increased flexibility of information requests), and strategic agility (i.e., ability to effectively and efficiently deploy IT capabilities to respond to emerging market opportunities). According to Cai et al. (2013) and Mao et al. (2015a), KM capability, a complementary capability to IT capability is essential to make organizations agile and more successful in the face of uncertain and competitive environments. Further, Tallon and Pinsonneault (2011) argue about strategic IT-business alignment as a critical dynamic capability that enables an organization to adapt into increased environmental volatility created due to volatile consumers' demands, rapid product obsolescence, etc. and thereby, fosters agility and performance. It is quite perceptible that both higher and lower-level organizational capabilities (i.e., IT capability, human IT capability, KM capability, strategic IT-business alignment capability) influence organizational agility which is a critical determinant of organizational

performance. The following section briefly explains about previous studies highlighting organizational performance as an outcome of effectively utilized organizational capabilities and developed agility.

2.4 Organizational Performance

According to Sambamurthy et al. (2003), IT competency creates digital options, agility, and entrepreneurial alertness which influence organizational competitive actions and finally leads to superior financial performance. Further Overby et al. (2006) regarded IT as generating digital options in terms of knowledge reach/richness and process reach/richness and influence the sensing and responding organizational agilities to realize greater performance. Bi et al. (2011) documented IT capability (i.e., e-business centric IT expertise) influencing the market responsive agility, which in-turn enhances organizational sales performance. Chakravarty et al. (2013) have demonstrated both the enabling and facilitating role of IT competencies on agility and performance respectively. Following Chen et al. (2014), IT capability (i.e., IT infrastructure, IT business partnership, business IT strategic thinking, IT business process integration, IT management, external IT linkages) influences the business process agility in the presence of uncertain environmental factors and improves organizational performance.

Byrd and Turner (2001) suggest that critical IT skills (i.e., business functional skills, technology management skills, interpersonal skills, and technical skills) of organizational IT personnel are essential to obtain two IS success variables such as IS infrastructure flexibility and competitive advantage provided by IS (CAPIS: an imperative determinant of organizational performance). In particular, along with the direct effect of IT personnel' skills on CAPIS, they have also investigated an indirect effect of IS infrastructure flexibility. According to Cai et al. (2013), lower-order organizational capabilities such as IT and KM capabilities influence the higher-order capability i.e., agility to generate enhanced performance. Further Tallon and Pinsonneault (2011) have discussed about both the direct and indirect (via agility) relationship between strategic IT-business alignment and firm performance.

2.5 Capabilities-Agility-Performance Contradictions

Some IS researchers suggest that organizational capabilities may sometimes obstruct agility and performance. For example, Allen and Boynton (1991) recommend that IT by itself is inflexible hence, cannot foster agility and performance. 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". Grover and Malhotra (1999) suggested that huge IT investments may sometimes lead to unintended technology traps. According to Carr (2003), IT has been predominantly gaining popularity and its prevalence is well acknowledged in most of the business operations. So, there is a possibility of IT being imitated or replicated by other organizations and hence, IT may lose its ability to generate long-term sustainable competitive advantage. Since any changes relating to technology are extremely complex and uncertain, Rettig (2007) studied the enterprise software as crucial IT capability and demonstrated that data integration and process automation may create rigidity and hence obstruct agility. According to Overby et al. (2006), improper management and ineffective IT utilization may impede agility and performance. In the face of uncertain and consistent changes van Oosterhout et al. (2006) posit that inflexible legacy IT systems generate rigid IT architectures and hence hinder agility. Recent studies conducted by Lu and Ramamurthy (2011) discus about relatively fixed physical and technological IS artifacts that can hinder agility. According to Stehr (1992), knowledge and skills are not directly observable (i.e., intangible) and hence, their specific effects on various success variables such as agility and performance can be inferred through other observable (i.e., tangible) organizational capabilities (e.g., IT capability). However, if the tangible organizational resources (i.e., IT infrastructure) suffer from technology traps, they will ironically impede agility and performance.

Previous researches also indicate that tight or inflexible connection between IT and business can delay or hamper an organization's ability to quickly identify and respond to environmental changes (Benbya and McKelvey, 2006; Tallon and Pinsonneault, 2011). Organizations need to thrive for attaining the accurate level and type of alignment otherwise huge investments at misalignment is meaningless and wasteful. Additionally, Shpilberg et al. (2007) suggest that looking for alignment as merely a solution to any IT-related problems can be misguiding to organizations. Tallon (2012) has conceptualized strategic alignment as a process of complex chain of activities and recommends that misalignment can create significant performance issues in the business value chain by creating bottlenecks and decrease the business value of IT.

2.6 Research Gaps

A detailed review of the prior literature exhibits that although, IT capability is extremely essential for the organizations to experience greater business value by means of either increased profitability, improved productivity, enhanced competitive advantage, operational cost cut or by other measures of organizational performance (Chen et al. 2015), still there is not much of discussion on its direct or indirect (via agility) association with performance. Furthermore, a few of the previous researches have only investigated the IT-agility connection without incorporating organizational performance as the outcome variable (Lu and Ramamurthy, 2011; Mao et al. 2015a). Therefore, a more in-depth analysis is warranted to examine the IT capability-agility-performance linkages. Moreover, most of the past literature are conceptual and do not employ rigorous empirical analysis to investigate these unique relationships (Overby et al. 2006; Sambamurthy et al. 2003).

An extensive review of past literature suggests that the research showcasing the relationship between human IT capability and organizational performance is very thin on the ground. Most prior studies have greatly investigated the technical components of IT but overlooked the human components of IT. Very few studies have examined human IT factors as the predictors of agility (Fink and Neumann, 2007, 2009). However, literature is silent regarding the component-oriented view of IT where both the technical and human IT elements have been investigated to predict performance. Additionally, very few empirical researches have investigated the critical components of human IT capability such as technology management knowledge and skills, business functional knowledge and skills, interpersonal management knowledge and skills, etc. (Byrd and Turner, 2001; Lee et al. 1995). Therefore, a more precise investigation is required to assess the effect of these human IT capabilities on organizational performance.

Previous studies have documented various organizational capabilities such as (IT capability and KM capability) as important contributors to agility and performance. However, very little research supports their systematic assessment in this context (Cai et al. 2013; Chen et al. 2014). Drawing on the RBV theory, organizations have acknowledged greater IT capability as an underpinning to identify and act in response to market related changes and the KBV researchers highlight proper acquisition of knowledge assets to realize enhanced business value which is an important determinant of agility and performance. But both these traditional RBV and KBV

theories are criticized for depicting only the internal operational mechanisms and neglecting the importance of the external business environment (Aragon-Correa and Sharma, 2003; Mao et al. 2015a). Therefore, in the face of uncertain environmental changes a more integrated analysis representing the influence of contextual factors on the internal business operations is needed.

Based on the rationale of dynamic capabilities, past studies have examined both strategic IT-business alignment and agility as higher-order capabilities in two separate streams of researches (Mao et al. 2015a; Pelletier and Raymond, 2014). However, agility as an outcome of strategic alignment to influence performance has been largely overlooked (Tallon and Pinsonneault, 2011). Therefore, a more detailed empirical analysis is needed to examine the direct and indirect (via agility) effect of strategic alignment on performance.

Moreover, very few previous researches have conceptualized organizational capabilities based on the hierarchical framework and embeddedness view of capabilities (Cai et al. 2013; Liu et al. 2013). Also not many of the prior studies have performed empirical analysis and hence, further explicit research is needed in this direction.

It is evident from prior literature that organizational capabilities do not necessarily always enhance agility, and performance and the impeding role of these capabilities on agility and performance has been discussed (Allen and Boynton, 1991; Benbya and McKelvey, 2006; Grover and Malhotra, 1999; Overby et al. 2006; Rettig, 2007). However, very few studies have empirically tested these contradiction effects (Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2011), which demands for further research in this direction. Although, critical organizational capabilities are expected to produce greater agility and superior performance, it is also essential to understand their possible contradicting effects on both agility and performance. Hence, more discussion is required in this regard.

Although, previous extant literature emphasize the unique relationships (either direct or indirect) between organizational capabilities and performance, very few studies have investigated the role of moderator variables on these linkages (Lu and Ramamurthy, 2011; Mao et al. 2015a; Tallon and Pinsonneault, 2011). Therefore, a more comprehensive analysis is required to investigate such relationships in presence of moderators (either internally-oriented e.g., IT spending or externally-oriented e.g., Environmental uncertainty). Additionally, in presence of both moderators and mediators a moderated-mediation effect needs to be investigated.

Since the previous literature support various organizational capabilities-agility-performance related studies conducted mostly in the advanced countries such as U.S.A. { Bharadwaj, (2000): IT capability-performance relationship; Lu and Ramamurthy, (2011): IT capability-agility linkage; Tallon and Pinsonneault, (2011): Strategic IT-business alignment capability-agility-performance relationship}, China {Cai et al. (2013): IT capability-KM capability-agility-performance linkage; Chen et al. (2014): IT capability-agility-performance association; Liu et al. (2013): IT capability-agility-performance association; Mao et al. (2015a): IT capability-KM capability-agility link}, Australia {Bi et al. (2013): IT capability-agility relationship}, Israel {Fink and Neumann, (2007): Human IT capability-agility relationship}, etc., very few studies have examined such relationships in the context of developing economy (such as Turkey) {Yayla and Hu, (2012): strategic alignment-performance linkage}. Therefore, further researches are needed to examine these distinctive relationships in context to other developing economies, such as India.

A majority of the previous studies have examined capabilities-agility-performance linkages based on data collected from a diverse range of industries. For example, Lu and Ramamurthy (2011) have collected data from banking/finance, computers/software, consulting, manufacturing, medicine/health, transportation, etc. In addition, Tallon and Pinsonneault (2011) have conducted study on electronics and computing machinery, financial services, business and professional services, wholesale and retail, etc. Further, Luftman et al. (2015) have gathered survey responses from agriculture, chemical, education, finance, retail, services, and telecommunication industries. However, according to Chen et al. (2014) the potential confounding effects of industry variation may influence the results. Therefore, in order to avoid these confounding effects further researches need to be carried out on specific industries.

This chapter has precisely discussed a wide range of prior studies conducted on various organizational capabilities (with special focus on IT capability, human IT capability, KM capability, and strategic IT-business alignment capability) towards realization of greater agility and improved performance. Although, most of the previous researches have regarded these organizational capabilities as enablers of both agility and performance, some have also discussed about their contradicting roles. All these variables have been studied based on the hierarchical framework and embeddedness view of organizational capabilities. IT capability, human IT

capability, KM capability are considered as lower-level capabilities and strategic IT-business alignment capability is regarded as the higher-level capability, and both of these kinds influence another dynamic higher-level capability i.e., agility to attain superior performance. Furthermore, borrowing the critical RBV, KBV, and DCV theories from the strategic management literature, this study intends to conceptualize the organizational capabilities such as IT capability and human IT capability based on RBV, KM capability based on KBV, and strategic IT-business alignment capability based on DCV principles. This chapter also proposes an integrated research model containing all these important study variables which reflects a combination of individual capability-agility-performance relationships. After a detailed review of previous literature research gaps have been identified and with an aim to bridge these gaps subsequent chapters (chapters 5 to 8) represent meticulous analysis of each capability-agility-performance linkage. In order to avoid the perplexing effects of industrial variation this study focuses on Indian banking industry only and various IT and business executives working in the middle to senior level of management have been selected as target participants for this study. The next chapter exhibits a detailed overview of the Indian banking industry.

Chapter 3

Overview of Indian Banking Industry

This chapter provides a summery on the Indian banking industry and highlights on various information technology (IT), knowledge management (KM), and strategic IT-business alignment initiatives practiced by the Indian banking firms. Further, this chapter underscores the importance of studying various organizational capabilities such as IT capability, human IT capability, KM capability, strategic IT-business alignment capability in the context of Indian banking industry. Since the extant literature is silent regarding precise investigation on the effects of different organizational capabilities to enhance banking agility and performance, this chapter provides the necessity of such kind of studies in Indian banking perspective. The information relating to IT, KM, and strategic alignment initiatives are documented based on the secondary sources such as research articles published in the Indian context, Reserve Bank of India (RBI) reports, and World Bank reports.

3.1 Evolution of Indian Banking Industry

The Indian banking system was originated during the pre-independence era in the late 18^{th} century, but most of the then established banks were highly unsuccessful due to the ongoing world war related activities. After independence in 1947, the Indian economy was adversely impacted because of partition of India which had paralyzed the banking system for quite a long time. Then the government of India played a pivotal role in shaping the economic life of the nation and in 1948 the government adopted the Industrial Policy Resolution to envisage a mixed economy having both public and private ownership structures. For better banking regulation the government of India nationalized the RBI, India's central banking authority and enacted the RBI act, 1949, which was further modified in 2013. Later on starting from 1969 till 1980 most of the commercial banks were nationalized and by then the government had controlled about 91% of the banking business in India. During the liberalization era in early 1990 the government had licensed a number of private banks and the new wave ushered the era of privatization with a modern outlook and tech-savvy methods for traditional banking.

3.2 Present Indian Banking System

The Indian Banking system is broadly categorized as the scheduled banks and nonscheduled banks. Further the scheduled banks are classified into two categories such as commercial banks and co-operative banks. The scheduled co-operative banks consist of scheduled state co-operative banks and scheduled urban co-operative banks. Based on the ownership structure and nature of competition the scheduled commercial banks comprise of the following five different groups.

1- State Bank of India and Associates
2- Nationalized Banks } Public Sector Banks
3- Private Sector Banks (the old and new generation banks)
4- Foreign Banks
5- Regional Rural Banks

The scheduled commercial banks have been selected as the sample frame work for the present research with special focus on the public and private sector banks. The rural banks provide local level banking to the rural population of India and the numbers of rural bank branches are limited in urban areas. The study was intended to be conducted mostly in the urban areas and hence, the regional rural banks were not included. Further, the foreign banks only operate in 15 Indian states including union territories and very less number of these banks operates in the studied state, i.e. Odisha, a state in the eastern part of India. The Indian banking system is presented in figure no. 3.1. The gradual growth of the scheduled commercial banks in terms of number of banks, number of branches, population per bank, aggregate deposit, bank credit, credit-deposit ratio, etc. from the year 2005 to 2013 is illustrated in table no. 3.1. The number of offices of scheduled commercial banks operated across India since 2007 to 2013 is presented in table no. 3.2. Further their overall banking business is exhibited in figure no. 3.2. Additionally, table no. 3.3 reports the distribution of deposits and credits of the scheduled commercial banks particularly in Odisha for the years 2012 and 2013.

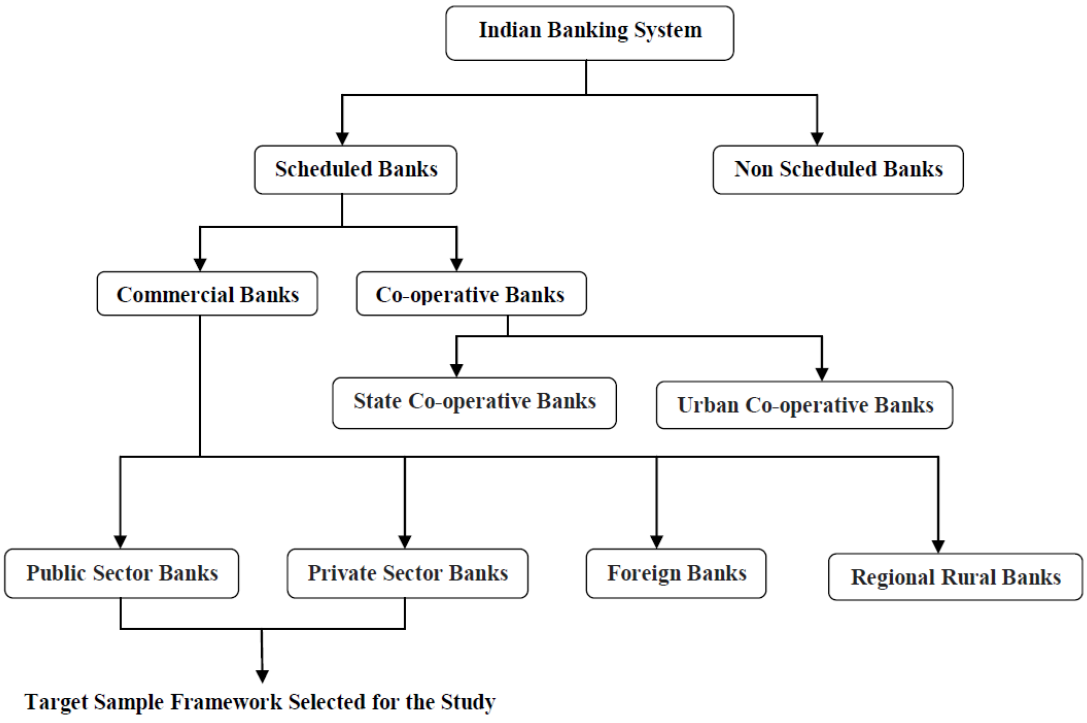


Figure 3.1 Indian Banking System
Source: Author's creation

Table 3.1 Growth of Scheduled Commercial Banks in India (2005-2013)

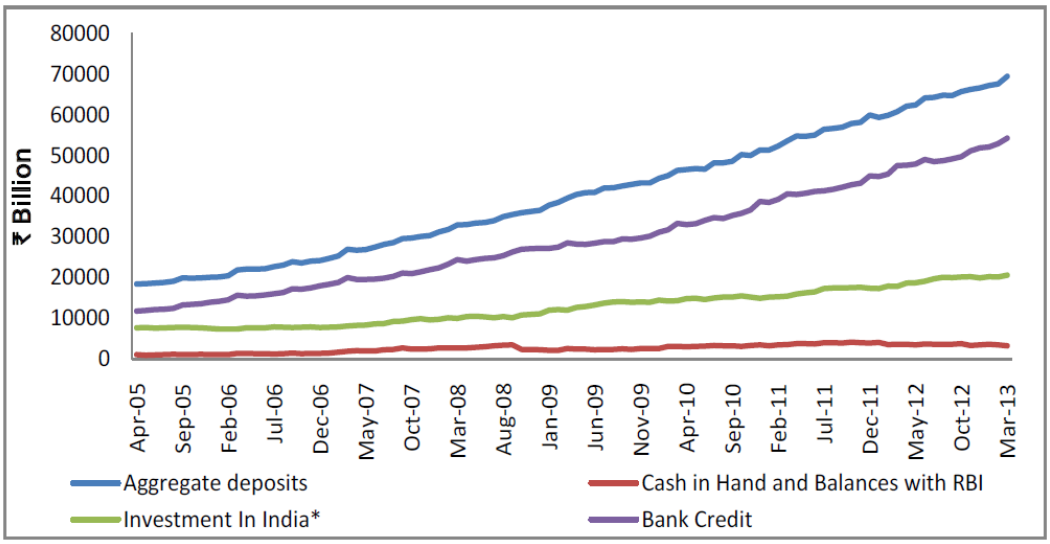
				As on 31st March					
Indicators	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
No. of Commercial Banks	284	218	178	169	166	163	163	169	151
No. of Branches	70373	72072	74653	78787	82897	88203	94019	102373	109811
Population per Bank	16000	16000	16000	15000	15000	14000	13000	13000	12000
Aggregate Deposit (in ₹ Billion)	17002	21090	26119	31969	38341	44928	52078	59091	67504
Bank Credit (in ₹ Billion)	11004	15071	19312	23619	27755	32448	39421	46119	52605
Per Capita Deposit (in ₹)	16281	19130	23382	28610	33919	39107	45505	50183	56380
Per Capita Credit (in ₹)	10752	13869	17541	21218	24617	28431	34187	38874	44028
Credit Deposit Ratio (in %)	63	70	74	75	74	74	76	79	79

Note: The Credit-Deposit ratio reflects the banks' liquidity position (i.e. the ability to meet all the financial obligations using only liquid assets)
Source: Statistical Tables Relating to Banks in India (2012-2013) - RBI (Author's Compilation)

Table 3.2 Offices of Scheduled Commercial Banks in India (2007-2013)

Indicators	As on March 31st						
Bank Groups	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
State Bank of India and its Associates	14691	15870	16940	18392	19341	20260	21315
Nationalized Banks	37437	39287	41027	43675	46461	50729	54528
Public Sector Banks	**52128**	**55157**	**57967**	**62067**	**65802**	**70989**	**75843**
Old Private Sector Banks	4840	4725	4955	5276	5093	5678	6290
New Private Sector Banks	2599	3638	4336	5243	7009	8298	9718
Private Sector Banks	**7439**	**8363**	**9291**	**10519**	**12102**	**13976**	**16008**

Note: For Odisha the number of offices of Scheduled Commercial Banks is 3568 (As on March 31st- 2013)
Source: Statistical Tables Relating to Banks in India (2012-2013) - RBI (Author's Compilation)



*Investment in government and other approved securities

Figure 3.2 Scheduled Commercial Banks' Business in India (2005-2013) (As on the last reporting Friday of Month)
Source: Statistical Tables Relating to Banks in India (2012-2013) - RBI

Table 3.3 Distribution of Deposits and Credits of Scheduled Commercial Banks in Odisha (As of 31st March 2012-2013)

Deposit						Credit			
No.of reporting offices		Amount (in ₹ Billion)	Percent Share in total deposit	Amount (in ₹ Billion)	Percent Share in total deposit	Amount (in ₹ Billion)	Percent Share in total credit	Amount (in ₹ Billion)	Percent Share in total credit
2012	**2013**	**2012**		**2013**		**2012**		**2013**	
3196	3447	1254.20	2.03	1439.78	2.0	588.46	1.2	663.25	1.2

Note: For Odisha the Credit to Deposit ratio of Scheduled Commercial Banks is 46.9 and 46.1 (As on March 31st 2012-13 respectively)
Source: Statistical Tables Relating to Banks in India (2012-2013) - RBI (Author's Compilation)

3.3 IT Capabilities and Indian Banking System

Organizations functioning in developing and newly industrializing economies like India face increased domestic and global competition, rapidly changing market trends, economic downturn, volatile financial markets, etc. The banking industry is no different from other industries confronting such challenges. Therefore, in the face of environmental uncertainties they have to come up with effective responses to survive and succeed. In this respect, IT serves as an essential platform to enhance their productivity and competitiveness. However, from technology adoption perspective, Indian banking firms have been dealing with two major issues such as IT as a strategic tool and IT as an operational necessity. In order to address the first challenge the comprehensive centralized banking application systems have been made available to banks to meet the banking needs and practices. For increasing the operational efficiency, a robust data communications network connecting all the branches of the bank to the data center hosting the centralized banking application systems has been developed. Presently, both the public and private sector banks have been effectively utilizing the centralized core banking systems (CBS) with a robust telecommunications network to create multiple delivery channels such as automated teller machines (ATMs), electronic clearing service (ECS), internet banking, mobile banking, call centers, real time gross settlement (RTGS), national electronic fund transfer (NEFT), immediate payment service (IMPS), etc. These contemporary IT capabilities enable the banks to add services, and value to their customers and better manage customer relationships. The Indian banking payment system is illustrated in figure no. 3.3. The annual turnover of various payment systems from 2013 to 2016 is presented in table no. 3.4.

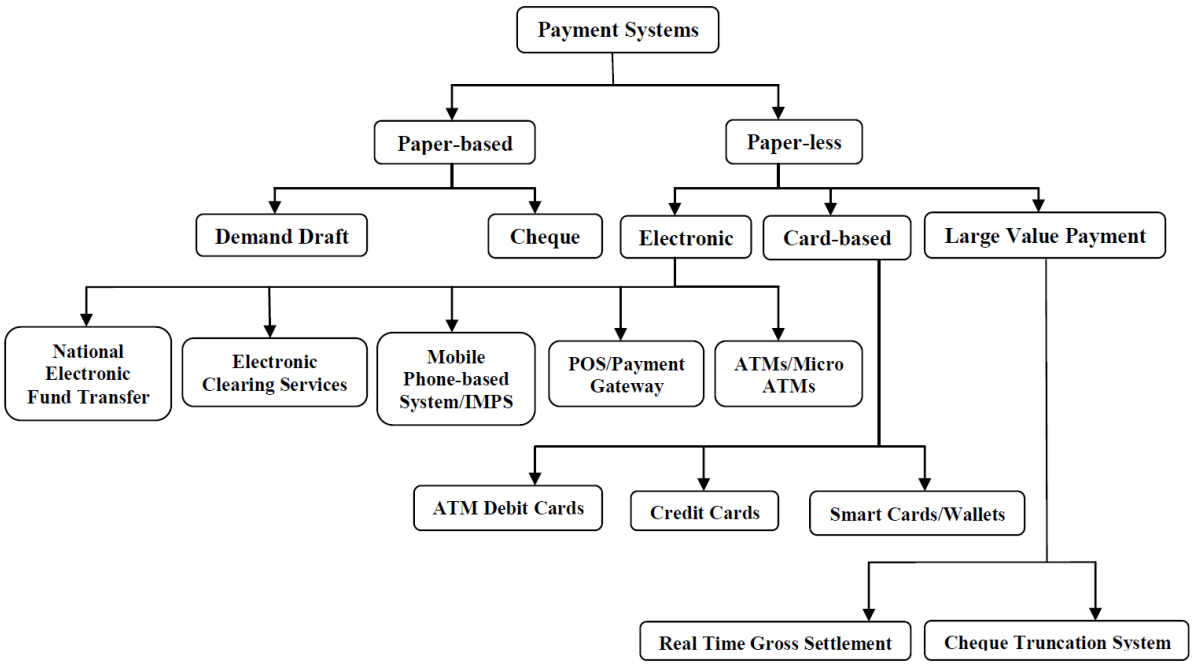


Figure 3.3 Indian Banking Payment Systems
Source: Banking on Technology Perspectives on Indian Banking Industry (January 2014) (Author's Creation)

Table 3.4 Payment System Indicators – Annual Turnover

		Volume (million)		Value (₹ billion)		
Items	**2013-14**	**2014-15**	**2015-16**	**2013-14**	**2014-15**	**2015-16**
RTGS	81.1	92.8	98.3	734252	754032	824578
ECS (Debit)	192.9	226.0	224.8	1268	1740	1652
ECS (Credit)	152.5	115.3	39.0	2492	2019	1059
NEFT	661.0	927.6	1252.9	43786	59804	83273
IMPS	15.4	78.4	220.8	96	582	1622
Credit Cards	509.1	615.1	785.7	1540	1899	2407
Debit Cards	619.1	808.1	1173.5	955	1213	1589

Source: RBI Annual Report (2015-2016) (Author's Compilation)

The customers use ATMs to access their money anytime which symbolizes the shift from traditional banking to channel-based banking. The use of debit/credit cards refer to cashless banking transactions. Different electronic channels enable the customers to directly access their bank accounts which provide them quick service and better transparency. In addition, banks sometimes offer incentives to the non-branch channel users to promote e-banking solutions. All these initiatives have lessened the number of walk-in customers and improved the in-branch customer service. Now-a-days banks are using smart phones as an alternative channel to deliver full-fledged banking services to their customers. Customers are also using smart phones to avail

banking services through short message services (SMSs). Another emerging trend i.e., virtual banking is also gaining popularity where banks only use the electronic medium to offer all their products and services without any brick-and-mortar branches. Although, this has already been tested in advanced countries such as U.S.A. and Europe, India being a developing nation is yet to witness such paradigms. According to RBI report (from 2003 to 2011), there has been a constant increase in the number of electronic banking transactions in the nation (Figure 3.4). Further, compared to the electronic payments the value of paper-based transactions via cheques and/or demand drafts has fallen over the years (from 2004 to 2011) (Figure no. 3.5). In addition, the mobile banking transactions have significantly increased from 2013 to 2015 (Figure 3.6). In a global scenario the average annual growth rate of cashless transaction in India is about 23% (from 2010 to 2015), which is the second highest growth rate after China (27%) (Figure 3.7).

Presently, the demonetization has unleashed a revolution in the banking world and encouraged more cashless transactions by increased use of debit/credit cards. Some banks have developed their mobile wallet applications to facilitate better banking experience in such situations. For example, the State Bank of India (SBI) has recently launched "Buddy" which is the first Indian mobile wallet *application* available in 13 Indian languages. This application provides special features like hassle free money transfer to registered and new users, free transfer of additional cash into an account of customers' choice, send reminders to settle dues, instant recharge and payment of bills, booking movie tickets, flights, and hotels and shop for favorite merchandise.

(₹ billion)

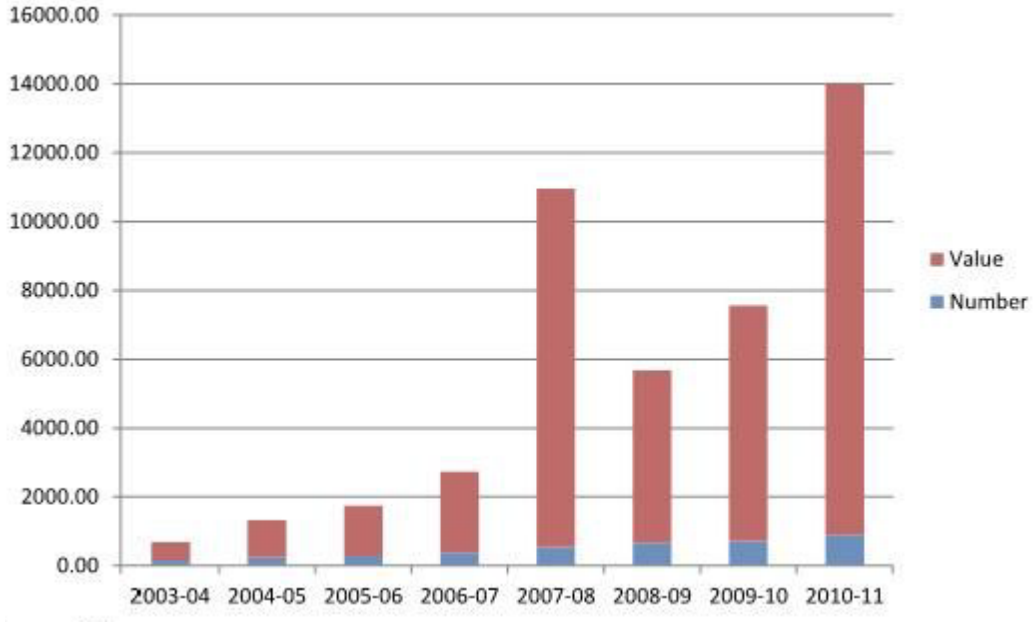


Figure 3.4 Statistics on Retail Electronic Payments (2003-2011)
Source: RBI

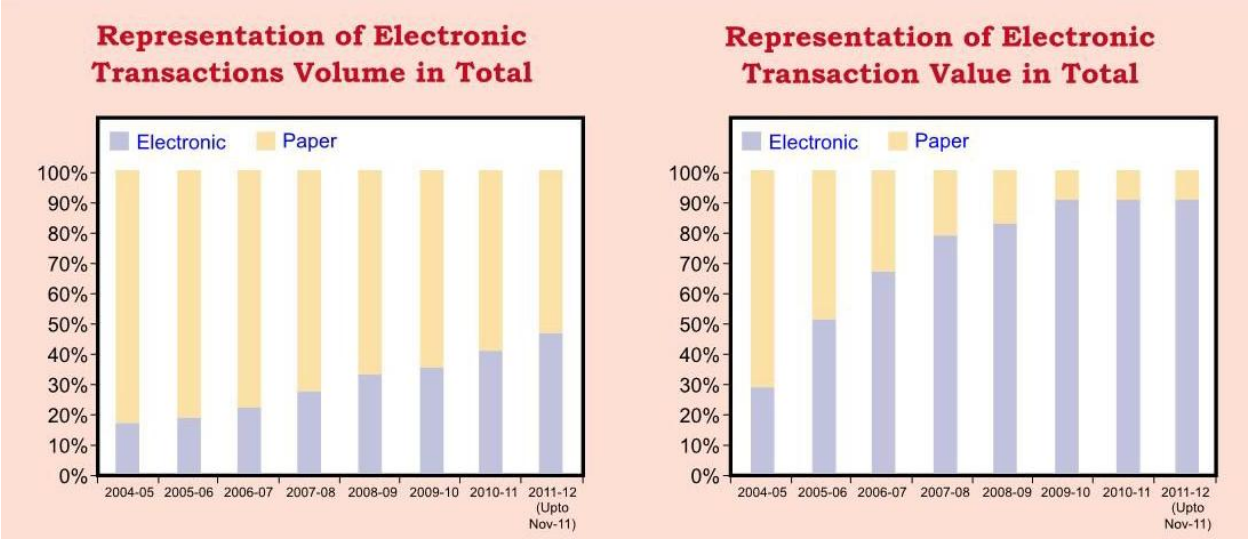


Figure 3.5 Statistics on Electronic Vs. Paper-based Transactions (2004-2011)
Source: RBI

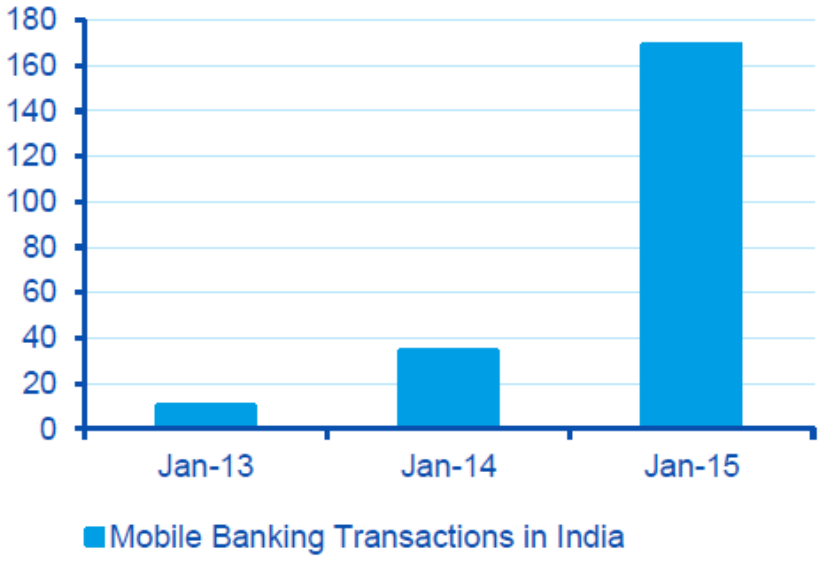


Figure 3.6 Mobile Banking Transactions (2013-2015)
Source: BBVA Research, RBI

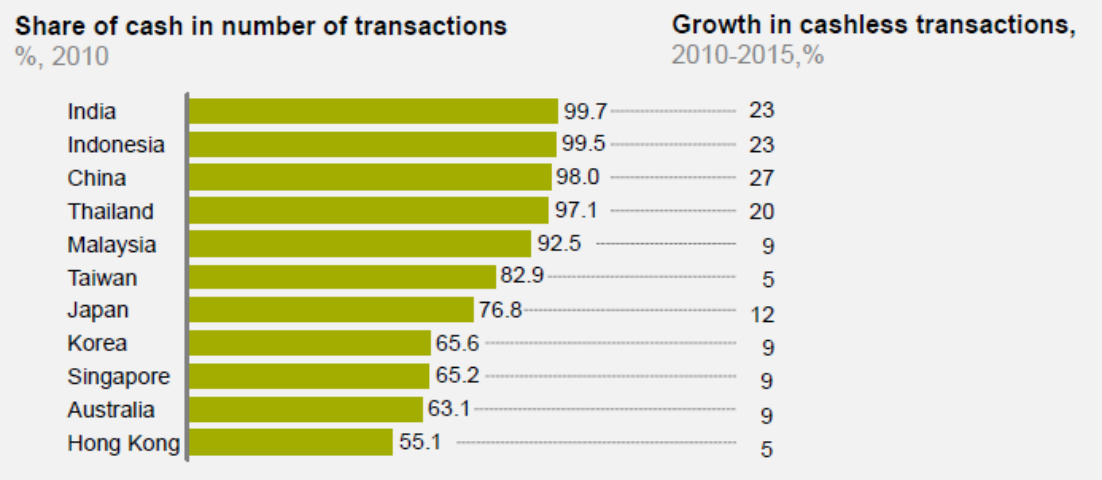


Figure 3.7 Growth of Cash-less Transaction of Asian Countries (2010-2015)
Source: McKinsey&Company

3.4 KM Capabilities and Indian Banking System

Today's knowledge economy demands for effective and efficient utilization of knowledge to generate tangible and intangible business values. Although, knowledge measurement in a nation's economy is a complex task, the World Bank's knowledge assessment methodology (KAM) provides a more holistic approach in this context. This methodology takes into account

nation's economic and institutional regime, education and quality of its human capital, innovation system, and modern information and communication technology (ICT) (Table 3.5).

Table 3.5 Major Components of Knowledge Economy

Components	Characteristics
Foundations of the knowledge economy	– increased education levels in the developed countries, – growing internationalization of the economies through global trade in services, – advancements in and dissemination of information and communication technologies.
Indicators of the knowledge economy	– transition from the industrial economy to the service-based system, – increasing number of professional and technical workers and their growing impact on the economy, – information society organized around knowledge and information, – scientific research and development, alongside the merger of science and technology with the economy, are the key to the information society, – advancements in intellectual technology.
Pillars of knowledge in the knowledge economy	– ICT, – human capital, – social capital (trust, cooperation and social networks), – knowledge management in organisations.

Source: Katarzyna (2016)

In context to Indian banking industry, KM is an imperative aspect which strives to increase the performance through better use of IT and KM capabilities. According to Tandon (2007) banks are an important pillar of Indian services sector and have a special place for KM. Effective KM process and utilization of knowledge-based goods and services creates and sustains enhanced performance. Presently, Indian banks are able to gather, process, and analyze wide range of information to meet the customers' demands and changing preferences. Therefore, KM is essential to achieve the banking business objectives by means of bringing together people, process and technology. A case study on Mauritius banks conducted by Mauree-Narrainen and Chittoo (2014) suggest that the greatest challenges of KM refer to acquire the "right" knowledge to the "right" employee at the "right" time in the "right" form. However, these challenges may also hold true for the Indian banking groups. In the same vein Industrial Credit and Investment Corporation (ICICI) bank in India has developed a KM portal named as "Wise Guy" that integrates KM, IT, and human resources (HR) with an aim to generate a learning organization which is extremely critical to remain competitive in market. It promotes a culture of knowledge sharing between IT and business professionals via improved workplace communication to cultivate mutual social relationships and increase understanding of the work culture.

In recent times, Indian banks are adopting the business intelligence (BI) system to foster the data analysis process and enhance decision making. BI along with traditional information systems (IS) first convert data into information, and then into knowledge to meet the needs of the end-users. According to Zhang (2009), the KM systems facilitate easy extraction of knowledge from data and information and also improve the BI utilization process. Integration of BI and KM usually increases knowledge generated through the BI system, which leads to better decision making about gauging end-users' perceptions. The integration of BI and KM systems for ICICI bank is exhibited in figure no. 3.8. However, the KM system needs to be upgraded in a strategic manner by the use of meta-data repository or KM repository to help users find the requisite information in an effective manner.

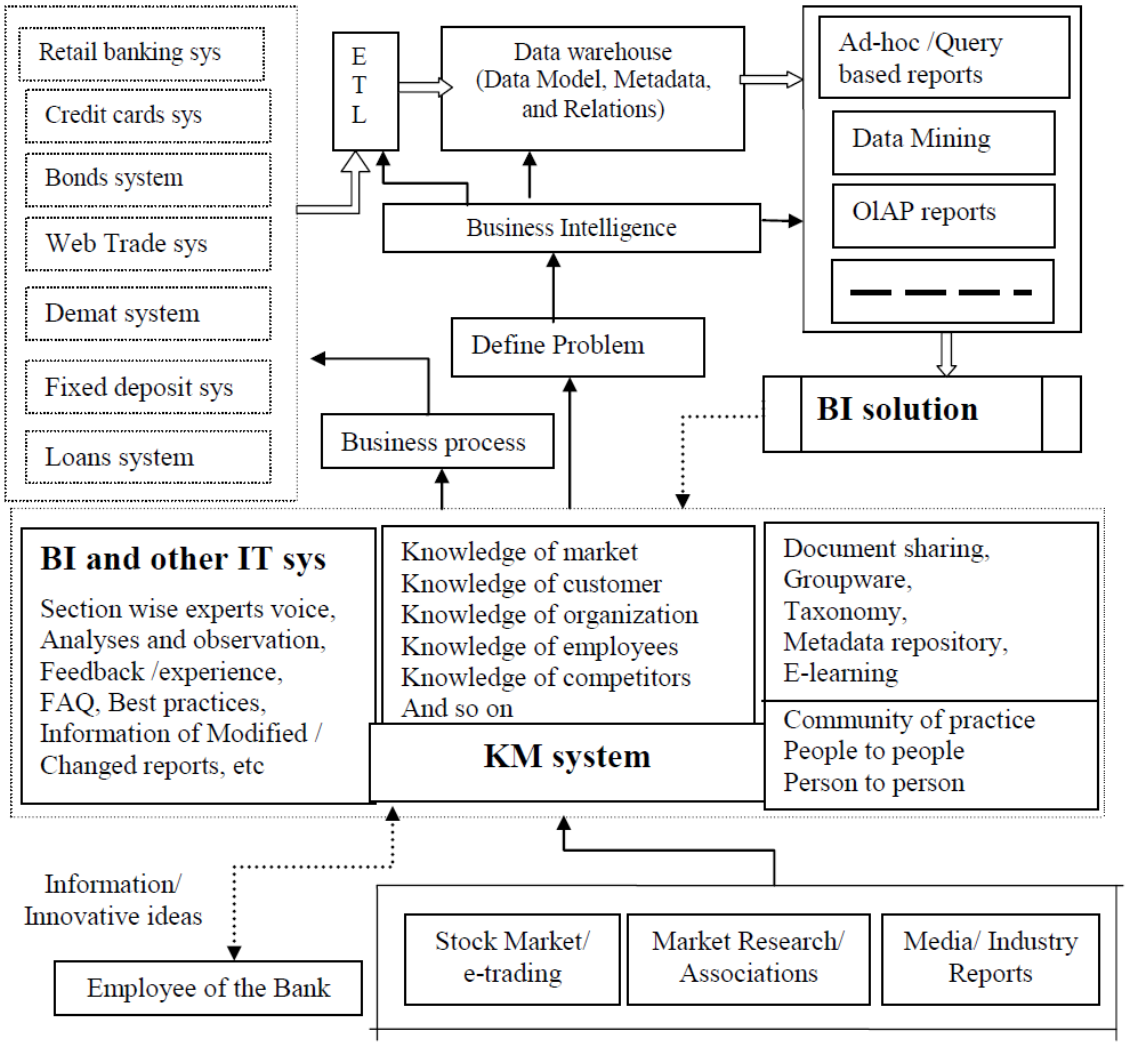


Figure 3.8 Integration of BI and KM system (Private Sector Bank: ICICI)

Note: ETL (extract, transform, and load)- the set of processes by which data is extracted from databases, applications and systems, transformed, and loaded into target systems; Data warehouse- large data stores; OLAP (Online Analytical Processing)- provides multidimensional analysis of business data for trend analysis, and sophisticated data modeling; Data mining- analyzes *data* and summarizes the analysis into meaningful information to increase revenue, cost-cuts or both.

Source: Rao and Dey (2012)

According to Rao and Dey (2012), in context to the public sector banks the adoption of KM is yet to be explored. These banks are successfully promoting the "anytime" and "anywhere" banking by effectively utilizing CBS and other delivery channels like ATMs. CBS is an integrated suite of applications (e.g., customer IS, loans system, deposits system, transactions processing system, etc.) which is mainly designed for branch level day-to-day operations and generates reports from transaction data. However, it is not developed to make specific decisions relating to problems of the employees, managers, and executives of the bank. Therefore, an integrated system can be developed to create a centralized database containing information of customers and employees. Further, these data can be analyzed by using various tools and techniques to enhance business performance. The banks may also consider investment in BI technology for maximizing their business. According to Anand (2011), many public sector Indian banks have already adopted this technology. The integration of BI and KM systems for public sector banks is exhibited in figure no. 3.9.

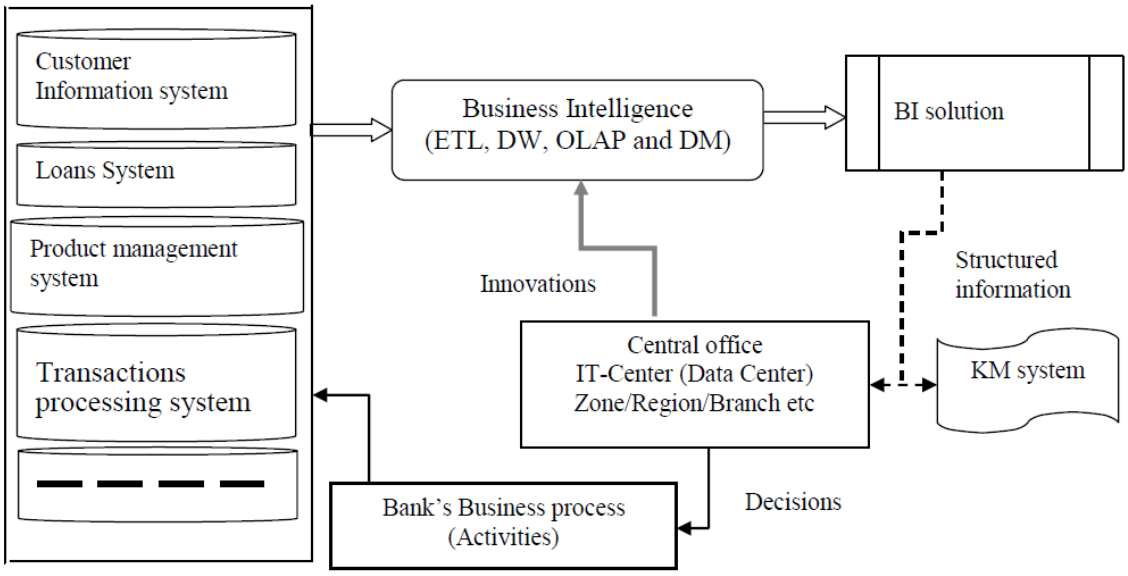


Figure 3.9 Integration of BI and KM system (Public Sector Bank)
Source: Rao and Dey (2012)

Following Laporte (2004), the World Bank has been a knowledge bank since 1996 and its knowledge sharing (KS) program situated in the World Bank Institute (WBI) produces knowledge for its economic, sectoral work, country level assessments, project preparation and/or evaluations, and capacity building programs. Based on the World Bank's knowledge for development report (2011), banks' ability to offer customized solutions to clients and customers rests on a broad knowledge ecosystem of complementary and interrelated knowledge-based activities as presented in figure no. 3.10. The bank's products and services related knowledge interact with a dynamic system through which information flows within and across boundaries to deliver useful products and services to customers and clients.

In context to Indian banks (both public and private sector banks), although IT is a necessity for facilitating knowledge centric approaches an environment conducive to knowledge creation and sharing is also important. Therefore, banks need to form a participative management system which endorses free communication between IT and business professionals. Further, effective IT and knowledge integration enable sophisticated products/services development to fulfill changes in customers' demands.

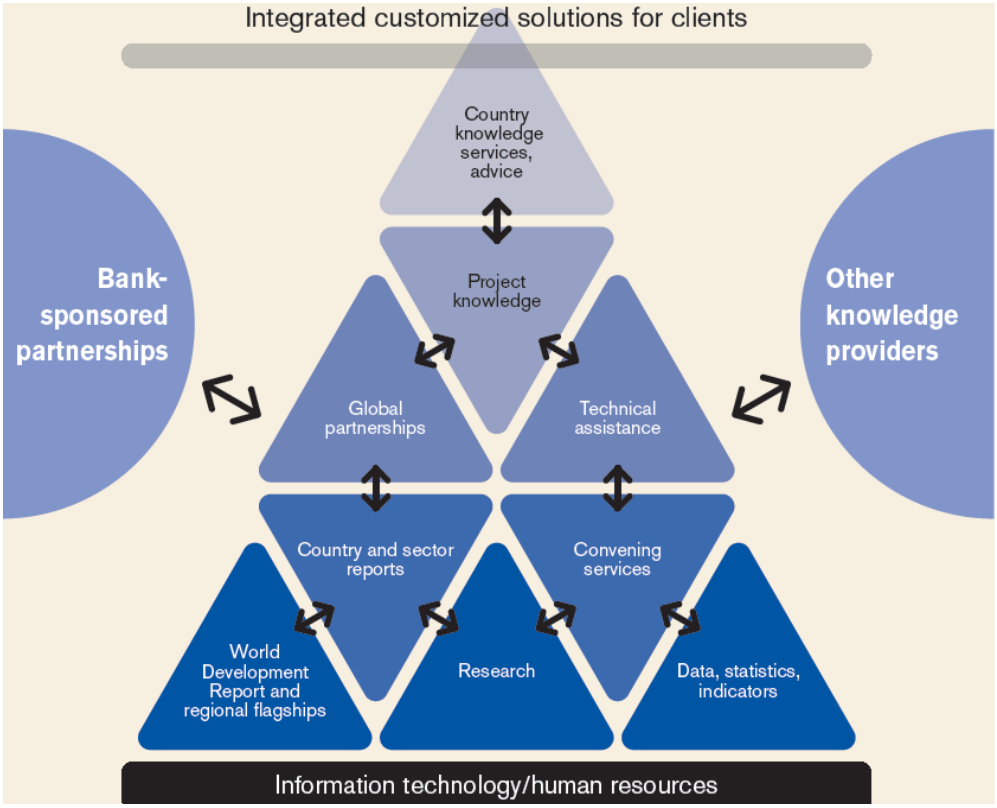


Figure 3.10 Bank's Ecosystem of Interlinked Knowledge Activities
Source: The State of World Bank Knowledge Services (Knowledge for development, 2011)

3.5 Strategic IT-Business Alignment Capability and Indian Banking System

The IS literature suggest that proper alignment of IT and business strategies is essential to improve performance, yet there is no standardized framework to foster alignment particularly in context to banking environment (Kekwaletswe and Mathebula, 2014). The study conducted by Kekwaletswe and Mathebula (2014) suggests a model representing the strategic IT-business alignment in context to a banking environment (Figure 3.11). The IT-business alignment related researches from banking industry perspectives have been mostly studied in advanced countries such as Australian banking industry (Broadbent and Weill, 1993) and U.S.A. banking industry (Floyd and Wooldridge, 1990). However, from a developing country perspective like India, such kinds of studies are very limited (Singh and Desai, 2013).

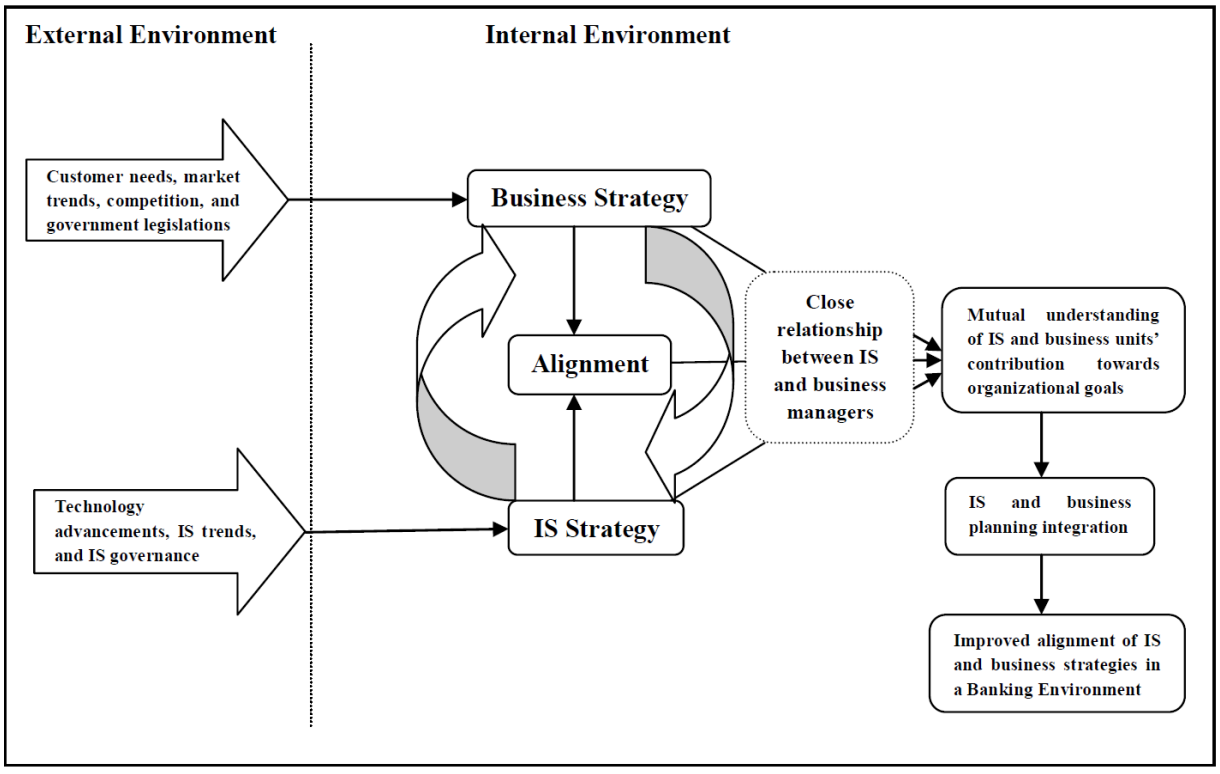


Figure 3.11 Alignment of IT and Business strategies in a Banking Environment
Source: Kekwaletswe and Mathebula (2014) (Author's creation)

The institute for development and research in banking technology (IDRBT), a research group established by RBI reports that in recent times, there is a strong emphasis on alignment of the IT

strategy of the bank with its business objectives. The top management teams support and encourage a culture where banks are readily accepting changes brought in by new IT systems and processes, which may influence the operational and technological environment of the banks. Some of the critical steps taken by the Indian banks (both public and private sector banks) towards effective IT-business alignment are as follows:

- The IT strategies of the banks are usually approved by the board which provides a roadmap to the future IT implementations within the banks.

- Banks' top management teams at the board level also participate in the IT committee to review both business and IT strategic goals on a periodic basis. Further, this committee oversees the approval of the IT budgets and prioritizes banking projects within the scope of IT. It also acts as a bridge between the business and IT teams to ensure the effective implementation of business plans to drive banks' objectives over the long haul.

- The banks have established the Project Steering Committees to review the crucial strategic initiatives and the senior executives track the progress of the projects at pre-defined intervals i.e., monthly or quarterly.

- Various business verticals have been created for the support of business groups to effectively implement IT initiatives. Banks have also strategic planning process groups that ensure and co-ordinate the alignment of IT objectives with business objectives.

Thus, the business and IT executives ensure both business and IT goals cascade throughout the banks' roles and actions to facilitate effective alignment. This will foster and maximize the business value of IT. Additionally, banks are also adopting advanced IT governance models to better align business and IT teams and realign organizational structures for efficient implementation of IT projects.

This chapter thoroughly discussed various organizational capabilities such as IT capability, KM capability, and strategic IT-business alignment initiatives practiced by the Indian banking industry with special focus on public and private sector banks. It is apparent that the prior literature is silent on the role of IT capability, human IT capability, KM capability, and strategic IT-business alignment capability on augmenting Indian banking agility. Agility in the

context of banking not only represents speed in execution but also means that the bank is flexible and nimble. Agile banks can have the ability to increase or decrease the products and services portfolio by simultaneously expanding or shrinking the banking processes and capabilities. It also enhances a bank's ability to tap emerging platforms like social media to cater the needs of a particular segment of customers. Therefore, this study intends to provide a more holistic understanding about how the Indian banks are utilizing their IT, KM, and other dynamic recourses to leverage IT capability, human IT capability, KM capability, and strategic alignment capability to attain greater agility and superior performance.

Chapter 4

Research Design and Methodology

This chapter narrates the overall strategy employed to address the research objectives and answer the research questions in a coherent and logical way. Broadly it is comprised of two sections, where the first section represents the research design, research universe, sampling methods, sample size calculation, methods of data collection, questionnaire design, and research variables. The second section describes about the fundamental statistical tools and techniques employed for analysis of the collected data.

4.1 Research Setting

Research is defined as an art of systematic inquiry that examines various hypotheses proposed by the researcher, suggests new interpretations of the data, and creates avenues for future research. In this respect, research depicts a process of creating knowledge by utilizing existing knowledge in a novel and innovative manner to develop new concepts and understandings. Therefore, it is essential to predetermine the research design and methodology for effective execution of the research process. Further, it is also important to set the research setting i.e., the environment to conduct the studies for better quality data collection and interpretation of results. The following subsections represent various research design and methodology related activities undertaken for this study.

4.1.1 Research Design

Research design primarily refers to the framework that has been developed for the study and represents the blueprint of the overall research strategy. In addition, it involves the theoretical, methodological, and ethical considerations to shape both the design and the objective of the research. It also depicts the degree of reflexivity from the researcher perspective to acknowledge the fundamental theory and/or theoretical assumptions relating to research focus and process. Following Given (2008) and Creswell (2013), exploratory, descriptive, and explanatory research designs are the frequently used research designs in social sciences researches. For the present study the researcher has employed a combination of all these research design approaches in a systematic order.

The exploratory research design typically addresses the "what" questions. This type of research design involves a thorough literature search to explore new phenomena and thereby, initiates a hypothetical or theoretical idea. Based on a detailed study of the previous literature as explained in chapter 2, various organizational capabilities such as information technology (IT) capability, human IT capability, knowledge management (KM) capability, and strategic IT-business alignment capability have been studied in dyads and simultaneously all these capabilities have not been studied to improve agility and performance. Therefore, utilizing an exploratory research (also known as formulative research) the present study intends to acquire new insights regarding this phenomenon and formulates more precise research problems and develops hypotheses (Shields and Rangarjan, 2013).

The descriptive research design normally addresses the "how" questions. As the name suggests it describes the additional information about the phenomenon that has already been explored and hence, represents a higher-order research design. According to Shields and Rangarajan (2013), a descriptive research is generally used to describe the characteristics of a phenomenon or population being studied. Descriptive research is "*aimed at casting light on current issues or problems through a process of data collection that describes the situation more completely than was possible without employing this method"* (Fox and Bayat, 2008: 45). For a pragmatic investigation of the research problem this research design usually consists of three methods for data collection, such as through observation, case studies, and surveys.

The explanatory research design usually addresses the "why" questions. This type of research design tries to explain the relationships between the variables under the study. It lies above both exploratory and descriptive research designs and hence denotes the highest-order design. According to Given (2008), this research design traditionally depicts the quantitative research and tests hypotheses by measuring relationships between variables using statistical data analysis techniques. "*In the narrowest sense, this term is sometimes used synonymously with experimental research, with the implication that only experiments are capable of answering causal questions*" (Given, 2008: 323). Further, it also includes *structural equation modelling* to identify causal relationships through the analysis of correlations between variables. For this particular study the researcher has utilized the match-pair research design to explain the correlation between variables. Although, matched-pair designs have been widely used in medical

researches, these experimental research designs can also be suitably used for social science researches (Dunning, 2012; Peck, 1985).

4.1.2 Research Universe

This research intends to investigate diverse organizational capabilities such as IT capability, human IT capability, KM capability, and strategic IT-business alignment capability to realize enhanced agility and performance of the scheduled commercial banks (particularly both public and private sector banks) in India. To be specific, this study was carried out in the urban branches of these banks in Odisha, a state situated in the eastern India. The business and IT executives working in the middle to senior level of management have been selected as target participants for this study.

4.1.3 Sampling Methods

According to Given (2008: 797), *"a sample is the set of actual data sources that are drawn from a larger population of potential data sources"*. Sampling is the process of selecting a suitable sample, which is a representative of the population to determine the parameters or characteristics of the whole population. Therefore, it is essential to draw the appropriate sample that can successfully interpret the population. This research utilizes a matched-pair survey design, a special case of randomized block design, which is equivalent to the stratified random sampling method. The stratified sampling method is a probabilistic sampling technique to select the sample groups. This method usually comprises of two steps, first dividing the population into separate groups called as strata, and then applying simple random sampling to draw sample from each strata. Like this method, in the randomized block design homogeneous subgroups or blocks are constructed to reduce variance in the data. The blocks are created so that the variability within each block is less than that of the entire sample and hence a researcher gets an overall more efficient estimate than he/she would get without blocking. For this particular study the researcher has created two blocks for the business executives and IT executives working in the middle to senior level of management. It is also important to understand that the term 'matched pair' is not synonymous with 'identical pair' (Peck, 1985). Hence, the pairs of the IT and business executives are matched based on some specific criteria called as the matching criteria such as industry type (public and private), organizational size, etc. The researcher sets these matching criteria based on the requirement of the study. Further the matched-pair survey method reduces

sample selection bias and also ensures that each block within the population receives proper representation within the sample i.e., the population is not overrepresented or underrepresented.

The sample size for any research represents the number of data sources that are actually drawn from the total population (Given, 2008) which also frames inferences about the population. Furthermore, the sample size needs to have the sufficient statistical power and accuracy to conduct the study. According to Israel (1992), determination of the appropriate sample size requires fulfillment of three important criteria. First, the *level of precision* (i.e., sampling error) that represents the range in percentage points (e.g. ±5%) within which the true value of the population is to be estimated. Second, the *confidence level (or risk level).* If the researcher selects 95% confidence level, then it means that 95 out of 100 samples will represent the true population within the pre-specified level of precision. Third, the *degree of variability* (i.e., distribution of attributes in the population). If a population is more heterogeneous, then it will require a larger sample size to obtain a given level of precision. But if the population is more homogeneous, then smaller sample size is required. Usually a proportion of .5 indicates the maximum variability in a population and is often used to determine a more conservative sample size (i.e., a larger one). For this particular study the researcher has used the following formula for calculation of the sample size (Cochran, 1963; Israel, 1992).

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where,

n_0 is the sample size

Z^2 is the desired confidence level (i.e., 95%) (Z = 1.96 according to the standard normal distribution table)

e is the desired level of precision (e = ±.05, i.e., sampling error)

p is the degree of variability (i.e., the estimated proportion of an attribute present in the population) (p =.5, i.e., maximum variability)

q is 1-p (i.e., q = .5)

Therefore, the sample size is determined to be

$$n_0 = \frac{Z^2 pq}{e^2} = \frac{(1.96)^2(.5)(.5)}{(.05)^2} = 385$$

With an aim to reduce the sampling error and response biases, the researcher has distributed a total of 950 numbers of structured questionnaires among the business and IT executives. The detailed data collection procedure is explained in the subsequent section.

4.1.4 Data Collection

For effective operationalization of the study variables both primary and secondary data have been collected for this study. Primary data are collected for specific research purposes and usually original in nature. The data that have been already collected by and readily available from other sources are called as the secondary data. In this study the author has used various secondary data sources such as previously published research articles, Reserve Bank of India (RBI) reports, World Bank reports, etc. For collection of the primary data the author has first shortlisted various public and private sector banking groups operating in the state of Odisha from the State Level Bankers Committee (SLBC), Odisha website. Then, the author has divided the population into two blocks for the business and IT executives working in the middle to senior level of management. A complete sample profile of these participants is presented in table no. 4.1.

The business executives constitute the general managers, deputy general managers, assistant general managers, etc. and the IT executives comprised of chief information officers (CIOs), IT directors, IT project managers, etc. This study has utilized both the online and offline methods to distribute questionnaires among these participants. The business executives were contacted in person and the questionnaires were distributed using hand delivery method. The contact information and e-mail addresses of the IT executives were collected from them and the questionnaires were sent using online survey forms. A total of 523 e-mail addresses were accumulated and about 367 of them were found to be correct addresses. Due to prior travel commitments, unavailability of time, or corporate policy, some of the IT executives had not responded after the very first e-mail. Those IT executives who did not want to participate due to

corporate policy were excluded. For rest of the IT executives follow-up e-mails were sent after two weeks and reminder e-mails after one month.

According to Sivo et al. (2006: 352) "*the most notorious problem for mail and internet-based surveys is the failure of questionnaire recipients to respond. This failure to respond may very well result in what is known as nonresponse error*". Hence, a t-test was conducted to examine such non-response bias. The comparative analysis between the early (i.e., the responses collected immediately after the initial e-mails) and late (i.e., the responses collected after the reminder e-mails) responses could not exhibit a significant difference (as all ps > 0.05) which proves the nonexistence of non-response bias issue. Out of 950 numbers of questionnaires 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate. Following Jarvenpaa and Staples (2001) and Ravichandran and Rai (2000), in information system (IS) research a response rate within the range of 17% to 28% are considered as reasonable. Further Sivo et al. (2006) have conducted a study on the response rates reported in six well-regarded IS journals (from 1998 to 2002), where data were gathered using questionnaires and summarize that the average response rate ranged from 22% to 59.4%. Recent studies also report such low response rates in IS literature utilizing matched-pair surveys (Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2011) with few deviations such as studies conducted by Chen et al. (2014) and Wu and Li (2008) (Table 4.2). Therefore, the response rate of 31% as obtained in this study is well justified.

Further, Kline (2015) has presented additional guidelines for determination of sample size in studies involving structural equation modelling (SEM). According to Kline (2015), the sample will be considered as small if the size is < 100; medium if the size ranges between 100 and 200; and large if the size is > 200. Since the present study employs SEM technique (as explained in the subsequent section), a sample size of 300 will be considered as large. Additionally, Kline (2015) suggests that sample size portrays complex relationships in a model and complex models require larger samples. Moreover, the ratio of the number of cases to the number of free parameters is desirable to be 20:1, and a more realistic target may be 10:1, however, the statistical precision of the results may be doubtful if the ratio is less than 5:1. This means that for each independent variable more than 5 numbers of observations should be taken

into consideration. The present study intends to match the cases/parameter ratio as 10:1 (as evident from chapters 5, 6, 7, and 8) and approximates Kline's (2015) criteria.

Table 4.1 Sample Characteristics *($n_0 = 300$)*

Ownership structure	**Observation**	**Percentage**
Public-owned	165	55
Private-owned	135	45
Banks' Age (in years)	**Observation**	**Percentage**
0-20	2	0.66
20-40	90	30
More than 40	208	69.34
Banks' Size (based on number of employees working across India)	**Observation**	**Percentage**
Fewer than 20000	2	0.66
20000-40000	105	35
More than 40000	193	64.34
Participants (Matched Survey)	**Observation**	**Percentage**
Business Executives		
General Managers	16	5.33
Deputy General Managers	20	6.66
Assistant General Managers	33	11
Chief Managers	35	11.66
Senior Managers	55	18.33
Deputy Managers	70	23.33
Assistant Managers	71	23.69
IT Executives		
Chief Information Officers	7	2.33
IT Directors	10	3.33
IT Project Managers	38	12.66
IT Risk Managers	45	15
Innovation Specialist	29	9.66
Assistant Managers-IT	88	29.33
Other IT managers	83	27.69
Total	**300**	**100**

Table 4.2 Previous Studies Using Matched-pair Survey in IS Research

Reference	Sample Size	Response Rate	Remarks
Ray et al. (2005)	72	9%	Organizations' IT resources and capabilities enhance the performance of the customer service processes by delivering superior quality customer service.
Tallon (2008)	241	13%	Managerial IT capabilities lead to the development of technical IT capabilities which in-turn drives agility. Environmental dynamism is important for agility or adaptiveness.
Wu and Li (2008)	215	86%	The study conceptualizes an indirect causal effect of IT capability on organizational performance via mediating roles of business process agility and environmental uncertainty.
Lu and Ramamurthy (2011)	128	15%	There exists a significant positive relationship between IT capability and organizational agility. Over IT spending does not lead to greater agility. If IT spending enhances and foster IT capabilities then it will improve agility.
Tallon and Pinsonneault (2011)	241	15%	Strategic IT-business alignment has a positive and significant effect on agility which is associated with improved firm performance.
Chen et al. (2014)	214	92.2% (for IT executives) 89.2% (for business executives)	Firm-wide IT capability facilitates augmented performance and the performance impact of IT capability is fully mediated by business process agility. Further,

			environmental factors act as moderators and influence the IT capability-business process agility relationship.

4.1.5 Research Instrument Development

The researcher has conducted a thorough review of the past literature to explore essential organizational capabilities that influence agility and performance. Concerning to the same, various lower-order and higher-order organizational capabilities such as IT capability, human IT capability, KM capability, and strategic IT-business alignment capability have been identified that greatly impact agility and performance. A multi-item reflective measurement scale has been developed based on the prior studies with slightly modified measures to fit into the context of the study. To be specific, a five-point Likert-type rating scale is used to collect responses relating to the multi-item measures, where the extreme points represent a range from strongly disagree (1) to strongly agree (5). The research instrument comprises of two sections, where the first section is to collect information about the control variables (i.e., ownership structure, banks' size, and banks' age) and the second section comprises of the structured questionnaire containing the independent, dependent, mediator, and moderator variables. A total of 112 numbers of structured survey questions are developed covering all the study variables. Since this study takes into account for two categories of respondents, some of the questions are for the business executives, some of them are for the IT executives, and some target both business and IT executives. The list of all the variables along with their indicators and supporting literature is exhibited in table no. 4.3.

Table 4.3 List of Variables along with Indicators and Supporting Literature

Variables (Independent)	Survey Questions	Supporting Literature
Managerial IT capabilities	1.There is a strong partnership between the IT and business executives 2.IT executives plan for IT strategies consistent with business goals 3.IT executives evaluate major IT investments after implementation 4.IT is used as an industry and market practices changer	Reich and Benbasat, (2000) Tallon et al. (2000) Sambamurthy et al. (2003) Bassellier and Benbasat, (2004) Tallon, (2008)
Technical IT capabilities	1.Our bank uses hardware i.e.,	Keen, (1991)

	compatible with particular operating system and has a high degree of systems inter-connectivity 2.Based on end-user requests new functionality can be quickly added to existing software modules 3.IT executives are encouraged to improve their technical skills 4.Our bank uses user-friendly operating systems 5.Our bank encourages IT-based innovations	Bharadwaj, (2000) Tippins and Sohi, (2003) Tallon, (2008)
Business Functional Skills	1.IT executives are knowledgeable about existing business functions 2.IT executives are encouraged to learn new business functions and technologies 3.IT executives understand business issues and provide suitable technical solutions 4.IT executives acquire knowledge about market competitors and business environments	Lee et al. (1995) Lee et al. (2002) Fink and Neumann, (2009)
Interpersonal Management Skills	1.IT executives work in collaborative and cross-functional groups to solve business and IT issues 2.IT executives are proactive team players and project positive attitude 3.IT executives are encouraged to perform other external IT services by extending their existing knowledge domain 4.IT executives are encouraged to develop effective communication skills 5.IT executives are encouraged to develop planning, organizing, and leading capabilities	Lee et al. (2002) Fink and Neumann, (2007) Fink and Neumann, (2009)
Technology Management Skills	1.IT executives effectively manage technological fundamentals to create competitive advantage 2.IT executives are encouraged to develop necessary IT skills and follow modern IT trends 3.IT executives use IT as a medium to attain organizational objectives 4.IT executives properly plan, design, optimize for operation of technological products, services, and processes 5.IT executives are encouraged to develop web-based applications to meet up new market challenges	Lee et al. (2002) Lee et al. (1995) Fink and Neumann, (2009)
IT capability	1.Our bank has advanced IT infrastructure compared to others in the market 2.IT executives are knowledgeable about existing IT systems 3.IT executives are encouraged to	Bharadwaj, (2000) Tippins and Sohi, (2003) Lu and Ramamurthy, (2011) Chen et al. (2014) Mao et al. (2015a)

	experiment with new IT trends as necessary 4.IT executives are encouraged to effectively manage IT 5.IT executives maintain technology-based links with customers and suppliers 6.IT executives restructure IT processes to leverage opportunities 7.IT executives proactively explore IT to embrace innovative IT applications	
KM capability	1.Business executives are encouraged to acquire knowledge relating to new product development 2.Business executives comprehend changes in customers' demands and buying behaviors 3.Business executives have the required knowledge for overall firm governance 4.Business executives learn to better utilize knowledge resources to deal with uncertainties 5.Our bank promotes individual as well as organizational communication	Tanriverdi, (2005) Tanriverdi and Venkatraman, (2005) Ning et al. (2006) [4a]Cai et al. (2013) Mao et al. (2014)
Strategic IT-Business alignment	1.Our bank encourages effective communication between IT and business units 2.The value of IT's contributions into business strategies is acknowledged by both IT and business units 3.Our bank encourages collaboration of business and IT strategies to realize the value of IT in achieving business objectives 4.Our bank defines IT's role in business and vice versa 5.Our bank utilizes IT as a dynamic resource to offer customized solutions to business units 6.Our bank encourages development of necessary business and IT skill to promote alignment 7.Our bank encourages consistent use of IT applications on business processes	Luftman, (2000) Luftman et al. (2008) [4b]Luftman et al. (2015)
Variables (Mediator)	**Survey Questions**	**Supporting Literature**
Business Process Agility	1.Our bank encourages customization of product and services to meet customers' demands 2.Our bank encourages effective IT deployment 3.Our bank introduces new pricing schedules following competitors in the market 4.Our bank promotes expansion of business into new regional or	Tallon, (2008) Chen et al. (2014) Roldan et al. (2015)

	international markets	
Market Responsive Agility	1.Our bank makes effective and quick response to changing customers demand and competitors' strategy 2.Our bank develops and markets new products and services 3. Our bank makes required reengineering of business to better serve the market place 4.Our bank tries to broaden it's market outlets	Wu et al. (2006) Bi et al. (2011) Bi et al. (2013)
Sensing Agility	1.Our bank develops effective market intelligence to identify and track changes in customer preference and competitors' strategy 2.Our bank tracks new products or services launched by market competitors 3.Our bank identifies and builds essential capabilities to foresee market uncertainties 4.Our bank recognizes various changes relating to government regulations, policies, legal affairs, and economic shifts	Dove (2001, 2005) Overby et al. (2006)
Responding Agility	1.Our bank commences new ventures and modifies existing product lines/features for quick response to changing competitor's strategy and customer needs 2.Our bank creates innovative products to adapt the existing business fulfilling the demand changes 3.Our bank responds to market threats as opportunities to realize enhanced value 4.Our bank quickly responds to customer complaints and resolves issues	Dove (2001, 2005) Overby et al. (2006)
Adaptive agility	1.Our bank quickly senses and reacts to market and customer related changes 2.Our bank promotes incremental innovation 3.Our bank deals with resilient market responses 4.Our bank strives for continuous business process improvement to enhance business continuity	Sheffi and Rice Jr. (2005) Lee et al. (2008)
Entrepreneurial agility	1.Our bank proactively identifies environmental uncertainties 2.Our bank takes pre-emptive measures to deal with environmental threats 3.Our bank promotes radical innovation 4.Our bank launches innovative competitive actions to attain greater competitive advantage	Sheffi and Rice Jr. (2005) Lee et al. (2008)
Market capitalizing agility	1.Our bank encourages quick decision making in the face of market and/or customer	Lu and Ramamurthy, (2011) Cai et al. (2013)

	changes 2.Our bank constantly improves it's products/services offerings to quickly respond to and capitalize on changes 3.Our bank promotes superior intellectual ability to cope with market-related chaos 4.Our bank promotes effective IT utilization to discover external environmental changes 5.Our bank introduces products/services that are easily saleable in market 6.Our bank adopts contemporary technologies to react to competitors	
Operational adjustment agility	1.Our bank promotes IT-business proximity to detect the locus of change 2.Our bank Builds up customers' confidence 3.Our bank has the ability to scale up/down the levels of production/service 4.Our bank encourages quick internal adjustments whenever there is shortage of resources 5.Our bank switches IT vendors to avail of lower cost, improved quality, and better delivery times 6. Our bank encourages effective IT-business coordination to deal with consumer demands	Lu and Ramamurthy, (2011) Cai et al. (2013)
Variable (Dependent)	**Survey Questions**	**Supporting Literature**
Organizational Performance	1.Our bank strives for high return on investment 2.Our bank has high overall growth 3.Our bank has high competitive advantage relating to market competitors 4.Overall our bank is successful 5.Our bank has high profitability relative to goals 6.Our bank makes effective asset utilization 7.Our bank has high market share relative to goals 8.Our bank performs well relative to competitors 9.Our bank efficiently performs day-to-day business activities 10.Our bank promotes production of innovative products and services to attain product/service differentiation compared to competitors 11.Our bank promotes excellence in internal business processes to enhance it's responsiveness towards customers' needs	Bharadwaj, (2000) Hsu and Sabherwal, (2011) Tallon and Pinsonneault, (2011) Van Grembergen and De Haes, (2012) Chakravarty et al. (2013) Pebrianto, (2013) Inan and Bititci, (2015) Wu et al. (2015)

	12.Our bank promotes IT-business alignment to generate higher business value from IT related investments 13.Our bank strives for improved customer relations and loyalty 14.Our bank strives for long-run sustainable business performance	
Variables (Moderator)	**Survey Questions**	**Supporting Literature**
IT Spending	1.IT executives are encouraged to make rational investment on overall IT infrastructure 2.IT executives are encouraged to make rational investment on IT innovations 3.IT executives are encouraged to make rational investment on internal IT services 4.IT executives are encouraged to make rational investment on compatible hardware 5.IT executives are encouraged to make rational investment on software applications 6.IT executives are encouraged to make rational investment on shared network connectivity 7.IT executives are encouraged to make rational investment on delivery channels 8.IT executives are encouraged to make rational investment on core banking solution 9.IT executives are encouraged to make rational investment on risk management solutions 10.IT executives are encouraged to make rational investment on mobile banking solutions 11.IT executives are encouraged to make rational investment on customer relationship management	Bharadwaj, (2000) Santhanam and Hartono, (2003) Lu and Ramamurthy, (2011) Ramesh and Daler, (2012) KPMG Report, (2012)
Environmental Uncertainty	1.Our bank faces diversity in nature of competition 2.Our bank faces competition in product/service quality 3.Our bank functions in an environment where products/services get obsolete quickly 4.Our bank functions in an environment where competitor' moves, and products/services demand changes are not easily predictable 5.Our bank functions in an environment where there exists heterogeneity in product lines 6.Our bank functions in an environment where there exists heterogeneity in	Kearns and Lederer, (2003) Newkirk and Lederer, (2006) Yayla and Hu, (2012) Chen et al. (2014)

	mode of product distribution 7.Our bank functions in an environment where there exists heterogeneity in nature of competition 8.Our bank functions in an environment where there exists heterogeneity in customer buying habits 9.Our bank functions in an environment where there exists heterogeneity in geographic location	

[4a, 4b] Cai et al. (2013) and Luftman et al. (2015) have investigated IT capability, KM capability, and strategic IT-business alignment as the formative constructs (where the indicators cause the construct). However, according to Petter et al. (2007), formative constructs may cause potential problem in IS research. Therefore, following Edwards (2011), in this study these formative constructs have been operationalized as reflective ones (where the indicators are caused by the construct).

Following Becker (2005), this study takes into account for various control variables to increase the statistical power by means of reducing the error terms and alternative explanations for the findings. On the basis of the previous literature studies (as shown in table no. 4.4), this research uses various factors such as ownership structure, banks' age, banks' size as the control variables. According to Spector and Brannick, (2011: 288), "*The distinguishing feature of control variables is that they are considered extraneous variables that are not linked to the hypotheses and theories being tested*". Based on these thoughts, in this study the control variables have not been included as part of the hypotheses testing.

Table 4.4 Previous Studies Using Control Variables in IS Research

Reference	Control Variables	Remarks
Bi et al. (2011)	Firm size Firm age	IT capability is a source of competitive advantage and enables the firms to generate market responsive agility and obtain superior sales performance.
Tallon and Pinsonneault, (2011)	Firm size	In the face of tremendous changes and uncertainties in the external environment, agility can be seen as a key competitive imperative. IT plays a vital role in providing greater agility. With an aim to improve firm performance, effective IT-business strategic alignment is essential to understand how firms strategize for and justify agility as key business imperatives.
Chen and Siau (2012)	Company size	Both IT (IT infrastructure

		flexibility) and IS (business intelligence) components assist in improving long run organizational agility.
Lim et al. (2012)	Firm size	Firms with powerful senior IT executives greatly contribute to the effective renewal process of IT capabilities and thereby, enhance firm's competitive advantage.
Liu et al. (2013)	Firm size	IT is an important competitive tool. Flexible IT infrastructure and IT assimilation affect firm's performance by means of absorptive capacity and supply chain agility.
Chen et al. (2014)	Firm size (number of employees) Ownership structure Organizational age (in years)	IT capability fosters superior performance. Business process agility fully mediates the IT capability-performance relationship. Environmental factors act as moderators to influence the ability of firms' IT capability to generate business process agility.
Cai et al. (2013)	Ownership Firm size	Lower-order capabilities (IT and KM capabilities) influence higher-order capability (organizational agility) which in-turn leads to superior firm performance.
Mao et al. (2015a)	Organization size Organization age	IT and KM capabilities greatly impact organizational agility in higher uncertain environments.

According to Straub (1989), the designed research instrument needs to be validated through a series of procedures to ensure the content validity, construct validity, and reliability. Following Lu and Ramamurthy (2011), the measurement scales were pretested utilizing the Q-sort method, which comes after the measures have been created through a detailed literature search and before the administration of the actual survey (Nahm et al. 2002). In this study before the commencement of the actual survey the researcher had divided the questionnaire into two parts i.e., part A and part B, where the part A contained the business executive survey questions and the part B comprised of the IT executive survey questions. Then two business doctoral students and IS doctoral students were selected as the judges to assess each part. They were

requested to sort the questions so that the researcher can measure the inter-judge agreement. Based on their judgment any questions that were identified as being too ambiguous were reworded or removed. Then, for the modified questionnaire the inter-judge agreement was measured by the "Cohen's Kappa" (Cohen, 1960), and "Hit Ratio" (Moore and Benbasat, 1991). The average Kappa scores were calculated to be 0.68 for part A and 0.73 for part B which were greater than the suggested threshold of 0.65 (Nahm et al. 2002). Moreover, the overall hit ratios of 71 % (for part A) and 79% (for part B) suggest that most of the measures were placed in the intended or target category by all the judges. Using this questionnaire a pilot study was conducted on 9 local branches, where 70 questionnaires were distributed in a matched-pair survey among the business and IT executives to gauge the suitability, phrasing, clarity, and comprehensiveness of the indicators. Out of 70 questionnaires, 28 valid and matched responses were returned, where the respondents had identified some ambiguities. The questionnaire was further refined by deleting the ambiguous questions and adding more relevant ones prior to the actual administration of the survey.

4.2 Multivariate Analysis Techniques

The multivariate analysis is used to understand the relationships between the variables in a study and also depicts their relevance in context to examine the actual research problem. In general a constellation of various statistical techniques are employed to establish such relationships, known as multivariate analysis techniques. According to Hair et al. (2014), multivariate techniques in a study are defined as all the statistical techniques that concurrently investigate multiple measurements on various individuals or objects. Following Kothari (2004), multivariate techniques are usually considered as powerful tools to examine data represented in terms of many variables. The univariate analysis, which is conducted separately for each variable does not take into account for the correlation or inter-dependence among the variables and hence, may lead to inaccurate interpretation of the result (Kothari, 2004). The underlying objective of the multivariate technique is to transform massive data into a smaller number of composite scores so that they exhibit as much information as possible contained in the raw data and hence, represent a simplified visible data form. Thus, these techniques are basically used for obtaining more realistic results and foster the decision-making process. The following sub-sections briefly discuss about various multivariate techniques as used in this study.

4.2.1 Descriptive statistics

Descriptive statistics fundamentally describe the characteristics of the data in a study. According to Given (2008), it represents the mathematical summarization of the data which involves the conversion of a large number of observed values into a few numbers. In general the descriptive statistics are categorized as numerical (e.g., measures of central tendency and variability) and graphical (e.g., bar charts, scatter plots, and histograms). The measures of central tendency typically depict the tendency of the quantitative data to gather around the central value. There are three common measures of central tendency i.e., mean, median, and mode that provide a set of values describing the typical score in a distribution of scores (Given, 2008). The mean represents the average value i.e., the value which is calculated by dividing the total of the values in a given series of items with the total number of items. The median is the middle item's value in a given series of items when ordered either ascending or descending manner. The mode represents the highest frequency i.e., the frequently occurring item in a series and possesses the maximum concentration.

In contrast, the measures of variability (dispersion) usually represent the extent to which the items are spread in a series (i.e., the variation around the central value). The measures of dispersion typically consist of the range, variance, and standard deviation of the scores (Given, 2008). The range depicts the simplest measure of dispersion and is defined as the difference between the largest and smallest values in a given series of items. The variance basically represents the variability of the items that are spread out from their statistical average (i.e., mean). This variation may be positive or negative, hence in order to obtain a positive value it is mathematically estimated as the average of the squared differences of the items from the mean. The standard deviation quantifies the amount of variability of the set of items and is calculated by the square root of the variance. According to Kothari (2004), "mean" is the most suitable measure of central tendency and "standard deviation" is the most commonly used measure of dispersion. Hence, in the present study mean and standard deviation have been calculated for every item. Further, the basic summery statistics has been also provided in terms of the sample maximum and minimum which denote the largest and smallest value respectively in the data set.

4.2.2 Exploratory Factor Analysis (EFA)

An EFA delineates the underlying structure of the variables by explaining the inter-correlation among them. According to Hair et al. (2014), this technique summarizes the information contained in a large number of original variables into a smaller set of latent variables or factors with minimum loss of information. Further, EFA should be conducted when the sample size is more than 100 and the ideal cases/parameter ratio is 5:1 (Hair et al. 2014).

In this study the EFA has been conducted by using the principal component analysis (PCA) extraction method and varimax rotation based on Eigenvalue greater than 1. The Eigenvalue greater than 1 describes a measure of explained variance and is regarded as an important criterion to assess the usefulness of a factor. By using the PCA, the number of observed variables gets reduced to a smaller number of principal components, which explain the required amount of variance in the data. Rotation is the process for transforming the factor loadings into a simpler and more meaningful structure (Treiblmaier and Filzmoser, 2010). The "varimax" rotation, generally regarded as the best orthogonal rotation and is overwhelmingly used in a wide variety of researches because of its simplicity and conceptual clarity (MacCallum et al. 1999). In an orthogonal rotation the final extracted factors will be at right angles with each other, which essentially exhibits that each factor will explicate information independent of other factors.

In this study, the EFA has been conducted to extract the theoretically meaningful items for the study variables and all these extracted items have the factor loadings above 0.6 and do not cross-load on other components (as illustrated in chapters 5, 6, 7, and 8). Hence, following Hair et al. (2014), these items properly define the study variables. The suitability of EFA is also established by the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA), and Bartlett's test of sphericity. The MSA value varies between 0 to 1 and a value of 0.50 or more represents data adequacy for factor analysis (Kaiser, 1974), where the value close to 1 is an indication of correlation pattern of the items to generate distinctive and consistent factors. According to Treiblmaier and Filzmoser (2010), the MSA value of 0.80 indicates a good ("meritorious") factorability of the correlation matrix and hence represents that the items can produce unique and reliable factors. The Bartlett's test of sphericity tests the significance of the study as well as the correlations among the variables. The significance level ($p < 0.05$) indicates

that the correlation matrix is significantly different from the identity matrix and there exists zero correlation among the variables.

The communality denotes the extent to which an item explains common variance with all other items, which ranges from 0 to 1, and usually higher communalities are recommended. If the communality value of an item varies between 0.0 to 0.4, then it may not load significantly on any factor. The communalities values are considered "high", if all the items score 0.8 or greater, which is unlikely to occur in real data (Osborne and Costello, 2009). According to Field (2009), the communalities after extraction should be above 0.5. MacCallum et al. (1999) suggest that the communalities of all items should be greater than 0.6 or at least the mean level of communalities should be 0.7.

4.2.3 Multiple Regression Analysis

According to Field (2009), regression analysis is a statistical procedure to predict an outcome (dependent) variable from one or more independent variables. If in a regression analysis one independent variable predicts the dependent variable, it is called as simple regression, while in the case of two or more independent variables predicting the dependent variable is known as multiple regression (Hair et al. 2014). Usually multiple regression analysis is the most widely used multivariate technique for "prediction" and "explanation" of relationships between independent and dependent variables. Following Hair et al. (2014), "prediction" exhibits the extent to which a regression model predicts the dependent variable, and "explanation" estimates each independent variable's regression coefficient along with the magnitude, sign, and statistical significance to establish a theoretical grounding for the effects of the independent variables on the dependent variable. Based on these rationales multiple regression analysis fulfils the two-folded objectives in a study. First to maximize the overall predictive power of the independent variables and second, to compare diverse sets of independent variables so as to ascertain the predictive power of each set. In a regression model when the independent variables are related to each other the regression coefficient of one independent variable may get influenced by the other. If the independent variables are highly correlated, the issue of multicollinearity arises, which can lead to skewed or misleading results relating to the predictive power of individual independent variable. Therefore, in the present study multicollinearity issue has been examined using various collinearity statistics such as tolerance and the variance inflation factor (VIF) (as presented in chapters 5, 6, 7, and 8).

4.2.4 Structural Equation Modelling (SEM)

SEM is a statistical modelling technique which is extensively used in the behavioral and social science researches. According to Hair et al. (2014), SEM is an extension of various multivariate techniques (particularly EFA and multiple regression analysis) and tests theories containing multiple equations, which involve dependence relationships. SEM fundamentally provides quantitative tests for various hypotheses proposed by the researcher and depicts relationships among the unobserved (latent) variables or constructs that are measured by multiple observed variables or indicators (Lomax and Schumacker, 2012). In a conceptual model, SEM investigates the complex patterns of relationships among the constructs by taking into account for the effect of measurement error in the estimation process.

SEM analysis usually consists of two parts: the measurement model which involves the confirmatory factor analysis (CFA) and the structural model (Ho, 2013). The measurement model represents the relationship between unobserved (latent) and observed variables and also tests the reliability and validity of the latent variables. The reliability is measured by the composite reliability (CR) and maximum reliability {MaxR designated by the symbol 'H', MaxR(H)} values. The validity of the latent constructs is estimated by the convergent and discriminant validity. The convergent validity refers to the degree to which the indicators of the constructs share common variance i.e., there exists convergence between the constructs. On the other hand the discriminant validity represents the extent to which the constructs are distinct from other constructs i.e., there exists discrimination/distinction between the constructs. The convergent validity is calculated by the average variance extracted (AVE) values and the maximum shared variance (MSV) along with comparison of shared variance between the constructs with the square root AVE estimate the discriminant validity. According to Ho (2013), the latent variables or constructs as defined by the measurement model can be inter-connected via a correlational and dependence relationship. These relationships among the constructs are represented in the form of the structural model. For accurate prediction of such relationships both the measurement and structural models need to be assessed based on various model fit indices. Following Yuan (2005), one of the most important steps in SEM is about assessing whether a specific model (measurement and/or structural model) 'fits' the data, based on which the model may be "accepted or rejected".

Following Hooper et al. (2008), the model fit indices are categorized as absolute fit indices, incremental fit indices, and parsimonious fit indices. The absolute fit indices determine how well a priori model fits the sample data and do not rely on comparison with a baseline model. Usually the relative/normed chi-square ($\chi 2/df$) or (CMIN/DF), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), and adjusted goodness-of-fit statistic (AGFI) are calculated as critical absolute fit indices. Although, chi-square is the traditional measure for determining the overall model fit, it is often criticized due to its over-sensitiveness towards sample size. When the sample size is large it always rejects the model (Jöreskog and Sörbom, 1993) and in case of smaller sample size it lacks statistical power and cannot differentiate between a good fitting model and poor fitting model (Kenny and McCoach, 2003). Therefore, the researchers use alternative indices which minimize the effect of sample size and one such index is relative/normed chi-square, which is determined by dividing chi-square with the degrees of freedom (df) i.e., ($\chi 2/df$) (Wheaton et al. 1977). The recommended range for this is between 2.0 to 5.0 (Tabachnick and Fidell, 2007; Wheaton et al. 1977). The (RMSEA) is one of the most informative fit indices and represents how well a model fits the population (Diamantopoulos and Siguaw, 2000). According to MacCallum et al. (1996), an RMSEA value between 0.08 to 0.10 exhibits a mediocre fit and below 0.08 provides a good fit. GFI is treated as an alternative to the chi-square statistics which determines the proportion of variance that is accounted for by the estimated population covariance (Tabachnick and Fidell, 2007). AGFI tends to adjust the GFI based upon the degrees of freedom and both of these indices range between 0 and 1, where the values of 0.90 or higher indicate good fitting model and the values less than 0.90 shows mediocre fit.

The estimation of the incremental fit indices relies on comparison with some alternative baseline model and do not use the chi-square statistics in its raw form but compares this value to the baseline model. The normed-fit index (NFI), non-normed fit index (NNFI) also known as the Tucker-Lewis index (TLI), and comparative fit index (CFI) are the crucial incremental fit indices. The NFI evaluates a model by comparing its chi-square value to the chi-square value of the null model. Its value ranges between 0 and 1, but values greater than 0.90 are considered as good fit. However, this index is sensitive to sample size and underestimates the fit for smaller sample size (i.e., less than 200). Hence, according to Kline (2015), the model fit should not solely rely on this index. In order to overcome this issue, the TLI (or NNFI) index is calculated

which usually prefers simpler models. The recommended value of this index is as low as 0.80 and due to its non-normed feature, the value can go above 0.90 and sometimes above 1.0, thus, becomes difficult to interpret (Byrne, 2013). The CFI is not typically affected by the sample size and accurately estimates when the sample size is small (Tabachnick and Fidell, 2007). This statistic ranges between 0.0 and 1.0 and the value greater than 0.90 indicates a good fit.

The parsimonious fit indices compare the models based on their level of complexity and provide information about the best model. The parsimonious goodness-of-fit index (PGFI) and parsimonious normed fit Index (PNFI) are the two categories of parsimonious fit indices which are calculated by adjusting the degrees of freedom with GFI and NFI respectively. The values of these indices are considerably lower than other model fit indices and generally no threshold levels are recommended for them. However, according to Mulaik et al. (1989), these indices should be within the value of 0.50 when other model fit indices achieve values above 0.90.

4.2.5 Moderation Analysis

As described in the previous section, SEM establishes the relationship between the unobserved (latent) and observed variables and also interconnects the unobserved (latent) variables through dependence relationships. However, the researchers often investigate whether such relationship gets influenced by a third variable known as the moderator variable. In general, the concept of moderation is explained by subgroup differences, and interactions effects (Little et al. 2007). Following Hayes (2009), a moderated effect is statistically modeled as the interaction between the predictor variable and the moderator variable and then, this interaction term is entered into the regression equation only after the linear main effects on the outcome variable of the predictor and moderator variable are estimated. If the effect of interaction term on the outcome variable is found to be significant, then it is inferred that the effect of the predictor variable on the outcome variable is influenced by the moderator variable. The conceptual diagram showing the effect of the moderator (W) on the relationship between the predictor (X) and outcome (Y) is presented in figure no. 4.1. Generally the interaction-moderation analysis is tested by evaluating a linear regression model of the form:

$$Y = i_Y + b1X + b2W + b3XW + e_Y$$

Where, Y = *the outcome variable,*

X = the predictor variable

W = the moderator variable

b1, b2, and b3 are estimated regression coefficients

e_Y *= error in estimation*

i_Y *= regression intercept*

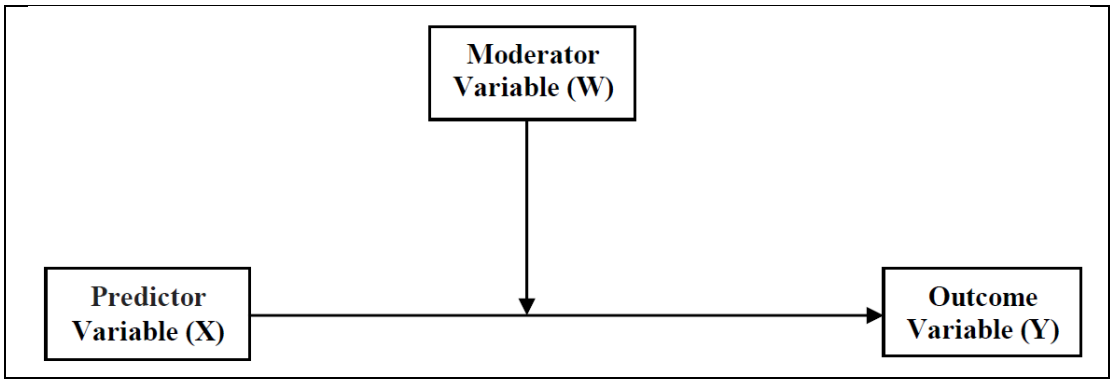


Figure 4.1 The relationship between the predictor and outcome is influenced by the moderator

Following Hayes (2009) and Little et al. (2007), this research has examined the interaction-moderation effect using the AMOS statistical tool as exhibited in chapters 5, 6, 7, and 8.

4.2.6 Mediation Analysis

In the mediation analysis the causal relationship between the predictor (X) and outcome (Y) variable is examined through one or more mediator variable(s) (M). Therefore, in this analysis along with the direct causal relationship between predictor (X) and outcome (Y) an indirect relationship (via mediator) is established. Typically a mediation model exhibits that the predictor (X) affects the mediator (M), which in-turn influences the outcome (Y). According to Hayes (2015), in a mediation analysis the primary focus is on the estimation of the indirect effect i.e., the mediation model takes the forms of X → M → Y. The conceptual diagram showing the indirect effect of predictor (X) on outcome (Y) through single mediator (M) is illustrated in figure no. 4.2.This indirect effect can be tested using the following two linear regression models.

$$M = i_M + aX + e_M$$
$$Y = i_Y + cX + bM + e_Y$$

Where, Y = *the outcome variable,*

X = the predictor variable

M = the mediator variable

a, b, and *c are estimated regression coefficients*

e_M *and* e_Y *are error in estimations*

i_M *and* i_Y *are regression intercepts*

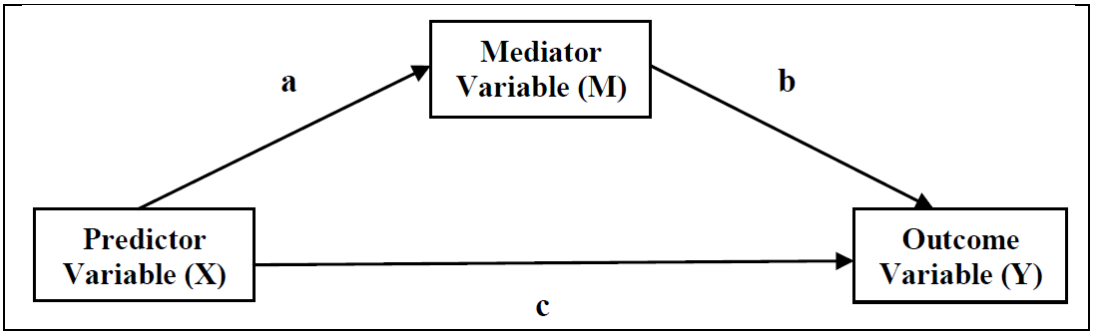


Figure 4.2 The indirect effect of the predictor on the outcome (a x b) is influenced through the mediator

Although, the literature suggests many methods for testing hypotheses involving mediation effects, the Baron and Kenny's (1986) approach has been the most widely used method to claim mediation if the following three necessary conditions are met.

1. X has a significant relationship on M
2. M has a significant relationship on Y
3. The effect of X on Y diminishes in the presence of M in the model

Further, Baron and Kenny (1986) also recommend conducting the Sobel *z*-test for determination of the indirect path (a x b) using the following formula.

$$z = \frac{a \times b}{\sqrt{b^2 s_a^2 + a^2 s_b^2}}$$

Where, *a and b are the estimated regression coefficients*

S_a *and* S_b *are the standard errors of a and b respectively*

However, recent studies conducted by Hayes (2009), Hayes, (2013) and Zhao et al. (2010) have criticized this Baron and Kenny (1986) approach and suggested that the strength of the mediation effect should be only measured by the magnitude of the indirect effect, but not by the absence of the direct effect. Further, there should be only one pivotal requirement to be met i.e., the indirect effect (a x b) is significant instead a significant relationship to be mediated. In addition, Preacher and Hayes (2004) have popularized more rigorous and powerful bootstrapping techniques which overpower the Sobel test.

Further, according to Preacher (2015), generally the indirect effect can be quantified in two ways: the product of coefficients (a × b) and the difference in coefficients ($c^I - c$), where "c^I" is the effect of X on Y in the absence of M, and "c" is the effect of X on Y in the presence of M. If both M and Y are continuous variables then, a × b = c^I – c, so it is immaterial how the indirect effect is computed. *"In generalized linear mediation models, the residual variance for M and Y is held constant when variables are moved in and out of equations, so "c^I" cannot be directly compared to "c" without rescaling to render coefficients commensurable"* (Preacher, 2015: 829). Since product of coefficients method (a x b) does not suffer from the incommensurability problem, it should be used to compute indirect effects (Bauer, 2009; Buis, 2010; MacKinnon et al. 2007). Preacher (2015) has suggested various methods that can be implemented in modern SEM software for this computation. Therefore, following Gaskin (2016), the present research uses the *"MyIndirectEffectEstimand"* in AMOS (Version 20) to conduct the mediation analysis as presented in chapters 5, 6, 7, and 8.

4.2.7 Moderated-Mediation Analysis

According to Hayes (2015), a mediation effect is said to be moderated if the moderator (W) shows a nonzero weight on the indirect effect of the predictor (X) on outcome (Y) through mediator (M), which means that an indirect effect can be quantified at different levels of a moderator. This nonzero weight i.e., the *index of moderated mediation* normally estimated as a product of at least two regression coefficients and represents a formal test for moderated mediation effect. This effect (considering one mediator and one moderator) is conceptually diagrammed in figure no. 4.3 and estimated by using the following two linear regression equations.

$$M = i_M + a_1X + a_2W + a_3XW + e_M$$
$$Y = i_Y + cX + bM + e_Y$$

Where, Y = *the outcome variable,*

X = the predictor variable

M = the mediator variable

W = the moderator variable

a_1, a_2, a_3, *b, and c are estimated regression coefficients*

e_M *and* e_Y *are error in estimations*

i_M *and* i_Y *are regression intercepts*

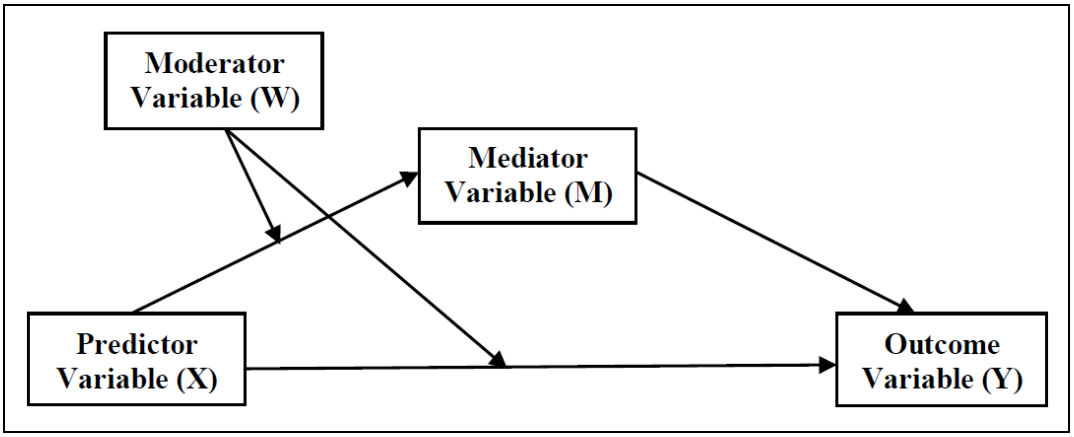


Figure 4.3 Conceptual diagram showing the moderated mediation effect of the predictor on the outcome

Following Hayes (2015), this research uses the *"PROCESS Macro for SPSS"* to estimate the *index of moderated mediation* as presented in chapters 5, 6, 7, and 8.

The following table no. 4.5 exhibits some important prior studies which have adopted various multivariate techniques and SEM analysis in IS research.

Table 4.5 Previous Studies adopting Multivariate Techniques and SEM analysis in IS Research

Reference	Remarks
Kim et al. (2006)	Explores how IS innovations relating to supply chain communication systems affect channel relationships and firm performance with the moderating influence of partner clarity.
Fink and Neumann, (2007)	Investigate various IT personnel capabilities to obtain IT infrastructure capability which in-turn leads to IT-dependent organizational agility.
Fink and Neumann, (2009)	Examine the effect of human IT elements on IT infrastructure-enabled flexibility to realize strategic alignment and IT-based competitive advantage by taking into consideration of various

	organizational moderators.
Bi et al. (2011)	Assess the relationship between IT capability and organizational performance by taking into account for the top management commitment as a crucial moderator.
Lu and Ramamurthy (2011)	Empirically investigates the link between IT capability and organizational agility along with IT spending as a moderator.
Tallon and Pinsonneault (2011)	Examine the effect of strategic IT-business alignment on firm performance through the mediating influence of organizational agility and also address the influences of IT flexibility and environmental volatility as moderators.
Cai et al. (2013)	Demonstrate the role of IT and KM capabilities on developing organizational agility along with the moderating effect of organizational climate.
Liu et al. (2013)	Study the performance impact of IT capability through the mediating role of absorptive capacity and supply chain agility.
Wang et al. (2013)	Assess the effect of IT skills on IT capabilities and strategic IT-business alignment.
Luftman et al. (2015)	Discuss critical measures of IT-business alignment to enhance the company performance.
Mao et al. (2015a)	Explore how the IT and KM capabilities influence organizational agility by taking into account for contingent factors such as environmental uncertainty and information intensity as moderators.
Roldán et al. (2015)	Assess the role of IS capabilities on attaining organizational agility along with absorptive capacity as a mediator and hierarchy culture as a moderator, and further examine the moderated-mediation effect.

This chapter thoroughly explained several research design and methods that have been implemented to conduct this study in a coherent and logical way. The present research administers a matched-pair survey to collect primary responses from the business and IT executives (particularly working in the middle to senior level of management) of various scheduled commercial banks in India. The subsequent chapters (5, 6, 7, and 8) meticulously investigate the effects of various organizational capabilities with special focus on IT capability, human IT capability, KM capability, and strategic IT-business alignment capability on organizational agility with an objective to enhance the organizational performance.

Chapter 5

Effect of Information Technology (IT) Capability on Organizational Performance: The mediating role of Organizational Agility

5.1 Introduction

Information technology (IT) capability is identified as an organizational capability which denotes the ability of an organization to deploy and mobilize IT-based resources combining and leveraging the value of other organizational resources and capabilities to enhance organizational performance (or simply performance) (Bharadwaj, 2000; Melville et al. 2004; Stoel and Muhanna, 2009). Although, various prior studies have documented the critical contribution of IT capability towards augmented performance, very few studies have explained about the process involving into it (Bi et al. 2011; Chen et al. 2014). Therefore, a more precise investigation is warranted to identify the processes through which organizations utilize their IT capability to attain superior performance. In this chapter the author has investigated the mediating role of organizational agility (or simply agility) and the moderating role of IT spending on the IT capability-performance linkage. In addition, a moderated-mediating role of IT spending has also been examined on the direct and indirect (via agility) relationship between IT capability and performance.

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). It is usually perceived that IT enhances performance by accelerating decision making, effective communication, and swiftly reacting towards the changing business environment. Firms invest in IT to become agile by pursuing fast and innovative initiatives to efficiently respond to the continually unfolding market place.

It is also observed by few researchers that IT may hamper and at times slow down agility (Overby et al. 2006) due to somewhat information system (IS) related steady physical and technological artifacts (Galliers, 2006). Unresponsive legacy IT systems, and inflexible IT

architectures can relatively act as impeding factors to agility and performance (van Oosterhout et al. 2006). Hence, IT may constrain the firm's ability to respond to threats or opportunities (Bharadwaj, 2000). The seminal research conducted by Carr (2003) has enquired about the strategic value and importance of IT and explains a negative relationship between IT spending and performance. 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, 2006). These assorted observations emphasize on proper application of IT which can enhance and in some cases hamper the firm's agility and performance.

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 organizations lack agility due to inflexible technology or whether ineffective IT management allows IT rigidity to persist and in-turn adversely affect performance. 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 and superior performance (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). Most of the previous researches have conceptualized IT capability drawn on the resource-based-view [5a](RBV) of the firms (Barney, 1991) and according to the RBV concept, some studies highlight the importance of business process agility (BPA) as a critical aspect of internal business process towards attaining greater performance (Chen et al. 2014; Sambamurthy et al. 2003; Weill et al. 2002).

This chapter primarily focuses on developing and testing a model describing the link between managerial and technical IT capabilities, market responsive and business process agilities, and performance. 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 to attain greater performance in contemporary business environments (Kohli and Grover, 2008; Lu and Ramamurthy, 2011).

[5a] RBV is described in detail in chapter 2.

Hence, there is a need for deeply examining the relationships between the constructs of IT capability, agility and performance. As a manifestation of the value of IT investment, the author has developed a model based on the prior conceptual and empirical investigations. Hence, this chapter addresses the following research questions:

1. Does IT capability (studied as managerial and technical IT capabilities) enable or inhibit agility {(studied as business process agility (BPA) and market responsive agility (MRA)}?
2. Does IT capability (in terms of managerial and technical IT capabilities) enable or inhibit performance?
3. Does agility (in terms of BPA and MRA) enable or inhibit performance?
4. What is the moderating influence of IT spending on the IT capability (as managerial and technical IT capabilities) and agility (as BPA and MRA) association?
5. What is the mediating role of agility (both BPA and MRA) on the relationship between IT capability (both managerial and technical IT capabilities) and performance?
6. [5b]What is the moderated-mediating role of IT spending on the direct and indirect (via mediator) relationship between IT capability (as managerial and technical IT capabilities) and performance?

5.2 Theoretical overview and Hypotheses

5.2.1 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 performance (Kim et al. 2011; Ray et al. 2012). Drawing on the RBV rationale, IT capability is recognized as an important organizational capability that has the ability to organize and utilize IT-based resources in arrangement with other organizational resources and capabilities to attain superior performance. According to Bharadwaj (2000), the key elements under IT capability constitute human IT resources, IT infrastructure, and IT enabled intangible assets. Some studies support effective IT management as a specific IT capability, which results in building competitive advantage (Chen et al. 2015; Fink, 2011).

[5b] Although, moderated-mediation analysis has been performed, due to lack of previous literature support, hypotheses have not been proposed relating to this analysis.

5.2.1.1 Managerial IT capability

Managerial IT capability enables firms' ability to effectively exercise IT skill-based resources in designing flexible IT infrastructure using hardware, software, and shared networks. As a result, the issue of rigidity traps, which might otherwise hinder agility can be evaded. Following Feeny and Willcocks (1998), managerial IT capability is categorized as shared vision between IT and business, IT services delivery, and IT architectural design that facilitate creation of greater business value by enabling firms to sense and respond to uncertain changes and thereby, making them more agile.

5.2.1.2 Technical IT capability

On the basis of RBV principles, agile-seeking firms utilize the expertise, insight, and strategic planning to generate technical IT capabilities in order to make firms realize enhanced performance. According to Byrd and Turner (2001), technical IT capabilities along with IT infrastructure mediate the relationship between IT skills capabilities and competitive advantage. Prior studies have explained the interrelatedness among the technical, managerial or human capital as crucial IT capabilities (Weil et al. 2002). Therefore, this chapter particularly showcases the interconnection between managerial and technical IT capabilities, where managerial capabilities are related to IT governance and technical capabilities involve in IT infrastructure (Tallon, 2008).

5.2.2 Organizational Agility

"Organizational agility" is recognized 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. 1997). A large group of IS researchers have discussed the concept of agility through their researches (Chen et al. 2014; Galliers, 2006; Overby et al. 2006; Sambamurthy et al. 2003). In order to respond to continually changing, unanticipated customers'

demands in a fluctuating market environment, organizations have to be quick in accumulating their technical skill, workforces, and management expertise with effective IT infrastructure.

5.2.2.1 Business Process Agility (BPA)

Various researches suggest that the internal business processes may be realized as essential elements connecting IT capability and organizational performance (Dehning et al. 2007; Tallon, 2008; Weill et al. 2002). According to Dove (2001), firms utilize their internal business processes to quickly handle the market or demand changes. This is regarded as a firm's business process agility, which 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).

5.2.2.2 Market Responsive Agility (MRA)

To address changing customers' demands and competitors' strategies, 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 market responsive agility highlighting an aggressive, competitive and growth-oriented entrepreneurial mind-set 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.

5.2.3 IT Capability-Agility Linkage

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 marketplace can be properly assessed by efficiently appraising the outcome of IT investment. Hence, based on this argument the following hypotheses are proposed:

H_{1a}: Managerial IT capability has a positive effect on BPA.
H_{1b}: Managerial IT capability has a positive effect on MRA.

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 firms' 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 capability and agility link.

H_{2a}: Technical IT capability has a positive effect on BPA.
H_{2b}: Technical IT capability has a positive effect on MRA.

5.2.4 Agility-Performance Linkage

Agility is considered as a critical enabler of performance as it can broaden firms' repertoire of responses to business related changes, various competitive actions, and risk management activities (Benaroch et al. 2006; Fichman, 2004; Sambamurthy et al. 2003; Tallon and Pinsonneault, 2011). Agile firms effectively deploy IT to deal with changes in customers' demands and competitors' strategies relating to different product and service offerings, which assists firms to attain higher competitive advantages. In this chapter the author has studied agility as BPA and MRA, and argued that both categories of agility are essential to effectively sense and swiftly respond to unanticipated changes to control uncertain market situations, which in-turn enhances performance. Based on these thoughts the following hypotheses are proposed.

H_{3a}: BPA has a positive effect on performance.

H_{3b}: MRA has a positive effect on performance.

5.2.5 IT Capability-Performance Linkage

Following the *'resource heterogeneity approach*' by Newbert (2007:127), it is exhibited that IT capability possesses the VRIN characteristics of RBV theory i.e., it is valuable, rare, inimitable, and/or non-substitutable. Hence it can be considered as source of competitive advantage and higher performance. According to Makadok (2000), firms focus on resource-picking and capability-building approaches to acquire and sustain higher performance. Resource-picking approaches represent procurement of VRIN resources and capability-building approaches specify the integration of such resources with organizational culture and structure to build VRIN capabilities. Based on the rationale of RBV, Bharadwaj (2000) has explained theoretical links between IT capability and business performance. IT capability enables firms to differentiate themselves from the market competitors on the basis of their IT resources such as IT infrastructure, human IT expertise/skill, etc. to generate firm-specific IT capabilities which will be difficult for the competitors to acquire and imitate and thereby, creates greater competitive advantage through IT. Given these arguments, the following hypotheses are postulated.

H_{4a}: Managerial IT capability has a positive effect on performance.

H_{4b}: Technical IT capability has a positive effect on performance.

5.2.6 Agility as mediator between IT capability and Performance

A detailed study of the previous literature (Bi et al. 2011; Chakravarty et al. 2013; Chen et al. 2014) suggests that IT capability-agility-performance related researches are progressively increasing. For example, Bi et al. (2011) have conceptualized IT capability based on the tenets of RBV and report its positive effects on the MRA to achieve higher sales performance. Chakravarty et al. (2013) have studied the dual roles i.e., the enabling and facilitating roles of IT capability towards development of agility (considered as a strategic capability) which focuses on effective implementation of vital entrepreneurial and adaptive actions to enhance firm performance. Chen et al. (2014) have examined the IT capability-performance relationship along with the mediating role of BPA and moderating role of environmental factors. Their research highlights BPA as a full mediator between IT capability and performance, and the moderation

analysis suggests that a hostile environment weakens IT capability and BPA linkage, while a complex environment strengthens it. These prior studies suggest that researchers have previously examined the mediating effect of either BPA or MRA on the IT capability-performance relationship. Extending these literature studies, in this chapter the author has investigated both BPA and MRA as mediators in assessing the IT capability and performance linkages. Hence, the following hypotheses are proposed.

H_{5a}: The positive relationship between managerial IT capability and performance is mediated by BPA.

H_{5b}: The positive relationship between managerial IT capability and performance is mediated by MRA.

H_{5c}: The positive relationship between technical IT capability and performance is mediated by BPA.

H_{5d}: The positive relationship between technical IT capability and performance is mediated by MRA.

5.2.7 IT Spending as moderator on IT capability-Agility Linkage

Prior research acknowledges IT investment as one of the primary initiatives to develop a flexible IT based business process which in-turn positively impacts 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.

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 type of business operation, hence, losing its ability to create long-term competitive advantage. Nevertheless, studies have supported the effectiveness of IT investment to be appropriately channeled for fostering and developing necessary IT capability to augment agility and superior firm performance (Bhatt and Grover, 2005; Lu and Ramamurthy, 2011).

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 to the market related as well as

internal business process oriented changes. Hence, in this chapter the moderating influence of IT spending on the IT capability-BPA-MRA associations has been investigated and the following hypotheses are postulated.

H_{6a}: IT spending positively moderates the relationship between managerial IT capability and BPA.

H_{6b}: IT spending positively moderates the relationship between managerial IT capability and MRA.

H_{6c}: IT spending positively moderates the relationship between technical IT capability and BPA.

H_{6d}: IT spending positively moderates the relationship between technical IT capability and MRA.

All the above mentioned hypotheses are illustrated in the following research model (Figure 5.1).

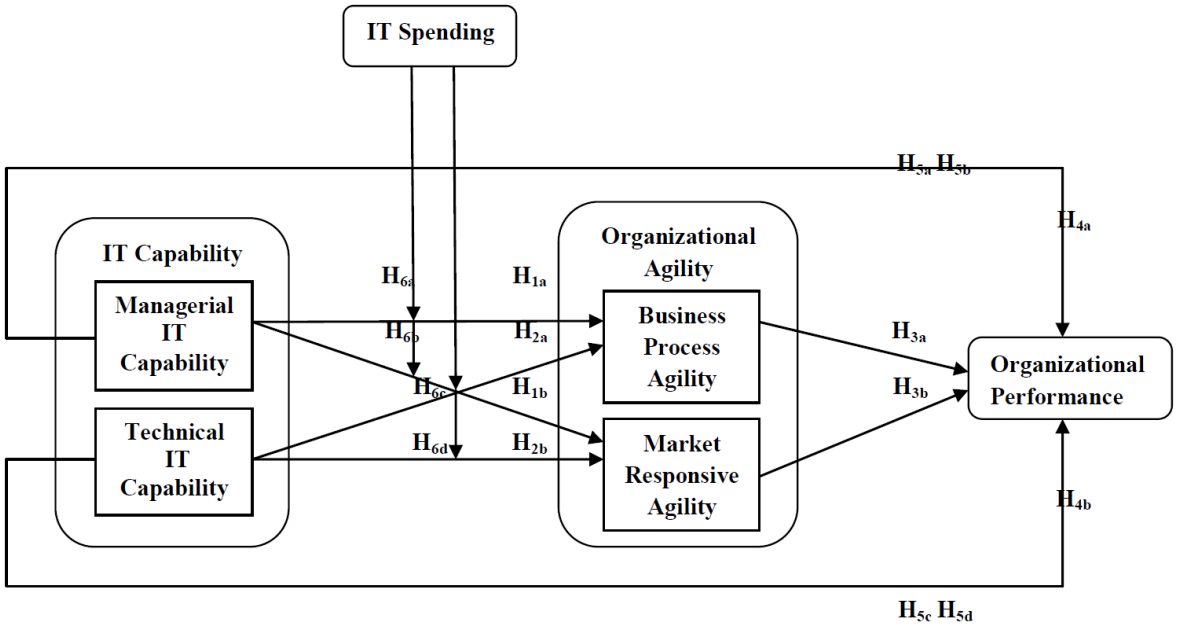


Figure 5.1 Conceptual model representing the relationship between IT capability, organizational agility, and organizational performance

5.3 Sample framework and Data collection

The sample consists of various public and private sector banking firms in the state of Odisha, India and the scope of the study is limited to the IT and business executives working in the middle to senior level of management. A total of 950 numbers of structured questionnaires were distributed in a matched-pair survey using both online (survey forms) and offline mode (hand delivery method). The bank managers and other senior executives were contacted personally and the e-mail id of the IT managers and executives were collected from them. A total of 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives, respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate.

5.4 Development of Instruments

Owing to prior literature, a multi-item reflective measurement scale is used with slightly modified items to fit into the context of this study. A five-point Likert-type rating scale has been 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 ascertain the validity of these measures. However, a series of tests to ensure construct validity and reliability (Straub, 1989) have also been performed.

5.5 Research Measures

In order to operationalize the research model, the primary constructs namely, IT capability (independent variable), agility (mediator variable), IT spending (moderator variable), and performance (dependent variable) are adapted and developed from a vigorous study of the prior literature. The business executives have been selected for agility and performance related measures and IT executives have been targeted for IT capability and IT spending related measures.

5.5.1 Measures for IT capability

IT capability is broadly categorized as managerial and technical capabilities (Tallon, 2008), where each of the constructs is operationalized with four and five indicators, respectively.

5.5.1.1 Managerial IT capabilities

Studies performed by Bassellier and Benbasat (2004) and Reich and Benbasat (2000) suggest the mutual effort exerted by both IT and business executives jointly solve IT and business issues, which promotes strategic IT deployment, and establish a shared vision for both business and IT. Therefore, *IT-business partnership (MAGIT1)* is selected as the first indicator of managerial IT capabilities (Reich and Benbasat, 2000). The second item *strategic IT planning (MAGIT2)* corresponds to the firm's intention to strategically utilize IT to assess existing objectives set for IT relating to cost cut, quality, speed, and efficiency of business operations (Tallon, 2008). Since *post-implementation IT reviews (MAGIT3)* are essential to the IT executives for evaluating their overall effectiveness, it is selected as the third indicator (Tallon et al. 2000). The fourth indicator was chosen as *IT as an industry and market practices changer (MAGIT4)* (Tallon, 2008).

5.5.1.2 Technical IT capabilities

As this construct focuses on flexible and easily adaptable IT infrastructures, hence, the first identified indicator is *network connectivity and hardware compatibility (TECHIT1)* (Tallon, 2008), which can be viewed as the reach and range (Keen, 1991) of an agile IT infrastructure. According to Tallon (2008), IT infrastructure may include another component named as *software modularity (TECHIT2)* which highlights quick development and redesign of software so as to easily achieve reengineered or customized IT applications. 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 (TECHIT3)* is taken as the third indicator (Tallon, 2008). The fourth and fifth indicators were selected as *user-friendly operating systems (TECHIT4)* and *IT-based innovation (TECHIT5),* respectively to foster an IT system devoid of legacy IT and rigidity traps (Tippins and Sohi, 2003).

5.5.2 Measures for Organizational agility

Organizational agility is operationalised in terms of business process and market responsive agilities.

5.5.2.1 Business Process Agility (BPA)

In this chapter the author has adopted the measurements suggested by Chen et al. (2014) and Tallon, (2008) for BPA. The first indicator for BPA is *customization of product and services to*

suit individual customer's demand (BUSPROAG1), the second indicator denotes *effective IT deployment to produce innovative, faster, and cheaper products and services to better serve customers (BUSPROAG2),* the third indicator is *introduction of new pricing schedules relating to changes in competitors prices (BUSPROAG3),* and the fourth indicator denotes *expansion of business into new regional or international markets (BUSPROAG4).*

5.5.2.2 Market Responsive Agility (MRA)

Following the research work conducted by Wu et al. (2006), Bi et al. (2011), and Bi et al. (2013), the first indicator for MRA was set as *effective and quick response to changing customers' demands and competitors' strategies (MARKRESPAG1),* the second indicator describes *development and marketing of new products and services in response to changing customers' tastes and preferences (MARKRESPAG2),* the third indicator represents *reengineering of business firms to better serve the market place (MARKRESPAG3),* and the fourth indicator explains *broadening firms' market outlets to strive for increased market shares (MARKRESPAG4).*

5.5.3 Measures for Organizational Performance

Previous literature studies relating to business value of IT suggest that financial measures such as return on assets (ROA) and return on sales (ROS) are commonly used measures for organizational performance (Bharadwaj, 2000; Chakravarty et al. 2013). Extending these previous studies the *return on investment (ROI) (ORGPERF1)* is used as the first indicator to evaluate the benefits of IT investments, the second indicator was selected as *overall organizational growth (ORGPERF2),* the third indicator represents *competitive advantage of firms relating to market competitors (ORGPERF3),* and the last indicator denotes *overall organizational success (ORGPERF4).*

5.5.4 Measures for IT Spending

According to Bharadwaj (2000) and Santhanam and Hartono (2003), IT investments/spending enhance firms' productivity, competitive position and consumer welfare. But, following Lu and Ramamurthy, (2011) if IT spending is not transmitted into developing and nurturing IT capability it may obstruct agility. They have measured IT spending as a contextual variable which was estimated by the ratio of IT budget to sales revenue. For this research the author has

investigated IT spending from an Indian banking industry context and follows the research work conducted by Ramesh and Daler (2012), where the impact of IT spending on various IT enabled banking services have been highlighted. Following Lu and Ramamurthy (2011), IT spending is treated as the moderator, influencing IT capability-agility linkage and it is measured by first *spending on overall IT infrastructure (ITSPEND1),* second, *spending on IT innovations (new services and capabilities) (ITSPEND2),* third, *spending on internal IT services (personnel) (ITSPEND3),* fourth, spending on *compatible hardware (ITSPEND4),* fifth, *spending on software applications (ITSPEND5),* and sixth, *spending on shared network connectivity (ITSPEND6).*

5.6 Data Analysis and Hypotheses Testing

Twenty seven indicators which cover all the study variables were first examined through a preliminary analysis containing procedures of descriptive statistics, and exploratory factor analysis [5c](EFA) utilizing SPSS (version 20). Out of the 27 indicators, a total of 24 indicators were loaded under 7 components which explain nearly 74% of variance. More variance is attributable to the first factor as compared to other remaining 6 factors (Table 5.3). The fourth indicator of BPA (*dealing with environmental changes involving regulatory and/or legal changes, and economic shifts: BUSPROAG4*), MRA (*broadening firms' market outlets to strive for increased market shares: MARKRESPAG4*), and performance (*overall organizational success: ORGPERF4*) did not load under any factor, hence these indicators were dropped. Moreover, no indicator was loaded under the 7th component and hence, it was also dropped. The EFA table containing 6 extracted components and 24 indicators is presented in table no. 5.4.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA) value of 0.805 represented adequacy of data for factor analysis (Table 5.1). The Bartlett's Test of Sphericity checks the significance of the study. The chi-square statistics of 6364.012 along with degrees of freedom 351 was found to be significant and hence, implies that the samples are significant to conduct factor analysis (Table 5.1). The communality values for all the indicators were found to be greater than 0.6 (Table 5.2). Hence, these indicators properly explain the common variance.
Further the unique and distinct indicators extracted under each construct were tested for their reliability and the Cronbach alpha (α) values were calculated to be within the range of 0.752 to 0.926 (Table 5.5), which is above the threshold value of 0.7 (Hair et al. 2006). Hence, these

[5c] The EFA procedure is discussed in detail in chapter 4.

extracted indicators were proved to be highly reliable. From table no. 5.4 it is evident that all the factor loadings are above 0.5 and there is no cross loading of the indicators, which confirm the convergent as well as discriminant validity of EFA.

Then, confirmatory factor analysis (CFA) was performed along with the interaction-moderation, and mediation analysis using AMOS (version 20). The moderated-mediation analysis was carried out using the SPSS-PROCESS macro. The 6-component model is a representation of 2 second-order constructs namely, IT capability and agility each having 2 first-order reflective dimensions (such as managerial and technical IT capabilities, and BPA and MRA), and 2 first-order constructs (such as IT spending and performance) which are measured by 3 interchangeable observed indicators. Managerial and technical IT capabilities are studied as the independent variables, BPA and MRA as the mediators, IT spending as the moderator, and performance as the dependent variable. A series of tests were conducted to confirm construct reliability, validity, and good data fit.

Table 5.1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA)		0.805
Bartlett's Test of Sphericity	Approx. Chi-Square	6364.012
	Df	351
	Sig.	0.000

Table 5.2 Communalities

Loaded Items	Extraction
ITSPEND1	0.831
ITSPEND2	0.782
MARKRESPAG4	0.639
ITSPEND4	0.681
MAGIT1	0.719
ITSPEND5	0.878
ITSPEND6	0.921
BUSPROAG3	0.743
TECHIT1	0.803
TECHIT2	0.906
BUSPROAG2	0.658
TECHIT3	0.871
TECHIT4	0.710
TECHIT5	0.658
BUSPROAG1	0.820
BUSPROAG4	0.659
ORGPERF4	0.642
MARKRESPAG2	0.674

MAGIT2	0.696
MAGIT3	0.757
MAGIT4	0.678
ORGPERF1	0.787
ORGPERF2	0.651
MARKRESPAG1	0.726
MARKRESPAG3	0.673
ORGPERF3	0.708
ITSPEND3	0.796

Table 5.3 Total Variance Explained by Extracted Factors

Factors	**Initial Eigenvalues** ***Total***	***% of Variance***	***Cumulative %***	**Extraction Sums of Squared Loadings** ***Total***	***% of Variance***	***Cumulative %***	**Rotation Sums of Squared Loadings** ***Total***	***% of Variance***	***Cumulative %***
1	8.276	30.652	30.652	8.276	30.652	30.652	4.601	17.041	17.041
2	3.139	11.627	42.280	3.139	11.627	42.280	4.185	15.502	32.542
3	2.590	9.591	51.871	2.590	9.591	51.871	3.074	11.387	43.929
4	2.048	7.584	59.455	2.048	7.584	59.455	2.688	9.956	53.885
5	1.755	6.499	65.953	1.755	6.499	65.953	2.122	7.858	61.743
6	1.249	4.628	70.581	1.249	4.628	70.581	2.076	7.690	69.833
7	1.012	3.750	74.330	1.012	3.754	74.330	1.322	4.897	74.330

Extraction Method: Principal Component Analysis

Table 5.4 Rotated Component Matrix and Descriptive Statistics

Item Loadings	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
ITSPEND1	0.750						1.000	5.000	3.523	1.039
ITSPEND2	0.697						1.000	5.000	3.550	0.992
ITSPEND3	0.882						1.000	5.000	3.500	1.101
ITSPEND4	0.604						2.000	5.000	3.676	1.096
ITSPEND5	0.900						1.000	5.000	3.516	1.026
ITSPEND6	0.939						1.000	5.000	3.490	1.089
TECHIT1		0.830					2.000	5.000	3.523	0.958
TECHIT2		0.908					1.000	5.000	3.543	0.999
TECHIT3		0.871					1.000	5.000	3.526	0.965
TECHIT4		0.625					2.000	5.000	3.700	1.086
TECHIT5		0.704					1.000	5.000	3.566	1.014
BUSPROAG1			0.863				1.000	5.000	3.490	1.089
BUSPROAG2			0.708				1.000	5.000	3.496	1.067
BUSPROAG3			0.789				1.000	5.000	3.636	1.023
MAGIT1				0.628			1.000	5.000	3.600	0.967
MAGIT2				0.787			1.000	5.000	3.536	0.911
MAGIT3				0.840			2.000	5.000	3.603	0.914
MAGIT4				0.693			2.000	5.000	3.723	0.936
ORGPERF1					0.868		1.000	5.000	3.750	1.034
ORGPERF2					0.797		2.000	5.000	3.550	0.954
ORGPERF3					0.812		1.000	5.000	3.626	0.929

MARKRESPAG1						0.813	1.000	5.000	3.660	0.945
MARKRESPAG2						0.799	1.000	5.000	3.673	0.932
MARKRESPAG3						0.813	1.000	5.000	3.670	1.00

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 5.5 Reliability of Extracted Indicators

Variables	Number of Indicators	Cronbach α
Technical IT Capability	5	0.896
Managerial IT Capability	4	0.817
Market Responsive Agility	3	0.752
Business Process Agility	3	0.835
Organizational Performance	3	0.781
IT Spending	6	0.926

5.6.1 Test for Common-method bias (CMB)

This study utilizes 2 different categories of respondents i.e., IT and business executives to collect the responses. The data on IT capability and IT spending were collected from the IT executives and business executives were the source for agility and performance related data. Hence, CMB may occur. The extent of CMB was empirically tested by using Harman's single factor method in SPSS (version 20), where an EFA containing all the 27 indicators was conducted by constraining the number of components extracted to be 1, and this single factor accounted for only 21% of variance, which shows the absence of CMB. According to Podsakoff et al. (2003), if CMB was a problem it would have explained more than 50% of the variance. Afterwards, a CFA was performed on this single-component model using AMOS (version 20) (Kearns and Sabherwal, 2007). The results culminated in a poor fitting model denoting all the key indices as χ^2 = 1559.031, df = 97, GFI = 0.492, AGFI= 0.383, RMSEA = 0.310, NFI = 0.360, TLI=0.451, CFI = 0.482. From this it is evident that the constructs are free from CMB.

5.6.2 Measurement Model

The measurement model was developed using the 6 components extracted through EFA containing 24 indicators. However, to improve data fit 6 indicators were dropped. Since this research uses reflective indictors, which are usually interchangeable among each other, hence dropping few of them to achieve better data fit does not alter the conceptual domain of the constructs (Petter et al. 2007). Therefore, the final measurement model consists of 6 constructs with 18 indicators (Figure 5.2).

Further, this measurement model was validated through multiple data [5d]fit indices which primarily comprise of absolute fit indices like CMIN/DF (χ2/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The estimated and acceptable threshold levels of all these critical indices are presented in table no. 5.6 which confirms a good model fit.

5.6.3 Test for construct reliability in CFA

The reliability of all the 6 constructs was tested based on examining the composite reliability values and maximum reliability (MaxR designated by the symbol 'H'). The composite reliability reflects the internal consistency of the individual constructs and the calculated values (within the range of 0.752 to 0.951) exceed the recommended value of 0.7 (Bernstein and Nunnally, 1994) (Table 5.7). The MaxR(H), a more robust calculation than composite reliability was also estimated and the values (within the range of 0.848 to 0.988) were found to be higher than composite reliability, which further confirmed higher reliability of the constructs.

5.6.4 Test for construct validity in CFA

The construct validity was tested calculating the convergent and discriminant validities.

5.6.4.1 Convergent validity

The average variance extracted (AVE) values were estimated for the convergent validity and all the 6 constructs exhibit AVE values (within the range of 0.503 to 0.867) greater than 0.5 (Hair et al. 2006), which suggest that the individual latent factor is properly explained by its observed variables (Table 5.7). Additionally, the calculated standardized estimates inferred from CFA conducted on the 6-component model validates that convergent validity issue is not a potential risk for the constructs (Anderson and Gerbing, 1988; Bentler, 1989) (Table 5.7).

5.6.4.2 Discriminant validity

As shown in table no. 5.8, the square root of the AVE for each construct was calculated to be greater than the inter-construct correlation. Further, the estimated values of maximum shared variance (MSV) (within the range of 0.036 to 0.370) were also found to be less than the AVE values (Table 5.7) (Hair et al. 2010). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issue.

[5d] Prior literature studies supporting the estimated and acceptable threshold levels of the data fit indices have been discussed in detail in Chapter 4.

Thus, the measurement model containing all the 6 constructs was confirmed to be a good fitting model with higher reliability and validity. Further, structural models were developed as presented in subsequent sections.

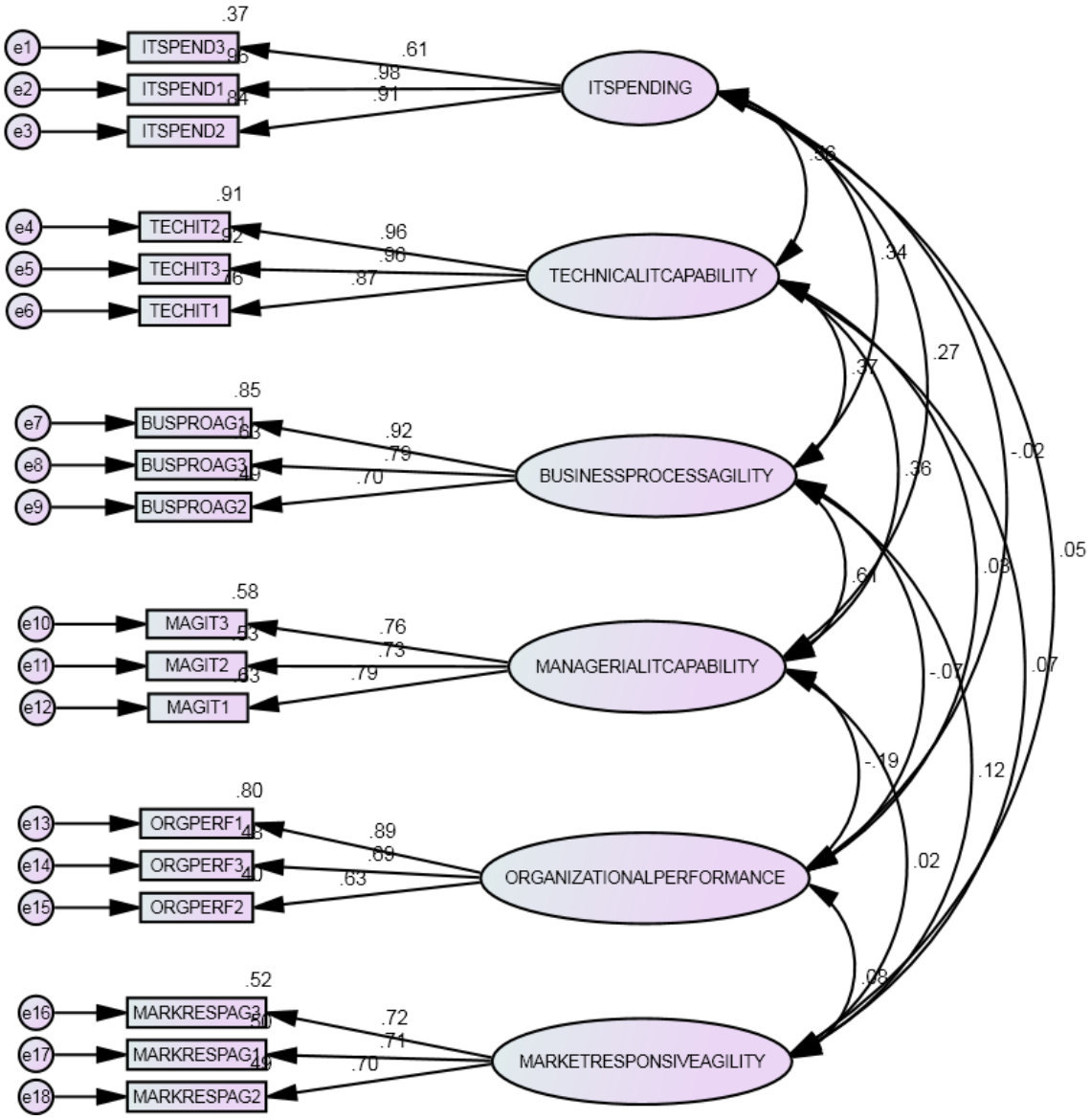


Figure 5.2 Measurement Model

Table 5.6 Fit Indices of the Measurement Model

Fit Indices	Estimated Levels	Acceptable Threshold Levels
Absolute fit indices		
CMIN/DF	2.331	$\leq 2^{G}, \leq 5^{M}$
GFI	0.907	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.868	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.067	$<0.08^{G}, \leq 0.10^{M}$

Incremental fit indices		
NFI	0.914	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.935	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.949	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices		
PGFI	0.637	No threshold levels
PNFI	0.717	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 5.7 Confirmatory Factor Analysis

Model Constructs	Items	Standardized Loadings	Composite Reliability	AVE	MSV	Max R(H)
Organizational Performance	ORGPERF1 ORGPERF2 ORGPERF3	0.894*** 0.634*** 0.690***	0.788	0.559	0.036	0.848
IT Spending	ITSPEND1 ITSPEND 2 ITSPEND 3	0.982*** 0.914*** 0.608***	0.883	0.723	0.314	0.975
Technical IT Capability	TECHIT1 TECHIT 2 TECHIT 3	0.872*** 0.956*** 0.962***	0.951	0.867	0.314	0.985
Business Process Agility	BUSPROAG1 BUSPROAG2 BUSPROAG3	0.919*** 0.699*** 0.795***	0.849	0.655	0.370	0.986
Managerial IT Capability	MAGIT1 MAGIT2 MAGIT3	0.792*** 0.728*** 0.760***	0.804	0.578	0.370	0.987
Market Responsive Agility	MARKRESPAG1 MARKRESPAG2 MARKRESPAG3	0.705*** 0.702*** 0.720***	0.752	0.503	0.015	0.988

Notes: significant at ***p<.001

Table 5.8 Discriminant Validity

Factors	Organizational Performance	IT Spending	Technical IT capability	Business Process Agility	Managerial IT capability	Market Responsive Agility
Organizational Performance	**0.748**					
IT Spending	-0.018	**0.850**				
Technical IT Capability	0.030	0.560	**0.931**			
Business Process Agility	-0.068	0.341	0.368	**0.809**		
Managerial IT Capability	-0.191	0.270	0.358	0.608	**0.760**	
Market Responsive Agility	0.082	0.047	0.072	0.122	0.023	**0.709**

Notes: Diagonal elements (bold) are the square roots of average variance extracted

5.6.5 Structural Model

The structural linkages between managerial and technical IT capabilities with BPA and MRA is presented in figure no. 5.3 (Model 1), where positive significant path coefficients were calculated for each relationship (for technical IT capability-BPA, structural link = 0.168, $p < 0.001$, for technical IT capability-MRA, structural link = 0.065, $p < 0.05$; for managerial IT capability-BPA, structural link = 0.553, $p < 0.001$, for managerial IT capability-MRA, structural link = 0.029, $p < 0.05$). Hence, the proposed hypotheses H_{1a}, H_{1b}, H_{2a}, and H_{2b} are supported.

Further, structural linkages between managerial and technical IT capabilities with performance is presented in figure no. 5.4 (Model 2), where a positive significant path coefficient was calculated for technical IT capability and performance linkage (structural link = 0.119, $p < 0.001$), but a significant negative relationship was calculated between managerial IT capability and performance (structural link = -0.246, $p < 0.001$). Hence, the formulated hypothesis H_{4a} is not supported while H_{4b} is supported.

Figure no. 5.5 (Model 3) represents the structural linkages between BPA and MRA with performance, where a positive significant path coefficient was calculated for MRA-performance linkage (structural link = 0.099, $p < 0.01$) and a negative significant path coefficient was calculated for BPA-performance linkage (structural link = -0.079, $p < 0.05$). Hence, hypothesis H_{3a} is not supported, while H_{3b} is supported.

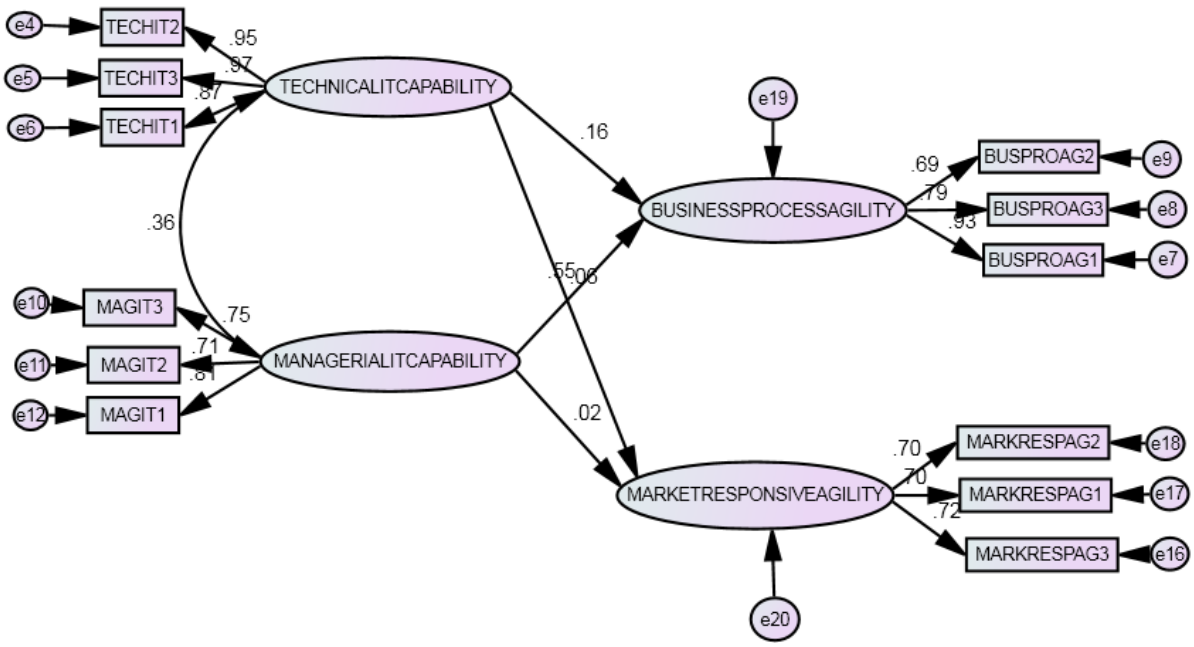


Figure 5.3 Structural linkages between IT capability and Organizational agility dimensions (Model 1)

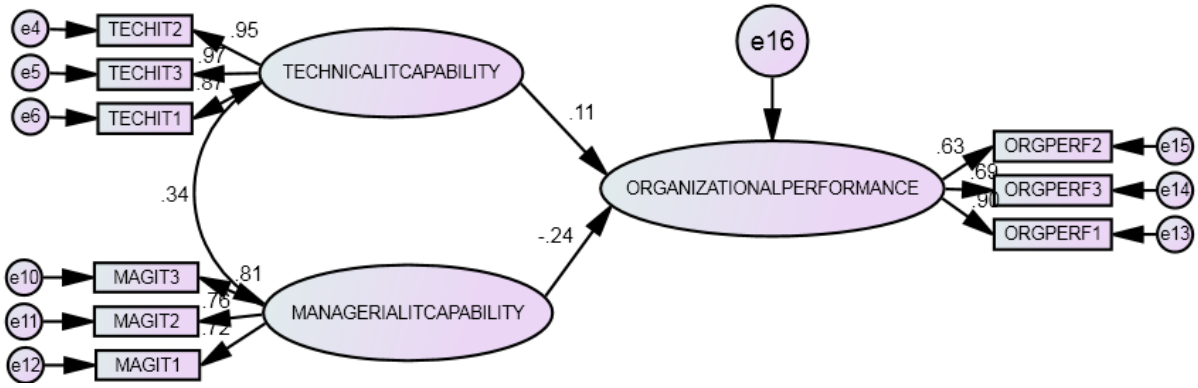


Figure 5.4 Structural linkages between IT capability dimensions and Organizational performance (Model 2)

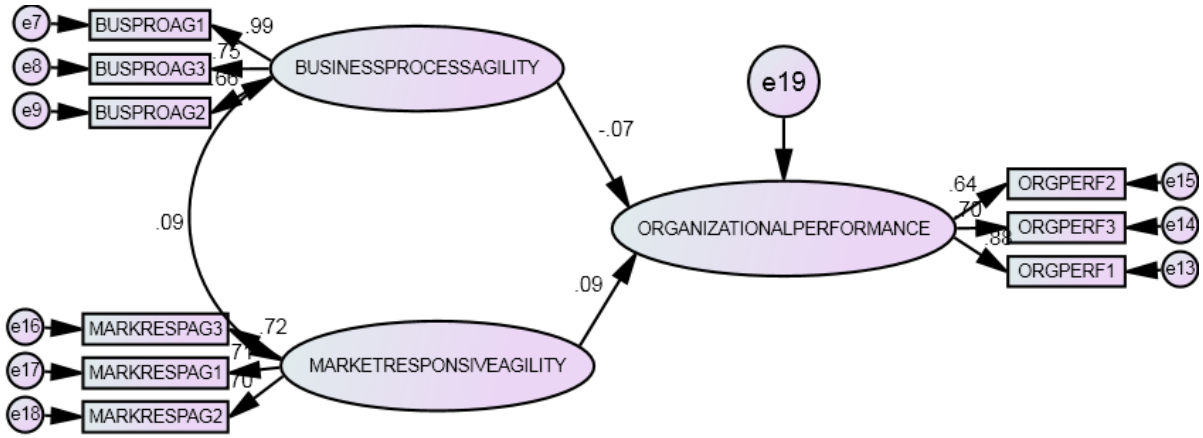


Figure 5.5 Structural linkages between Organizational agility dimensions and Organizational performance (Model 3)

A data imputation process was carried out to create composites for each construct and path models were generated and used for the rest of the analysis. Figure no. 5.6 (Model 4) exhibits path diagrams showing the relationships between managerial IT capability, technical IT capability, BPA, MRA, and performance, which essentially examine all the above mentioned relationships in one diagram. From figure no. 5.6 it is evident that managerial IT capability is showing a negative and technical IT capability is showing a positive relationship with performance in the presence of both BPA and MRA (However, individual indirect effects, i.e., mediation effects are tested in the Mediation Analysis section). Further, all these structural models (Model 1 to 4) were tested for various data fit indices by calculating the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. These fit indices are presented in table no. 5.9 where all these estimated values were found to be within the acceptable threshold levels.

5.6.6 Test for Multicollinearity

A linear regression analysis was conducted to estimate the observed variability of the independent variables namely managerial IT capability, technical IT capability, BPA, and MRA on the dependent variable i.e., performance. Table no. 5.10 represents the model summary and collinearity statistics of each of these independent variables. The R^2 value of 0.613 denotes that independent variables explain 61% of observed variability in performance. The standardized coefficients (Beta) and t-statistics represent significant relationship between the independent and

dependent variables. The tolerance and the variance inflation factor (VIF) represent the extent of multicollinearity issue among the variables. Following Field (2009), the threshold levels for tolerance and VIF are set to be > 0.2 and < 10 respectively. Table no. 5.10 represents tolerance level within the range of 0.498 to 0.869 and VIF index within the range of 1.032 to 2.007, suggesting the absence of multicollinearity issue.

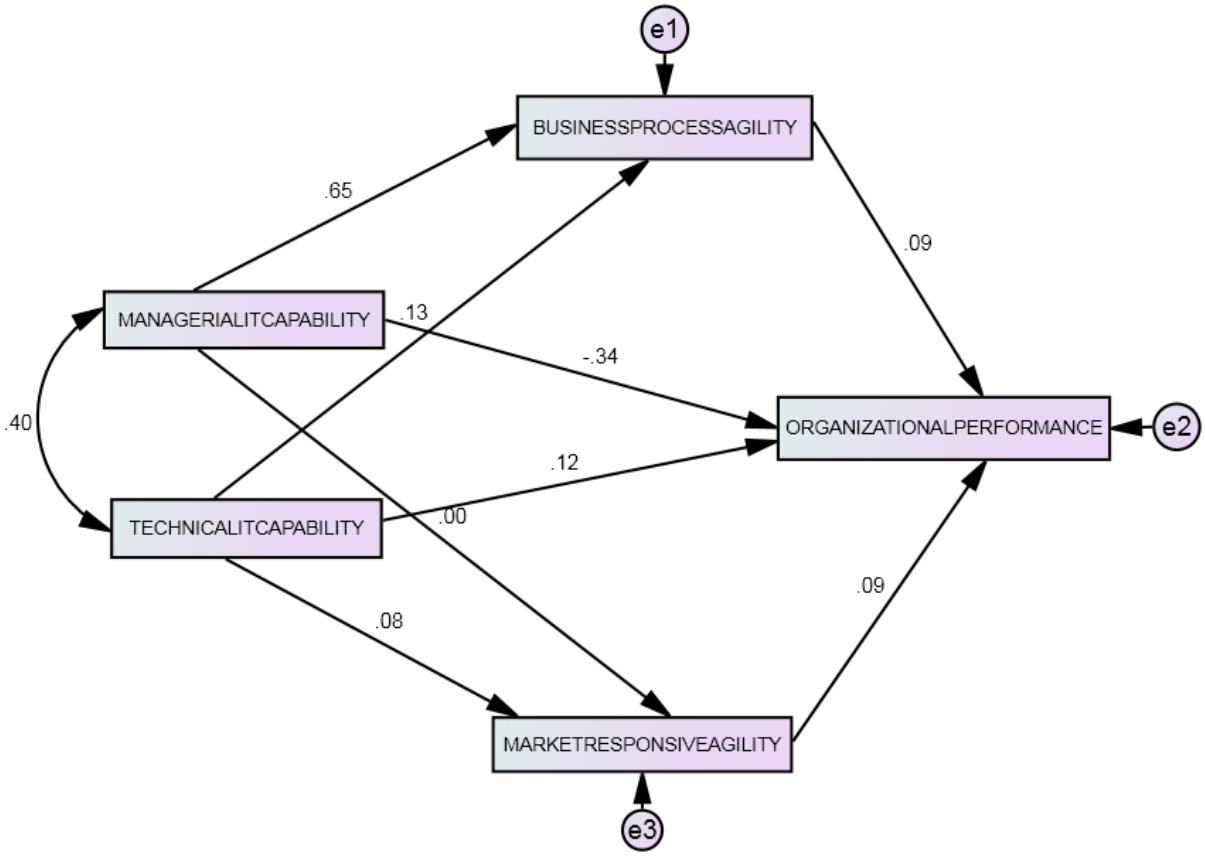


Figure 5.6 Path diagram showing relationships between IT capability dimensions, Organizational agility dimensions and Organizational performance (Model 4)

Table 5.9 Fit Indices of the Structural Models (1 to 4)

Fit Indices	Model 1	Model 2	Model 3	Model 4	Acceptable Threshold Levels
Absolute fit indices					
CMIN/DF	2.810	1.451	1.854	3.991	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.929	0.976	0.968	0.990	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.887	0.955	0.940	0.922	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.072	0.039	0.053	0.079	$<0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices					
NFI	0.935	0.978	0.952	0.972	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.942	0.989	0.966	0.892	$\geq 0.90^{G}$, $\geq 0.80^{M}$

CFI	0.957	0.993	0.977	0.978	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices					
PGF1	0.584	0.520	0.516	0.661	No threshold levels
PNFI	0.694	0.652	0.635	0.794	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 5.10 Model Summery, Coefficients and Collinearity Statistics

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
Model	***B***	***Std. Error***	***Beta***			***Tolerance***	***VIF***
Constant	3.710	0.326		11.364	0.000		
Market Responsive Agility	0.117	0.077	0.086	1.522	0.010	0.869	1.150
Managerial IT Capability	-0.452	0.106	-0.335	-4.252	0.000	0.503	1.986
Business Process Agility	0.082	0.071	0.092	1.161	0.027	0.498	2.007
Technical IT Capability	0.111	0.056	0.122	1.968	0.050	0.811	1.233

R=0.701, R^2=0.613, Adjusted R^2=0.599; Dependent variable: Organizational performance; Independent variable: Managerial IT capability, Technical IT capability, BPA, and MRA

5.6.7 Interaction-Moderation Analysis

The interaction variables (Managerial IT capability_X_IT spending and Technical IT capability_X_IT spending) were computed and path estimates were calculated. The interaction-moderation effects of IT spending with managerial and technical IT capabilities on both BPA and MRA are shown in figures no. 5.7 and 5.8. From figure no. 5.7 it is evident that the interaction of IT spending with managerial IT capability exhibits a significant positive effect on BPA and MRA (for Managerial IT capability_X_IT Spending-BPA, structural link = 0.029, $p < 0.05$, and for Managerial IT capability_X_IT Spending-MRA, structural link = 0.180, $p < 0.001$). Hence both H_{6a} and H_{6b} are supported. Figure no. 5.8 illustrates a significant negative effect of IT spending and technical IT capability interaction with BPA (structural link = -0.109, $p < 0.01$), while a significant positive effect on MRA (structural link = 0.165, $p < 0.01$). Therefore, hypothesis H_{6c} is not supported, but H_{6d} is supported.

The interaction-moderation models (Model 5 and 6) were validated by the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The summary of these

estimates are presented in table no. 5.11 showing all these fit indices within the acceptable threshold levels. Further, these interaction-moderation relationships are plotted as shown in figures no. 5.9, 5.10, 5.11, and 5.12.

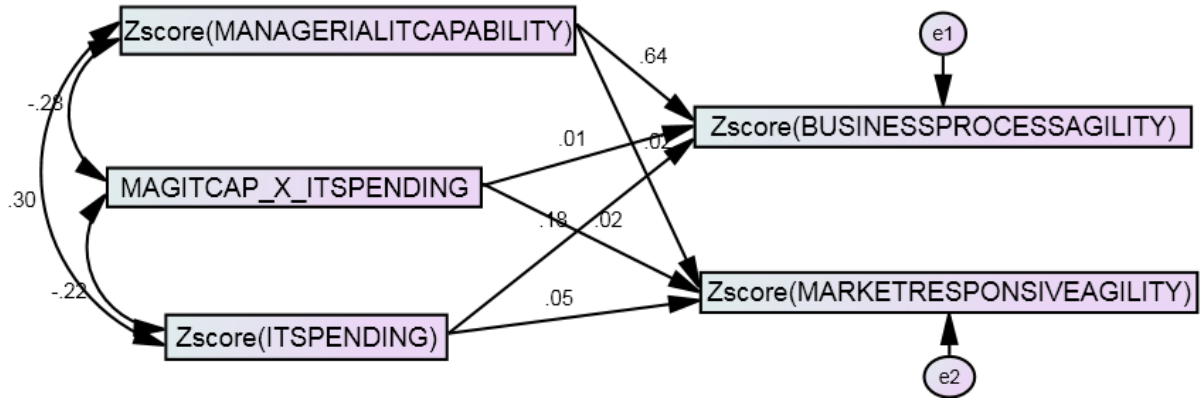


Figure 5.7 Interaction effect of IT spending and Managerial IT capability on business process and market responsive agility (Model 5)

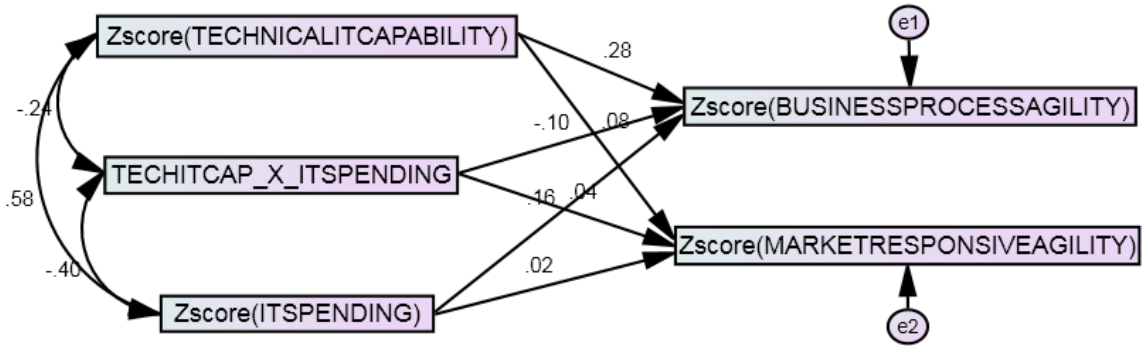


Figure 5.8 Interaction effect of IT spending and Technical IT capability on business process and market responsive agility (Model 6)

Table 5.11 Fit Indices of the Moderation Models (5 and 6)

Fit Indices	Model 5	Model 6	Acceptable Threshold Levels
Absolute fit indices			
CMIN/DF	3.764	3.712	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.990	0.994	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.848	0.907	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.080	0.079	$<0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices			
NFI	0.972	0.981	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.845	0.842	$\geq 0.90^{G}$, $\geq 0.80^{M}$
CFI	0.974	0.984	$\geq 0.90^{G}$, $\geq 0.80^{M}$

Parsimonious fit indices	0.384	0.320	No threshold levels
PGF1	0.594	0.532	No threshold levels
PNFI			

Note: G= good data fit, M= mediocre data fit

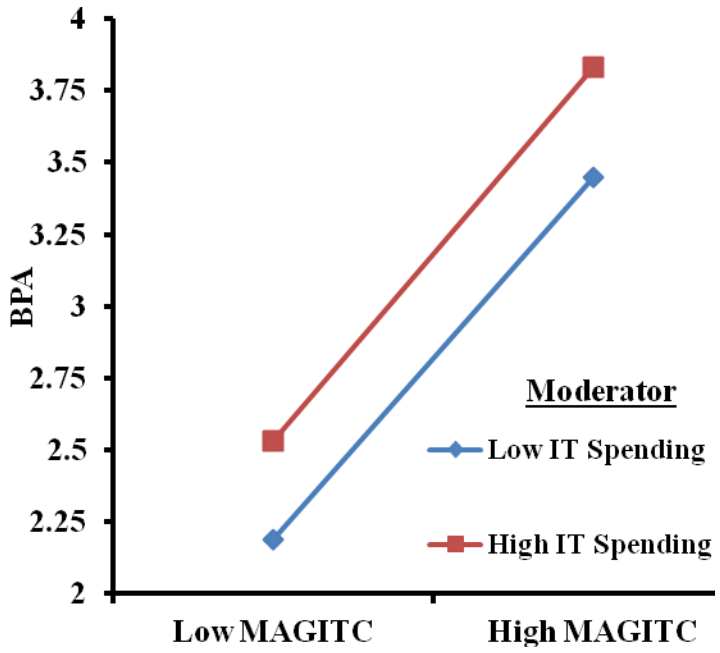


Figure 5.9 IT spending strengthens the positive relationship between Managerial IT capability (MAGITC) and Business process agility (BPA)

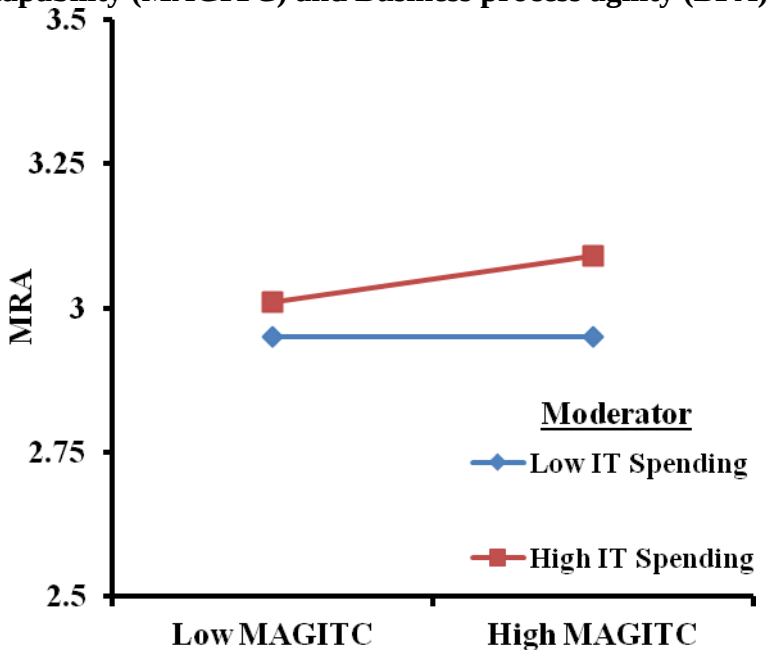


Figure 5.10 IT spending strengthens the positive relationship between Managerial IT capability (MAGITC) and Market responsive agility (MRA)

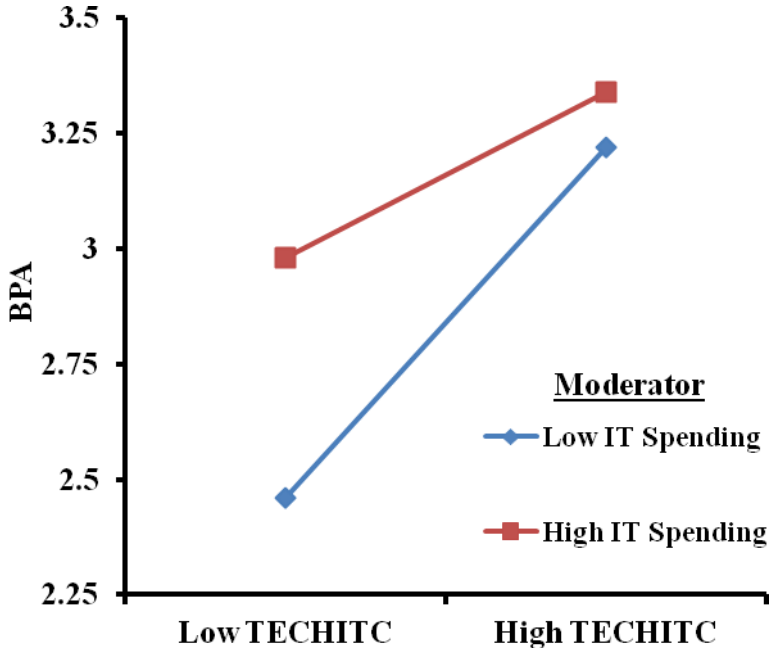


Figure 5.11 IT spending dampens the positive relationship between Technical IT capability (TECHITC) and Business process agility (BPA)

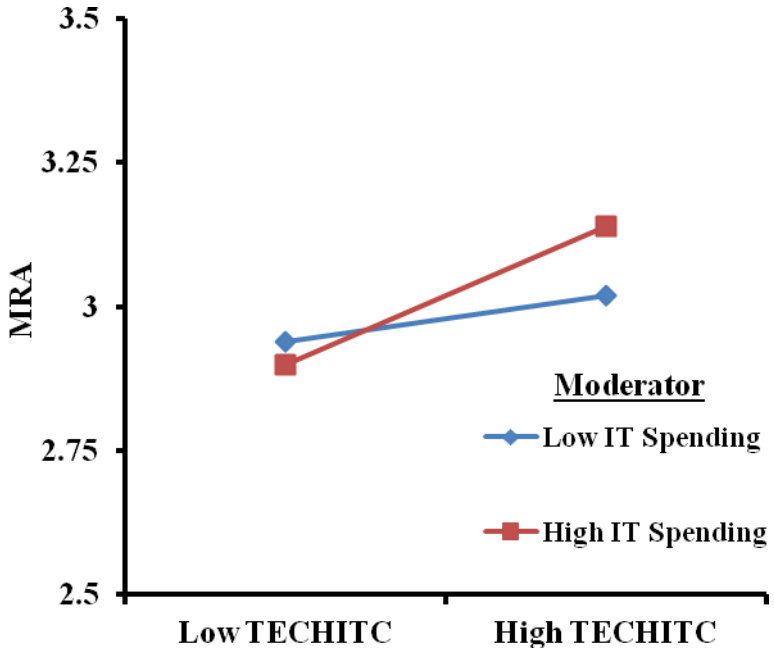


Figure 5.12 IT spending strengthens the positive relationship between Technical IT capability (TECHITC) and Market responsive agility (MRA)

5.6.8 Mediation Analysis

In this chapter BPA and MRA are treated as the mediators and their indirect effects on the managerial IT capability-performance linkage and technical IT capability-performance relationship are individually examined and the path coefficients are illustrated in figures no. 5.13, 5.14, 5.15, and 5.16. The indirect effect estimates are calculated by utilizing the "*MyIndirectEffectEstimand"* Gaskin (2016), which uses 2000 numbers of bootstrap samples in AMOS (version 20) and presented by 'A X B', where 'A' is the technical and managerial IT capability-BPA and MRA relationships (i.e., from independent variables to mediators) and 'B' is the BPA and MRA-organizational performance relationships (i.e., from mediators to dependent variable).

For technical IT capability-BPA-performance and technical IT capability-MRA-performance relationships these indirect effect estimates were calculated to be significant (AXB = -0.038, $p < 0.01$; AXB = 0.007, $p < 0.05$). Therefore, hypotheses H_{5c} and H_{5d} are supported. In case of managerial IT capability-BPA-performance linkage this estimate is significant (AXB = 0.129, $p < 0.01$), thus, support H_{5a}. But for managerial IT capability-MRA-performance linkage this estimate is non-significant hence H_{5b} is not supported. These indirect estimates are shown in table no. 5.12.

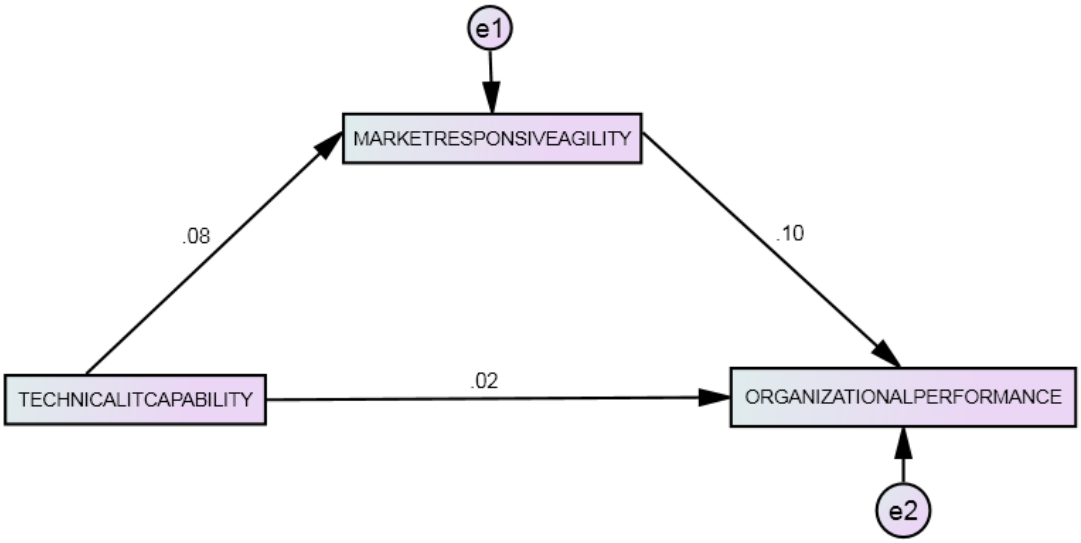


Figure 5.13 Market responsive agility as a mediator between Technical IT capability and Organizational performance

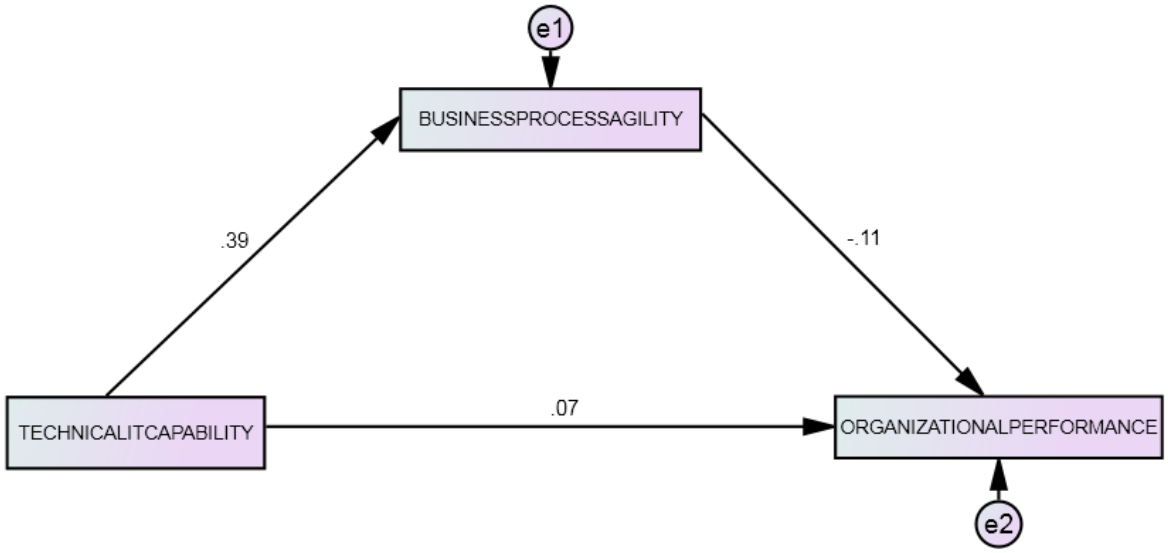


Figure 5.14 Business process agility as a mediator between Technical IT capability and Organizational performance

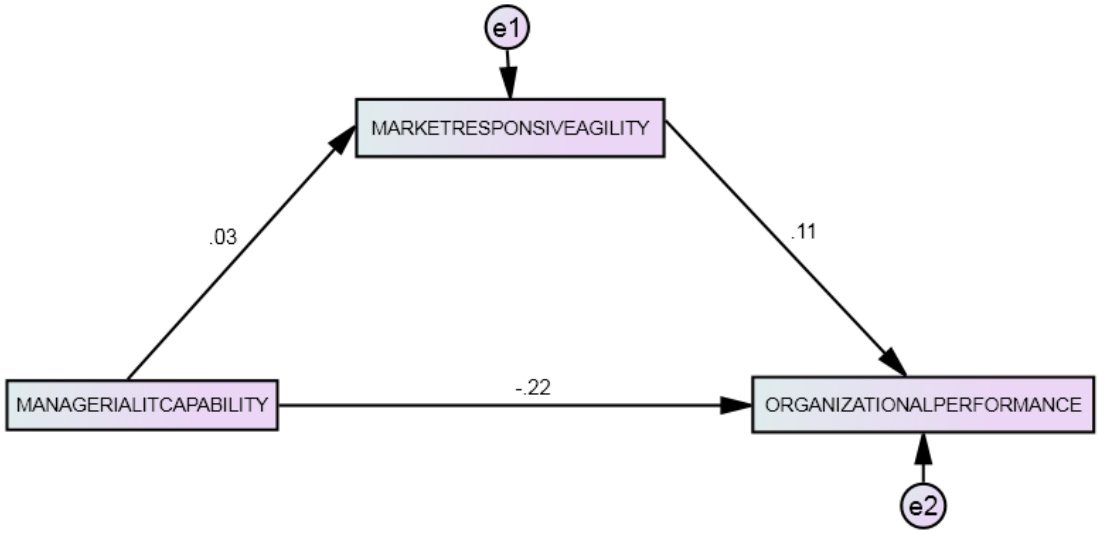


Figure 5.15 Market responsive agility as a mediator between Managerial IT capability and Organizational performance

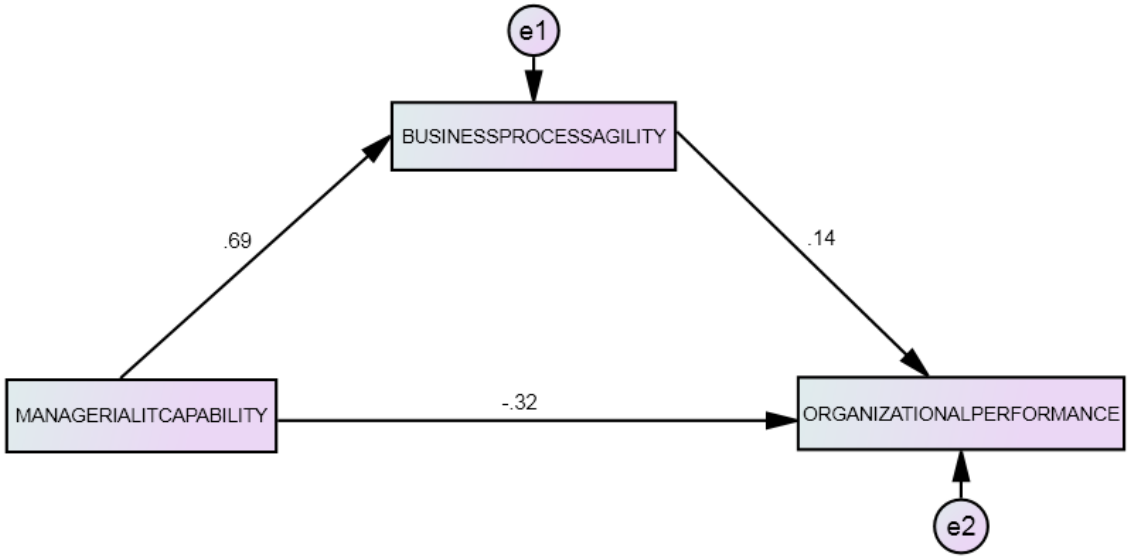


Figure 5.16 Business process agility as a mediator between Technical IT capability and Organizational performance

Table 5.12 Indirect Effects

Examined Relationships	Indirect Effects Estimates (A X B)	Significance
Technical IT capability^{i}→MRA^{m}→Organizational performance^{d}	0.007	*
Technical IT capability^{i}→BPA^{m}→Organizational performance^{d}	-0.038	**
Managerial IT capability^{i}→MRA^{m}→Organizational performance^{d}	0.005	NS
Managerial IT capability^{i}→BPA^{m}→Organizational performance^{d}	0.129	**

Note: i= Independent variable, m= Mediator, d= Dependent variable; A= i→m, B= m→d; bootstrap results based on n=2000, confidence level for confidence intervals = 0.05 (∗); Note: significant at *p<.05, **p<.01, NS=not significant

5.6.9 Moderated Mediation Analysis

From the interaction-moderation analysis it is observed that all four interaction-moderation effects {Figure 5.7 (Model 5) and 5.8 (Model6)} are significant and further the mediation analysis also reveals significant indirect effects (except Managerial IT capability-MRA-Performance relationship). Hence, a moderated-mediation effect of IT spending was examined on the direct and indirect (via mediator) relationship between managerial IT capability-technical IT capability-performance linkages using the bootstrapping method with 10,000 bootstrap samples in SPSS-PROCESS macro (Hayes, 2015).

The index of the moderated-mediation effect is presented in table no. 5.13 and it is obtained that the lower and the upper limits of confidence intervals do not include zero, which proves the significance of the moderated-metiation effects as examined in managerial IT capability, BPA, and performance relationships (with IT spending as modertor) and technical IT capability, BPA, and performance associations (with IT spending as modertor). However, the technical IT capability-MRA-performance linkages (with IT spending as moderator) were found to be non-significant (since the lower and the upper limits of confidence intervals include zero).

Table 5.13 Index of Moderated Mediation

Examined Relationships	Index	LLCI	ULCI	Significance
Managerial IT capability→BPA→Organizational Performance (IT spending)[#]	0.023	0.008	0.216	*
Technical IT capability→BPA→Organizational Performance (IT spending)[#]	0.082	0.011	0.324	*
Technical IT capability→MRA→ Organizational Performance (IT spending)[#]	0.003	-0.005	0.022	NS

Note: [#] moderator in parenthesis; LLCI= lower limit confidence interval, ULCI= upper limit confidence interval; bootstrap results based on n=10000; confidence level for confidence intervals = 0.05 (*), NS= not significant

The results showing the hypotheses testing is presented in table no. 5.14.

Table 5.14 Hypotheses Testing

Proposed Hypotheses	Standardized Estimates	Predicted Sign	Inferences
H_{1a}: Managerial IT capability→BPA	0.553***	Positive	Supported
H_{1b}: Managerial IT capability→MRA	0.029*	Positive	Supported
H_{2a}: Technical IT capability→BPA	0.168***	Positive	Supported
H_{2b}: Technical IT capability→MRA	0.065*	Positive	Supported
H_{3a}:BPA→performance	-0.079*	Positive	Not Supported
H_{3b}:MRA→performance	0.099**	Positive	Supported
H_{4a}: Managerial IT capability→performance	-0.246***	Positive	Not Supported
H_{4b}: Technical IT capability→performance	0.119***	Positive	Supported
H_{5a}: Managerial IT capability→BPA→performance {(AXB) effects}	0.129**	---	Supported
H_{5b}: Managerial IT capability→MRA→performance {(AXB) effects}	0.005	---	Not Supported
H_{5c}: Technical IT capability BPA→performance {(AXB) effects}	-0.038**	---	Supported
H_{5d}: Technical IT capability MRA→performance {(AXB) effects}	0.007*	---	Supported
H_{6a}: Managerial IT capability_X_IT spending→BPA	0.029*	Positive	Supported
H_{6b}: Managerial IT capability_X_IT spending→MRA	0.180***	Positive	Supported

H_{6c}: Technical IT capability_X_IT spending→BPA	-0.109**	Positive	Not Supported
H_{6d}: Technical IT capability_X_IT spending→MRA	0.165**	Positive	Supported

Note: significant at *p<.05, **p<.01, ***p<.001

5.7 Key findings of this study

A meticulous empirical analysis successfully answers the research questions and the key findings are presented as following:

IT capability is a critical organizational capability which enables an organization to be agile and facilitate greater performance in the long run. The positive effects of both managerial and technical IT capabilities on BPA and MRA (Figure 5.3) support the credentials of effectively managed IT infrastructure for realization of greater agility. However, the significant negative relationship between managerial IT capability and performance (Figure 5.4) reveal that organizations need to follow the recent advancements in IT and focus on effective IT management as well as utilization of state of the art contemporary technology infrastructure to attain superior performance.

Agile organizations have the ability to swiftly sense and readily respond to the pivotal business environmental changes for example: changes in customers' taste and preferences, competitors' strategy, etc. But, the individual relationship examined between BPA and performance was found to be significant but negative (Figure 5.5) which infers that organizations have to be proactive in realizing the internal business or operational changes for example: providing better customized products or service offerings to existing customers, changing the products' price compared to competitors, etc.

In recent times organizations are greatly investing in IT infrastructure to attain agility which leads to superior performance either in terms greater ROI, sustainable competitive advantage, and overall organizational growth. The interaction-moderation effects of IT spending with managerial IT capability explain significant positive relationships with both BPA and MRA (Figure 5.7), and support these thoughts. Whereas, the IT spending and technical IT capability interaction is only demonstrating a significant positive effect on MRA but not on BPA (Figure 5.8). From this it is inferred that IT infrastructure spending is not able to generate necessary technical IT capabilities to realize enhanced process oriented agility. Hence, banking firms need to make rational IT investment decisions or-else it will dampen the already established positive

relationship between technical IT capability and BPA. However, the inevitability of IT investments cannot be ignored, which is evident from table no. 5.13, where IT spending possesses a significant effect on both direct and indirect (via BPA) relationships between IT capability (both managerial and technical) and performance.

Chapter 6

Effect of Human Information Technology (IT) Capability on Organizational Performance: The mediating role of Organizational Agility

6.1 Introduction

On the basis of the rationale of resource based view [6a](RBV), the human IT capability is defined as a critical organizational capability, that enables the organizations to enhance the IT related skills/expertise of their IT personnel and these specific IT skills/expertise will be strongly associated with superior performance. Following various prior researches (Bharadwaj, 2000; Chen et al. 2014; Lu and Ramamurthy, 2011), in chapter 5 the author has examined the relationship between IT capability (mainly studied as the technical component of IT) and organizational performance (or simply performance), with organizational agility (or simply agility) as mediator and IT spending as moderator. Since both the technical and human components are essential and fundamental to form the concept of IT, therefore, in this chapter the author has examined both these [6b]components and investigated human IT capability (comprising of business functional skills, interpersonal management skills, and technology management skills) as the independent variable, performance as the dependent variable, IT infrastructure spending as the moderator, and agility {in terms sensing agility (SA) and responding agility (RA)} as the mediator. The conceptualization of both SA and RA has been inspired by the research work conducted by Chung et al. (2012), Dove (2001, 2005), and Overby et al. (2006) where, SA denotes an organization's sensing ability by fast identification and interpretation of various market opportunities, and RA represents the quick transformation of knowledge into action. Therefore, the author suggests that organizations can attain both these agilities only if the human components of IT possess high skills and expertise regarding various business functions, technology management, and strong interpersonal behavior.

In recent times, organizations are operating in a volatile and competitive market environment and in order to obtain greater performance with sustainable competitive advantages

[6a]RBV is described in detail in chapter 2.
[6b]The human component is mentioned as "Human IT capability" or simply "Human IT" and the technical component is presented as "IT infrastructure" or simply "IT" i.e. "IT infrastructure spending/IT spending".

they need to be agile and inculcate the attitude of swiftly and smoothly sensing and responding to the market related changes (Overby et al. 2006). According to Tallon and Pinsonneault (2011), agility is defined as a dynamic capability that fosters effective integration and assimilation of organizational resources, such as knowledge and technological assets and can boost up firm's performance for a longer time frame. Presently, firms are investing in IT so as to generate IT enabled innovative and rapid responses to cope with unanticipated changes, which in-turn foster performance (Lu and Ramamurthy, 2011). Stehr (1992) reported that knowledge and skills are not directly observable and hence their specific effects on agility and performance can be inferred through other observable organizational capabilities (e.g., IT capability). However, if the tangible organizational resources (i.e., IT infrastructure) suffer from technology traps, they will ironically impede agility and performance.

Following Fink and Neumann, (2009), IT comprises of human elements as well as technical elements. According to them the human IT elements represent the business knowledge/skills, technical knowledge/skills, and behavioral knowledge/skills of IT personnel and the technical IT elements outline compatible operating systems, software applications, network connectivity, efficient communication protocols, effective data management systems, etc. These technical components have been treated as independent variables in the investigation in chapter 5. Therefore, in this chapter the author has investigated both the human as well as technical components and treats the human IT constituents (namely, business functions, interpersonal management, and technology management skills) as the independent variables and technical IT elements i.e., IT infrastructure spending (i.e., spending on hardware, software, and shared networks) as the moderator. Agility, in terms of SA and RA are studied as mediators. Taking all these variables in to account, the following research questions have been framed for this chapter.

1. Does human IT capability (studied as business functions, interpersonal management, and technology management skills) enable or inhibit organizational agility {(studied as sensing agility (SA) and responding agility (RA)}?
2. Does human IT capability (in terms of business functions, interpersonal management, and technology management skills) enable or inhibit performance?
3. Does agility (in terms of SA and RA) enable or inhibit performance?

4. What is the moderating influence of IT spending on the human IT capability (as business functions, interpersonal management, and technology management skills) and agility (as SA and RA) association?
5. What is the mediating role of agility (both SA and RA) on the relationship between human IT capability (in terms of business functions, interpersonal management, and technology management skills) and performance?
6. [6c]What is the moderated-mediating role of IT spending on the direct and indirect (via mediator) relationship between human IT capability (in terms of business functions, interpersonal management, and technology management skills) and performance?

6.2 Theoretical overview and Hypotheses

6.2.1 Human IT capability

Previous information system (IS) researchers have defined IT infrastructure from a technical point of view and explained it as an arrangement of technical components such as hardware, software, shared networks, telecommunications, etc. (Byrd and Turner, 2001; Fink and Neumann, 2009). Another important approach exhibits the component-oriented view taking into consideration of both the technical as well as human components. Hence, this approach possesses a broader perspective by describing technical components in terms of four categories such as IT platform, network sharing and telecommunications, distributed information, and core applications and human components including expertise, knowledge and skills of the organization's IT professionals. In this chapter the author has adopted this component-oriented perspective and investigates both the human IT components (as predictors) and technical IT components (as moderator).

The human IT capability delineates the necessary knowledge, skills, and expertise required for the IT professionals of an organization who have embraced the perspective of working in an unstable environment to face any unanticipated changes and possess apposite proficiency to efficiently deal with the changes. According to Lee et al. (1995), three IT related capabilities are essential for the IT personnel such as learning new technologies, focusing on technology as a medium, and lastly understanding updated technological trends. Broadly they have classified the knowledge and skill into two types, namely non-technology and technology-

[6c] Although, moderated-mediation analysis has been performed, due to lack of previous literature support, hypotheses have not been proposed relating to this analysis.

related, where non-technology-related knowledge and skill include the business functional expertise, and interpersonal management skill and technology-related skill consists of technology management expertise. They have also argued that knowledge and skill in the non-technology related category are of higher importance than technology-related type. Based on their logic this chapter underscores human IT elements categorized as business functional skills, interpersonal management skills, and technology management skills.

6.2.1.1 Business Functional Skills

Following Lee et al. (1995) and Lee et al. (2002), it is imperative that IT personnel acquire adequate business functional skill/expertise to effectively re-engineer the internal business processes by adopting advanced IT tools. An in-depth business functional knowledge is essential for the decision makers to properly gauge the business related issues and develop the necessary technical solutions.

6.2.1.2 Interpersonal Management Skills

Interpersonal management skills reflect the behavioral aptitude possessed by the IT professionals which implicates skills such as planning, organizing, leading, etc. Previous literature suggest a long line of research explaining the significance of critical interpersonal/behavioral expertise required for IT professionals (Lee et al. 1995; Lee et al. 2002; Fink and Neumann, 2007, 2009). According to Kettinger and Lee (2002), IT personnel's capabilities involving strong interpersonal skills and effective communication with end users lead to greater IT innovations.

6.2.1.3 Technology Management Skills

Technology management skill concerns with effective and profitable implementation of IT to meet strategic business objectives. It is essential for IT personnel to acquire this expertise so as to augment their capability by learning where and how to utilize IT to meet the strategic business goals (Lee et al. 2002). IT personnel need to effectively manage technological fundamentals in order to plan, design, optimize and operate technological products, services, and processes to create competitive advantages and attain organizational objectives.

6.2.2 Organizational Agility

Recently, a broad range of IS researchers (Sambamurthy et al. 2003; Overby et al. 2006; Rai et al. 2006; Tallon, 2008; Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2011; Nazir and

Pinsonneault, 2012; Cai et al. 2013; Chen et al. 2014; Mao et al. 2015a,b; Chen et al. 2015; Ragin-Skorecka, 2016) have shown an immense interest on the concept of "agility". For example, according to Chen et al. (2015) and Mao et al. (2015a), organizational agility delineates the competency with which a firm deals with imminent market uncertainties by means of innovative and rapid responses which transform these market changes into opportunities. Therefore, rapidness and innovativeness are the two important attributes of agility, where rapidness represents timely realization and precise response to market changes and innovativeness concentrates on the quality of the response.

According to Cai et al. (2013), organizational agility facilitates effective integration of resources, knowledge, and relationships by means of precisely and rapidly sensing the market related changes, and quickly sending the signal to the firm, so that in response to the signal necessary business reconfiguration takes place with proper integration of the internal resources. This is certainly a distinctive firm capability that assists IT executives to make prompt and timely decisions regarding new product development or modifying existing product lines, features, etc. and thereby, making firms more agile (Nazir and Pinsonneault, 2012; Mao et al. 2015a; Chen et al. 2015).

6.2.2.1 Sensing Agility (SA)

According to Dove (2001, 2005), agility can be denoted as the ability of the organization to sense the unprecedented market uncertainties which is manifested by the intellectual aptitude of the organizational professionals to identify suitable things to act on. Following the argument of Overby et al. (2006), SA is defined as a diverse range of capabilities required by the firms to identify and comprehend the important forces of environmental changes which may include changes in costumers' preferences and competitors' actions, government regulatory and legal policy changes, change in economic growth, IT infrastructural changes, etc.

6.2.2.2 Responding Agility (RA)

After accurately sensing the environmental changes, it is vital that organizations make the right response towards them. Therefore, this type of agility is defined as the ability of the firms to start up innovative projects and/or transform existing business to physically act on changing competitors' strategies and customers' tastes and preferences. According to Dove (2001), the firms may acquire a variety of responses ranging from a "complex response", "simple response",

to “no response”. The “complex moves” may entail new product launch, starting up a new venture, developing innovative distribution channel, etc. The “simple responses” may encompass change in product line and features, change in price, etc. Referring to the last response approach, i.e., “no move” represents that sometimes making no move may be beneficial for the firm as long as this piece of action does not indicate a failure to sense business opportunities.

6.2.3 Human IT capability-Agility Linkage

Following Fink and Neumann (2007), business functional, behavioral, and technical capabilities of IT personnel are essential IT capabilities and hence, constitute the human IT capability. They have investigated its effect on the IT-dependent organizational agility, comprising of IT-dependent system, information, and strategic agility. The last element i.e., IT-dependent strategic agility is treated as the outcome variable which describes the ability of the organization to efficiently respond to emerging market opportunities by effectively utilizing existing IT capabilities. Following their work, in this study the author has conceptualized RA as an organizational capability to quickly respond to market-related changes. The research work conducted by Fink and Neumann (2009) suggests the interrelationship between the human elements of IT and IT infrastructure-enabled flexibility to deal with increasing turbulence of business environments. Therefore, extending these prior studies the author has investigated the effects of individual human IT components namely, technology management skill, interpersonal management skill, and business functional skill on both SA and RA, which are to be tested in the form of following hypotheses.

H_{7a}: Technology management skill has a positive effect on SA.
H_{7b}: Technology management skill has a positive effect on RA.
H_{8a}: Interpersonal management skill has a positive effect on SA.
H_{8b}: Interpersonal management skill has a positive effect on RA.
H_{9a}: Business functional skill has a positive effect on SA.
H_{9b}: Business functional skill has a positive effect on RA.

6.2.4 Agility-Performance Linkage

A myriad of researchers have explained agility as a higher-order dynamic capability that assists firms promptly sensing and responding to the changes in customers’ tastes and preferences,

competitors' actions, government regulations, etc. (Bi et al. 2013; Cai et al. 2013; Sambamurthy et al. 2003; Tallon and Pinsonneault 2011; Wu et al. 2006;). According to these prior studies, agile firms effectually deal with such changes and generate augmented performance over a longer time frame. Based on these literatures, the following hypotheses are proposed.

H_{10a}: SA has a positive effect on performance.
H_{10b}: RA has a positive effect on performance.

6.2.5 Human IT Capability-Performance Linkage

Ross et al. (1996) have suggested about the art of redesigning internal business process by properly identifying and rapidly responding to changes in external market and competitive demands so as to attain superior competitive advantage. Following Bharadwaj (2000), enhanced competitive advantage is a crucial determinant of superior performance. Based on these works, the author has argued that business functional skills facilitate these redesigning processes and contribute to higher performance. Following Kettinger and Lee (2002) strong interpersonal management skills of IT personnel lead to greater IT innovations, and firms orchestrated with higher-levels of IT applications essentially develop greater capabilities to realize superior performance. It has been also observed that IT personnel with higher technology management expertise have the ability to follow modern IT trends and use IT as a medium to make the firms more successful. Based on these arguments the following hypotheses are postulated.

H_{11a}: Technology management skill has a positive effect on performance.
H_{11b}: Interpersonal management skill has a positive effect on performance.
H_{11c}: Business functional skill has a positive effect on performance.

6.2.6 Agility as mediator between Human IT capability and Performance

Previous researches have investigated the effects of human IT capability elements such as business functional, behavioral, and technical capabilities on agility and competitive impacts of IT (Fink and Neumann, 2007; 2009). According to Fink and Neumann (2009) IT's competitive impacts reflect the competitive position of firms which is associated with IT-based competitive advantages. Fink and Neumann (2007) have examined the human IT capability-IT-dependent

organizational agility connection and report about the essential contribution of human IT capability on augmented strategic agility which in-turn leads to superior performance. However, they have not directly incorporated performance as a research variable. Bridging this gap the author has investigated the relationship between human IT capability and performance with agility (both SA and RA) as the mediator and the following hypotheses are framed.

H_{12a}: The positive relationship between technology management skill and performance is mediated by SA.

H_{12b}: The positive relationship between technology management skill and performance is mediated by RA.

H_{12c}: The positive relationship between interpersonal management skill and performance is mediated by SA.

H_{12d}: The positive relationship between interpersonal management skill and performance is mediated by RA.

H_{12e}: The positive relationship between business functional skill and performance is mediated by SA.

H_{12f}: The positive relationship between business functional skill and performance is mediated by RA.

6.2.7 IT Spending as moderator on Human IT capability-Agility Linkage

Following Dehning et al. (2007) and Lu and Ramamurthy (2011), IT investment is considered as one of the primary initiatives to establish an agile IT platform that facilitates IT enabled business operations and thereby, positively influences the business performance. These previous studies suggest that IT investment needs to be properly translated into fostering essential IT capability for augmented agility. However, they have mostly conceptualized IT capability from the technical point of view and overshadows the component-oriented view (comprising of both technical and human IT elements). So taking prior studies a step further this study posits the significance of IT spending on developing human IT capabilities and builds the premise that prudently invested IT has the ability to create pertinent human IT capability (comprised of business functions, interpersonal management, and technology management skills) to effectively shape agility. Therefore, the following hypotheses are developed.

H_{13a}: IT spending positively moderates the relationship between technology management skill and SA.

H_{13b}: IT spending positively moderates the relationship between technology management skill and RA.

H_{13c}: IT spending positively moderates the relationship between interpersonal management skill and SA.

H_{13d}: IT spending positively moderates the relationship between interpersonal management skill and RA.

H_{13e}: IT spending positively moderates the relationship between business functional skill and SA.

H_{13f}: IT spending positively moderates the relationship between business functional skill and RA.

However, there may be a contradiction to the above mentioned arguments entailing the adverse effects of huge and impudent IT investments. According to Carr (2003), IT has been predominantly gaining popularity and its prevalence is well acknowledged in most of the business operations. So, there is a possibility of IT being imitated or replicated by other organizations and hence, IT may lose its ability to generate long-term sustainable competitive advantage. Based on these mixed observations, this study examines whether IT spending enables or hinders agility. Although, the positive effect of IT spending on IT-agility link has been hypothesized, some contradictions have also been observed as explained in the "key findings" section (Section, 6.7).

All the above mentioned hypotheses are illustrated in the following research model (Figure 6.1).

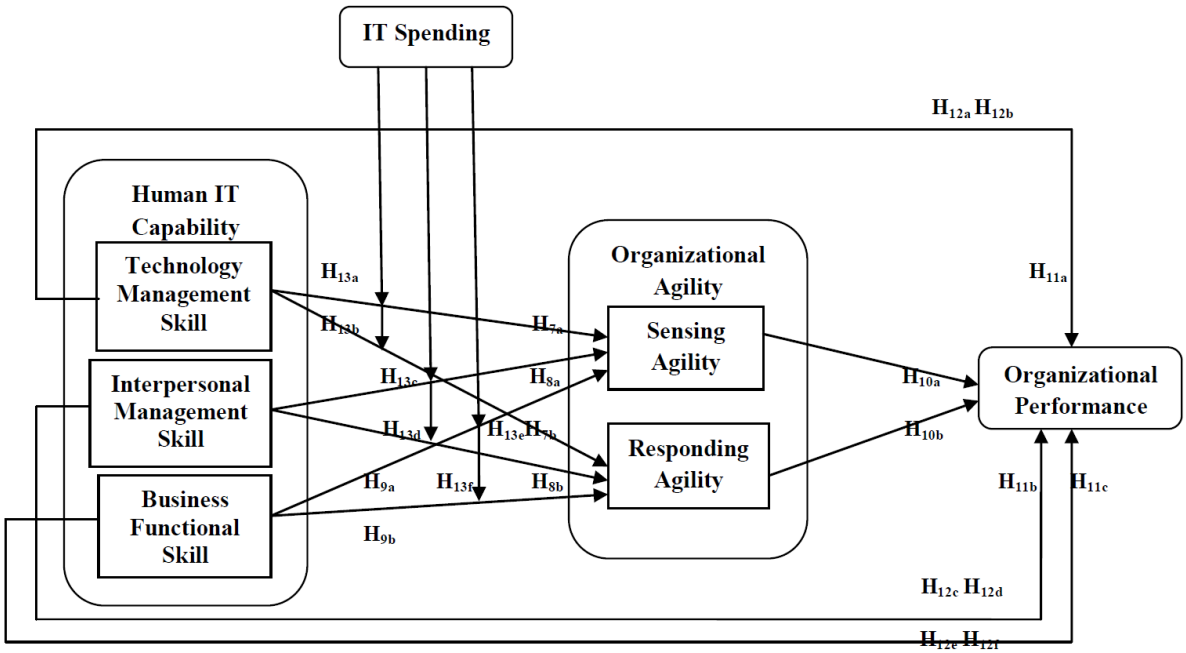


Figure 6.1 Conceptual model representing the relationship between human IT capability, organizational agility, and organizational performance

6.3 Sample framework and Data collection

The public and private sector banking firms operating in the state of Odisha, India were selected as target samples, where a matched-pair survey was administered among the IT and business executives working in the middle to senior level of management. A total of 950 numbers of structured questionnaires were distributed via both online (survey forms) and offline mode (hand delivery method). The bank managers and other senior executives were contacted personally and the e-mail id of the IT managers and executives were collected from them. A total of 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives, respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate.

6.4 Development of Instruments

Following previous literature studies, a five-point Likert-type rating scale has been utilized to collect responses for the studied multi-item measures, where both the extreme points exhibit ranges from strongly disagree (1) to strongly agree (5). Since all the constructs along with the

indicators have been adapted from prior researches, therefore, the validity of these measures is pre-tested. However, few items are slightly modified to fit into the context of this study and hence, a series of tests are performed to ascertain construct reliability, validity, and good data fit (Straub, 1989).

6.5 Research Measures

In order to operationalize the research model, the primary constructs namely human IT capability (independent variable), agility (mediator variable), IT spending (moderator variable) and performance (dependent variable) are adapted and developed from a vigorous study of the prior literature. Data relating to agility and performance measures have been collected from the business executives and IT executives have been targeted for human IT capability and IT spending related measures.

6.5.1 Measures for Human IT capability

The human IT capability is studied in terms of technology management skills, interpersonal management skills and business functional skills.

6.5.1.1 Business Functional Skills

Following Fink and Neumann (2009) and Lee et al. (2002), this construct is examined by four indicators, such as first, *knowledge about existing business functions (BusFun1),* second, *learning new business functions and technologies (BusFun2),* third, *understand business issues and find out suitable technical solutions (BusFun3),* and fourth, *acquire knowledge about market competitors and business environments (BusFun4).*

6.5.1.2 Interpersonal Management Skills

Based on the research work conducted by Fink and Neumann (2007), this construct comprises of five indicators, such as first, *work in collaborative and cross-functional groups to solve business as well as IT issues (IntMagt1),* second, *be a proactive team player with a propensity to project a positive attitude (IntMagt2),* third, *able to perform other external IT services by extending existing knowledge domain (IntMagt3),* fourth, *develop effective communication skills (IntMagt4),* fifth, *develop planning, organizing, and leading capabilities (IntMagt5).*

6.5.1.3 Technology Management Skills

Following Lee et al. (1995) and Fink and Neumann (2009), this construct is measured by five indicators, such as first, *effective management of technological fundamentals to create competitive advantage (TechMagt1),* second, *developing necessary IT skills and follow modern IT trends (TechMagt2),* third, *use IT as a medium to attain organizational objectives (TechMagt3),* fourth, *proper planning, designing, optimization, and operation of technological products, services, and processes (TechMagt4),* fifth, *developing web-based applications to meet up new market challenges (TechMagt5).*

6.5.2 Measures for Organizational agility

Organizational agility is operationalised in terms of sensing and responding agilities.

6.5.2.1 Sensing Agility (SA)

Following the researches by Dove (2001, 2005) and Overby et al. (2006), SA is studied in terms of four indicators which are first, *develop effective market intelligence to identify and track changes in customer preference and competitors' strategy (SA1),* second, *track new products or services launched by market competitors (SA2),* third, *identify and build essential capabilities to foresee market uncertainties (SA3),* and fourth, *recognize various changes relating to government regulations, policies, legal affairs, and economic shifts (SA4).*

6.5.2.2 Responding Agility (RA)

RA is studied in terms of four indicators, out of which three are based on research work conducted by Dove (2001, 2005) and Overby et al. (2006), and relating to the context of the study, the last indicator is created by author. All these indicators are as follows: first, *commence new ventures and modify existing product lines/features for quick response to changing competitor's strategies and customers' needs (RA1),* second, *create innovative products to adapt the existing business fulfilling the demand changes (RA2),* third, *responding to market threats as opportunities to realize enhanced value (RA3),* fourth, *quick response to customer complaints and resolve issue (RA4).*

6.5.3 Measures for Organizational Performance

The indicator *"overall organizational success"* did not load under any factor in the exploratory factor analysis performed in chapter 5 (Table 5.4). So, in this chapter it is selected as the first indicator for performance and is levelled as *(OP1)*. The second indicator is chosen as *profitability relative to goals (OP2)*, third, *asset utilization* (measured by return on assets ROA) *(OP3)*, and fourth, *market share relative to goals (OP4)* (Bharadwaj, 2000; Chakravarty et al. 2013; Wu et al. 2015).

6.5.4 Measures for IT Spending

A total of five indicators are studied for IT spending. The first indicator is s*pending on delivery channels (ITSpend1)* {(for example, automated teller machines (ATMs)}, second, *spending on core banking solution (CBS) (ITSpend2),* third, *spending on risk management solutions (RMS) (ITSpend3),* fourth, *spending on mobile banking solutions (MBS) (ITSpend4),* fifth, *spending on customer relationship management (CRM) (ITSpend5)* (KPMG Report, 2012; Ramesh and Daler, 2012).

6.6 Data Analysis and Hypotheses Testing

A total of 31 indicators covering all the study variables were first examined through a preliminary analysis containing procedures of descriptive statistics, and exploratory factor analysis [6d](EFA) utilizing SPSS (version 20). Out of the 31 indicators, a total of 28 indicators were loaded under 8 components which explain nearly 73% of variance. More variance is attributable to the first factor as compared to other remaining 7 factors (Table 6.3). The fourth indicator of business functional skill (*acquire knowledge about market competitors and business environments: BusFun4*), interpersonal management skill (*develop effective communication skills: IntMagt4*), and RA (*responding to market threats as opportunities to broaden market outlets: RA4)* did not load under any factor, hence these indicators were dropped. Further the 8th extracted component could load only one indicator i.e., the fifth indicator of interpersonal management skill *(develop planning, organizing, and leading capabilities: IntMagt5)* and therefore, it was also dropped. The EFA table containing 7 extracted components and 27 indicators is presented in table no. 6.4.

[6d] The EFA procedure is discussed in detail in chapter 4.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA) value of 0.819 represents adequacy of data for factor analysis (Table 6.1). The Bartlett's Test of Sphericity checks the significance of the study. The chi-square statistics of 7021.840 along with degrees of freedom 645 was found to be significant and hence, implies that the samples are significant to conduct factor analysis (Table 6.1). The communality values for all the indicators were found to be greater than 0.6 (Table 6.2). Hence, these indicators properly explain the common variance. Further, the unique and distinct indicators extracted under each construct were tested for their reliability and the Cronbach alpha (α) values were calculated to be within the range of 0.752 to 0.932 (Table 6.5) which is above the threshold value of 0.7 (Hair et al. 2006). Hence, these extracted indicators were proved to be highly reliable. From table no. 6.4 it is evident that all the factor loadings are above 0.5 and there is no cross loading of the indicators, which confirm the convergent as well as discriminant validity of EFA.

Then, confirmatory factor analysis (CFA) was performed along with the interaction-moderation, and mediation analysis using AMOS (version 20). The moderated-mediation analysis was carried out using the SPSS-PROCESS macro. The 7-component model is a representation of 2 second-order constructs namely, human IT capability and agility each having 2 first-order reflective dimensions (such as technology management skill, interpersonal management skill, business functional skill, and SA and RA), and 2 first-order constructs (such as IT spending and performance) which are measured by 3 interchangeable observed indicators. Technology management skill, interpersonal management skill, and business functional skill are studied as the independent variables, SA and RA as the mediators, IT spending as the moderator, and performance as the dependent variable. A series of tests were conducted to confirm construct reliability, validity, and good data fit.

Table 6.1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA)		0.819
Bartlett's Test of Sphericity	Approx. Chi-Square	7021.840
	Df	645
	Sig.	0.000

Table 6.2 Communalities

Loaded Items	Extraction
TechMagt1	0.800
TechMagt4	0.781
ITSpend2	0.775
ITSpend1	0.832
TechMagt2	0.905
TechMagt3	0.875
RA3	0.670
ITSpend3	0.793
OP4	0.696
BusFun3	0.817
BusFun2	0.712
OP1	0.710
RA1	0.717
IntMagt4	0.553
IntMagt5	0.688
OP3	0.683
SA1	0.752
SA2	0.658
SA4	0.692
OP2	0.714
BusFun1	0.688
SA3	0.696
RA2	0.661
RA4	0.687
ITSpend4	0.870
ITSpend5	0.911
IntMagt2	0.654
IntMagt1	0.793
IntMagt3	0.703
BusFun4	0.707
TechMagt5	0.667

Table 6.3 Total Variance Explained by Extracted Factors

Factors	**Initial Eigenvalues** ***Total***	***% of Variance***	***Cumulative %***	**Extraction Sums of Squared Loadings** ***Total***	***% of Variance***	***Cumulative %***	**Rotation Sums of Squared Loadings** ***Total***	***% of Variance***	***Cumulative %***
1	8.981	28.971	28.971	8.981	28.971	28.971	4.629	14.932	14.932
2	3.582	11.555	40.527	3.582	11.555	40.527	3.821	12.327	27.259
3	2.687	8.669	49.195	2.687	8.669	49.195	3.579	11.546	38.805
4	2.291	7.389	56.584	2.291	7.389	56.584	2.622	8.458	47.263
5	1.764	5.691	62.275	1.764	5.691	62.275	2.366	7.632	54.895
6	1.383	4.461	66.736	1.383	4.461	66.736	2.133	6.880	61.775
7	1.151	3.714	70.450	1.151	3.714	70.450	2.096	6.762	68.537

8	1.020	3.290	73.740	1.020	3.290	73.740	1.613	5.203	73.740

Extraction Method: Principal Component Analysis

Table 6.4 Rotated Component Matrix and Descriptive Statistics

Item Loadings	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Minimum	Maximum	Mean	Standard Deviation
ITSpend1	0.780							1.000	5.000	3.523	1.039
ITSpend2	0.714							1.000	5.000	3.550	0.992
ITSpend3	0.874							1.000	5.000	3.500	1.101
ITSpend4	0.870							1.000	5.000	3.516	1. 026
ITSpend5	0.920							1.000	5.000	3.490	1.089
TechMagt1		0.749						2.000	5.000	3.523	0.958
TechMagt2		0.838						1.000	5.000	3.543	0.999
TechMagt3		0.786						1.000	5.000	3.526	0.965
TechMagt4		0.653						2.000	5.000	3.700	1.086
TechMagt5		0.780						1.000	5.000	3.566	1.014
SA1			0.798					1.000	5.000	3.490	1.089
SA2			0.692					1.000	5.000	3.496	1.067
SA3			0.750					1.000	5.000	3.636	1.023
SA4			0.668					1.000	5.000	3.473	0.984
OP1				0.722				2.000	5.000	3.583	0.886
OP2				0.707				1.000	5.000	3.410	0.999
OP3				0.614				1.000	5.000	3.436	0.984
OP4				0.612				2.000	5.000	3.723	0.936
BusFun1					0.614			1.000	5.000	3.600	0.967
BusFun2					0.783			1.000	5.000	3.536	0.911
BusFun3					0.866			2.000	5.000	3.603	0.914
IntMagt1						0.868		1.000	5.000	3.750	1.034
IntMagt2						0.802		2.000	5.000	3.550	0.954
IntMagt3						0.804		1.000	5.000	3.626	0.929
RA1							0.839	1.000	5.000	3.660	0.945
RA2							0.780	1.000	5.000	3.673	0.932
RA3							0.802	1.000	5.000	3.670	1.000

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 6.5 Reliability of Extracted Indicators

Variables	Number of Indicators	Cronbach α
IT Spending	5	0.932
Technology Management Skill	5	0.896
Interpersonal Management Skill	3	0.781
Business Functional Skill	3	0.806
Sensing Agility	4	0.867
Responding Agility	3	0.752
Organizational Performance	4	0.813

6.6.1 Test for Common-method bias (CMB)

This study utilizes two different categories of respondents i.e., IT and business executives to collect the responses. The data on human IT capability and IT spending were collected from the IT executives and business executives were the source for agility and performance related data. Hence, CMB may occur. The extent of CMB was empirically tested by using Harman's single factor method in SPSS (version 20), where an EFA containing all the 31 indicators was conducted by constraining the number of components extracted to be 1 and this single factor accounted for only 23% of variance, which shows the absence of CMB. According to Podsakoff et al. (2003), if CMB was a problem it would have explained more than 50% of the variance. Afterwards, a CFA was performed on this single-component model using AMOS (version 20) (Kearns and Sabherwal, 2007). The results culminated in a poor fitting model denoting all the key indices as χ^2 = 1459.073, df = 91, GFI = 0.392, AGFI= 0.281, RMSEA = 0.411, NFI = 0.462, TLI=0.532, CFI = 0.581. From this it is evident that the constructs are free from CMB.

6.6.2 Measurement Model

The measurement model was developed using the 7 components extracted through EFA containing 27 indicators. However, to improve data fit 6 indicators were dropped. Since this research uses reflective indictors, which are usually interchangeable among each other, so dropping few of them to achieve better data fit will still capture the essence of the concept (Petter et al. 2007). Therefore, the final measurement model consists of 7 constructs with 21 indicators (Figure 6.2).

Further, this measurement model was validated through multiple data [6e]fit indices which primarily comprise of absolute fit indices like CMIN/DF (χ2/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The estimated and acceptable threshold levels of all these critical indices are presented in table no 6.6 which confirms a good model fit.

[6e] Prior literature studies supporting the estimated and acceptable threshold levels of the data fit indices have been discussed in detail in Chapter 4.

6.6.3 Test for construct reliability in CFA

The reliability of all the 7 constructs was tested based on examining the composite reliability values and maximum reliability (MaxR designated by the symbol 'H'). The composite reliability reflects the internal consistency of the individual constructs and the calculated values (within the range of 0.752 to 0.951) exceed the recommended value of 0.7 (Bernstein and Nunnally, 1994) (Table 6.7). The MaxR(H), a more robust calculation than composite reliability was also estimated and the values (within the range of 0.847 to 0.988) were found to be higher than composite reliability, which further confirmed higher reliability of the constructs.

6.6.4 Test for construct validity in CFA

The construct validity was tested calculating the convergent and discriminant validities.

6.6.4.1 Convergent validity

The average variance extracted (AVE) values were estimated for the convergent validity and all the 7 constructs exhibit AVE values (within the range of 0.503 to 0.867) greater than 0.5 (Hair et al. 2006), which suggest that the individual latent factor is properly explained by its observed variables (Table 6.7). Additionally, the calculated standardized estimates inferred from CFA conducted on the 7-component model validates that convergent validity issue is not a potential risk for the constructs (Anderson and Gerbing, 1988; Bentler, 1989) (Table 6.7).

6.6.4.2 Discriminant validity

As shown in table 6.8, the square root of the AVE for each construct was calculated to be greater than the inter-construct correlation. Further, the estimated values of maximum shared variance (MSV) (within the range of 0.036 to 0.521) were also found to be less than the AVE values (Table 6.7) (Hair et al. 2010). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issue.

Thus, the measurement model containing all the 7 constructs was confirmed to be a good fitting model with higher reliability and validity. Further, structural models were developed as presented in subsequent sections.

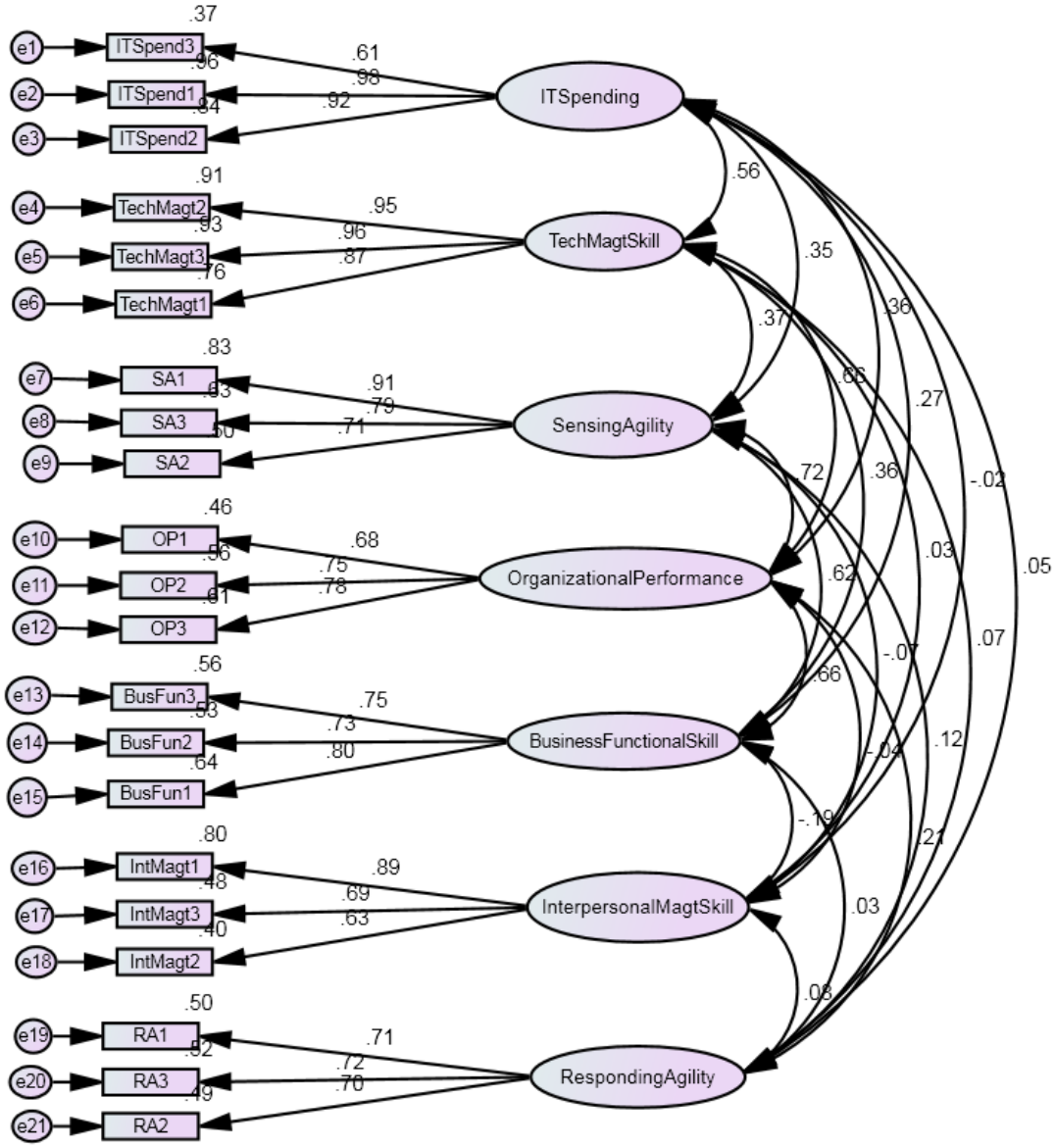


Figure 6.2 Measurement Model

Table 6.6 Fit Indices of the Measurement Model

Fit Indices	Estimated Levels	Acceptable Threshold Levels
Absolute fit indices		
CMIN/DF	2.191	$\leq 2^{G}, \leq 5^{M}$
GFI	0.897	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.859	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.063	$<0.08^{G}, \leq 0.10^{M}$
Incremental fit indices		
NFI	0.904	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.931	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.945	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices		

PGF1	0.653	No threshold levels
PNFI	0.724	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 6.7 Confirmatory Factor Analysis

Model Constructs	Items	Standardized Loadings	Composite Reliability	AVE	MSV	Max R(H)
Inter Personal Management Skill	IntMagt1 IntMagt2 IntMagt3	0.893*** 0.634*** 0.690***	0.788	0.559	0.036	0.847
IT Spending	ITSpend1 ITSpend2 ITSpend3	0.981*** 0.915*** 0.607***	0.883	0.723	0.314	0.974
Technology Management Skill	TechMagt1 TechMagt2 TechMagt3	0.873*** 0.955*** 0.962***	0.951	0.867	0.432	0.984
Sensing Agility	SA1 SA2 SA3	0.914*** 0.707*** 0.794***	0.849	0.655	0.521	0.986
Organizational Performance	OP1 OP2 OP3	0.675*** 0.748*** 0.779***	0.779	0.541	0.521	0.987
Business Functional Skill	BusFun1 BusFun2 BusFun3	0.802*** 0.727*** 0.746***	0.803	0.576	0.436	0.987
Responding Agility	RA1 RA2 RA3	0.705*** 0.700*** 0.722***	0.752	0.503	0.045	0.988

Notes: significant at ***p<.001

Table 6.8 Discriminant Validity

Factors	Inter Personal Management Skill	IT Spending	Technology Management Skill	Sensing Agility	Organizational Performance	Business Functional Skill	Responding Agility
Inter Personal Management Skill	**0.747**						
IT Spending	-0.018	**0.850**					
Technology Management Skill	0.029	0.560	**0.931**				
Sensing Agility	-0.068	0.347	0.371	**0.809**			
Organizational Performance	-0.036	0.356	0.657	0.722	**0.735**		
Business Functional Skill	-0.189	0.271	0.360	0.618	0.660	**0.759**	
Responding Agility	0.082	0.047	0.071	0.124	0.213	0.027	**0.709**

Notes: Diagonal elements (bold) are the square roots of average variance extracted

6.6.5 Structural Model

The structural linkages between technology management skill, interpersonal management skill, and business functional skill with SA and RA is presented in figure no. 6.3 (Model 1), where positive significant path coefficients are calculated for each relationship (for technology management skill-SA, structural link = 0.169, $p < 0.001$, for technology management skill-RA, structural link = 0.069, $p < 0.05$; for interpersonal management skill-SA, structural link = 0.039, $p < 0.05$, for interpersonal management skill-RA, structural link = 0.099, $p < 0.01$; for business functional skill-SA, structural link = 0.556, $p < 0.001$, for business functional skill-RA, structural link = 0.048, $p < 0.05$). Hence, the proposed hypotheses H_{7a}, H_{7b}, H_{8a}, H_{8b}, H_{9a}, H_{9b} are supported.

Further, structural linkages between technology management skill, interpersonal management skill, and business functional skill with performance is presented in figure no. 6.4 (Model 2), where positive significant path coefficients are calculated for each relationship (for technology management skill-performance, structural link = 0.496, $p < 0.001$; for interpersonal management skill-performance, structural link = 0.054, $p < 0.05$; for business functional skill-performance, structural link = 0.483, $p < 0.001$) Hence, the formulated hypothesis H_{11a}, H_{11b}, and H_{11c} are supported.

Figure no. 6.5 (Model 3) represents the structural linkages between SA and RA with performance, where positive significant path coefficients are calculated for SA-performance linkage (structural link = 0.693, $p < 0.001$) and RA-performance linkage (structural link = 0.136, $p < 0.001$). Hence, hypothesis H_{10a} and H_{10b} are supported.

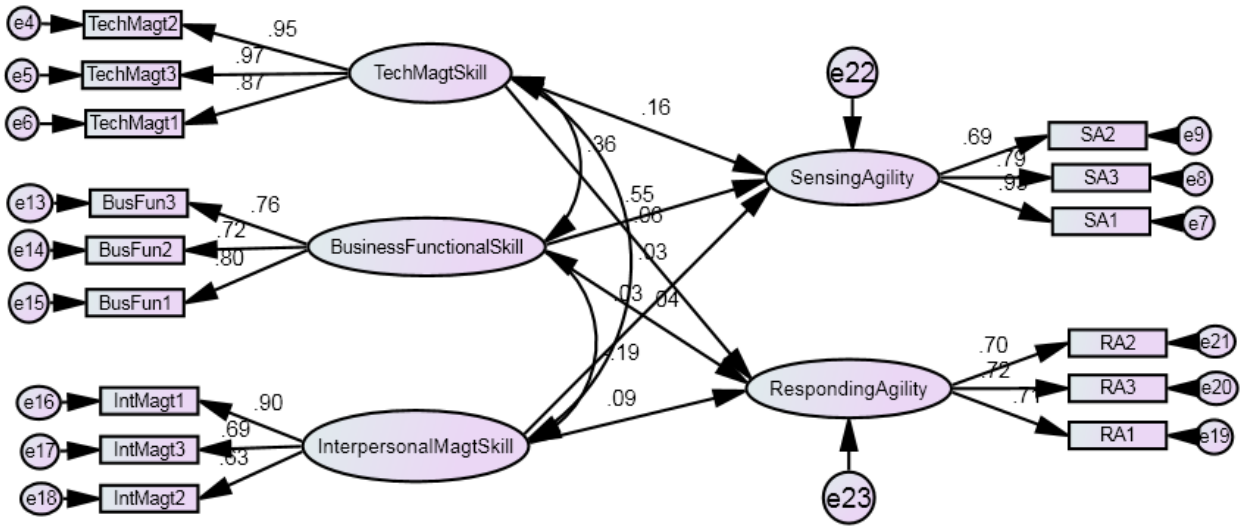


Figure 6.3 Structural linkages between the components of Human IT capability and organizational agility (Model 1)

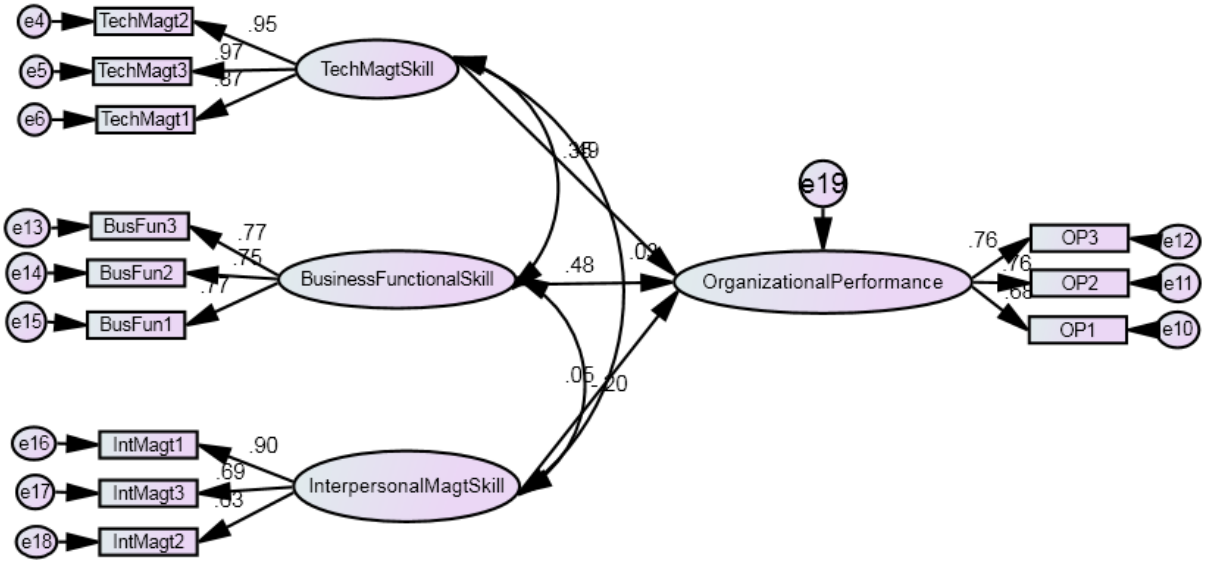


Figure 6.4 Structural linkages between Human IT capability dimensions and organizational performance (Model 2)

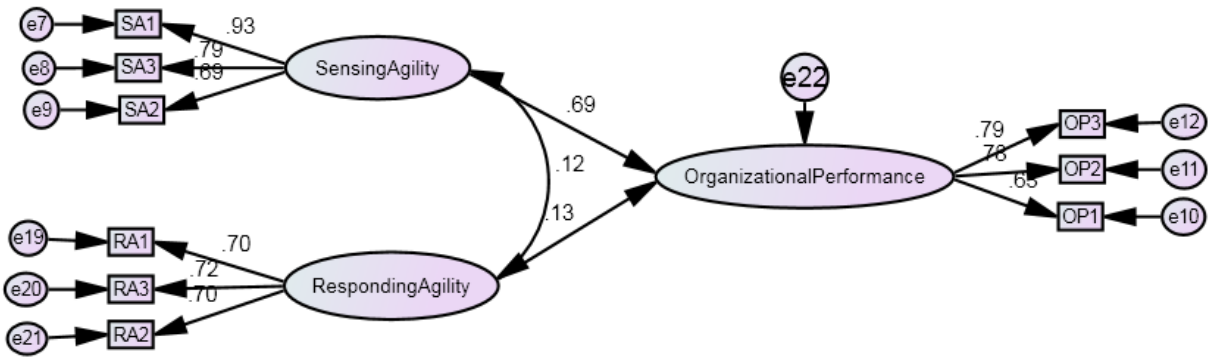


Figure 6.5 Structural linkages between Organizational agility dimensions and Organizational performance (Model 3)

A data imputation process was carried out to create composites for each construct and path models were generated and used for the rest of the analysis. Figure no. 6.6 (Model 4) exhibits path diagrams showing the relationships between technology management skill, interpersonal management skill, business functional skill, SA, RA, and performance, which essentially examine all the above mentioned relationships in one diagram. From figure no. 6.6 is evident that all the human IT capability components (namely, technology management skill, interpersonal management skill, business functional skill) exhibit positive relationships with performance in the presence of both SA and RA (However, individual indirect effects, i.e., mediation effects are tested in the Mediation Analysis section). Further, all these structural models (Model 1 to 4) were tested for various data fit indices by calculating the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. These fit indices are presented in table no. 6.9, where all these estimated values were found to be within the acceptable threshold levels.

6.6.6 Test for Multicollinearity

A linear regression analysis was conducted to estimate the observed variability of the independent variables namely, technology management skill, interpersonal management skill, business functional skill, SA, and RA on the dependent variable i.e., performance. Table no. 6.10 represents the model summary and collinearity statistics of each of these independent variables. The R^2 value of 0.871 denotes that independent variables explain 87% of observed variability in performance. The standardized coefficients (Beta) and t-statistics represent significant

relationship between the independent and dependent variables. The tolerance and the variance inflation factor (VIF) represent the extent of multicollinearity issue among the variables. Following Field (2009), the threshold levels for tolerance and VIF are set to be > 0.2 and < 10 respectively. Table no. 6.10 represents tolerance level within the range of 0.479 to 0.960 and VIF index within the range of 1.041 to 2.170, suggesting the absence of multicollinearity issue.

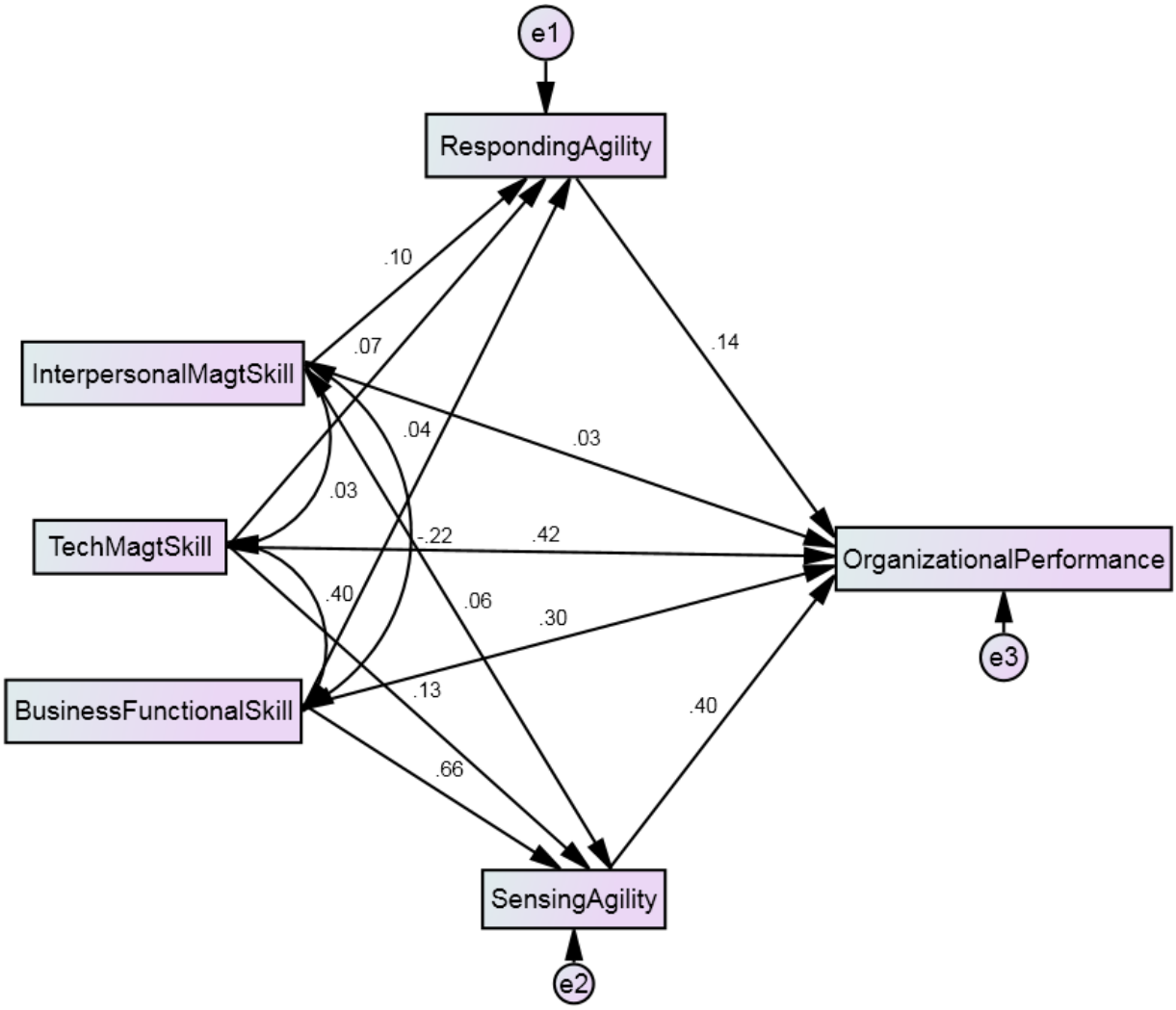


Figure 6.6 Structural linkages between Human IT capability dimensions, Organizational agility dimensions and Organizational performance (Model 4)

Table 6.9 Fit Indices of the Structural Models (1 to 4)

Fit Indices	Model 1	Model 2	Model 3	Model 4	Acceptable Threshold Levels
Absolute fit indices CMIN/DF	2.318	2.047	2.917	4.824	$\leq 2^{G}, \leq 5^{M}$

GFI	0.922	0.949	0.956	0.989	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.884	0.917	0.917	0.843	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.066	0.059	0.079	0.080	$<0.08^{G}, \leq 0.10^{M}$
Incremental fit indices					
NFI	0.923	0.952	0.934	0.984	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.941	0.965	0.933	0.902	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.954	0.975	0.955	0.987	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices					
PGF1	0.622	0.584	0.510	0.500	No threshold levels
PNFI	0.712	0.693	0.623	0.598	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 6.10 Model Summery, Coefficients and Collinearity Statistics

	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**	**Collinearity Statistics**	
Model	***B***	***Std. Error***	***Beta***			***Tolerance***	***VIF***
Constant	-0.142	0.096		-1.489	0.010		
Responding Agility	0.129	0.021	0.135	6.289	0.000	0.960	1.041
Interpersonal Management Skill	0.017	0.014	0.026	1.172	0.018	0.922	1.084
Business Functional Skill	0.268	0.028	0.300	9.699	0.000	0.461	2.170
Sensing Agility	0.235	0.018	0.399	13.165	0.000	0.479	2.008
Technology Management Skill	0.248	0.014	0.419	17.836	0.000	0.799	1.252

R=0.933, R^2=0.871, Adjusted R^2=0.868; Dependent variable: Organizational performance; Independent variable: Technology Management Skill, Interpersonal Management Skill, Business Functional Skill, SA, and RA

6.6.7 Interaction-Moderation Analysis

The interaction variables (Technology management skill_X_IT spending, Interpersonal management skill_X_IT spending, and Business functional skill_X_IT spending) were computed and path estimates were calculated. The interaction-moderation effects of IT spending with technology management skill, interpersonal management skill, and business functional skill on both SA and RA are shown in figures no. 6.7, 6.8, and 6.9. From figure no. 6.7 it is evident that the interaction of IT spending with interpersonal management skill exhibits a significant negative effect on both SA and RA (for Interpersonal management skill_X_IT Spending-SA, structural link = -0.078, $p < 0.05$ and Interpersonal management skill_X_IT Spending-RA, structural link = -0.079, $p < 0.05$). Hence both H_{13c} and H_{13d} are not supported. Figure no. 6.8 illustrates a

significant negative effect of IT spending and technology management skill interaction with SA (structural link = -0.107, $p < 0.01$), while a significant positive effect on RA (structural link = 0.049, $p < 0.05$). Therefore, hypothesis H_{13a} is not supported, but H_{13b} is supported. Figure no. 6.9 exhibits significant positive effect of the interaction between IT spending and business functional skill on both SA and RA (for Business functional skill_X_IT spending-SA, structural link = 0.029, $p < 0.05$; for Business functional skill_X_IT spending-RA, structural link = 0.019, $p < 0.05$). Therefore, the proposed hypotheses H_{13e} and H_{13f} are supported.

The interaction-moderation models (Model 5, 6, and 7) were validated by the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The summary of these estimates are presented in table no. 6.11 showing all these fit indices within the acceptable threshold levels. Further, these interaction-moderation relationships are plotted as shown in figures no. 6.10, 6.11, 6.12, 6.13, 6.14, and 6.15.

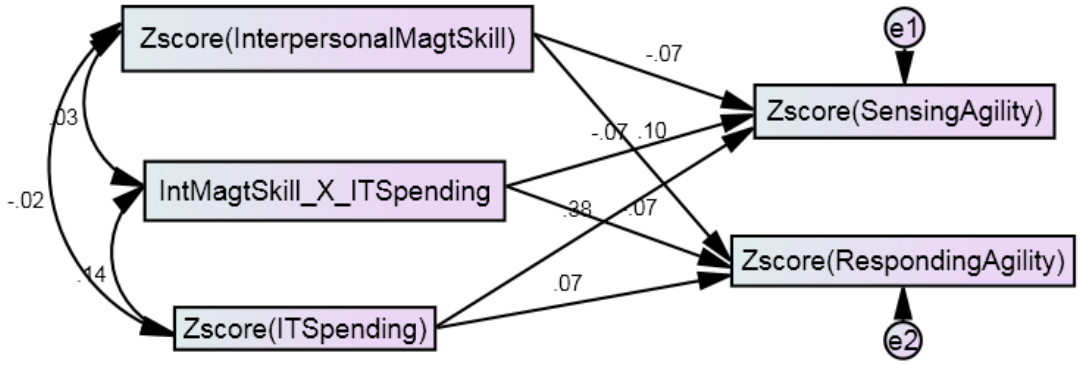


Figure 6.7 Interaction effect of IT spending and Interpersonal management skill on Sensing and Responding agilities (Model 5)

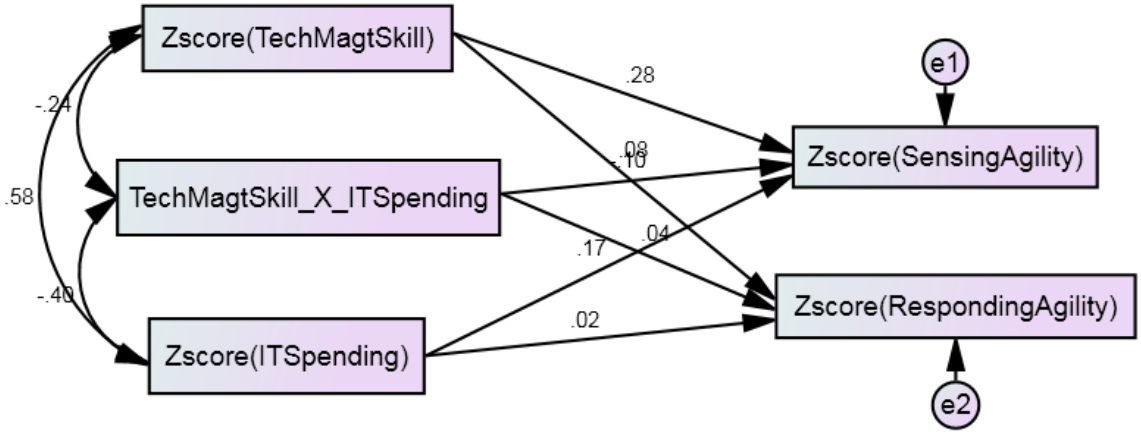


Figure 6.8 Interaction effect of IT spending and Technology management skill on Sensing and Responding agilities (Model 6)

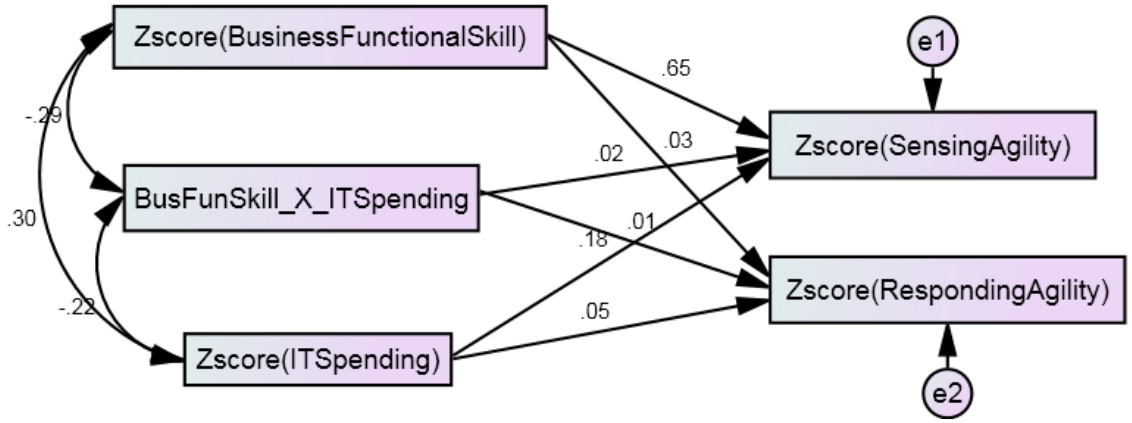


Figure 6.9 Interaction effect of IT spending and Business functional skill on Sensing and Responding agilities (Model 7)

Table 6.11 Fit Indices of the Moderation Models (5 to 7)

Fit Indices	Model 5	Model 6	Model 7	Acceptable Threshold Levels
Absolute fit indices				
CMIN/DF	4.120	4.165	3.945	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.992	0.993	0.990	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.879	0.898	0.844	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.080	0.080	0.079	$< 0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices				
NFI	0.907	0.979	0.972	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.878	0.825	0.850	$\geq 0.90^{G}$, $\geq 0.80^{M}$
CFI	0.908	0.983	0.975	$\geq 0.90^{G}$, $\geq 0.80^{M}$
Parsimonious fit indices				
PGF1	0.322	0.304	0.310	No threshold levels
PNFI	0.412	0.413	0.423	No threshold levels

Note: G= good data fit, M= mediocre data fit

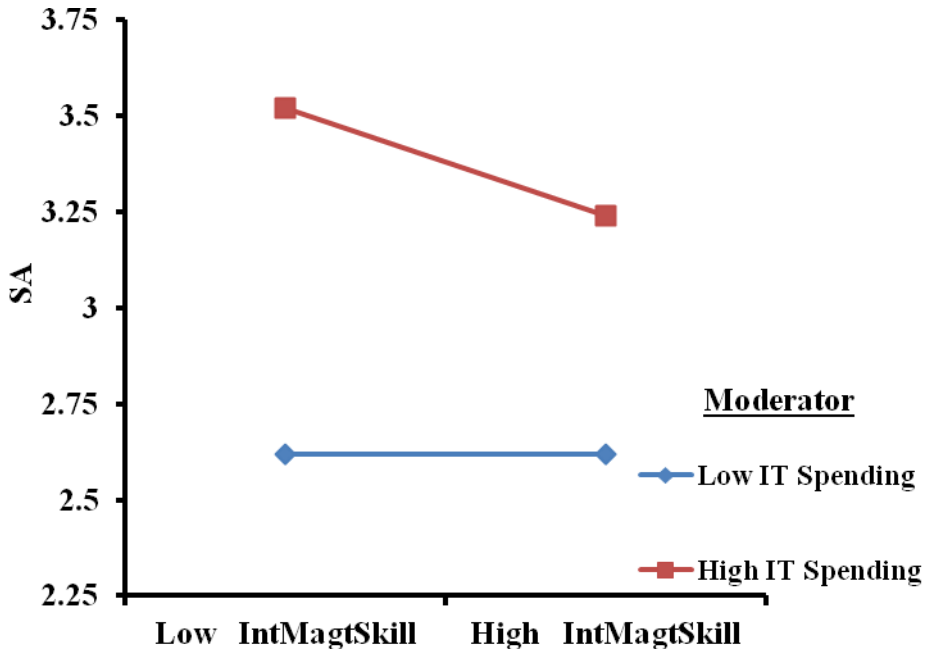


Figure 6.10 IT spending strengthens the negative relationship between Interpersonal management skill (IntMagtSkill) and Sensing agility (SA)

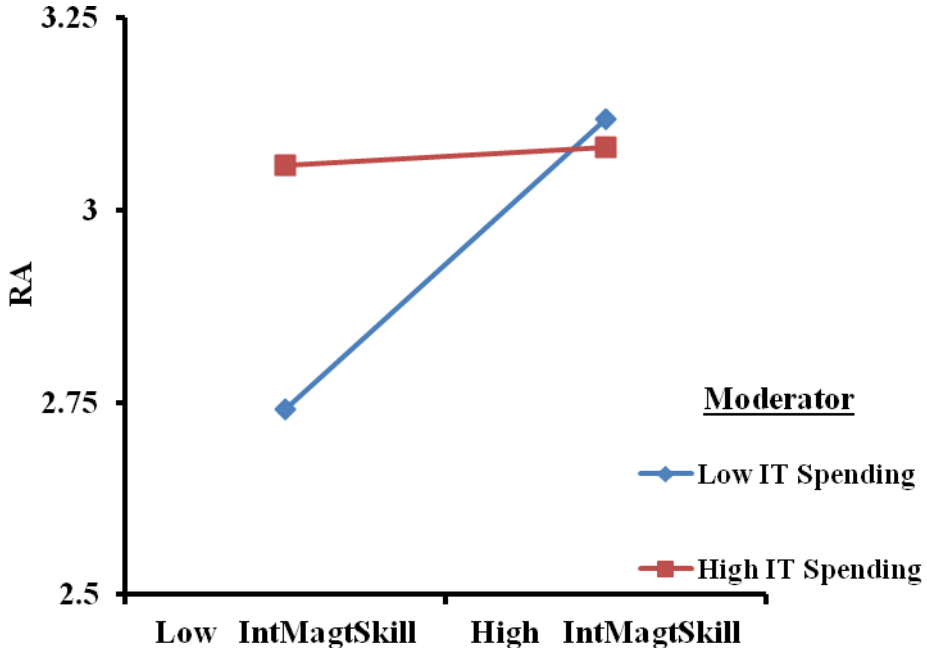


Figure 6.11 IT spending dampens the positive relationship between Interpersonal management skill (IntMagtSkill) and Responding agility (RA)

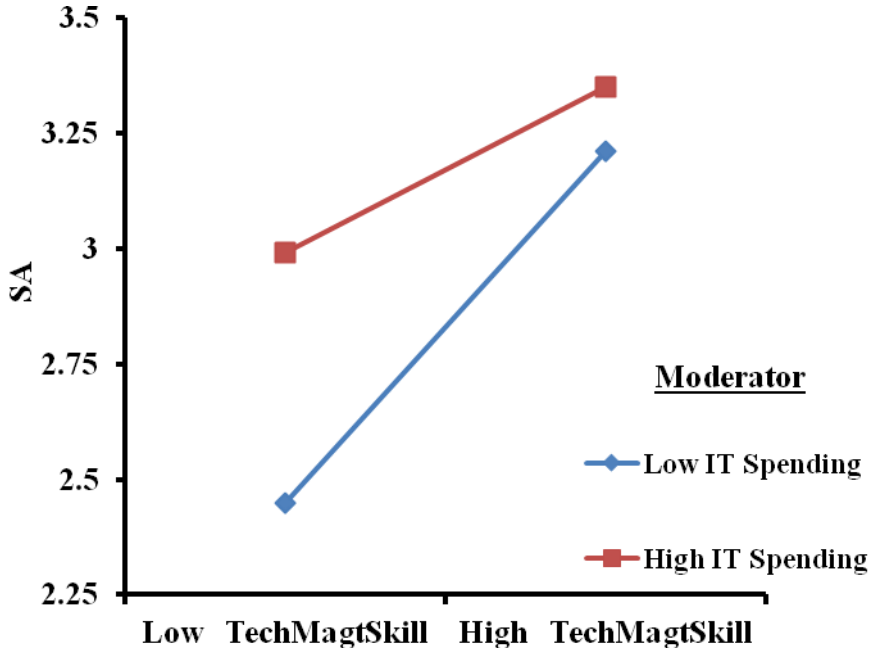


Figure 6.12 IT spending dampens the positive relationship between Technology management skill (TechMagtSkill) and Sensing agility (SA)

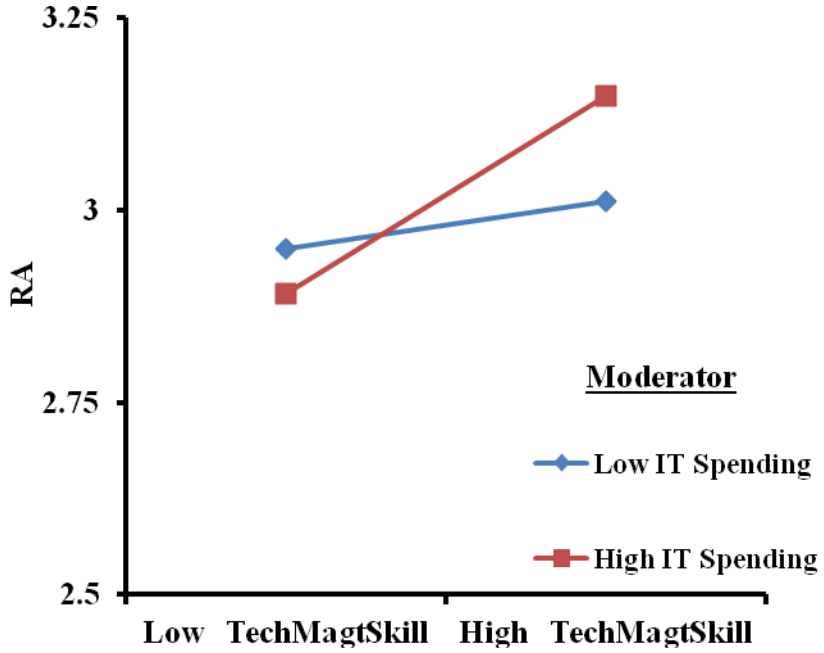


Figure 6.13 IT spending strengthens the positive relationship between Technology management skill (TechMagtSkill) and Responding agility (RA)

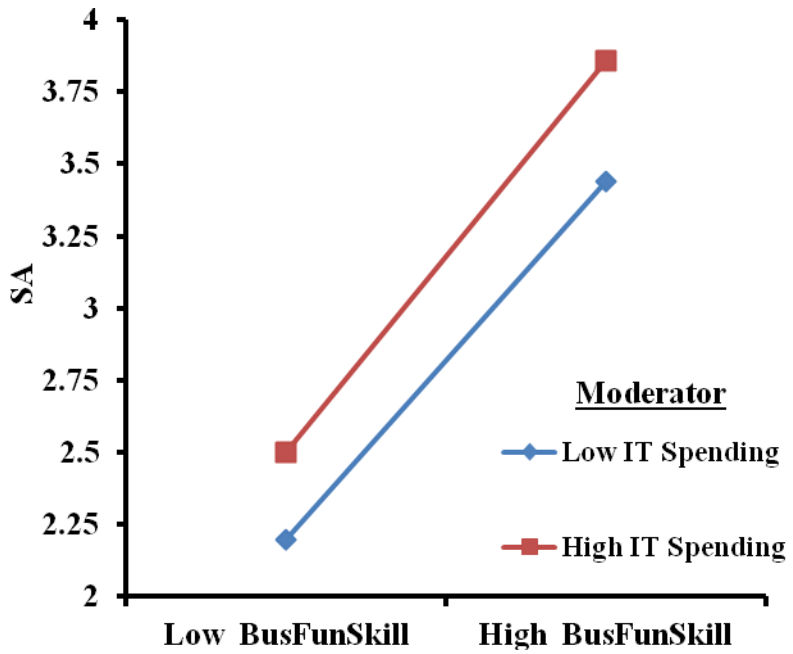


Figure 6.14 IT spending strengthens the positive relationship between Business function skill (BusFunSkill) and Sensing agility (SA)

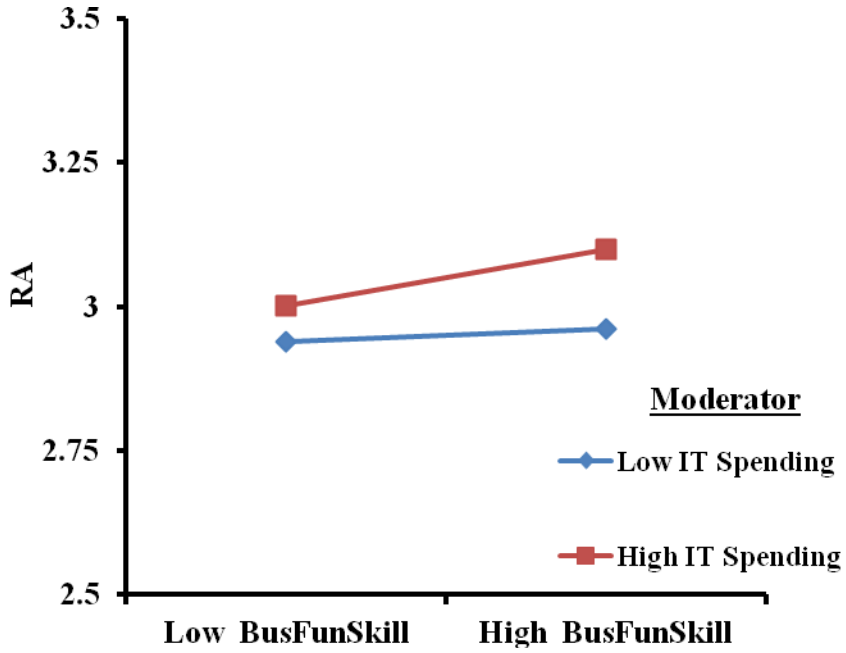


Figure 6.15 IT spending strengthens the positive relationship between Business function skill (BusFunSkill) and Responding agility (RA)

6.6.8 Mediation Analysis

In this chapter SA and RA are treated as the mediators and their indirect effects on the technology management skill-performance linkage, interpersonal management skill-performance association, and business functional skill-performance relationship are individually examined and the path coefficients are illustrated in figures no. 6.16, 6.17, 6.18, 6.19, 6.20, and 6.21. The indirect effect estimates are calculated by utilizing the "*MyIndirectEffectEstimand"* Gaskin (2016), which uses 2000 numbers of bootstrap samples in AMOS (version 20) and presented by 'A X B', where 'A' is the technology management, interpersonal management, and business functional skills-SA and RA relationships (i.e., from independent variables to mediators) and 'B' is the SA and RA-organizational performance relationships (i.e., from mediators to dependent variable) (Hayes, 2009).

For interpersonal management skill-SA-performance and interpersonal management skill-RA-performance linkages the indirect effect estimates are calculated to be significant (AXB = -0.046, $p < 0.05$; AXB = 0.016, $p < 0.05$). Therefore, both hypotheses H_{12c} and H_{12d} are supported. In case of technology management skill-SA-performance linkage this estimate is significant (AXB = 0.144, $p < 0.001$) but for technology management skill-RA-performance linkage, it is non-significant. Hence, hypothesis H_{12a} is supported, but H_{12b} is not supported. For business functional skill-SA-performance relationship the indirect estimate is calculated to be significant (AXB = 0.332, $p < 0.001$), but for business functional skill-RA-performance relationship, it is non-significant. Therefore, hypothesis H_{12e} is supported and H_{12f} is not supported. These indirect estimates are shown in table no. 6.12.

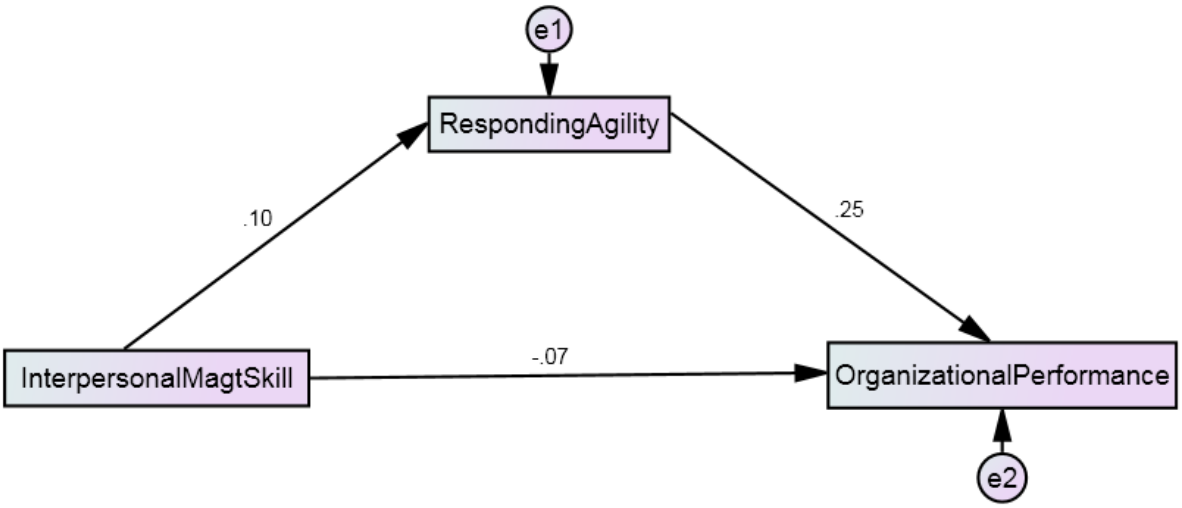


Figure 6.16 Responding agility as a mediator between Interpersonal management skill and Organizational performance

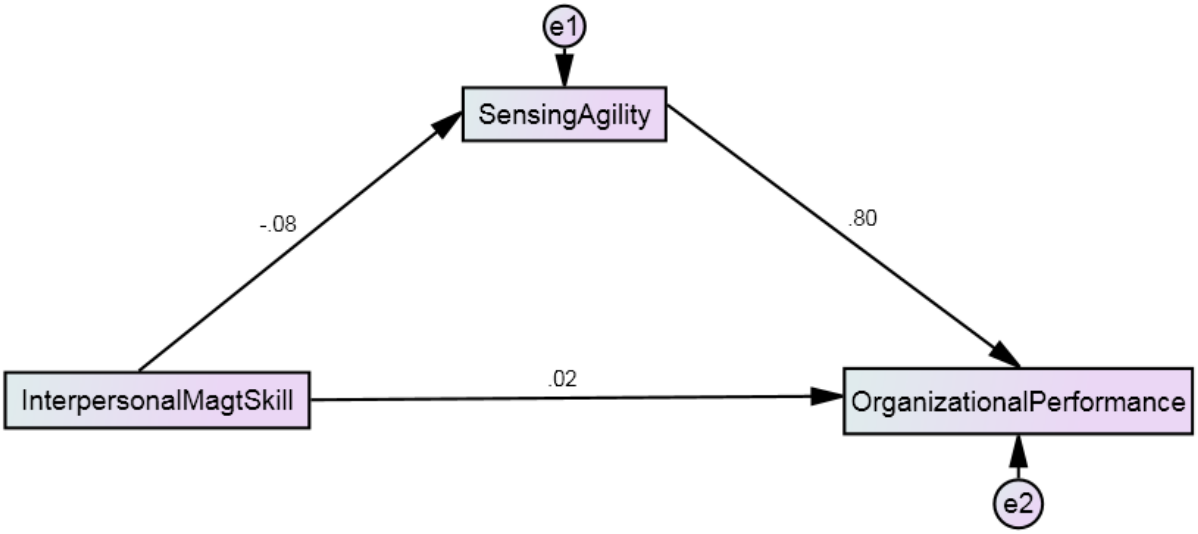


Figure 6.17 Sensing agility as a mediator between Interpersonal management skill and Organizational performance

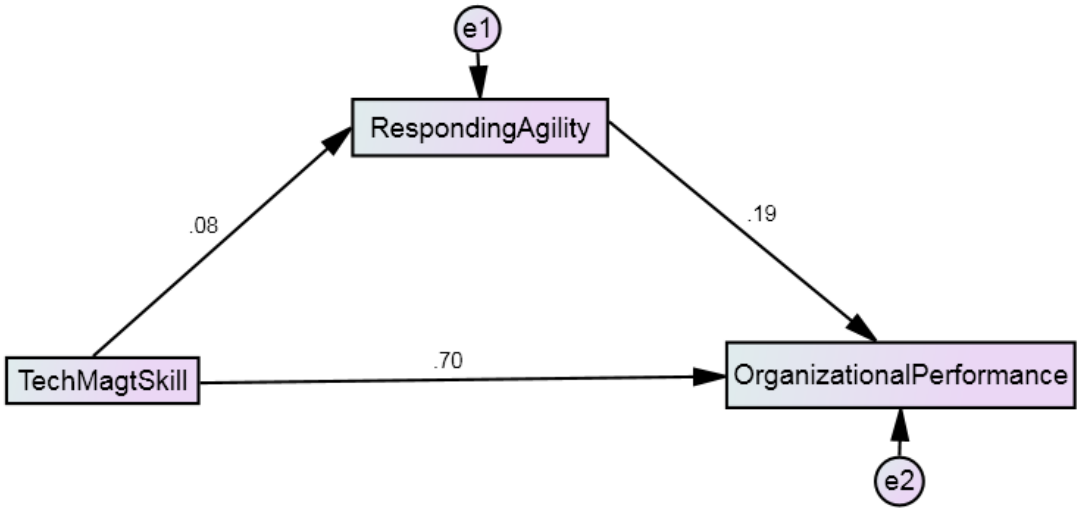


Figure 6.18 Responding agility as a mediator between Technology management skill and Organizational performance

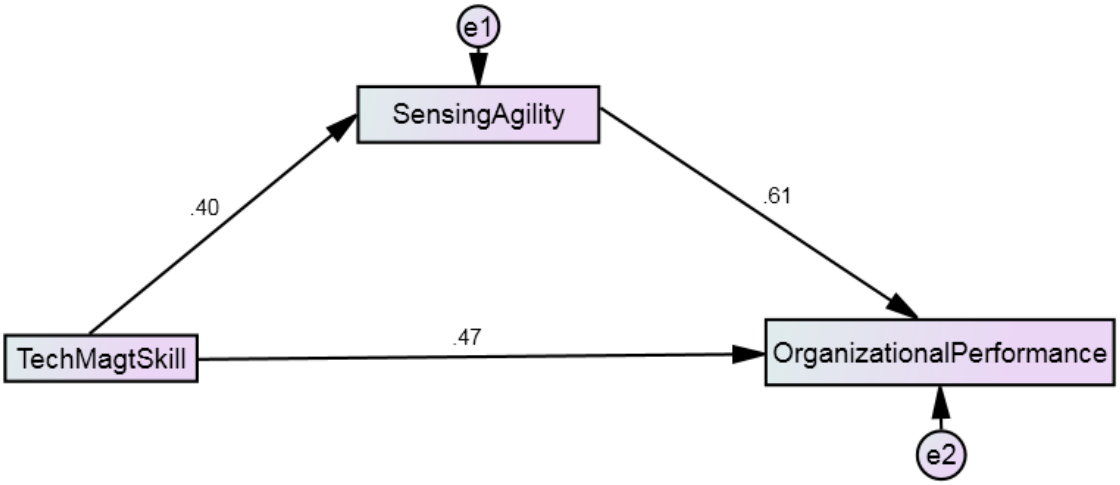


Figure 6.19 Sensing agility as a mediator between Technology management skill and Organizational performance

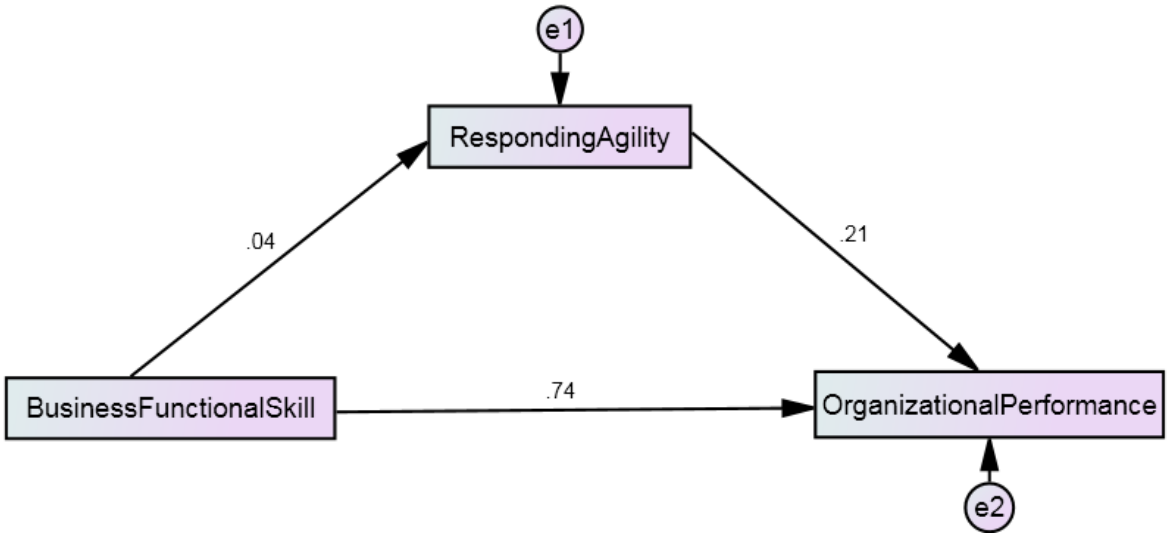


Figure 6.20 Responding agility as a mediator between Business functional skill and Organizational performance

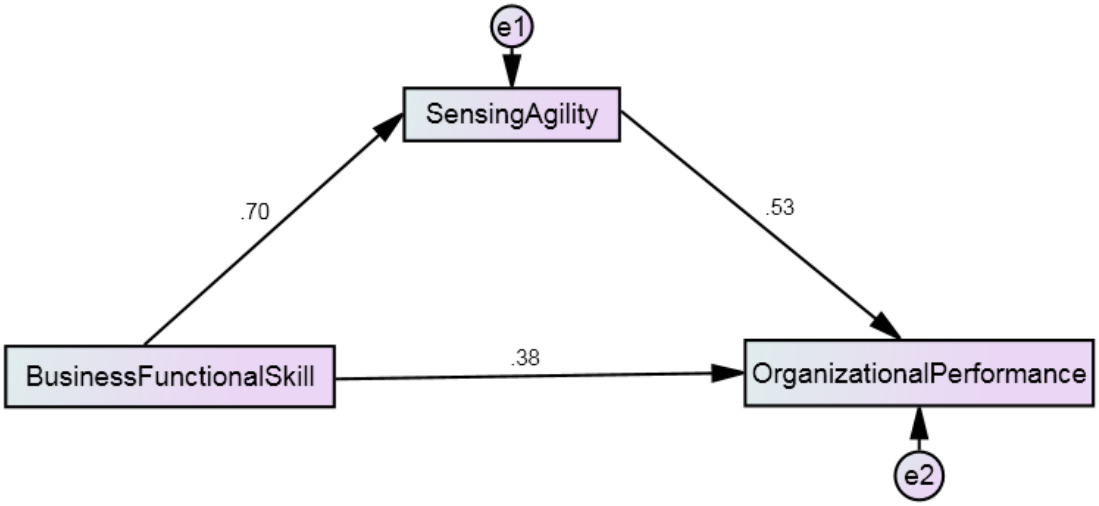


Figure 6.21 Sensing agility as a mediator between Business functional skill and Organizational performance

Table 6.12 Indirect Effects

Examined Relationships	Indirect Effects Estimates (A X B)	Significance
Interpersonal Management Skill[i]→RA[m]→Organizational performance[d]	0.016	*
Interpersonal Management Skill[i] →SA[m]→Organizational performance[d]	-0.046	*
Technology Management Skill[i]→RA[m]→Organizational performance[d]	0.009	NS
Technology Management Skill[i] →SA[m]→Organizational performance[d]	0.144	***

Business Functional Skill[i] →RA[m]→Organizational performance[d]	0.008	NS
Business Functional Skill[i] →SA[m]→Organizational performance[d]	0.332	***

Note: i= Independent variable, m= Mediator, d= Dependent variable; A= i→m, B= m→d; bootstrap results based on n=2000, confidence level for confidence intervals = 0.05 (∗); Note: significant at *p<.05, ***p<.001, NS=not significant

6.6.9 Moderated Mediation Analysis

From the interaction-moderation analysis it is observed that all six interaction-moderation effects {Figure 6.7 (Model 5), 6.8 (Model6), and 6.9 (Model 7)} are significant and further the mediation analysis also reveals significant indirect effects (except Technology management skill-RA-Performance and Business functional skill-RA-Performance relationships). Hence, a moderated-mediation effect of IT spending was examined on the direct and indirect (via mediator) relationship between technology management skill-interpersonal management skill-business functioanl skill-performance linkages using the bootstrapping method with 10,000 bootstrap samples in SPSS-PROCESS macro (Hayes, 2015).

The index of the moderated-mediation effect is presented in table no. 6.13 and it is obtained that the lower and the upper limits of confidence intervals do not include zero for technology management skill-SA-performance (with IT spending as modertor) and business funcational skill-SA-performance (with IT spending as modertor), which proves the significance of the moderated-metiation effects. However, this effect was non-significant for interpersonal management skill-SA-RA-performance linakages (with IT spending as modertor) (since the lower and the upper limits of confidence intervals include zero) (Table 6.13).

Table 6.13 Index of Moderated Mediation

Examined Relationships	Index	LLCI	ULCI	Significance
Technology management skill→SA→Organizational performance (IT spending)[#]	-0.058	-0.021	-0.116	*
Business functional skill→SA→Organizational performance (IT spending)[#]	0.010	0.009	0.324	*
Interpersonal management skill SA→Organizational performance (IT spending)[#]	-.548	-0.129	0.214	NS
Interpersonal management skill RA→Organizational performance (IT spending)[#]	-0.017	-0.052	0.009	NS

Note: [#] moderator in parenthesis; LLCI= lower limit confidence interval, ULCI= upper limit confidence interval; bootstrap results based on n=10000; confidence level for confidence intervals = 0.05 (∗), NS= not significant

The results showing the hypotheses testing is presented in table no. 6.14.

Table 6.14 Hypotheses Testing

Proposed Hypotheses	**Standardized Estimates**	**Predicted Sign**	**Inferences**
H_{7a}: Technology management skill→SA	0.169***	Positive	Supported
H_{7b}: Technology management skill→RA	0.069*	Positive	Supported
H_{8a}: Interpersonal management skill→SA	0.039*	Positive	Supported
H_{8b}: Interpersonal management skill→RA	0.099**	Positive	Supported
H_{9a}: Business functional skill→SA	0.556***	Positive	Supported
H_{9b}: Business functional skill→RA	0.048*	Positive	Supported
H_{10a}:SA-performance	0.693***	Positive	Supported
H_{10b}:RA-performance	0.136***	Positive	Supported
H_{11a}: Technology management skill→performance	0.496***	Positive	Supported
H_{11b}: Interpersonal management skill→performance	0.054*	Positive	Supported
H_{11c}: Business functional skill→performance	0.483***	Positive	Supported
H_{12a}: Technology management skill →SA→performance {(AXB) effects}	0.144***	---	Supported
H_{12b}: Technology management skill →RA→performance {(AXB) effects}	0.009	---	Not Supported
H_{12c}: Interpersonal management skill →SA→performance {(AXB) effects}	-0.046*	---	Supported
H_{12d}: Interpersonal management skill →RA→performance {(AXB) effects}	0.016*	---	Supported
H_{12e}: Business functional skill→SA→performance {(AXB) effects}	0.332***	---	Supported
H_{12f}: Business functional skill→RA→performance {(AXB) effects}	0.008	---	Not Supported
H_{13a}: Technology management skill_X_IT spending→SA	-0.107**	Positive	Not Supported
H_{13b}: Technology management skill_X_IT spending→RA	0.049*	Positive	Supported
H_{13c}: Interpersonal management skill_X_IT spending→SA	-0.078*	Positive	Not Supported
H_{13d}: Interpersonal management skill_X_IT spending→RA	-0.079*	Positive	Not Supported
H_{13e}: Business functional skill_X_IT spending→SA	0.029*	Positive	Supported
H_{13f}: Business functional skill_X_IT spending→RA	0.019*	Positive	Supported

Note: significant at *p<.05, **p<.01, ***p<.001

6.7 Key findings of this study

A thorough empirical analysis successfully answers the research questions and the key findings are presented as following:

The significant positive relationships established between human IT capability (with critical components such as Technology management skill, Interpersonal management skill, and Business functional skill) agility (with vital constituents namely SA and RA), and performance reinforce the argument that human IT capability is an essential organizational capability that enables an organization to enhance the IT related skills/expertise to foster agility which in-turn generates superior performance.

The significant positive moderating influence of IT spending on the business functional skill–agility (both SA and RA) linkage (Figure 6.9) reveals that investments on IT infrastructure for example, in CBS, CRM, and RMS enhances the ability of the IT personnel to learn about new technologies and business functions that assist them to develop effective market intelligence and track changes in customer preference and competitors' strategy. Further it was also validated by the moderated mediation finding where the direct and indirect effect (via SA) of Business functional skill on performance has been investigated in presence of IT spending.

However, the interaction of IT spending with interpersonal management skill illustrates significant negative effects on agility (both SA and RA) (Figure 6.7). In figure no. 6.7 surprisingly the individual effect of interpersonal management skill on SA is found to be negative (in presence of IT spending), which was earlier calculated to be significant and positive (without the moderator in figure 6.3; Model 1). Hence, it is inferred that IT investment is not translated into developing the interpersonal management skills of the IT personnel. This finding is also expected, because even if interpersonal management skills are essential to make firms agile, usually IT infrastructure investment decisions are not intended to develop such skills.

From figure no. 6.8 it is evident that the interaction of IT spending with technology management skill has a positive (significant) influence on RA but a negative (significant) effect on SA. Similar negative (significant) relationship was also estimated from the moderated mediation analysis (Table 6.13). This finding may be interpreted as organizational IT investment should more focus on building necessary IT management skills of the IT personnel to develop effective market intelligence for quicker identification of changes in customers' preferences and competitors' strategies and further, track new products or services launched by market competitors to maintain competitiveness.

Chapter 7

Effects of Information Technology (IT) and Knowledge Management (KM) capabilities on Organizational performance: The mediating role of Organizational Agility

7.1 Introduction

In chapters 5 and 6 the author has investigated the effects of information technology [7a](IT) capability and human IT capability on organizational performance (or simply performance) along with the mediating role of organizational agility (or simply agility). IT capability and human IT capability have been examined based on the principle of resource-based-view [7b](RBV). However, previous literature also suggest an extension of this RBV theory known as the knowledge-based-view [7c](KBV) theory, which considers knowledge as a crucial strategic resource for realization of greater economic benefits of the organizations (Balogun and Jenkins, 2003; Curado, 2006). According to Ariely (2003), this elucidation of "knowledge" as a "resource" provides evidence for the theoretical relationship between the RBV and the KBV. Additionally, the role of a complementary organizational capability such as knowledge management (KM) capability along with IT capability to enhance agility and performance is highly essential. Hence, in this chapter the author has investigated both IT and KM capabilities as vital organizational capabilities which enable the organization to better utilize both IT (tangible) and knowledge (intangible) resources to attain superior agility and performance.

Further, in chapter 5 and 6 the author has investigated the moderating role of IT spending on the IT capability-agility and human IT capability-agility relationships, respectively. However, some RBV critics argue this principle as only related to the internal organizational mechanism and indeed IT spending is an internal organizational affair. Although, IT investment is inevitable and firms will anyhow investment in IT either to ensure better competitive position or just for mere survival, their relationship with external business environment cannot be ignored. In order

[7a]In chapter 5 IT capability is studied has a second-order construct in terms of Managerial and Technical IT capabilities. In this chapter it is studied as a first order construct; [7b]RBV and [7c]KBV are described in detail in chapter 2.

to justify these relationships in this chapter the author has investigated environmental uncertainty as the moderator influencing the IT capability-KM capability-agility {(studied as of adaptive agility (AA) and entrepreneurial agility (EA)} linkages. Both AA and EA are conceptualized based on the research work conducted by Lee et al. (2008), where AA deals sensible and reactive market responses with focus on incremental innovation, and EA is linked to proactive anticipation of environmental changes with pre-emptive measures and radical innovations. In this chapter the author suggests that both IT and knowledge resources are needed to attain such radical as well as incremental innovations.

Previous studies have documented various factors namely, organizational capabilities (IT and/or KM capabilities), effective governance, culture, human resources, etc. as important contributors to agility and enhanced performance (Tseng and Lin, 2011; van Oosterhout et al. 2006). However, very little research support the systematic assessment of these factors in context to agility and performance (Ashrafi et al. 2006; Cai et al. 2013; Mao et al. 2015a). Following the RBV concept, some scholars claim that firms encounter pressures due to changes driven by some external factors such as, changes in technology trends, emerging markets, new customers' needs, etc. (Bharadwaj and Sambamurthy 2005; Lee, 2008). Firms also respond to such changes in variety of forms such as, leverage new technologies and platforms, reduce exposure in high-risk markets, and develop new products or services offerings. Since all these elements refer to efficient and prompt response to external threats, with an objective to attain higher performance (Tallon, 2008), they need to be thoroughly studied for linking IT capability and performance. Moreover, based on the theory of KBV, past literature has emphasized on the importance of effective KM or intellectual ability to gather and process wide-ranging information to recognize and anticipate external changes (Dove, 2001). The essence of studying KM capability and performance association holds good for addressing rising customer needs with continual observation and quick improvement of various products and services.

The traditional RBV and KBV theories mainly depict only the internal operational mechanisms used by a firm for creating competitive advantage; thereby overshadow the importance of the external business environment (Aragon-Correa and Sharma, 2003; Mao et al. 2015a). Hence, a more integrated analysis representing the influence of contextual factors on the internal business operations is needed to respond to changing business environment (Chen et al. 2014; Mao et al. 2015a). Based on prior researches, external factors such as environmental

uncertainty (diversity, dynamism, hostility), nature of competition, information intensity, industry-type, organizational climate, etc. may be considered as potential moderators to influence the IT-organizational performance linkage (Chen et al. 2014; Yayla and Hu, 2012). However, very few studies have incorporated these factors to assess IT capability-KM capability-agility-performance connections. So far, the literature supports very little research done on empirically investigating the relationship of IT and KM capabilities with agility and performance in contemporary business environments (Ashrafi et al. 2006; Cai et al. 2013; Kohli and Grover, 2008; Lu and Ramamurthy, 2011; Mao et al. 2015a,b). Bridging these research gaps this chapter addresses the following research questions.

1. Do IT and KM capabilities enable or inhibit agility {(studied as adaptive agility (AA) and entrepreneurial agility (EA)}?
2. Do IT and KM capabilities enable or inhibit performance?
3. Does agility (in terms of AA and EA) enable or inhibit performance?
4. What is the moderating influence of environmental uncertainty on the IT capability- AA-EA, and KM capability-AA-EA relationships?
5. What is the mediating role of agility (both AA and EA) on the IT capability-performance and KM capability-performance linkages?
6. [7d]What is the moderated-mediating role of environmental uncertainty on the direct and indirect (via mediator) relationship between IT capability and performance, and KM capability and performance?

7.2 Theoretical overview and Hypotheses

7.2.1 IT capability

Various information system (IS) researches have represented IT capability as an important organizational capability which is imperative for realization of greater business value (Chen et al. 2014; Fink, 2011; Rai and Tang, 2010). According to Bharadwaj (2000) IT capability is defined as the ability of the firm to organize and employ IT-based resources in coordination with other organizational capabilities to better realize IT's business value. Bharadwaj (2000) has explained about three key components namely, human IT resources, IT infrastructure, and IT enabled intangibles as pivotal factors to study IT capability. The human IT resources comprise of

[7d] Although, moderated-mediation analysis has been performed, due to lack of previous literature support hypotheses have not been proposed relating to this analysis.

technical and managerial personnel with appropriate skills. Tangible physical IT resources like computers, hardware, etc. consist of the IT infrastructure, and customer orientation, elevated synergy, knowledge assets, etc. indicate intangible assets enabled by IT. Literature suggests extensive analysis on the impact of IT capability on augmented corporate performance (Bharadwaj, 2000; Tallon, 2008). Still there are only few studies that explain the contribution of IT capability towards enhanced agility and performance in contemporary business environments (Chen et al. 2014; Chen et al. 2015).

7.2.2 KM capability

According to Gold et al. (2001), knowledge infrastructure and knowledge processes are two critical constituents of KM capability, where the knowledge infrastructure can be measured from the technical, structural, and cultural viewpoints and knowledge processes start with knowledge creation and completes with knowledge utilization. Since in most of the IS literature the KM capability has been documented from the process point of view (Cai et al. 2013; Mao et al. 2015a,b; Tanriverdi, 2005), in this research also it has been studied as a process-related construct.

KM capability is defined as an organizational capability that deals with effective mobilization and deployment of knowledge-based resources along with other organizational resources to gain superior business/economic value and sustainable competitive advantages (Chuang, 2004; Grant, 1996; Kearns and Lederer, 2003). Myriad of IS researchers have contended that effective KM plays an integral role in generating augmented business values (Dove, 2003; Khalifa et al. 2008). Following Tseng (2010), KM facilitates easy access to real-time knowledge on products, markets, competitors, etc. and thereby, fosters agility and performance. Since the literature suggests only a few studies that have empirically investigated the KM-agility-performance connection (Tseng, 2010; Cai et al. 2013; Mao et al. 2015a), the present research takes the previous literature a step further and extends the existing concept of KM-agility-performance linkage by meticulously examining their corresponding critical dimensions.

7.2.3 Organizational Agility

According to Lee et al. (2008), organizational agility is defined as a dynamic organizational capability that enables an organization to compete in contemporary business environments.

Following Sambamurthy et al. (2003), agile organizations have superior competing abilities as compared to less agile ones and attain greater competitive advantage as they effectively execute radical and incremental innovations in uncertain environmental situations. Further, agile organizations have the ability to cope with business environmental shocks and upheavals and adapt to emerging opportunities (Bharadwaj and Sambamurthy, 2005).

7.2.3.1 Adaptive agility (AA)

AA underpins the ability of the firm to identify feasible business environmental changes, opportunities, and threats with pertinent reconfiguring abilities of assets, infrastructure, and business processes to foster incremental innovations (Lee et al. 2008; Mathiyakalan et al. 2005). Further, organizations need to adapt to threats from natural disaster, excessive competitive stress, threats from globalization, etc. Hence organization's AA relates to effective assimilation of business operations that facilitate implementation of innovative ideas and decisions to deal with such uncertainties.

7.2.3.2 Entrepreneurial Agility (EA)

The EA represents the proactiveness and preemptiveness of the organization to anticipate responses relating to market changes (Lee et al. 2008). Organizations follow radically innovative strategic movements as compared to market competitors to attain greater advantage and higher economic outcomes. Organizations seek innovative and novel approaches to foresee future market needs and try to take preemptive measures to control resource imitations through unique marketing strategies.

7.2.4 IT capability-Agility Linkage

In order to foresee the imminent market changes, an effective IT governance model collectively sets strategic goals between business and IT executives and thereby, assists firms to deploy IT for resolving business related issues (Weill et al. 2002; Weill and Ross, 2004). Flexible strategic IT planning facilitates smooth internal operations and therefore, fosters both incremental and radical organizational innovations. Based on the RBV theory, application of unique, rare, and inimitable technical and managerial IT skills have the ability to create long-run competitive advantages and help the firm in dealing with uncertain market changes. Therefore, the following hypotheses are formulated exhibiting the IT capability-agility relationship.

H_{14a}: IT capability has a positive effect on AA.

H_{14b}: IT capability has a positive effect on EA.

7.2.5 KM capability-Agility Linkage

On the basis of KBV concept, generally KM capability promotes agility by creating and developing innovative responses for firms to deal with uncertainty. According to Nonaka (1994), an efficient deployment of KM assists in processing implicit individual knowledge to get transformed into explicit knowledge. Further, Gold et al. (2001) suggest that firms orchestrated with KM capabilities have the ability to assimilate the transformed knowledge with the firms' existing knowledge to generate another new knowledge that fosters managerial practices (Tanriverdi, 2005). Therefore, innovative responses get emerged and facilitate firms' smooth operations in persistent volatile market situations making them agile. Based on these arguments, the following hypotheses are postulated.

H_{15a}: KM capability has a positive effect on AA.

H_{15b}: KM capability has a positive effect on EA.

7.2.6 Agility-Performance Linkage

Agile organizations effectively utilize a diverse range of organizational resources and capabilities to attain greater performance. For example, organizations invest in IT to generate unique IT resources and capabilities so as to enhance performance. Further agile firms need to emphasize on knowledge creation, application, protection, and knowledge transfer in order to build up strategic assets for higher levels of performance (Curado, 2006). Therefore, the following hypotheses are formulated describing the positive relationship between agility (both AA and EA) and performance.

H_{16a}: AA has a positive effect on performance.

H_{16b}: EA has a positive effect on performance.

7.2.7 IT Capability-Performance Linkage

The RBV concept underpins utilization of firm-specific valuable, rare, inimitable/unique, and non-substitutable (VRIN) resources to enhance the ability of the firm to deliver sustainable

competitive advantage (Finney et al. 2004; Hooley and Greenley, 2005). This theory mainly delineates IT resources comprising of these VRIN characteristics, which enable the organization to build superior IT capabilities and realize higher performance. Hence the following hypothesis is presented.

H_{17}: IT Capability has a positive effect on performance.

7.2.8 KM Capability-Performance Linkage

Although, literature studies suggest KBV as an extension of the RBV rationale (Balogun and Jenkins, 2003; Huizing and Bouman, 2002), some KBV researchers argue that RBV does not explain the organization's specific knowledge needed to effectively integrate, coordinate, and mobilize organizational resources and capabilities and therefore, fails to differentiate between diverse knowledge-based capabilities (Kaplan et al. 2001; Theriou et al. 2009). Hence, based on the KBV theory, unique knowledge resources (intangible resources) are difficult to imitate and are considered as vital elements for organizations to attain sustainable differentiation and performance (Wiklund and Shepherd, 2003). Therefore, the following hypothesis is predicated.

H_{18}: KM Capability has a positive effect on performance.

7.2.9 Agility as mediator between IT capability and Performance

Previous literature studies have highlighted the importance of agility as an imperative factor for determining organizational performance (Chen et al. 2014; Lee et al. 2008). Chen et al. (2014) have examined the IT capability-performance relationship along with the mediating role of process agility and reports its positive mediating role. The research work conducted by Lee et al. (2008) suggests the interrelationship between IT capability and firm profitability along with the influence of both AA and EA on this relationship. Extending these prior researches AA and EA are studied as mediators between IT capability and performance and the following hypotheses are proposed.

H_{19a}: The positive relationship between IT capability and performance is mediated by AA.

H_{19b}: The positive relationship between IT capability and performance is mediated by EA.

7.2.10 Agility as mediator between KM capability and Performance

Following Lu and Ramamurthy's (2011) conceptualization of agility, the research work conducted by Cai et al. (2013) posit that KM capability is positively associated with performance. So far, limited researches have quantitatively examined the KM capability-performance relationship along with agility a mediator (Cai et al. 2013; Liu et al. 2014) and most of the prior studies are qualitative in nature. For instance, Ashrafi et al.'s (2006) qualitative research on KM capabilities demonstrates a positive influence on enterprise agility which further influences enhanced performance. In another qualitative research, Nazir and Pinsonneault (2012) have explained the positive influence of knowledge integration, which is a KM capability related construct on the sensing and responding firm agility to realize augmented business value. Therefore, this research provides a rigorous empirical investigation to assess the effect of KM capability on performance along with the mediating role of agility (both AA and EA) and posit the following hypotheses.

H_{20a}: The positive relationship between KM capability and performance is mediated by AA.
H_{20b}: The positive relationship between KM capability and performance is mediated by EA.

7.2.11 Environmental uncertainty as moderator on IT capability-Agility and KM capability-Agility Linkages

Following the concept of "fit" proposed by Venkatraman (1989), greater volume of information and superior information processing capability are vital for an agile organization which effectively sense and efficiently respond to unanticipated environmental changes. Based on this logic, IT and knowledge capabilities are expected to be more dynamic in an unstable environment and accordingly, organizations may invest in terms of money, time, and effort in building these necessary capabilities to attain agility (Tallon, 2008). If the environment is rather stable and predictable, huge investments relating to development of IT and knowledge capabilities produce fewer returns (Mao et al. 2015a). In addition, some researchers have criticized the traditional RBV and KBV theories for highlighting only the internal mechanisms of the organization and under-studying the effects of contextual variables on the organizational effectiveness (Rueda-Manzanares et al. 2008). According to Chen et al. (2014) an appropriate

match between the internal mechanisms and contextual variables is needed to realize greater agility and performance. Hence, based on these arguments the following hypotheses are proposed.

H_{21a}: Environmental uncertainty positively moderates the relationship between IT capability and AA.

H_{21b}: Environmental uncertainty positively moderates the relationship between IT capability and EA.

H_{22a}: Environmental uncertainty positively moderates the relationship between KM capability and AA.

H_{22b}: Environmental uncertainty positively moderates the relationship between KM capability and EA.

All the above mentioned hypotheses are illustrated in the following research model (Figure 7.1).

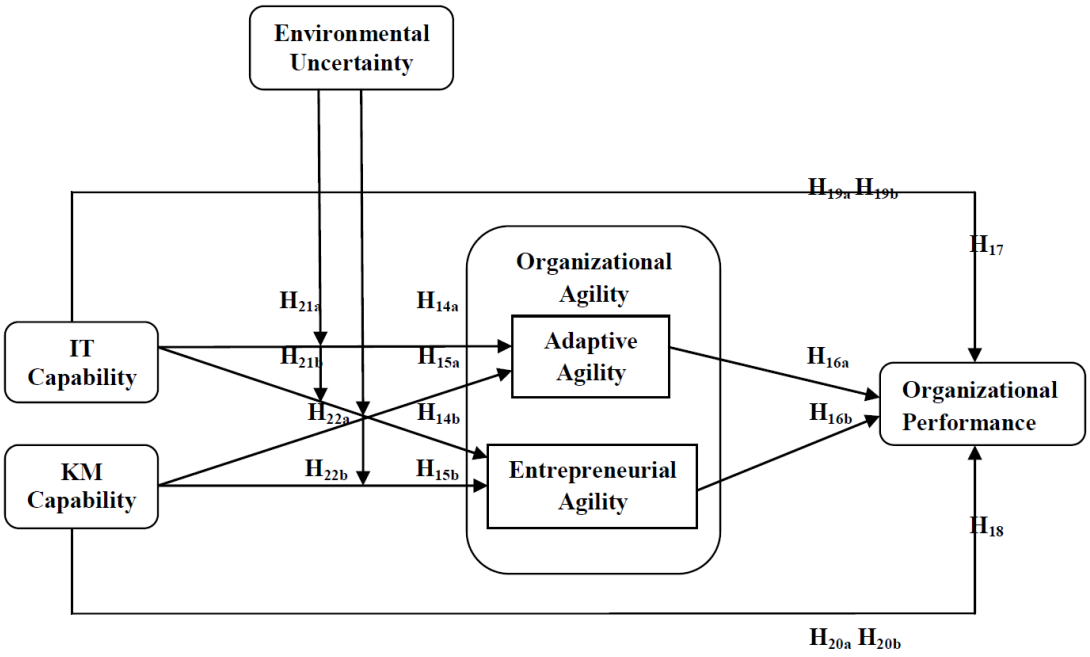


Figure 7.1 Conceptual model representing the relationship between IT capability, KM capability, organizational agility, and organizational performance

7.3 Sample framework and Data collection

The IT and business executives (particularly in the middle to senior level of management) working in various public and private sector banking firms in the state of Odisha, India are

selected as target respondents for the study. A total of 950 numbers of structured questionnaires were distributed in a matched-pair survey via online (survey forms) and offline mode (hand delivery method). A total of 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate.

7.4 Development of Instruments

The study uses a multi-item reflective measurement scale such as a five-point Likert-type rating scale to collect responses relating to the multi-item measures with extreme points ranging from strongly disagree (1) to strongly agree (5). All the studied measures have been adapted from prior researches which establish their validity. However, to check their validity in context to this study a series of tests relating to construct validity and reliability have been performed (Straub, 1989).

7.5 Research Measures

The research model is operationalized by studying IT capability and KM capability as independent variables, agility (both AA and EA) as mediators, environmental uncertainty as moderator, and performance as the dependent variable. IT executives have been surveyed for IT capability related measures, business executives have been selected for KM capability, agility, and performance related measures, while both IT and business executives have been targeted for environmental uncertainty related measures.

7.5.1 Measures for IT capability

IT capability is studied in terms of seven indicators such as, *IT infrastructure (ITCAP1)* (physical IT resources), *IT knowledge (ITCAP2)* (extent to which IT executives possess technical knowledge about existing IT resources), *experiment with new IT trends (ITCAP3), effective IT management (ITCAP4), technology-based links* with customers and suppliers *(ITCAP5), restructuring of IT processes* to leverage opportunities *(ITCAP6),* and lastly *proactive IT exploration (ITCAP7)* to embrace innovative IT applications for generating business opportunities (Chen et al. 2014; Lu and Ramamurthy, 2011; Tippins and Sohi, 2003).

7.5.2 Measures for KM capability

KM capability is studied in terms of five indicators such as *product knowledge capability (KMCAP1), customer knowledge capability (KMCAP2), managerial knowledge capability (KMCAP3), learning capability (KMCAP4), and communication capability (KMCAP5)* (Cai et al. 2013; Tanriverdi, 2005; Tanriverdi and Venkatraman, 2005; Ning et al. 2006). The *product knowledge capability (KMCAP1)* depicts the firms' ability to acquire knowledge relating to new product development and its operationalization, the *customer knowledge capability (KMCAP2)* refers to necessary knowledge involved in comprehending changes in customers' demands, buying behaviours, etc. The *managerial knowledge capability (KMCAP3)* entails knowledge required for overall firm governance. The *learning capability (KMCAP4)* refers to continuous learning of the organizations to better utilize knowledge resources to deal with uncertainties, and *communication capability (KMCAP5)* generates knowledge innovation by promoting individual as well as organizational communication.

7.5.3 Measures for Organizational agility

Organizational agility is studied in terms of adaptive and entrepreneurial agilities.

7.5.3.1 Adaptive agility (AA)

Following Lee et al. (2008) and Sheffi and Rice Jr. (2005), AA is studied in terms of four indicators such as *sensing and reacting to market and customer related changes (AA1),* practicing strategic movements which foster *incremental innovation (AA2),* ability to deal with *resilient market responses (AA3),* and strive for continuous business process improvement to enhance *business continuity (AA4).*

7.5.3.2 Entrepreneurial agility (EA)

EA is studied as four indicators namely, organization's *proactiveness (EA1)* to identify environmental uncertainties (e.g., changes in customers' taste and preferences, competitors' strategies, etc.), *pre-emptive measures (EA2)* to deal with environmental threats, implementing strategic movements which foster *radical innovation (EA3),* and focus on attaining greater competitive advantage by *launching innovative competitive actions (EA4)* (Lee et al. 2008; Sheffi and Rice Jr. 2005).

7.5.4 Measures for Organizational Performance

Following Hsu and Sabherwal (2011) and Pebrianto (2013), organizational performance is studied in terms of three indicators such as *competitive performance (OrgPerf1)* (i.e., performance relative to market competitors), *operational performance (OrgPerf2)* (i.e., performance relating to day-to-day business activities), and *innovative performance (OrgPerf3)* (i.e., production of innovative products and services to attain product/service differentiation compared to competitors).

7.5.5 Measures for Environmental Uncertainty

Environmental uncertainty is studied in terms of four indictors namely, environmental *diversity (EnvUn1)* (i.e., diversity in nature of competition, and products/services offerings provided to customers), *hostility (EnvUn2)* (i.e., threat from scarce supply of man power, threat from tough price competition, and competition in product/service quality), *dynamism (EnvUn3)* (i.e., an environment where products/services get obsolete quickly, technologies relating to products/services change quickly, etc.), and *complexity (EnvUn4)* (i.e., an environment where competitor' moves, and products/services demand changes are not easily predictable) (Chen et al. 2014; Newkirk and Lederer, 2006).

7.6 Data Analysis and Hypotheses Testing

A total of 27 indicators covering all the study variables were first examined through a preliminary analysis containing procedures of descriptive statistics, and exploratory factor analysis [7e](EFA) utilizing SPSS (version 20). Out of the 27 indicators, a total of 25 indicators were loaded under 6 components which explain nearly 70% of variance. More variance is attributable to the first factor as compared to other remaining 5 factors (Table 7.3). The first indicator of KM capability *(product knowledge capability: KMCAP1),* and the fourth indicator of adaptive agility *(business continuity: AA4)* did not load under any factor, hence, these indicators were dropped. The EFA table containing 6 extracted components and 25 indicators is presented in table no. 7.4.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA) value of 0.850 represents adequacy of data for factor analysis (Table 7.1). The Bartlett's Test of Sphericity checks the significance of the study. The chi-square statistics of 5936.853 along with degrees of

freedom 351 was found to be significant and hence, implies that the samples are significant to conduct factor analysis (Table 7.1). The communality values for all the indicators were found to be greater than 0.6 [7f]{(except for KMCAP5 (0.591) and EA4 (0.568)}(Table 7.2). Hence, these indicators properly explain the common variance. Further, the unique and distinct indicators extracted under each construct were tested for their reliability and the Cronbach alpha (α) values were calculated to be within the range of 0.752 to 0.931 (Table 7.5), which is above the threshold value of 0.7 (Hair et al. 2006). Hence, these extracted indicators were proved to be highly reliable. From table no. 7.4 it is evident that all the factor loadings are above 0.5 and there is no cross loading of the indicators, which confirm the convergent as well as discriminant validity of EFA.

Then, confirmatory factor analysis (CFA) was performed along with the interaction-moderation, and mediation analysis using AMOS (version 20). The moderated-mediation analysis was carried out using the SPSS-PROCESS macro. The 6-component model is a representation of 1 second-order construct namely, agility containing 2 first-order reflective dimensions (such as AA and EA), and 4 first-order constructs (such as IT capability, KM capability, performance, environmental uncertainty) which are measured by 3 interchangeable observed indicators. IT and KM capabilities are studied as the independent variables, AA and EA as the mediators, environmental uncertainty as the moderator, and performance as the dependent variable. A series of tests were conducted to confirm construct reliability, validity, and good data fit.

Table 7.1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA)		0.850
Bartlett's Test of Sphericity	Approx. Chi-Square	5936.853
	Df	351
	Sig.	0.000

Note: p<0.05

[7e] The EFA procedure is discussed in detail in chapter 4. [7f] Communalities values greater than 0.5 are also acceptable and properly explain the common variance (Field, 2009).

Table 7.2 Communalities

Loaded Items	Extraction
ITCAP1	0.778
EA2	0.838
ITCAP4	0.796
ITCAP5	0.714
ITCAP6	0.658
ITCAP2	0.821
EA1	0.894
ITCAP7	0.780
ITCAP3	0.803
OrgPerf3	0.670
KMCAP4	0.696
KMCAP3	0.677
KMCAP5	0.591
KMCAP2	0.676
OrgPerf1	0.669
AA1	0.753
AA2	0.665
KMCAP1	0.711
AA3	0.638
OrgPerf2	0.685
EA3	0.668
EnvUn2	0.626
EnvUn1	0.751
EnvUn3	0.665
AA4	0.644
EnvUn4	0.662
EA4	0.568

Table 7.3 Total Variance Explained by Extracted Factors

Factors	Initial Eigenvalues *Total*	*% of Variance*	*Cumulative %*	Extraction Sums of Squared Loadings *Total*	*% of Variance*	*Cumulative %*	Rotation Sums of Squared Loadings *Total*	*% of Variance*	*Cumulative %*
1	8.705	32.239	32.239	8.705	32.239	32.239	5.263	19.494	19.494
2	2.944	10.902	43.141	2.944	10.902	43.141	3.237	11.990	31.484
3	2.420	8.962	52.103	2.420	8.962	52.103	3.042	11.268	42.752
4	1.981	7.338	59.441	1.981	7.338	59.441	2.891	10.708	53.461
5	1.559	5.776	65.217	1.559	5.776	65.217	2.604	9.645	63.106
6	1.487	5.506	70.722	1.487	5.506	70.722	2.056	7.617	70.722

Extraction Method: Principal Component Analysis

Table 7.4 Rotated Component Matrix and Descriptive Statistics

Item Loadings	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Mini mum	Maxi mum	Mean	Standard Deviation
ITCAP1	0.778						2.000	5.000	3.523	0.958
ITCAP2	0.805						1.000	5.000	3.543	0.999
ITCAP3	0.781						1.000	5.000	3.526	0.965
ITCAP4	0.793						2.000	5.000	3.700	1.086
ITCAP5	0.735						1.000	5.000	3.550	0.992
ITCAP6	0.727						1.000	5.000	3.523	1.039
ITCAP7	0.770						2.000	5.000	3.700	1.052
KMCAP2		0.749					1.000	5.000	3.536	0.911
KMCAP3		0.735					2.000	5.000	3.603	0.914
KMCAP4		0.746					2.000	5.000	3.723	0.936
KMCAP5		0.694					1.000	5.000	3.513	0.934
EA1			0.801				1.000	5.000	3.553	1.008
EA2			0.781				1.000	5.000	3.453	0.964
EA3			0.703				1.000	5.000	3.500	1.074
EA4			0.671				1.000	5.000	3.640	1.134
AA1				0.813			1.000	5.000	3.490	1.089
AA2				0.759			1.000	5.000	3.496	1.067
AA3				0.688			1.000	5.000	3.636	1.023
EnvUn1					0.850		1.000	5.000	3.750	1.034
EnvUn2					0.783		2.000	5.000	3.550	0.954
EnvUn3					0.799		1.000	5.000	3.626	0.929
EnvUn4					0.775		1.000	5.000	3.533	
OrgPerf1						0.798	1.000	5.000	3.660	0.945
OrgPerf2						0.810	1.000	5.000	3.673	0.932
OrgPerf3						0.815	1.000	5.000	3.670	1.000

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 7.5 Reliability of Extracted Indicators

Variables	Number of Indicators	Cronbach α
IT Capability	7	0.931
KM Capability	4	0.801
Entrepreneurial Agility	4	0.871
Adaptive Agility	3	0.835
Organizational Performance	3	0.752
Environmental Uncertainty	4	0.813

7.6.1 Test for Common-method bias (CMB)

This study utilizes two different categories of respondents i.e., IT and business executives to collect the responses. The data on IT capability were collected from the IT executives, business executives were surveyed for KM capability, and agility related measures, and both business and IT executives were the source for environmental uncertainty related data. Hence, CMB may occur. The extent of CMB was empirically tested by using Harman's single factor method in

SPSS (version 20), where an EFA containing all the 27 indicators was conducted by constraining the number of components extracted to be 1 and this single factor accounted for only 25% of variance, which shows the absence of CMB. According to Podsakoff et al. (2003), if CMB was a problem it would have explained more than 50% of the variance. Afterwards, a CFA was performed on this single-component model using AMOS (version 20) (Kearns and Sabherwal, 2007). The results culminated in a poor fitting model denoting all the key indices as χ^2 = 2559.031, df = 92, GFI = 0.441, AGFI= 0.342, RMSEA = 0.331, NFI = 0.474, TLI=0.503, CFI = 0.581. From this it is evident that the constructs are free from CMB.

7.6.2 Measurement Model

The measurement model was developed using the 6 components extracted through EFA containing 25 indicators. However, to improve data fit 7 indicators were dropped. Since the research uses reflective indictors, which are usually interchangeable among each other, hence dropping few of them to achieve better data fit does not alter the conceptual domain of the constructs (Petter et al. 2007). Therefore, the final measurement model consists of 6 constructs with 18 indicators (Figure 7.2).

Further, this measurement model was validated through multiple data [7g]fit indices which primarily comprise of absolute fit indices like CMIN/DF (χ2/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The estimated and acceptable threshold levels of all these critical indices are presented in table no. 7.6 which confirms a good model fit.

7.6.3 Test for construct reliability in CFA

The reliability of all the 6 constructs were tested based on examining the composite reliability values and maximum reliability (MaxR designated by the symbol 'H'). The composite reliability reflects the internal consistency of the individual constructs and the calculated values (within the range of 0.752 to 0.951) exceed the recommended value of 0.7 (Bernstein and Nunnally, 1994) (Table 7.7). The MaxR(H), a more robust calculation than composite reliability was also estimated and the values (within the range of 0.853 to 0.984) were found to be higher than composite reliability, which further confirmed higher reliability of the constructs.

[7g] Prior literature studies supporting the estimated and acceptable threshold levels of the data fit indices have been discussed in detail in Chapter 4 .

7.6.4 Test for construct validity in CFA

The construct validity was tested calculating the convergent and discriminant validities.

7.6.4.1 Convergent validity

The average variance extracted (AVE) values were estimated for the convergent validity and all the 6 constructs exhibit AVE values (within the range of 0.503 to 0.866) greater than 0.5 (Hair et al. 2006), which suggest that the individual latent factor is properly explained by its observed variables (Table 7.7). Additionally, the calculated standardized estimates inferred from CFA conducted on the 6-component model validates that convergent validity issue is not a potential risk for the constructs (Anderson and Gerbing, 1988; Bentler, 1989) (Table 7.7).

7.6.4.2 Discriminant validity

As shown in table no. 7.8, the square root of the AVE for each construct was calculated to be greater than the inter-construct correlation. Further, the estimated values of maximum shared variance (MSV) (within the range of 0.014 to 0.417) were also found to be less than the AVE values (Table 7.7) (Hair et al. 2010). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issue.

Thus, the measurement model containing all the 6 constructs was confirmed to be a good fitting model with higher reliability and validity. Further, structural models were developed as presented in subsequent sections.

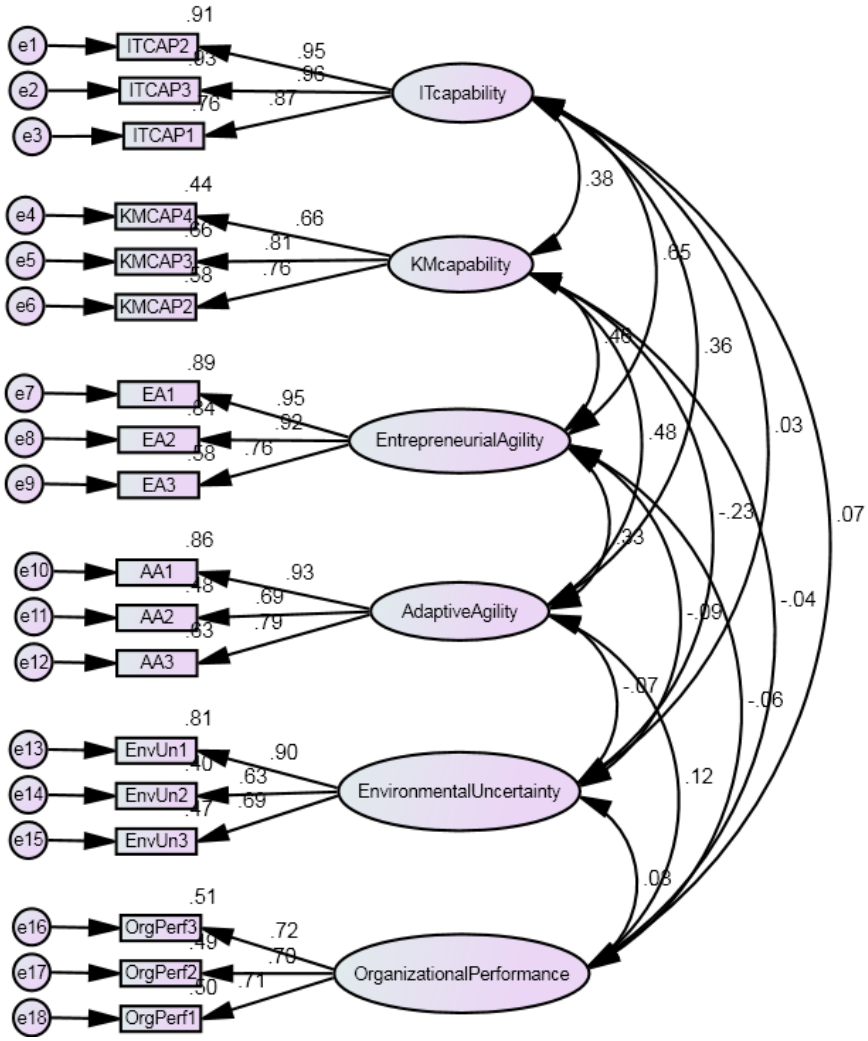


Figure 7.2 Measurement Model

Table 7.6 Fit Indices of the Measurement Model

Fit Indices	Estimated Levels	Acceptable Threshold Levels
Absolute fit indices		
CMIN/DF	2.574	$\leq 2^{G}, \leq 5^{M}$
GFI	0.902	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.860	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.073	$< 0.08^{G}, \leq 0.10^{M}$
Incremental fit indices		
NFI	0.907	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.924	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.941	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices		
PGF1	0.633	No threshold levels
PNFI	0.712	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 7.7 Confirmatory Factor Analysis

Model Constructs	Items	Standardised Loadings	Composite Reliability	AVE	MSV	Max R(H)
Environmental Uncertainty	EnvUn1 EnvUn2 EnvUn3	0.900*** 0.631*** 0.685***	0.788	0.559	0.053	0.853
IT capability	ITCAP1 ITCAP2 ITCAP3	0.872*** 0.952*** 0.965***	0.951	0.866	0.417	0.970
KM capability	KMCAP2 KMCAP3 KMCAP4	0.761*** 0.810*** 0.662***	0.790	0.558	0.232	0.973
Entrepreneurial agility	EA1 EA2 EA3	0.946*** 0.918*** 0.759***	0.909	0.771	0.417	0.981
Adaptive agility	AA1 AA2 AA3	0.930*** 0.691*** 0.791***	0.849	0.656	0.232	0.984
Organizational performance	OrgPerf1 OrgPerf2 OrgPerf3	0.709*** 0.703*** 0.715***	0.752	0.503	0.014	0.984

Notes: significant at ***p<.001

Table 7.8 Discriminant Validity

Factors	Environmental Uncertainty	IT capability	KM capability	Entrepreneurial agility	Adaptive agility	Organizational performance
Environmental Uncertainty	**0.748**					
IT capability	0.029	**0.931**				
KM capability	-0.231	0.382	**0.747**			
Entrepreneurial agility	-0.088	0.646	0.461	**0.878**		
Adaptive agility	-0.066	0.363	0.482	0.328	**0.810**	
Organizational performance	0.083	0.073	-0.037	-0.056	0.118	**0.709**

Notes: Diagonal elements are the square roots of average variance extracted

7.6.5 Structural Model

The structural linkages between IT and KM capabilities with AA and EA is presented in figure no. 7.3 (Model 1), where positive significant path coefficients are calculated for each relationship (for IT capability-AA, structural link = 0.215, $p < 0.001$, for IT capability-EA, structural link = 0.556, $p < 0.001$; for KM capability-AA, structural link = 0.403, $p < 0.001$, for KM capability-

EA, structural link = 0.259, $p < 0.001$). Hence, the proposed hypotheses H_{14a}, H_{14b}, H_{15a}, and H_{15b} are supported.

Further, structural linkages between IT and KM capabilities with performance is presented in figure no. 7.4 (Model 2), where a positive significant path coefficient is calculated for IT capability and performance linkage (structural link = 0.109, $p < 0.001$), but a significant negative relationship is calculated between KM capability and performance (structural link = -0.079, $p < 0.05$). Hence, the formulated hypothesis H_{17} is supported while H_{18} is not supported.

Figure no. 7.5 (Model 3) represents the structural linkages between AA and EA with performance, where a positive significant path coefficient is calculated for AA-performance linkage (structural link = 0.145, $p < 0.001$) and a negative significant path coefficient is calculated for EA-performance linkage (structural link = -0.109, $p < 0.001$). Hence, hypothesis H_{16a} is supported, while H_{16b} is not supported.

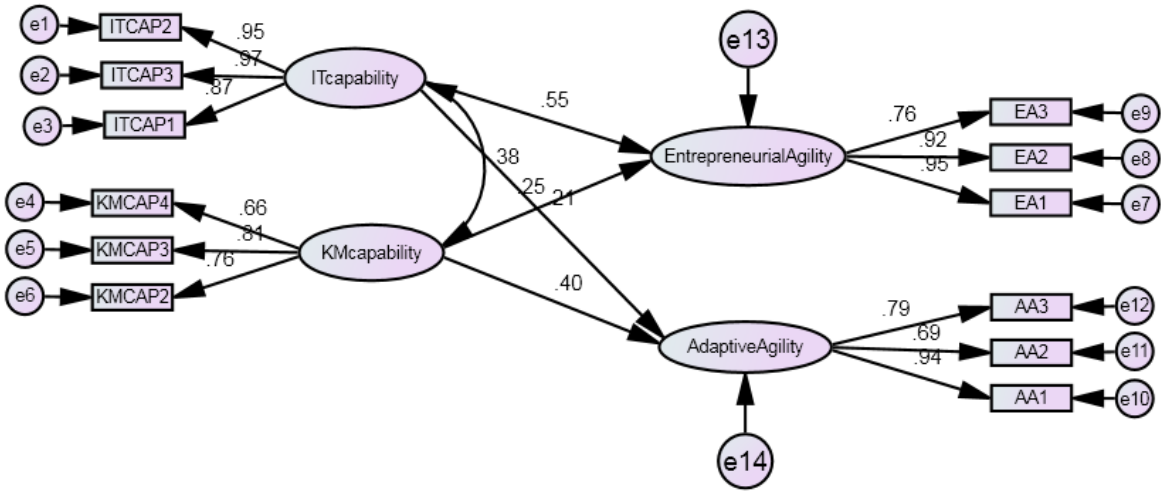


Figure 7.3 IT capability-KM capability-Entrepreneurial agility-Adaptive agility structural linkages (Model 1)

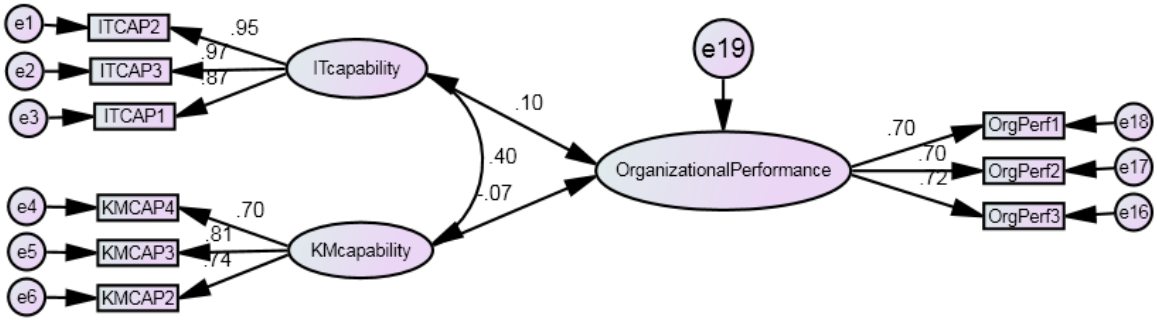


Figure 7.4 IT capability-KM capability-Organizational Performance structural linkages (Model 2)

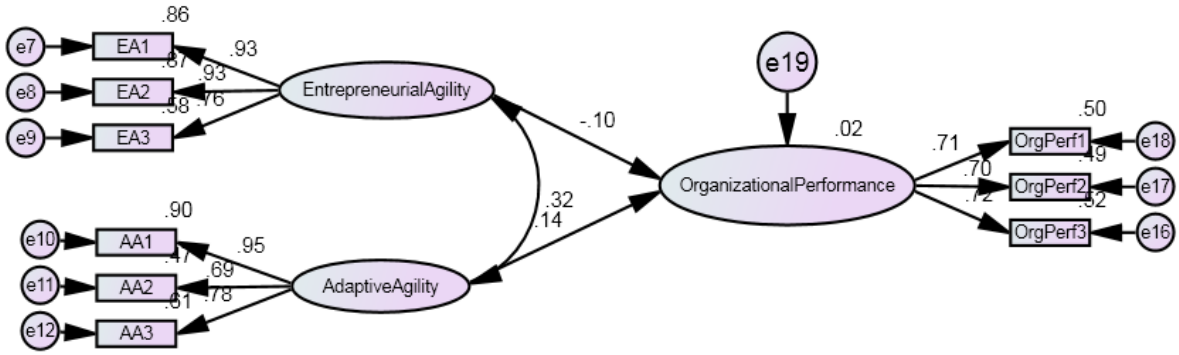


Figure 7.5 Entrepreneurial agility-Adaptive agility-Organizational performance structural linkages (Model 3)

A data imputation process was carried out to create composites for each construct and path models were generated and used for the rest of the analysis. Figure no. 7.6 (Model 4) exhibits path diagrams showing the relationships between IT capability, KM capability, AA, EA, and performance, which essentially examine all the above mentioned relationships in one diagram. From figure no. 7.6 it is evident that IT capability is showing a positive relationship and KM capability is showing a negative relationship with performance in the presence of both AA and EA (However, individual indirect effects, i.e., mediation effects are tested in the Mediation Analysis section). Further, all these structural models (Model 1 to 4) were tested for various data fit indices by calculating the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. These fit indices are presented in table no. 7.9 where all these estimated values were found to be within the acceptable threshold levels.

7.6.6 Test for Multicollinearity

A linear regression analysis was conducted to estimate the observed variability of the independent variables namely IT capability, KM capability, AA, and EA on the dependent variable i.e., performance. Table no. 7.10 represents the model summary and collinearity statistics of each of these independent variables. The R^2 value of 0.636 denotes that independent variables explain 63% of observed variability in performance. The standardized coefficients (Beta) and t-statistics represent significant relationship between the independent and dependent variables. The tolerance and the variance inflation factor (VIF) represent the extent of multicollinearity issue among the variables. Following Field (2009), the threshold levels for tolerance and VIF are set to be > 0.2 and < 10 respectively. Table no. 7.10 represents tolerance

level within the range of 0.478 to 0.670 and VIF index within the range of 1.492 to 2.092, suggesting the absence of multicollinearity issue.

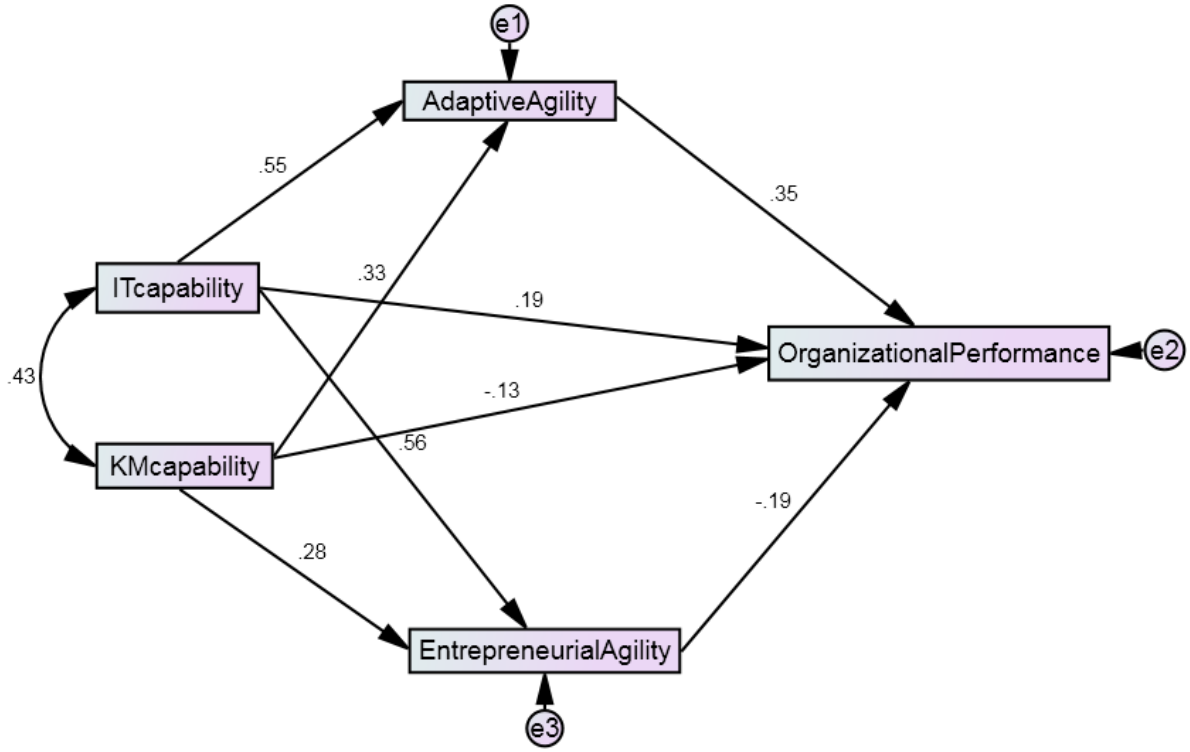


Figure 7.6 IT capability-KM capability-Entrepreneurial agility-Adaptive agility-Organizational performance structural linkages (Model 4)

Table 7.9 Fit Indices of the Structural Models (1 to 4)

Fit Indices	Model 1	Model 2	Model 3	Model 4	Acceptable Threshold Levels
Absolute fit indices					
CMIN/DF	4.080	2.300	2.884	4.924	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.907	0.959	0.954	0.839	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.852	0.924	0.914	0.801	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.080	0.066	0.079	0.080	$<0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices					
NFI	0.927	0.964	0.949	0.804	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.923	0.968	0.949	0.812	$\geq 0.90^{G}$, $\geq 0.80^{M}$
CFI	0.943	0.979	0.966	0.870	$\geq 0.90^{G}$, $\geq 0.80^{M}$
Parsimonious fit indices					
PGF1	0.570	0.512	0.509	0.500	No threshold levels
PNFI	0.688	0.642	0.633	0.581	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 7.10 Model Summery, Coefficients and Collinearity Statistics

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model	***B***	***Std. Error***	***Beta***			***Tolerance***	***VIF***
Constant	2.848	0.188		15.135	0.000		
Adaptive Agility	0.135	0.045	0.208	3.023	0.003	0.670	1.492
Entrepreneurial Agility	-0.134	0.055	-0.198	-4.428	0.016	0.478	2.092
KM Capability	-0.153	0.082	-0.138	-1.856	0.052	0.578	1.729
IT Capability	0.131	0.052	0.195	2.496	0.013	0.518	1.932

R=0.781, R^2=0.636, Adjusted R^2=0.629; Dependent variable: Organizational performance; Independent variable: IT capability, KM capability, AA, and EA

7.6.7 Interaction-Moderation Analysis

The interaction variables (IT capability_X_Environmental uncertainty and KM capability_X_ Environmental uncertainty) were computed and path estimates were calculated. The interaction-moderation effects of environmental uncertainty with IT and KM capabilities on both AA and EA are shown in figures no. 7.7 and 7.8. From figure no. 7.7 it is evident that the interaction of environmental uncertainty with IT capability exhibits a significant positive effect on AA and EA (for IT capability_X_Environmental uncertainty-AA, structural link = 0.047, $p < 0.05$, and for IT capability_X_Environmental uncertainty-EA structural link = 0.068, $p < 0.05$). Hence both H_{21a} and H_{21b} are supported. Figure no. 7.8 illustrates a significant positive effect of environmental uncertainty and KM capability interaction with EA (structural link = 0.080, $p < 0.05$), while a non-significant positive effect on AA. Therefore, hypothesis H_{22a} is not supported, but H_{22b} is supported.

The interaction-moderation models (Model 5 and 6) were validated by the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The summary of these estimates are presented in table no. 7.11 showing all these fit indices within the acceptable threshold levels. Further, these interaction-moderation relationships are plotted as shown in figures no. 7.9, 7.10, and 7.11 (Since KM capability_X_Environmental uncertainty-AA relationship is non-significant, it is not plotted).

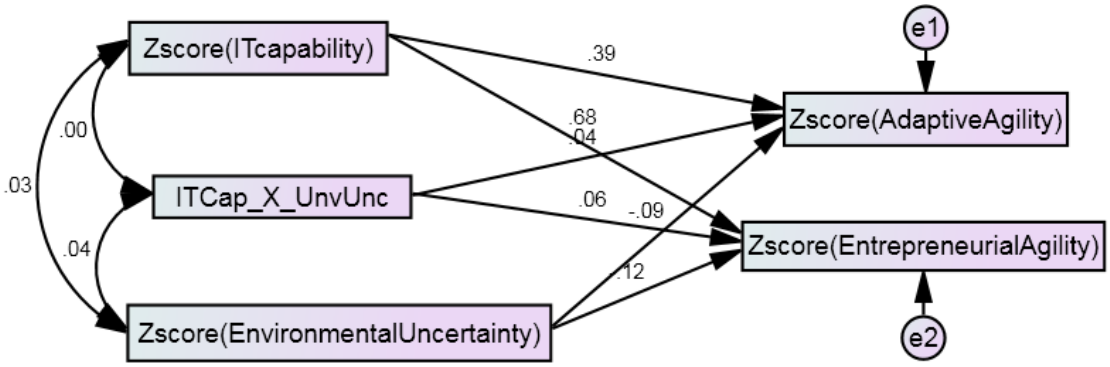


Figure 7.7 Interaction effect of Environmental uncertainty and IT capability on Adaptive and Entrepreneurial agility (Model 5)

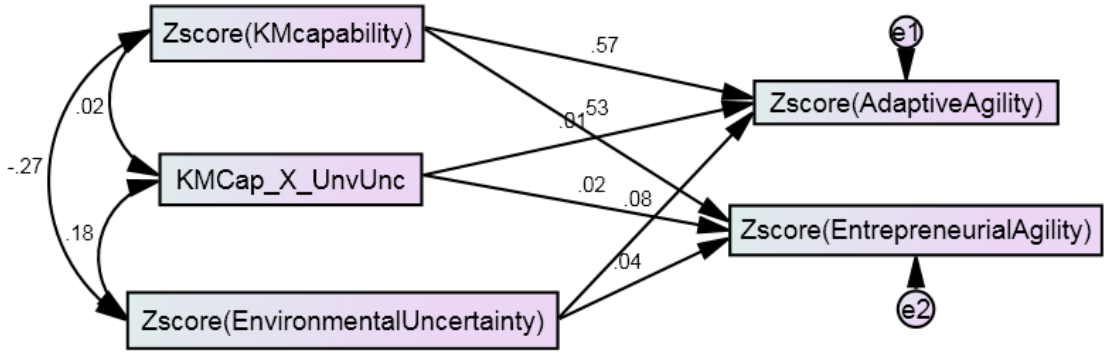


Figure 7.8 Interaction effect of Environmental uncertainty and KM capability on Adaptive and Entrepreneurial agility (Model 6)

Table 7.11 Fit Indices of the Moderation Models (5 and 6)

Fit Indices	Model 5	Model 6	Acceptable Threshold Levels
Absolute fit indices			
CMIN/DF	4.365	2.651	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.994	0.996	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.914	0.924	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.078	0.066	$<0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices			
NFI	0.982	0.947	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.859	0.928	$\geq 0.90^{G}$, $\geq 0.80^{M}$
CFI	0.986	0.993	$\geq 0.90^{G}$, $\geq 0.80^{M}$
Parsimonious fit indices			
PGF1	0.370	0.212	No threshold levels
PNFI	0.588	0.442	No threshold levels

Note: G= good data fit, M= mediocre data fit

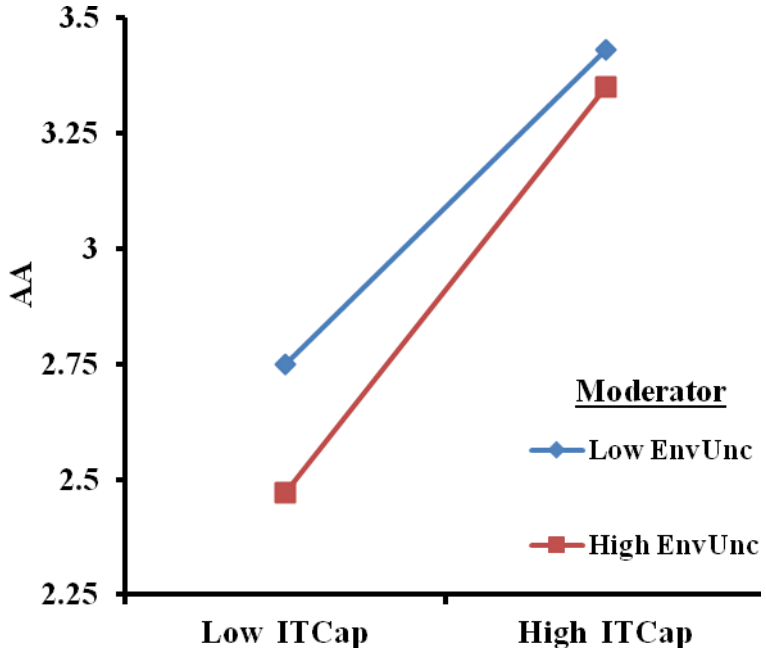


Figure 7.9 Environmental uncertainty (EnvUnc) strengthens the positive relationship between IT capability (ITCap) and Adaptive agility (AA)

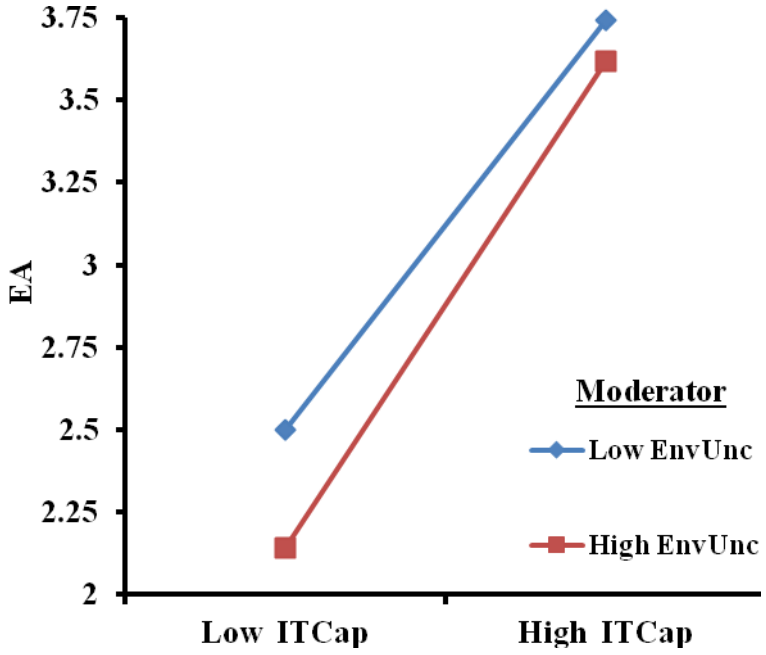


Figure 7.10 Environmental uncertainty (EnvUnc) strengthens the positive relationship between IT capability (ITCap) and Entrepreneurial agility (EA)

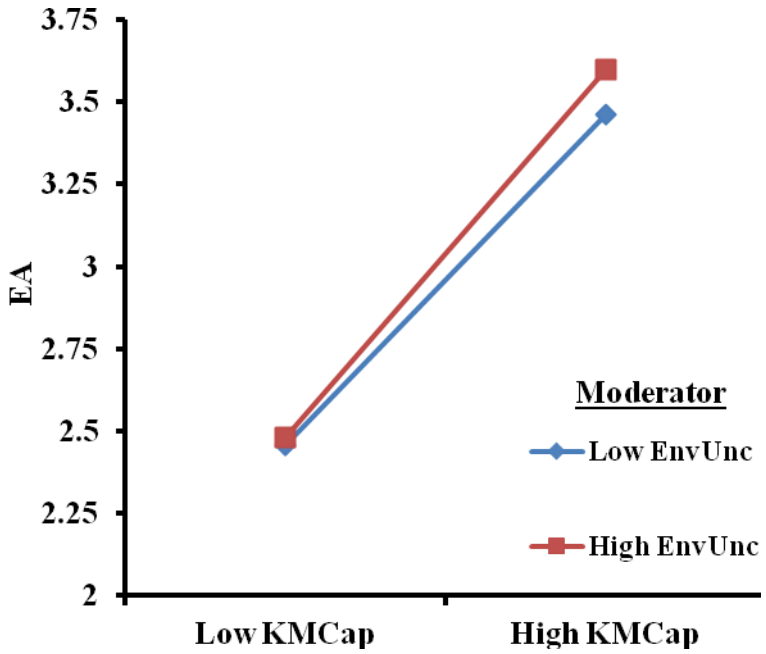


Figure 7.11 Environmental uncertainty (EnvUnc) strengthens the positive relationship between KM capability (KMCap) and Entrepreneurial agility (EA)

7.6.8 Mediation Analysis

In this chapter AA and EA are treated as the mediators and their indirect effects on the IT capability-performance linkage, and KM capability-performance association are individually examined and the path coefficients are illustrated in figures no. 7.12, 7.13, 7.14, and 7.15. The indirect effect estimates are calculated utilizing the "*MyIndirectEffectEstimand"* Gaskin (2016), which uses 2000 numbers of bootstrap samples in AMOS (version 20) and presented by 'A X B', where 'A' is the IT capability and KM capability-AA and EA relationships (i.e., from independent variables to mediators) and 'B' is the AA and EA-organizational performance relationships (i.e., from mediators to dependent variable) (Hayes, 2009).

For IT capability-AA-performance and IT capability-EA-performance relationships these indirect effect estimates are calculated to be significant (AXB = 0.032, $p < 0.05$; AXB = -0.100, $p < 0.01$). Therefore, both hypotheses H_{19a} and H_{19b} are supported. In case of KM capability-AA-performance linkage this estimate is significant (AXB = 0.141, $p < 0.001$), thereby, support H_{20a}. But for KM capability-EA-performance linkage this estimate is non-significant hence, H_{20b} is not supported. These indirect estimates are shown in table no. 7.12.

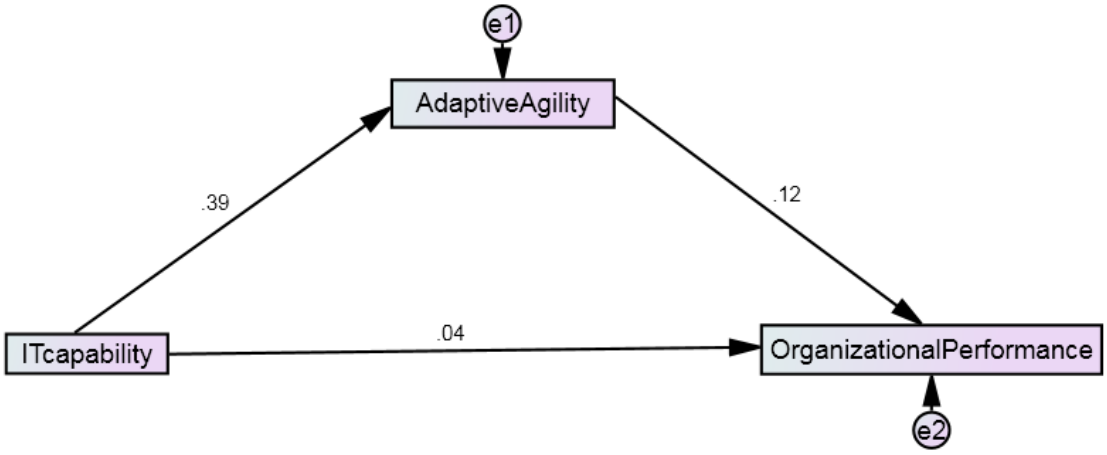


Figure 7.12 Adaptive agility as a mediator between IT capability and Organizational performance

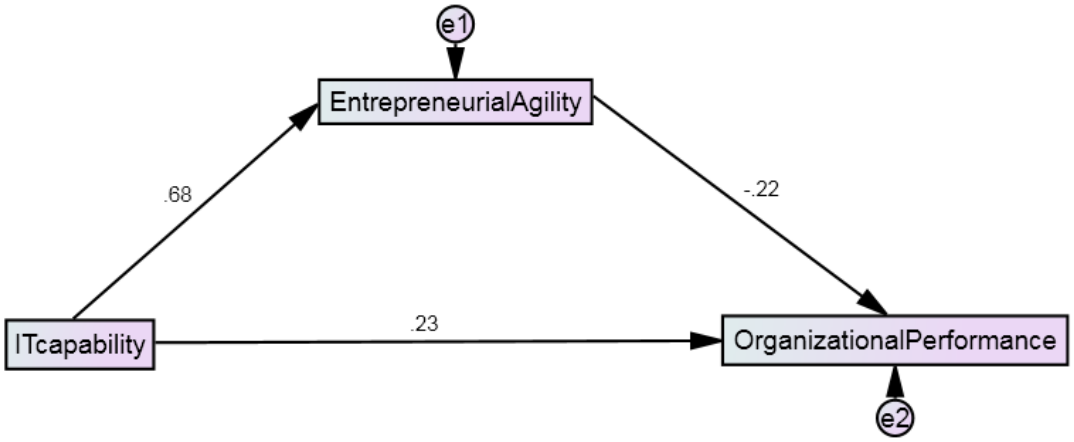


Figure 7.13 Entrepreneurial agility as a mediator between IT capability and Organizational performance

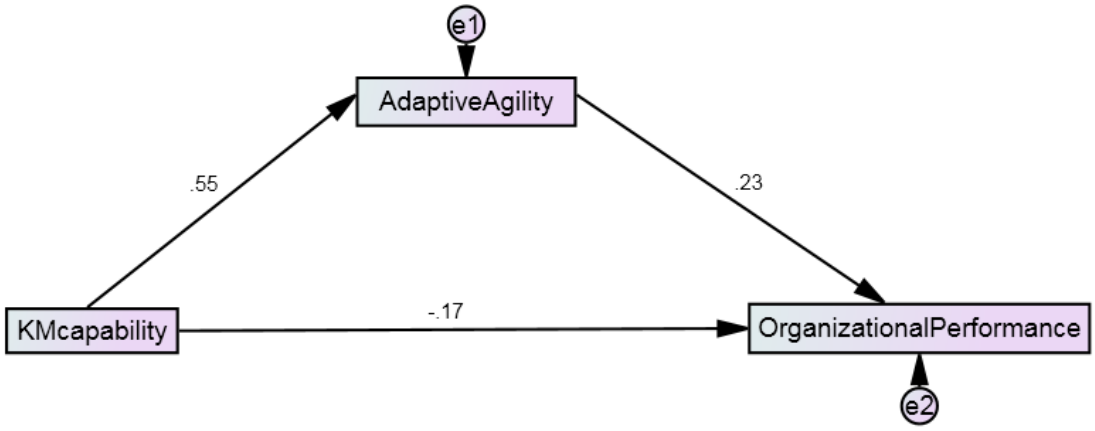


Figure 7.14 Adaptive agility as a mediator between KM capability and Organizational performance

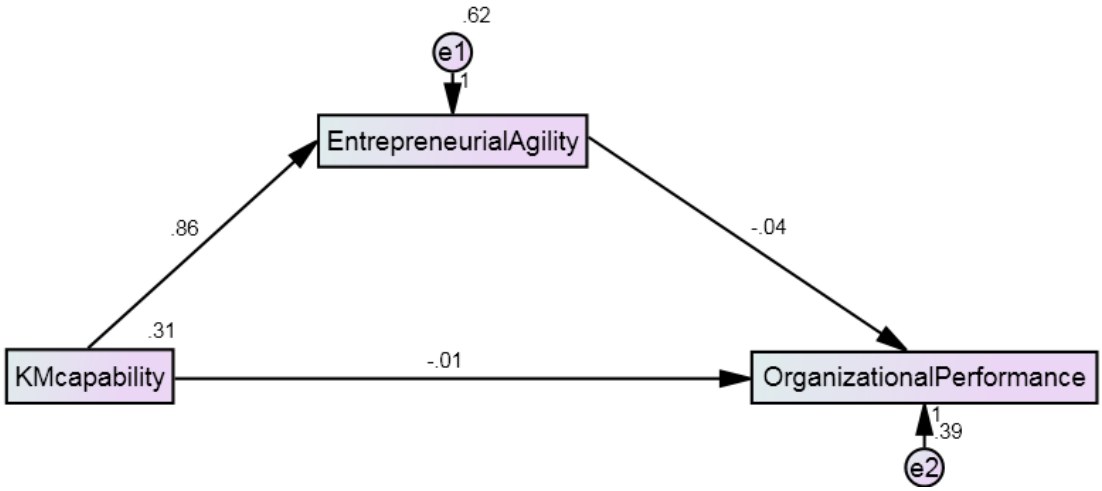


Figure 7.15 Entrepreneurial agility as a mediator between KM capability and Organizational performance

Table 7.12 Indirect Effects

Examined Relationships	Indirect Effects Estimates (A X B)	Significance
IT capability^{i}→AA^{m}→Organizational performance^{d}	0.032	*
IT capability^{i} →EA^{m}→Organizational performance^{d}	-0.100	**
KM capability^{i}→AA^{m}→Organizational performance^{d}	0.141	***
KM capability^{i}→EA^{m}→Organizational performance^{d}	-0.330	NS

Note: i= Independent variable, m= Mediator, d= Dependent variable; A= i→m, B= m→d; bootstrap results based on n=2000, confidence level for confidence intervals = 0.05 (⁎); Note: significant at *p<.05, **p<.01, ***p<.001, NS=not significant

7.6.9 Moderated Mediation Analysis

From the interaction-moderation analysis it is observed that three interaction-moderation effects {Figure 7.7 (Model 5) and 7.8 (Model6)} are significant (except KM capability_X_Environmental uncertainty-AA linkage). Further, the mediation analysis also reveals significant indirect effects (except KM capability-EA-Performance relationship). Hence, a moderated-mediation effect of environmental uncertainty was examined on the direct and indirect (via mediator) relationship between IT capability-performance linkages using the bootstrapping method with 10,000 bootstrap samples in SPSS-PROCESS macro (Hayes, 2015).

The index of the moderated-mediation effect is presented in table no. 7.13 and it is obtained that the lower and the upper limits of confidence intervals do not include zero, which proves the significance of the moderated-metiation effects as examined in IT capability, AA, and

performance relationships (with Environmental uncertainty modertor) and IT capability, EA, and performance associations (with Environmental uncertainty as modertor).

Table 7.13 Index of Moderated Mediation

Examined Relationships	Index	LLCI	ULCI	Significance
IT capability→AA→Organizational performance (Environmental uncertainty)[#]	0.050	0.039	0.118	*
IT capability→EA→Organizational performance (Environmental uncertainty)[#]	0.081	0.024	0.170	*

Note: [#] moderator in parenthesis; LLCI= lower limit confidence interval, ULCI= upper limit confidence interval; bootstrap results based on n=10000; confidence level for confidence intervals = 0.05 (*), NS= not significant

The results showing the hypotheses testing is presented in table no. 7.14.

Table 7.14 Hypotheses Testing

Proposed Hypotheses	Standardized Estimates	Predicted Sign	Inferences
H_{14a}: IT capability →AA	0.215***	Positive	Supported
H_{14b}: IT capability →EA	0.556***	Positive	Supported
H_{15a}: KM capability →AA	0.403***	Positive	Supported
H_{15b}: KM capability →EA	0.259***	Positive	Supported
H_{16a}: AA→performance	0.145***	Positive	Supported
H_{16b}: EA→performance	-0.109***	Positive	Not Supported
H_{17}:IT Capability→performance	0.109***	Positive	Supported
H_{18}:KM Capability→performance	-0.079*	Positive	Not Supported
H_{19a}:IT capability→AA→performance {(AXB) effects}	0.032*	---	Supported
H_{19b}:IT capability→EA→performance {(AXB) effects}	-0.100**	---	Supported
H_{20a}:KM capability→AA→performance {(AXB) effects}	0.141***	---	Supported
H_{20b}:KM capability→EA→performance {(AXB) effects}	-0.330	---	Not Supported
H_{21a}:IT capability_X_Environmental uncertainty→AA	0.047*	Positive	Supported
H_{21b}:IT capability_X_Environmental uncertainty→EA	0.068*	Positive	Supported
H_{22a}:KM capability_X_Environmental uncertainty→AA	0.010	Positive	Not Supported
H_{22b}:KM capability_X_Environmental uncertainty→EA	0.080*	Positive	Supported

Note: significant at *p<.05, **p<.01, ***p<.001

7.7 Key findings of this study

A precise empirical analysis successfully answers the research questions and the key findings are presented as following:

IT and KM capabilities are essential organizational capabilities which enable the organization to mobilize and deploy IT and KM-based resources to attain agility and agile organizations predict future organizational needs faster than competitors (less-agile ones) and hence strive for radical and incremental innovations and achieve greater competitive performance. However, from table no. 7.12 it is evident that EA does not mediate the KM capability-performance relationship, and also the individual relationships i.e., EA-performance and KM capability-performance are found to be negative, instead of positive as predicted (Figure 7.4 and 7.5). These findings suggest that similar to IT resources, banking firms should realize effective deployment of knowledge resources to proactively identify changes in customers' taste and preferences, competitors' strategies, etc. and involve in strategic decision-making relating to radical product/services innovation and launch innovative competitive actions. Thus, banking firms will realize IT-enabled as well as KM-enabled enhanced competitive, operational and innovative performance.

With an aim to bridge the shortcomings of RBV and KBV theories, this study tends to match the organization's internal mechanisms (IT and KM-based resource utilization) with contextual variables, namely environmental uncertainties (in terms of a diversity, hostility, dynamism, and complexity). From the interaction-moderation analysis (Figure 7.7, and 7.8) it is revealed that IT and KM resources are effectively utilized to generate essential capabilities which in-turn foster agility. However, the interaction-moderation effect of environmental uncertainty and KM capability on AA is found to be non-significant, which can be interpreted as in an uncertain environment banking firms do not effectively channel KM resources into capabilities and hence, identification and reaction to market and customer related changes are obstructed which may hinder organizational strategic movements involving incremental innovation. This inference is also supported by the moderated mediation analysis as presented in Table 7.13.

Chapter 8

Effect of Strategic Information Technology (IT)-Business Alignment Capability on Organizational Performance: The mediating role of Organizational Agility

8.1 Introduction

In chapters 5, 6, and 7 the author has investigated information technology (IT) capability, human IT capability, and the combined effect of IT and knowledge management (KM) capabilities on organizational agility (or simply agility) which in-turn facilitates higher organizational performance (or simply performance). In these previous chapters IT, human IT, and KM capabilities have been conceptualized based on the principles of resource-based-view [8a](RBV), and knowledge-based-view [8b](KBV). However, previous literature studies suggest that the RBV concept can be further extended to the theory of dynamic-capability-view [8c](DCV) (Curado and Bontis, 2006; Malerba and Orsenico, 2000) and following this DCV concept, in this chapter strategic IT-business alignment capability (or simply alignment capability) is conceptualized as an essential organizational dynamic capability (Pelletier and Raymond, 2014; Wilson et al. 2013), which enables the organization to attain greater agility and higher performance (Tallon and Pinsonneault, 2011). Agility is studied in terms of market capitalizing agility (MCA) and operational adjustment agility (OAA) based on the research work conducted by Lu and Ramamurthy (2011), where the former explains the ability of the organizations to swiftly respond to and capitalize on various business environmental changes and the later refers to quickly adjusting the internal business processes to cope with such changes. Although, previously IT capability-MCA-OAA relationships have been previously studied by Lu and Ramamurthy (2011), in this chapter the author makes an attempt to extend their research work and tries to examine the strategic IT-business alignment capability-MCA-OAA linkages and thereby, contributes to the existing information system (IS) literature. Further, the level of environmental uncertainties may compel organizations to revise their strategic alignment process

[8a]RBV, [8b]KBV, and [8c]DCV theories are discussed in detail in chapter 2.

(Tallon and Pinsonneault, 2011). Hence, based on these previous studies, in this chapter the strategic alignment capability-performance relationship has been investigated along with the mediating effect of agility (both MCA and OAA) and the moderating influence of environmental uncertainties on the strategic alignment capability-agility (both MCA and OAA) linkages.

In recent times, strategic alignment has become a top priority for the management practitioners and IS scholars. It has usually been studied as an outcome to be accomplished (Benbya and McKelvey, 2006) with little focus on the process through which it can be achieved. Although, prior studies have defined strategic alignment as the right coherence (fit) between IT and business strategies (Henderson and Venkatraman, 1993; Luftman et al. 2015) due to lack of knowledge on the process of alignment many organizations make huge IT investments without analyzing the degree of coherence between their IT and business objectives (Raymond and Croteau, 2009). According to some researchers, strategic alignment facilitates effective utilization of IT resources to support business strategies which in-turn maximizes return on IT investments, fosters effective IT and business process integration, and thereby, creates sustainable competitive advantage (Baker et al. 2011; Byrd et al. 2006; Sabegh and Motlagh, 2012).

At the same time, it is also evident that today's fast-moving, volatile, and competitive business environment has created immense pressure on the organizations to quickly recognize and react to the unanticipated changes so as to remain agile. Agile firms can easily assimilate the tactics to successfully cope with the unprecedented threats created due to extreme business competition, accelerating pace of modern technology, growing stake holder's expectation, globalization, emerging market uncertainty, etc. Further, these firms have the ability to survive amongst the competitors by capitalizing on business opportunities. Moreover, it is desired that firms persistently transform their resources, infrastructure, and strategies to remain adaptable to domestic as well as external changes (Prahalad, 2009). Therefore, next to strategic alignment, agility may be studied as a crucial business imperative to attain superior business value (Galliers, 2006; Overby et al. 2006).

However, research conducted by Shpilberg et al. (2007) suggests that looking for alignment as merely a solution to any IT-related problems can be misguiding to organizations and also adversely impacts performance. Based on these mixed observations, in this chapter the author has investigated whether strategic alignment capability enables or inhibits agility and

performance. Following the principles of DCV, past studies have examined both strategic alignment and agility as higher order organizational capabilities in two separate streams of researches (Mao et al. 2015a; Pelletier and Raymond, 2014). However, agility as an outcome of strategic alignment to influence performance has been largely overlooked (Tallon and Pinsonneault, 2011). Bridging these gaps this chapter addresses the following research questions.

1. Does strategic IT-business alignment capability enable or inhibit agility {(studied as market capitalizing agility (MCA) and operational adjustment agility (OAA)}?
2. Does strategic IT-business alignment capability enable or inhibit performance?
3. Does agility (in terms of MCA and OAA) enable or inhibit performance?
4. What is the moderating influence of environmental uncertainty on the strategic IT-business alignment capability and agility (as MCA and OAA) relationships?
5. What is the mediating role of agility (both MCA and OAA) on the strategic IT-business alignment capability-performance linkage?
6. [8d]What is the moderated-mediating role of environmental uncertainty on the direct and indirect (via mediator) relationship between strategic IT-business alignment capability and performance?

8.2 Theoretical overview and Hypotheses

8.2.1 Strategic IT-business Alignment Capability

Over the last three decades, the IS research scholars have raised a debate on how to make effective IT-business alignment so as to create superior business value. Prior studies have explained alignment in multiple terms such as 'fit' (Venkatraman, 1989), 'fusion' (Smaczny, 2001), 'harmony' (Luftman et al., 1993), 'linkage' (Henderson and Venkatraman, 1993) and 'integration' (Weill and Broadbent, 1998). Based on recent research by Luftman et al. (2015), all these terms defining alignment may be considered as synonymous, since they reflect efficient coordination of IT and business (non-IT) activities for improved business processes and thereby, creates enhanced business value. Hence, understanding the business dynamics (processes), firms need to focus on the process of alignment rather than simply adopting IT as a commodity which may lead them to acquire less strategic and technical competencies (Gutierrez and Serrano, 2008; Nevo and Wade, 2010).

[8d] Although, moderated-mediation analysis has been performed, due to lack of previous literature support hypotheses have not been proposed relating to this analysis.

Most of the previous researches have studied alignment at firm levels, while very few operationalize at a process level (Tallon, 2008; Tallon and Pinsonneault, 2011; Pelletier and Raymond, 2014). Firm/enterprise level researches have mainly emphasized on the 'what' rather than 'how' and 'why' of strategic alignment and thereby, calls for more dynamic and process-oriented approaches at this point. Therefore, extending these prior studies, instead of using a variance model (which provides a static view of alignment) the author has examined it based on a process model (Levy et al. 2011). Utilizing the capability-based lens alignment is studied from a DCV perspective where Luftman et al.'s (2015) strategic alignment maturity model (SAMM) has been operationalized for a clearer and finer understanding of this process. Although, prior literature suggest agile firms to be more responsive towards unanticipated market and/or business related changes, and consequently gain sustainable competitive advantage, which in-turn improves firm performance, very few studies have taken into account for agility as a mediator between strategic alignment capability and performance (Tallon and Pinsonneault, 2011).

8.2.2 Organizational Agility

Organizational agility is delineated as a crucial competence of an organization to cope with unprecedented business environmental changes, high market competition, etc. and thrives towards greater organizational success. Agility offers swift and easy business process refinement approaches in order to successfully deal with volatile external, and internal changes (Lu and Ramamurthy, 2011; van Oosterhout et al. 2006).

8.2.2.1 Market Capitalizing Agility (MCA)

Following Lu and Ramamurthy (2011) MCA underlines a growth-oriented, assertively change-embracing, and dynamic entrepreneurial approach about making strategic decisions in uncertain business and market changes. According to Dove (2001) MCA underpins superior intellectual ability of the organizations to discover suitable things to act on. It also emphasizes on appropriate utilization of IT to gather and process a wide ranging and extensive amounts of information to anticipate external environmental changes along with continuous monitoring and quickly improving products/services offerings to deal with customer demand changes.

8.2.2.2 Operational Adjustment Agility (OAA)

OAA represents the requirement of a firm to identify possible environmental changes, threats, and opportunities with suitable reconfiguring abilities of resources as well as business processes to provide quick and decisive responses to clients and other stakeholders (Chen et al. 2014). In the face of rapid changes, this agility reflects flexible and swiftly responding business operations to enable an organization strive for innovative initiatives to adapt market or demand changes.

8.2.3 Strategic IT-business Alignment Capability-Agility Linkage

Following the DCV rationale, strategic alignment process involves knowledge sharing among IT and business executives and improves their coordination by means of effective communication and collaboration. Therefore, it becomes simpler to identify changes before they could jointly decide as to how to efficiently respond to such changes (Barki and Pinsonneault, 2005). This facilitates agility in terms of augmented innovation and adaptiveness (Lavie and Rosenkopf, 2006). In a broader scenario, the act of knowledge sharing may be extended to customers, suppliers, and business partners to create further IT and business opportunities, which represents comprehensive decision making and therefore, supports agility. In addition, utilization of IT resources in business processes generates close IT-business proximity and thus, enables firms to closely detect the locus of change and makes them agile in responding to the change (Tallon, 2008). Based on these arguments the following hypotheses are formulated.

H_{23a}: Strategic alignment capability has a positive effect on MCA.
H_{23b}: Strategic alignment capability has a positive effect on OAA.

8.2.4 Agility-Performance Linkage

According to Lu and Ramamurthy (2011), entrepreneurial mind-set about strategic decision-making is essential to effectively address market and business related changes, which facilities enhanced business value. Agile organizations quickly respond to and capitalize on changes by continuously tracking and improving products/services offerings based on changes in customers' demands which in long run improves organizational performance (Cai et al. 2013). Therefore, MCA would facilitate better decision making regarding the production and service of the suitable things which are easily saleable in market. OAA enables an organization to properly integrate internal resources to adjust the modification of products/services scheme. Additionally, previous

researches conducted by Tallon and Pinsonneault (2011) and Zelbst et al. (2011) suggest the positive effect of agility on performance. Based on these studies the following hypotheses are proposed.

H_{24a}: MCA has a positive effect on performance.

H_{24b}: OAA has a positive effect on performance.

8.2.5 Strategic IT-business Alignment Capability-Performance Linkage

Previous researches have established a strong positive relationship between alignment and performance. For example, Bergeron et al (2004) and Kearns and Sabherwal (2007) have suggested that generally alignment improves performance. Further, alignment also enhances financial performance, market growth, innovation (Chan et al. 1997), and cost control (Oh and Pinsonneault 2007). Recently, Tallon and Pinsonneault (2011) have examined strategic alignment at the process level, where most of prior researches have operationalized it at the firm level. According to Tallon (2008), alignment is not a static concept and needs to be investigated from a process-oriented perspective. Based on these researches alignment is studied as a process-related construct and is expected to have a positive effect on performance. Hence the following hypothesis is postulated.

H_{25}: Strategic alignment capability has a positive effect on performance.

8.2.6 Agility as mediator between Strategic IT-business Alignment Capability and Performance

As mentioned above, previous researches have mostly examined the strategic alignment and performance relationships. Although, other stream of researches have documented agility as a critical determinant of performance (Cai et al. 2013; Liu et al. 2013), it has not been widely investigated as a mediator between strategic alignment capability and performance (Tallon and Pinsonneault, 2011). Further, previous studies report both strategic alignment and agility as higher-order dynamic capabilities (Mao et al. 2015a; Pelletier and Raymond, 2014) and demonstrate positive association with performance. Based on this logic, a mediating role of agility on strategic alignment capability-performance linkage may be expected and the following hypotheses are suggested.

H_{26a}: The positive relationship between strategic alignment capability and performance is mediated by MCA.

H_{26b}: The positive relationship between strategic alignment capability and performance is mediated by OAA.

8.2.7 Environmental uncertainty as moderator on Strategic alignment Capability-Agility Linkages

Previous research conducted by Tallon and Pinsonneault (2011) suggest that uncertain environmental changes can influence the agility and performance association. They have investigated environmental volatility as a primary contributor to uncertainties and risky decision making. Further Yayla and Hu (2012) examined environmental uncertainty as a moderator between strategic alignment and performance. Based on these researches, it may be expected that environmental uncertainties will influence the strategic alignment capability-agility relationship (since uncertain environment would entail more agility and better degree of alignment). Higher environmental uncertainty requires superior IT-business alignment that encourages firms to retool their internal business processes with proper redesigning of IT assets which may facilitate competent market operation. Hence, the following hypotheses are proposed.

H_{27a}: Environmental uncertainty positively moderates the relationship between strategic alignment capability and MCA.

H_{27b}: Environmental uncertainty positively moderates the relationship between strategic alignment capability and OAA.

All the above mentioned hypotheses are illustrated in the following research model (Figure 8.1).

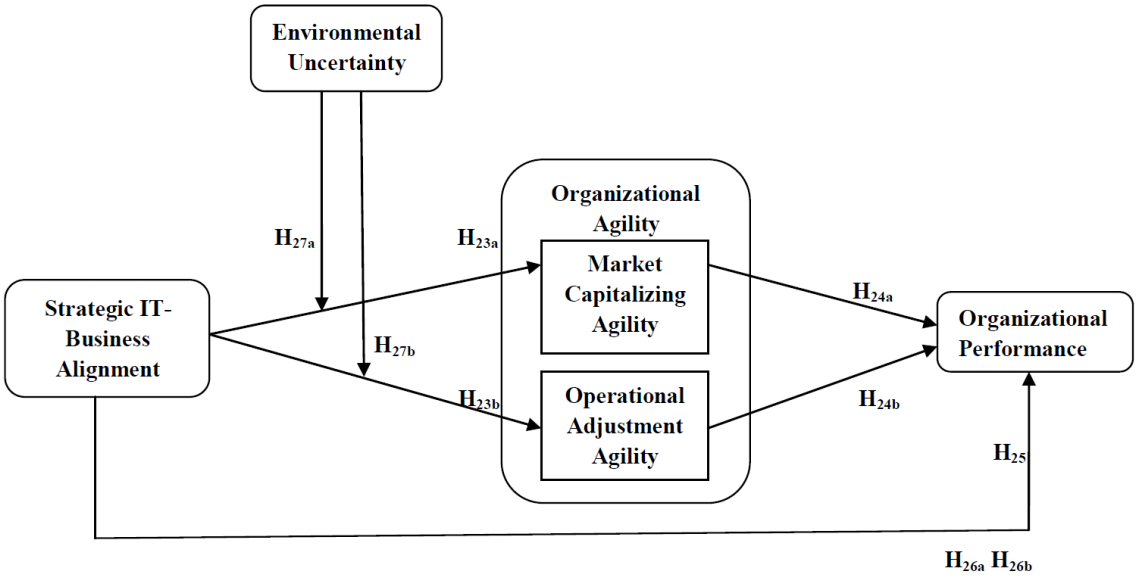


Figure 8.1 Conceptual model representing the relationship between Strategic IT-Business alignment, organizational agility, and organizational performance

8.3 Sample framework and Data collection

The public and private sector banking firms functioning in the state of Odisha, India are selected for the study and the scope of the study is limited to the IT and business executives working in the middle to senior level of management. A matched-pair survey was conducted and a total of 950 numbers of structured questionnaires were distributed via online (survey forms) and offline mode (hand delivery method). A total of 643 numbers of valid questionnaires were returned containing 323 and 320 responses from business and IT executives respectively. After eliminating the unmatched data, the final sample size was calculated to be 300 representing 31% response rate.

8.4 Development of Instruments

A multi-item reflective measurement scale such as a five-point Likert-type rating scale is utilized to collect responses relating to the multi-item measures with extreme points ranging from strongly disagree (1) to strongly agree (5). These studied measures have been adopted from prior researches with slightly modified indicators and their validity is pre-established. Further, construct validity and reliability (Straub, 1989) have been tested to check their validity in the context of this study.

8.5 Research Measures

The research model is operationalized by studying strategic IT-business alignment capability as independent variable, agility (both MCA and OAA) as mediators, environmental uncertainty as moderator, and performance as the dependent variable. Both IT and business executives are surveyed for strategic IT-business alignment capability and environmental uncertainty related measures, while business executives are selected for agility and performance related measures.

8.5.1 Measures for Strategic alignment Capability

Strategic alignment is a dynamic and evolutionary process, that evolves into a relationship where the IT and business related strategies are in harmony with each other (Luftman, 2000; Luftman et al. 2008; Luftman et al. 2015). Following the concept of DCV, this construct is operationalized by seven indicators where six are based on SAMM (Luftman et al. 2008; Luftman et al. 2015) and based on prior studies the last indicator was created by the author. All the seven indicators are first, *effective communication (ALIGN1)* between IT and business units, second, *use of value analytics (ALIGN2)* which describe the potential contributions of IT to the business strategies in certain conditions that both the IT and business units understand and acknowledge, third, *collaborative governance (ALIGN3)* that deals with collaboration of business strategies to IT priorities for better realizing the value of IT in achieving business objectives, fourth, *nature of partnership (ALIGN4)* which explains the extent of relationship/trust (how one values the other's contribution) between IT and business units with precise definition of IT's role in business and vice versa, fifth, *dynamic IT scope (ALIGN5)* which refers to utilizing IT as a dynamic and flexible infrastructure to deal with process related changes and offer customized solutions to business units and external partners, sixth, *IT-business skills development (ALIGN6)* relates to diverse human resources practices namely, selection and recruitment, training and development, career advancements, business and IT skill development, etc. to better encourage alignment, Seventh, *IT-business process integration (ALIGN7)* demonstrates consistent use of IT applications on business processes.

8.5.2 Measures for Organizational agility

Organizational agility is studied in terms of market capitalizing and operational adjustment agilities.

8.5.2.1 Market capitalizing agility (MCA)

MCA is studied as six indicators such as first, *quick decision making (MCA1)* in the face of market and/or customer changes, second, *improving products/services offerings (MCA2)* to quickly respond to and capitalize on changes, third, *superior intellectual ability (MCA3)* to cope with market-related chaos, fourth, *effective IT utilization (MCA4)* to discover external environmental changes, fifth, *introduce products/services that are easily saleable in market (MCA5),* and sixth, *adopting contemporary technologies* to react to competitors *(MCA6)* (Lu and Ramamurthy, 2011).

8.5.2.2 Operational adjustment agility (OAA)

Following the research work conducted by Lu and Ramamurthy (2011) this agility is studied in terms if six indicators. First, *promoting IT-business proximity to detect the locus of change (OAA1),* second, *build up customers' confidence (OAA2)* on business and fulfill special requests incase arise, third, *ability to scale up/down levels of production/service (OAA3)* to support market fluctuations, fourth, *encourage quick internal adjustments whenever there is shortage of resources (OAA4)* (manpower, funding, etc.), fifth, *switching IT vendors to avail of lower cost, improved quality, and better delivery times (OAA5),* sixth, *effective IT-business coordination to deal with consumer demands (OAA6).*

8.5.3 Measures for Organizational Performance

Following Wu et al. (2015) *strategic operational excellence (OrgPerf1)* is studied as the first indicator, which describes attaining excellence in internal business processes to enhance organizations' responsiveness towards customers' needs. Further, effective IT-business alignment facilitates better execution of responsibilities from both IT and business people and support generating higher business value from IT related investments (Van Grembergen and De Haes, 2012). Therefore, the second indicator is selected as *enhanced business value from IT investments (OrgPerf2).* According to Tallon and Pinsonneault (2011) customers perceive a better image for the products and services from strategically aligned organizations. Hence, the third indicator is set as *improved customer relations and loyalty (OrgPerf3).* Further, Inan and Bititci (2015) suggest that *sustainable business performance (OrgPerf4)* is a critical outcome of

dynamic capabilities and is selected as the fourth indicator (since in this chapter the author has conceptualized strategic alignment as an imperative dynamic capability).

8.5.4 Measures for Environmental Uncertainty

Previous research conducted by Yayla and Hu (2012) propose that environmental uncertainty acts as a moderator between alignment and performance relationship. Moreover, Kearns and Lederer (2003) suggest that environmental uncertainty influences strategic alignment (in terms of business dependence on IT, IT's participation in business planning, and alignment of IT plan with business plan) which in-turn enhances organizational performance. They have studied one critical aspect of environmental uncertainty i.e., "heterogeneity". Therefore, the first indicator is selected as, heterogeneity in *product lines (ENUN1),* second, *mode of product distribution (ENUN2),* third, *nature of competition (ENUN3),* fourth, *customer buying habits (ENUN4),* and fifth, *geographic location (ENUN5)* (Kearns and Lederer, 2003; Yayla and Hu 2012).

8.6 Data Analysis and Hypotheses Testing

A total of 28 indicators covering all the study variables were first examined through a preliminary analysis containing procedures of descriptive statistics, and exploratory factor analysis [8e](EFA) utilizing SPSS (version 20). Out of the 28 indicators, a total of 24 indicators were loaded under 7 components which explain nearly 73% of variance. More variance is attributable to the first factor as compared to other remaining 6 factors (Table 8.3). The second and third indicators of OAA *(build up customers' confidence: OAA2, and ability to scale up/down levels of production/service: OAA3)* and fist and fourth indicators of Environmental uncertainty *(*heterogeneity in *product lines: ENUN1, and customer buying habits: ENUN4)* did not load under any factor, hence these indicators were dropped. Further the 6th and 7th extracted components could load only two indicators of MCA (i.e., fourth and fifth indicator; *effective IT utilization: MCA4, and introduce products/services that are easily saleable in market: MCA5),* and one indicator of MCA (i.e., sixth indicator; *adopting contemporary technologies: MCA6),* respectively. Therefore, these two extracted components were dropped. The EFA table containing 5 extracted components and 21 indicators is presented in table no. 8.4.

The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy (MSA) value of 0.872 represents adequacy of data for factor analysis (Table 8.1). The Bartlett's Test of Sphericity checks the significance of the study. The chi-square statistics of 6053.450 along with degrees of

freedom 378 was found to be significant and hence, implies that the samples are significant to conduct factor analysis (Table 8.1). The communality values for all the indicators were found to be greater than 0.6 [8f]{(except for ENUN1 (0.595) and ALIGN4 (0.572)}(Table 8.2). Hence, these indicators properly explain the common variance. Further, the unique and distinct indicators extracted under each construct were tested for their reliability and the Cronbach alpha (α) values were calculated to be within the range of 0.743 to 0.938 (Table 8.5), which is above the threshold value of 0.7 (Hair et al. 2006). Hence, these extracted indicators were proved to be highly reliable. From table no. 8.4 it is evident that all the factor loadings are above 0.5 and there was no cross loading of the indicators, which confirm the convergent as well as discriminant validity of EFA.

Then, confirmatory factor analysis (CFA) was performed along with the interaction-moderation, and mediation analysis using AMOS (version 20). The moderated-mediation analysis was carried out using the SPSS-PROCESS macro. The 5-component model is a representation of 1 second-order construct namely, agility containing 2 first-order reflective dimensions (such as OAA and MCA), and 4 first-order constructs (such as Strategic IT-business alignment capability, performance, environmental uncertainty) which are measured by 3 interchangeable observed indicators. Strategic IT-business alignment capability is studied as the independent variable, OAA and MCA as the mediators, environmental uncertainty as the moderator, and performance as the dependent variable. A series of tests were conducted to confirm construct reliability, validity, and good data fit.

Table 8.1 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA)		0.872
Bartlett's Test of Sphericity	Approx. Chi-Square	6053.450
	Df	378
	Sig.	0.000

Note: p<0.05

[8e] The EFA procedure is discussed in detail in chapter 4. [8f] Communalities values greater than 0.5 are also acceptable and properly explain the common variance (Field, 2009).

Table 8.2 Communalities

Loaded Items	Extraction
OrgPerf1	0.835
OAA5	0.792
OAA4	0.836
OrgPerf2	0.862
OrgPerf3	0.877
OAA6	0.709
OAA2	0.631
ENUN2	0.690
ENUN5	0.759
ENUN4	0.704
ENUN3	0.665
MCA6	0.771
ENUN1	0.595
MCA2	0.653
ALIGN6	0.645
ALIGN1	0.809
ALIGN2	0.710
ALIGN5	0.623
ALIGN4	0.572
ALIGN3	0.754
ALIGN7	0.624
MCA1	0.789
MCA3	0.638
OrgPerf4	0.782
OAA3	0.727
OAA1	0.852
MCA4	0.810
MCA5	0.756

Table 8.3 Total Variance Explained by Extracted Factors

Factors	Initial Eigenvalues *Total*	*% of Variance*	*Cumulative %*	Extraction Sums of Squared Loadings *Total*	*% of Variance*	*Cumulative %*	Rotation Sums of Squared Loadings *Total*	*% of Variance*	*Cumulative %*
1	9.604	34.298	34.298	9.604	34.298	34.298	4.136	14.773	14.773
2	3.130	11.180	45.478	3.130	11.180	45.478	4.054	14.477	29.250
3	2.232	7.970	53.448	2.232	7.970	53.448	3.957	14.131	43.381
4	1.821	6.504	59.952	1.821	6.504	59.952	2.879	10.281	53.662
5	1.493	5.331	65.283	1.493	5.331	65.283	2.123	7.584	61.246
6	1.149	4.104	69.387	1.149	4.104	69.387	1.698	6.064	67.310
7	1.040	3.714	73.101	1.040	3.714	73.101	1.621	5.791	73.101

Extraction Method: Principal Component Analysis

Table 8.4 Rotated Component Matrix and Descriptive Statistics

Item Loadings	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Mini mum	Maxi mum	Mean	Standard Deviation
OAA1	0.882					1.00	5.00	3.490	1.089
OAA4	0.841					1.00	5.00	3.523	1.039
OAA6	0.806					1.00	5.00	3.500	1.101
OAA5	0.797					1.00	5.00	3.550	0.992
ALIGN1		0.803				1.00	5.00	3.490	1.089
ALIGN2		0.742				1.00	5.00	3.496	1.067
ALIGN4		0.711				1.00	5.00	3.600	0.967
ALIGN3		0.659				1.00	5.00	3.636	1.023
ALIGN6		0.624				1.00	5.00	3.436	0.984
ALIGN7		0.620				1.00	5.00	3.543	0.958
ALIGN5		0.611				1.00	5.00	3.410	0.999
OrgPerf3			0.855			1.00	5.00	3.526	0.965
OrgPerf2			0.850			1.00	5.00	3.543	0.999
OrgPerf1			0.842			2.00	5.00	3.523	0.958
OrgPerf4			0.778			1.00	5.00	3.510	0.965
ENUN3				0.724		1.00	5.00	3.513	0.934
ENUN2				0.700		2.00	5.00	3.723	0.936
ENUN5				0.696		1.00	5.00	3.666	0.954
MCA1					0.879	1.00	5.00	3.626	0.947
MCA3					0.771	2.00	5.00	3.640	0.986
MCA2					0.756	1.00	5.00	3.786	0.982

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 8.5 Reliability of Extracted Indicators

Variables	Number of Indicators	Cronbach α
Operational Adjustment Agility	4	0.908
Organizational Performance	4	0.938
Environmental Uncertainty	3	0.766
IT-Business Alignment	7	0.881
Market Capitalizing Agility	3	0.743

8.6.1 Test for Common-method bias (CMB)

This study utilizes two different categories of respondents i.e. IT and business executives to collect the responses. The data on strategic IT-business alignment and environmental uncertainty were collected from both IT and executives, and business executives were surveyed for agility and performance related data. Hence, CMB may occur. The extent of CMB was empirically tested by using Harman's single factor method in SPSS (version 20), where an EFA containing all the 28 indicators was conducted by constraining the number of components extracted to be 1 and this single factor accounted for only 25% of variance, which shows the absence of CMB. According to Podsakoff et al. (2003), if CMB was a problem it would have explained more than

50% of the variance. Afterwards a CFA was performed on this single-component model using AMOS (version 20) (Kearns and Sabherwal, 2007). The results culminated in a poor fitting model denoting all the key indices as χ^2 = 4559.031, df = 94, GFI = 0.49, AGFI= 0.38, RMSEA = 0.30, NFI = 0.47, TLI=0.55, CFI = 0.59. From this it is evident that the constructs are free from CMB.

8.6.2 Measurement Model

The measurement model was developed using the 5 components extracted through EFA containing 21 indicators. However, to improve data fit 3 indicators were dropped. Since this research uses reflective indictors, which are usually interchangeable among each other, hence, dropping few of them to achieve better data fit will not affect the meaning of the construct (Petter et al. 2007). Therefore, the final measurement model consists of 5 constructs with 18 indicators (Figure 8.2).

Further, this measurement model was validated through multiple data [8g]fit indices which primarily comprise of absolute fit indices like CMIN/DF (χ2/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The estimated and acceptable threshold levels of all these critical indices are presented in table no. 8.6 which confirms a good model fit.

8.6.3 Test for construct reliability in CFA

The reliability of all the 5 constructs were tested based on examining the composite reliability values and maximum reliability (MaxR designated by the symbol 'H'). The composite reliability reflects the internal consistency of the individual constructs and the calculated values (within the range of 0.761 to 0.951) exceed the recommended value of 0.7 (Bernstein and Nunnally, 1994) (Table 8.7). The MaxR(H), a more robust calculation than composite reliability was also estimated and the values (within the range of 0.771 to 0.988) were found to be higher than composite reliability, which further confirmed higher reliability of the constructs.

[8g] Prior literature studies supporting the estimated and acceptable threshold levels of the data fit indices have been discussed in detail in Chapter 4.

8.6.4 Test for construct validity in CFA

The construct validity was tested calculating the convergent and discriminant validities.

8.6.4.1 Convergent validity

The average variance extracted (AVE) values were estimated for the convergent validity and all the 5 constructs exhibit AVE values (within the range of 0.517 to 0.866) greater than 0.5 (Hair et al. 2006), which suggest that the individual latent factor is properly explained by its observed variables (Table 8.7). Additionally, the calculated standardized estimates inferred from CFA conducted on the 5-component model validates that convergent validity issue is not a potential risk for the constructs (Anderson and Gerbing, 1988; Bentler, 1989) (Table 8.7).

8.6.4.2 Discriminant validity

As shown in table no. 8.8, the square root of the AVE for each construct was calculated to be greater than the inter-construct correlation. Further, the estimated values of maximum shared variance (MSV) (within the range of 0.029 to 0.446) were also found to be less than the AVE values (Table 8.7) (Hair et al. 2010). Therefore, it is suggested that the constructs are free from the threat of discriminant validity issue.

Thus, the measurement model containing all the 5 constructs was confirmed to be a good fitting model with higher reliability and validity. Further, structural models were developed as presented in subsequent sections.

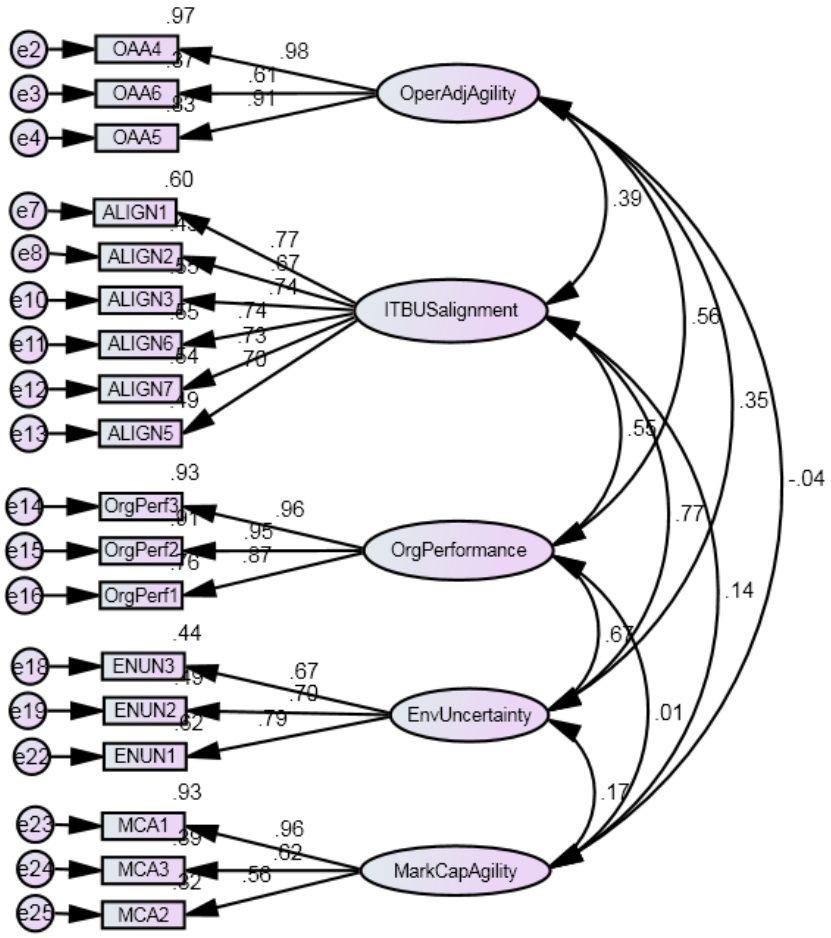


Figure 8.2 Measurement Model

Table 8.6 Fit Indices of the Measurement Model

Fit Indices	Estimated Levels	Acceptable Threshold Levels
Absolute fit indices		
CMIN/DF	2.929	$\leq 2^{G}, \leq 5^{M}$
GFI	0.877	$\geq 0.90^{G}, \geq 0.80^{M}$
AGFI	0.832	$\geq 0.90^{G}, \geq 0.80^{M}$
RMSEA	0.080	$<0.08^{G}, \leq 0.10^{M}$
Incremental fit indices		
NFI	0.897	$\geq 0.90^{G}, \geq 0.80^{M}$
TLI	0.913	$\geq 0.90^{G}, \geq 0.80^{M}$
CFI	0.929	$\geq 0.90^{G}, \geq 0.80^{M}$
Parsimonious fit indices		
PGF1	0.641	No threshold levels
PNFI	0.733	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 8.7 Confirmatory Factor Analysis

Model Constructs	Items	Standardised Loadings	Composite Reliability	AVE	MSV	Max R(H)
Environmental Uncertainty	ENUN1 ENUN2 ENUN3	0.900*** 0.631*** 0.685***	0.761	0.517	0.093	0.771
Operational adjustment agility	OAA4 OAA5 OAA6	0.872*** 0.952*** 0.965***	0.883	0.724	0.311	0.975
IT-Business alignment	ALIGN1 ALIGN2 ALIGN3 ALIGN5 ALIGN6 ALIGN7	0.773*** 0.667*** 0.741*** 0.703*** 0.741*** 0.732***	0.870	0.528	0.293	0.979
Organizational performance	OrgPerf1 OrgPerf2 OrgPerf3	0.873*** 0.954*** 0.962***	0.951	0.866	0.446	0.986
Market capitalizing agility	MCA1 MCA2 MCA3	0.963*** 0.563*** 0.623***	0.772	0.544	0.029	0.988

Notes: significant at ***p<.001

Table 8.8 Discriminant Validity

Factors	Environmental Uncertainty	Operational adjustment agility	IT-Business alignment	Organizational performance	Market capitalizing agility
Environmental Uncertainty	**0.719**				
Operational adjustment agility	0.346	**0.851**			
IT-Business alignment	0.073	0.390	**0.727**		
Organizational performance	0.668	0.558	0.546	**0.931**	
Market capitalizing agility	0.169	-0.041	0.142	0.007	**0.738**

Notes: Diagonal elements are the square roots of average variance extracted

8.6.5 Structural Model

The structural linkages between strategic alignment capability and both OAA and MCA is presented in figure no. 8.3 (Model 1), where positive significant path coefficients are calculated for each relationship (for strategic alignment-OAA, structural link = 0.378, $p < 0.001$, for strategic alignment-MCA, structural link = 0.136, $p < 0.001$). Hence, the proposed hypotheses H_{23a} and H_{23b} are supported.

Further, structural linkage between strategic alignment capability and performance is presented in figure no. 8.4 (Model 2), where a positive significant path coefficient is calculated (structural link = 0.537, $p < 0.001$). Hence, the formulated hypothesis H_{17} is supported.

Figure no. 8.5 (Model 3) represents the structural linkages between OAA and MCA with performance, where positive significant path coefficients are calculated for both OAA-performance (structural link = 0.556, $p < 0.001$) and MCA-performance linkages (structural link = 0.028, $p < 0.05$). Hence, hypotheses H_{24a} and H_{24b} are supported.

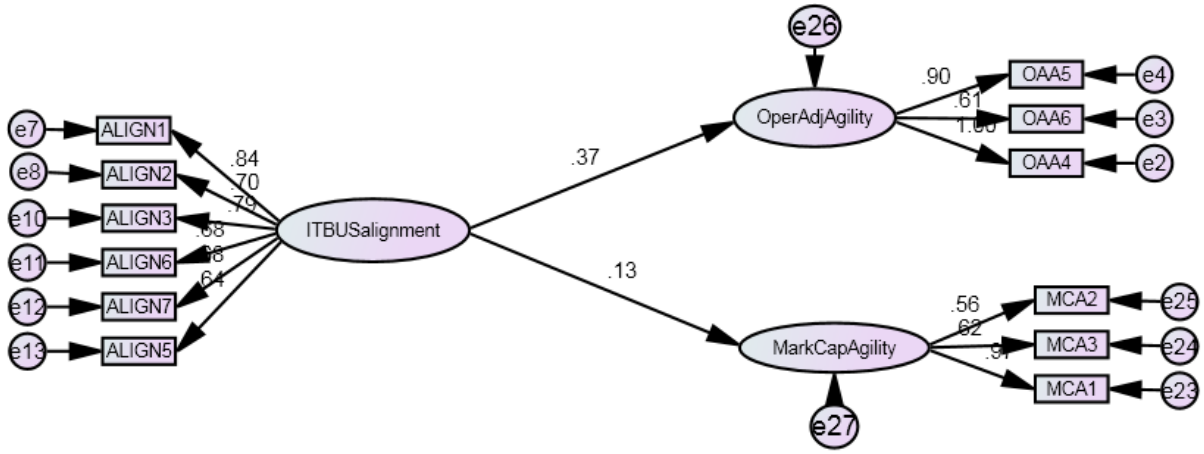


Figure 8.3 IT-Business alignment-Operational adjustment agility-Market capitalizing agility structural linkages (Model-1)

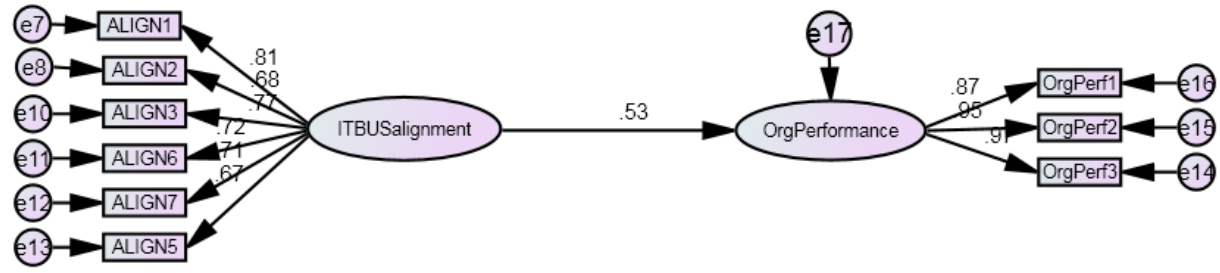


Figure 8.4 IT-Business alignment-Organizational performance structural linkages (Model-2)

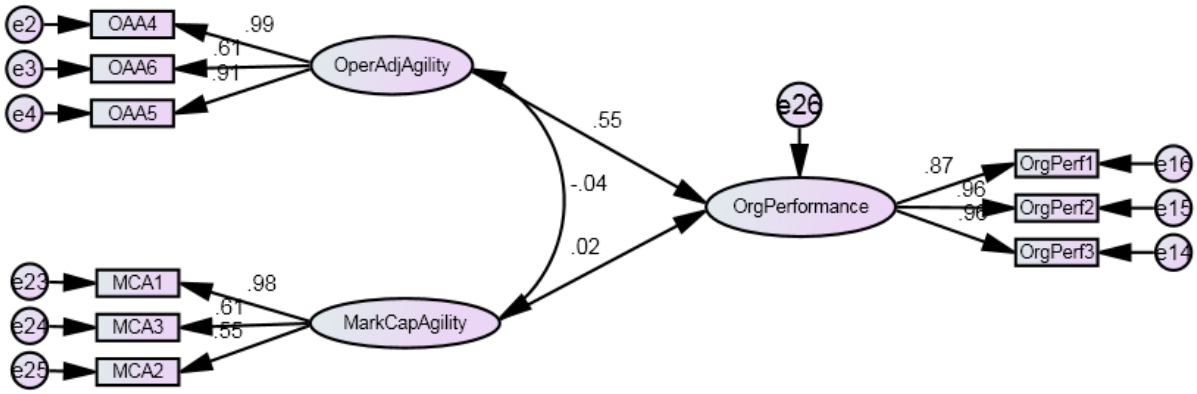


Figure 8.5 Operational adjustment agility-Market capitalizing agility-Organizational performance structural linkages (Model-3)

A data imputation process was carried out to create composites for each construct and path models were generated and used for the rest of the analysis. Figure no. 8.6 (Model 4) exhibits path diagrams showing the relationships between strategic alignment capability, OAA, MCA, and performance, which essentially examine all the above mentioned relationships in one diagram. From figure no. 8.6 it is evident that strategic alignment capability is showing a positive relationship with performance in the presence of both OAA and MCA (However, individual indirect effects, i.e., mediation effects are tested in the Mediation Analysis section). Further, all these structural models (Model 1 to 4) were tested for various data fit indices by calculating the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. These fit indices are presented in table no. 8.9 where all these estimated values were found to be within the acceptable threshold levels.

8.6.6 Test for Multicollinearity

A linear regression analysis was conducted to estimate the observed variability of the independent variables namely IT capability, KM capability, AA, and EA on the dependent variable i.e., performance. Table no. 8.10 represents the model summary and collinearity statistics of each of these independent variables. The R^2 value of 0.576 denotes that independent variables explain 57% of observed variability in performance. The standardized coefficients (Beta) and t-statistics represent significant relationship between the independent and dependent variables. The tolerance and the variance inflation factor (VIF) represent the extent of multicollinearity issue among the variables. Following Field (2009), the threshold levels for

tolerance and VIF are set to be > 0.2 and < 10 respectively. Table no. 8.10 represents tolerance level within the range of 0.795 to 0.862 and VIF index within the range of 1.160 to 1.257, suggesting the absence of multicollinearity issue.

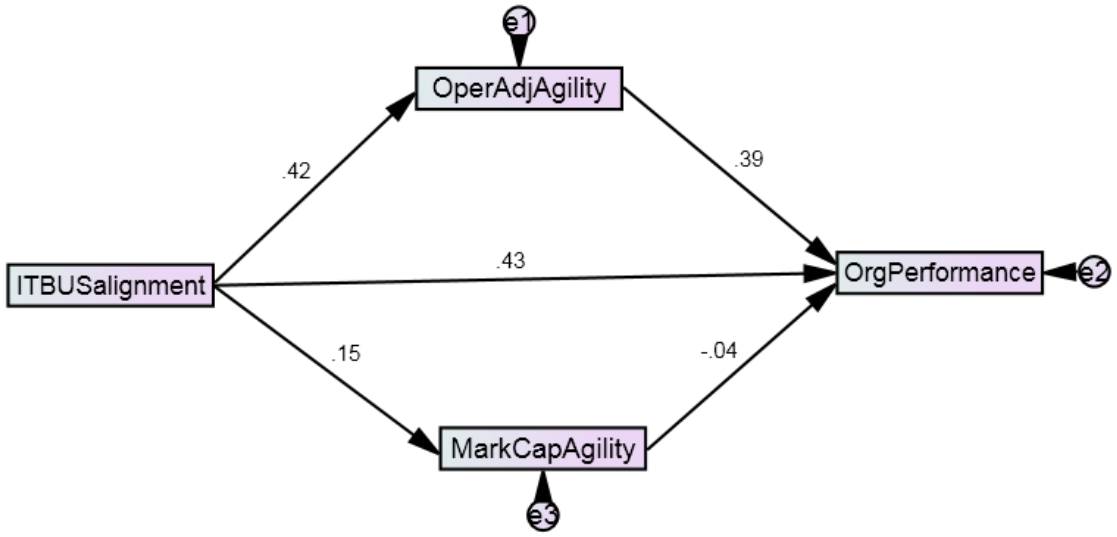


Figure 8.6 IT-Business alignment-Operational adjustment agility-Market capitalizing agility-Organizational performance structural linkages (Model-4)

8.6.7 Interaction-Moderation Analysis

The interaction variable (IT-Business alignment_X_Environmental uncertainty) was computed and path estimates were calculated. The interaction-moderation effects of environmental uncertainty with IT-Business alignment on both OAA and MCA are shown in figures no. 8.7. From figure no. 8.7 it is evident that the interaction of environmental uncertainty with IT-business alignment capability exhibits a significant negative effect on OAA (structural link = -0.137, $p < 0.001$), and a significant positive effect on MCA (structural link = 0.148, $p < 0.001$). Hence hypothesis H_{27a} is supported but H_{27b} is not supported.

The interaction-moderation models (Model 5) was validated by the absolute fit indices like CMIN/DF ($\chi 2$/df), GFI, AGFI, and RMSEA; incremental fit indices such as NFI, TLI, and CFI; and parsimonious fit indices such as PGFI and PNFI. The summary of these estimates are presented in table no. 8.9 showing all these fit indices within the acceptable threshold levels. Further, these interaction-moderation relationships are plotted as shown in figures no. 8.8, and 8.9.

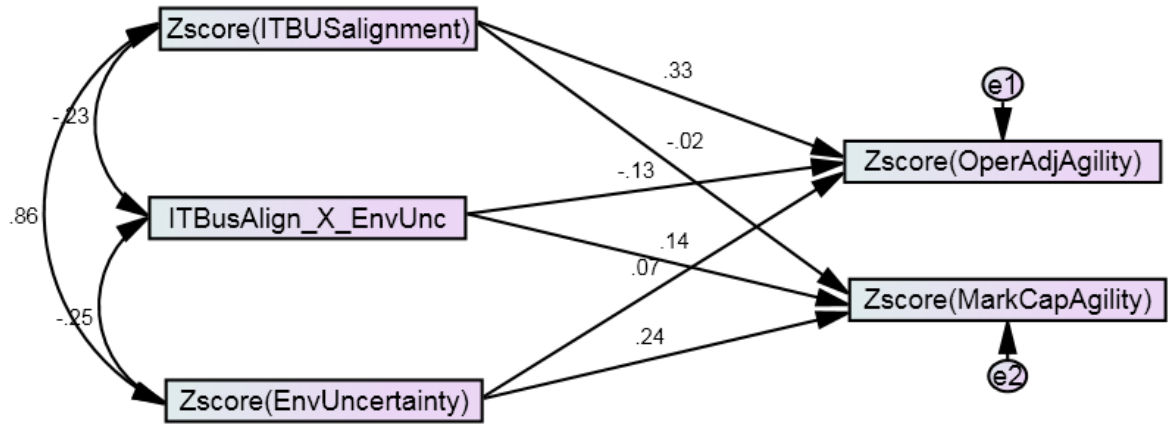


Figure 8.7 Interaction effect of Environmental uncertainty and IT-Business alignment on Operational adjustment and Market capitalizing agility (Model-5)

Table 8.9 Fit Indices of the Structural Models (1 to 4) and Moderation model 5

Fit Indices	Model 1	Model 2	Model 3	Model 4	Model 5	Acceptable Threshold Levels
Absolute fit indices						
CMIN/DF	3.695	4.077	1.801	4.332	3.632	$\leq 2^{G}$, $\leq 5^{M}$
GFI	0.906	0.885	0.970	0.993	0.995	$\geq 0.90^{G}$, $\geq 0.80^{M}$
AGFI	0.860	0.801	0.944	0.929	0.928	$\geq 0.90^{G}$, $\geq 0.80^{M}$
RMSEA	0.079	0.080	0.052	0.080	0.078	$<0.08^{G}$, $\leq 0.10^{M}$
Incremental fit indices						
NFI	0.896	0.918	0.978	0.984	0.993	$\geq 0.90^{G}$, $\geq 0.80^{M}$
TLI	0.901	0.904	0.985	0.923	0.947	$\geq 0.90^{G}$, $\geq 0.80^{M}$
CFI	0.922	0.930	0.990	0.987	0.995	$\geq 0.90^{G}$, $\geq 0.80^{M}$
Parsimonious fit indices						
PGF1	0.604	0.511	0.517	0.501	0.500	No threshold levels
PNFI	0.706	0.663	0.652	0.588	0.571	No threshold levels

Note: G= good data fit, M= mediocre data fit

Table 8.10 Model Summery, Coefficients and Collinearity Statistics

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
Model	***B***	***Std. Error***	***Beta***			***Tolerance***	***VIF***
Constant	0.535	0.241		2.222	0.020		
IT-Business Alignment	0.495	0.054	0.431	9.161	0.000	0.795	1.257
Market Capitalizing Agility	-0.044	0.044	-0.042	-0.989	0.023	0.862	1.160
Operational Adjustment Agility	0.544	0.064	0.393	8.463	0.000	0.813	1.230

R=0.693, R^2=0.576, Adjusted R^2=0.568; Dependent variable: Organizational performance; Independent variable: IT-Business alignment, OAA, and MCA

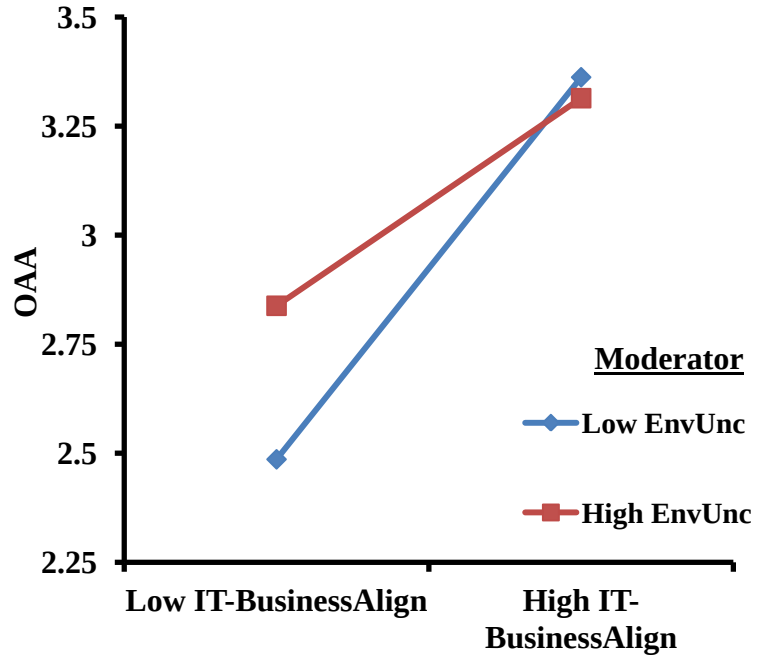


Figure 8.8 Environmental uncertainty dampens the positive relationship between IT-Business alignment (IT-BusinessAlign) and Operational adjustment agility (OAA)

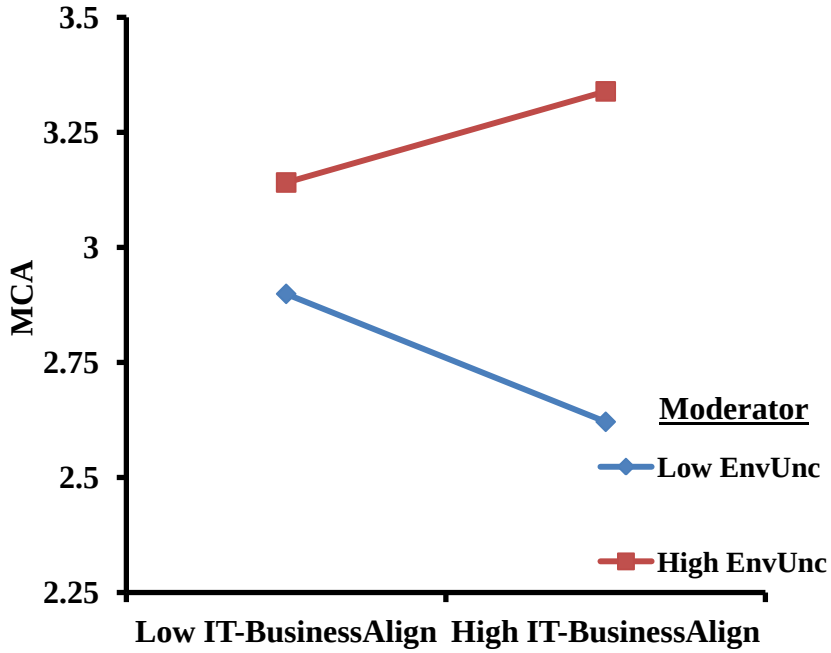


Figure 8.9 Environmental uncertainty dampens the negative relationship between IT-Business alignment (IT-BusinessAlign) and Market capitalizing agility (MCA)

8.6.8 Mediation Analysis

In this chapter OAA and MCA are treated as the mediators and their indirect effects on the IT-business alignment capability-performance linkage are individually examined and the path coefficients are illustrated in figures no. 8.10 and 8.11. The indirect effect estimates are calculated utilizing the "*MyIndirectEffectEstimand"* Gaskin (2016), which uses 2000 numbers of bootstrap samples in AMOS (version 20) and presented by 'A X B', where 'A' is the IT-business alignment capability-OAA and MCA relationships (i.e., from independent variable to mediators) and 'B' is the OAA and MCA-organizational performance relationships (i.e., from mediators to dependent variable) (Hayes, 2009). For IT-business alignment capability-OAA-performance and IT-business alignment capability-MCA-performance relationships these indirect effect estimates are calculated to be significant (AXB = 0.192, $p < 0.001$; AXB = -0.015, $p < 0.05$). Therefore, both hypotheses H_{26a} and H_{26b} are supported. These indirect estimates are shown in table no. 8.11.

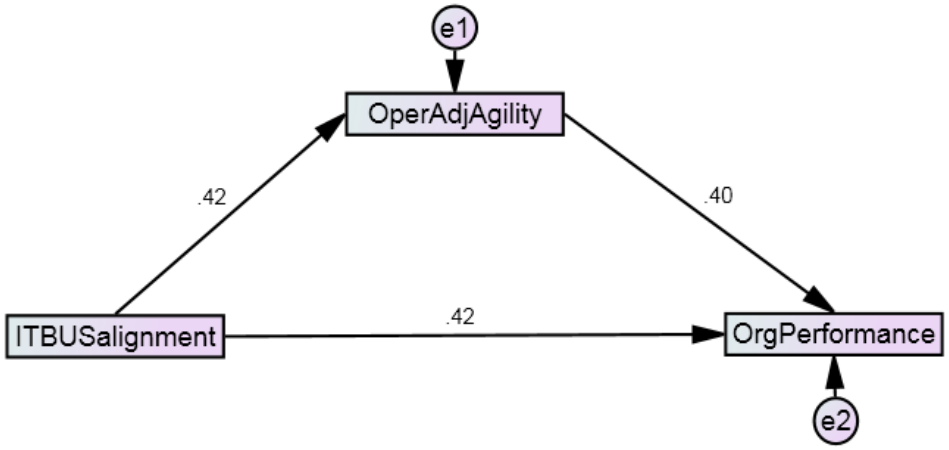


Figure 8.10 Operational adjustment agility as a mediator between IT-Business alignment and Organizational performance

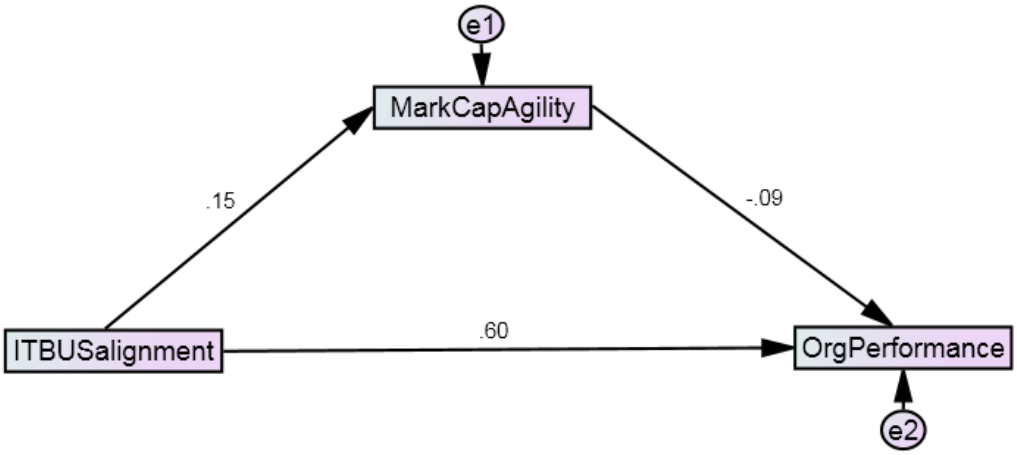


Figure 8.11 Market capitalizing agility as a mediator between IT-Business alignment and Organizational performance

Table 8.11 Indirect Effects

Examined Relationships	Indirect Effects Estimates (A X B)	Significance
IT-Business alignment[i]→OAA[m]→Organizational performance[d]	0.192	***
IT-Business alignment[i]→MCA[m]→Organizational performance[d]	-0.015	*

Note: i= Independent variable, m= Mediator, d= Dependent variable; A= i→m, B= m→d; bootstrap results based on n=2000, confidence level for confidence intervals = 0.05 (∗); Note: significant at *p<.05, ***p<.001, NS=not significant

8.6.9 Moderated Mediation Analysis

From the interaction-moderation analysis it is observed that interaction-moderation effects are significant {Figure 8.7 (Model 5)}. Further, the mediation analysis also reveals significant indirect effects. Hence, a moderated-mediation effect of environmental uncertainty was examined on the direct and indirect (via mediator) relationship between IT-business alignment capability-performance linkages using the bootstrapping method with 10,000 bootstrap samples in SPSS-PROCESS macro (Hayes, 2015).

The index of the moderated-mediation effect is presented in table no. 8.12 and it was obtained that the lower and the upper limits of confidence intervals do not include zero, which proves the significance of the moderated-metiation effects as examined in IT-business alignment capability, OAA, and performance relationships (with Environmental uncertainty modertor) and IT-business alignment capability, MCA, and performance associations (with Environmental uncertainty as modertor).

Table 8.12 Index of Moderated Mediation

Examined Relationships	Index	LLCI	ULCI	Significance
IT-Business alignment→OAA→Organizational performance (Environmental uncertainty)[#]	-0.077	-0.132	-0.029	*
IT-Business alignment→MCA→Organizational performance (Environmental uncertainty)[#]	-0.029	-0.072	-0.003	*

Note: [#] moderator in parenthesis; LLCI= lower limit confidence interval, ULCI= upper limit confidence interval; bootstrap results based on n=10000; confidence level for confidence intervals = 0.05 (*)

The results showing the hypotheses testing is presented in table no. 8.13.

Table 8.13 Hypotheses Testing

Proposed Hypotheses	Standardized Estimates	Predicted Sign	Inferences
H_{23a}: Strategic alignment→MCA	0.136***	Positive	Supported
H_{23b}: Strategic alignment→OAA	0.378***	Positive	Supported
H_{24a}: MCA→performance	0.028*	Positive	Supported
H_{24b}: OAA→performance	0.556***	Positive	Supported
H_{25}: Strategic alignment→performance	0.537***	Positive	Supported
H_{26a}: Strategic alignment →MCA→performance {(AXB) effects}	-0.015*	---	Supported
H_{26b}: Strategic alignment →OAA→performance {(AXB) effects}	0.192***	---	Supported
H_{27a}: Strategic alignment_X_Environmental uncertainty→MCA	0.148***	Positive	Supported
H_{27b}: Strategic alignment_X_Environmental uncertainty→OAA	-0.137***	Positive	Not Supported

Note: significant at *p<.05, ***p<.001

8.7 Key findings of this study

A meticulous empirical analysis successfully answers the research questions and the key findings are presented as following:

This study has conceptualized strategic IT-business alignment as a critical dynamic capability which enables an organization to develop coherence between its resources, competencies, and capabilities. Further, to ensure the IT-business harmony, this study demonstrates the IT-business alignment and performance relationships. In this respect, IT-business alignment is not considered as an outcome or event to be achieved, rather a continuous synchronization of various IT and organizational resources to effectuate the alignment process

which renders organizations more agile in the face of environmental uncertainties. The significant positive relationships between strategic alignment capability and agility (both OAA and MCA; Figure 8.3), and strategic alignment capability and performance (Figure 8.4) support these arguments.

Although, previous literature suggests agility as another important higher-order dynamic capability (Mao et al. 2015a), this study argues that agility (in terms of OAA and MCA) serves as a mediator promoting the strategic alignment-performance linkage which is evident from the significant mediation effects of OAA and MCA on strategic alignment-performance associations (Table 8.11).

From the interaction-moderation analysis it is obtained that the interaction of strategic alignment capability and environmental uncertainty is showing a significant negative effect on OAA and significant positive effect on MCA (Figure 8.7). More surprisingly in the presence of the moderator, the individual effects of strategic alignment capability on both OAA and MCA is found to be positive (structural link = 0.336, $p < 0.001$) and negative (structural link = - 0.029, $p < 0.05$) respectively, which is exactly the reverse finding of interaction-moderation effects (Figure 8.7). Hence, although hypothesis H_{27a} (Strategic alignment_X_Environmental uncertainty-MCA) has been accepted, from figures no. 8.8 and 8.9 it is apparent that environmental uncertainty dampens the positive relationship between strategic alignment capability-OAA and negative relationship between strategic alignment capability-MCA. These peculiar findings can be interpreted as although, strategic alignment capability promotes agility (both OAA and MCA) (Figure 8.3), when environmental uncertainties are higher, the strength of the relationship between strategic alignment capability and agility (both OAA and MCA) is diminished. A plausible explanation for this is the resource constraints that the IT and business units face in developing economies, such as India which result diminution in the degree of alignment and hinder agility. As evident from the moderated-mediation analysis (Table 8.12), the negative (significant) relationships estimated among strategic IT-business alignment capability, agility (as OAA and MCA), performance, and environmental uncertainty support this inference.

Chapter 9

Conclusion

This is the final chapter of the thesis, which confers about the summary of the research and also provides a set of recommendations for the effective utilization of various organizational capabilities to obtain improved organizational agility and performance from an Indian banking industry perspective. It also represents the theoretical contributions and practical implications of this study. In addition, it exhibits the research limitations and overall conclusion of the entire study. Lastly, this chapter provides further future research directions.

9.1 Summary

The central theme of investigation of this research was to examine how information technology (IT) capability, human IT capability, knowledge management (KM) capability, and strategic IT-business alignment capability impact organizational agility to achieve augmented organizational performance of various public and private-owned banking firms in India. Based on the hierarchical framework and embeddedness view of organizational capabilities, an integrated model containing all these important study variables was proposed in chapter 2. IT capability, human IT capability, KM capability were considered as lower-order capabilities and strategic IT-business alignment capability was regarded as the higher-order capability, and both of these kinds influenced another dynamic higher-order capability i.e., organizational agility to attain superior performance. Further, borrowing the resource-based-view (RBV), knowledge-based-view (KBV), and dynamic-capability-view (DCV) theories from the strategic management literature, this study intended to conceptualize IT capability and human IT capability based on RBV, KM capability based on KBV, and strategic IT-business alignment capability based on DCV principles. A matched-pair survey was conducted through structured questionnaires using both online (survey forms) and offline (hand delivery) methods to collect primary responses from business and IT executives working in the middle to senior level of management. Subsequently, various data analysis tools such as SPSS (version 20) and AMOS (version 20) were used to analyze these collected data with an aim to achieve the four primary objectives of this research.

As demonstrated in chapter 5, the first research objective was to investigate the effect of IT capability on organizational performance through the mediating role of organizational agility along with the moderating effect of IT spending. IT capability was studied as a second-order construct containing managerial and technical IT capabilities as the two critical dimensions. Additionally, organizational agility was also examined as a second-order construct comprising of business process and market responsive agilities as two crucial dimensions. Organizational performance was operationalized in terms of four indicators such as return on investment (ROI), overall organizational growth, competitive advantage, and overall organizational success. Further, IT spending was studied in terms of six indicators named as spending on overall IT infrastructure, spending on IT innovations (new services and capabilities), spending on internal IT services (personnel), spending on compatible hardware, spending on software applications, and spending on shared network connectivity.

An empirical analysis revealed that organizational managerial and technical IT capabilities positively influence both business process and market responsive agilities which enable the banks to swiftly identify and readily respond to the pivotal business environmental changes. Further, the positive relationship between technical IT capability and performance infers that banks are able to channel IT resources (infrastructure) to generate essential capabilities which in-turn enhances performance. Additionally, the positive market responsive agility-performance linkage ensures quick responses to pivotal business environmental changes. Moreover, both managerial and technical IT capabilities impact performance through business process and market responsive agilities (except managerial IT capability-market responsive agility-performance linkages), which confirms the inevitability of banking agility for superior performance. In recent times, banks are investing in IT to realize greater agility and performance, which is evident from the positive effect of IT spending on the managerial IT capability-technical IT capability-business process-market responsive agilities linkages {except technical IT capability-business process agility relationship (with IT spending as moderator)}. Further, the moderated-mediation analysis reveals that IT spending possesses a significant effect on both direct and indirect (via business process agility) relationships between IT capability (both managerial and technical) and performance.

As reported in chapter 6, the second research objective was to examine the impact of human IT capability on organizational performance through the mediating role of organizational

agility along with the moderating influence of IT spending. Human IT capability was studied as a second-order construct containing business functional skills, interpersonal management skills, and technology management skills as critical dimensions. Like-wise organizational agility as also examined as a second-order construct comprising of sensing and responding agilities as two crucial dimensions. Organizational performance was operationalized in terms of four indicators such as overall [9a]organizational success, profitability relative to goals, asset utilization (measured by return on assets ROA), and market share relative to goals. Further, IT spending was studied in terms of six indicators such as spending on delivery channels, spending on core banking solution (CBS), spending on risk management solutions (RMS), spending on mobile banking solutions (MBS), and spending on customer relationship management (CRM).

After a precise empirical analysis, it was revealed that technology management skill-interpersonal management skill-business functional skill-sensing agility-responding agility-performance relationships were found to be positive and significant which reinforce the argument that human IT capability essentially enables the banks to enhance the IT related skills/expertise to foster agility which in-turn generates superior performance. This argument is further supported by the significant mediating roles of both sensing and responding agilities on the technology management skill-interpersonal management skill-business functional skill-performance linkages (except technology management skill-responding agility-performance and business functional skill-responding agility-performance relationships). Additionally, it is also obtained that IT infrastructure spending enhances the ability of the IT personnel to learn about new technologies and business functions, which assist them to effectively sense and respond to business related changes and thereby, improves banking agility {except technology management skill-sensing agility linkage (with IT spending as moderator)}. However, IT spending is not translated into developing the interpersonal management skills of the IT personnel as evident from the negative (significant) relationship between interpersonal management skill-agility (both sensing and responding). Further, the moderated-mediation analysis highlights the significance of IT infrastructure spending to be channeled into developing technology management and business functional skills of IT personnel so as to enhance performance through sensing agility.

[9a] Since the "organizational success" indicator did not load under any factor in exploratory factor analysis (EFA) performed in chapter 5 (Table 5.4), it was again studied in chapter 6.

As explained in chapter 7, the third research objective was to explore the performance impacts of IT and KM capabilities through the mediating role of organizational agility along with the moderating influence of environmental uncertainty. IT capability, KM capability, environmental uncertainty, and organizational performance were examined as first-order constructs, while organizational agility as a second-order construct with critical dimensions as adaptive, and entrepreneurial agilities. IT capability was studied in terms of seven indicators such as, IT infrastructure, IT knowledge, strategic IT-business thinking, effective IT management, and technology-based links with customers and suppliers, restructuring of IT-business processes to leverage opportunities, and lastly proactive IT exploration to embrace innovative IT applications for generating business opportunities. KM capability was examined in terms of five indicators such as product knowledge capability, customer knowledge capability, managerial knowledge capability, learning capability, and communication capability. Organizational performance was studied in terms of three indicators such as competitive performance, operational performance, and innovative performance. Environmental uncertainty was assessed in terms of four indictors namely, environmental diversity, hostility, dynamism, and complexity.

A thorough empirical analysis divulged that IT and KM capabilities positively influence adaptive agility, entrepreneurial agility, and performance (except KM Capability-performance linkage). This finding suggests that banking firms more effectively deploy the IT assets than KM-based resources to attain enhanced banking agility and performance. Further, a negative (significant) relationship is obtained between entrepreneurial agility and performance along with a non-mediating effect of entrepreneurial agility on the KM capability-performance linkage. However, entrepreneurial agility exhibits a significant mediating impact on the IT capability-performance relationship, and adaptive agility illustrates a significant mediating effect on both IT-KM capabilities-performance associations, which highlight the importance of agility as a vital determinant of augmented performance. In addition, the moderation analysis revealed that in an uncertain environment, the banks tend to more effectively utilize their IT capabilities {since IT capability has positive (significant) effect on both adaptive and entrepreneurial agilities} compared to KM capabilities {since KM capability has only positive (significant) effect on entrepreneurial agility}. Furthermore, the moderated-mediation analysis inferred that in the face

of uncertain environment, IT capability significantly influence performance via both adaptive and entrepreneurial agilities.

As exhibited in chapter 8, the fourth research objective was to assess the effect of strategic IT-business alignment capability on organizational performance through the mediating role of organizational agility along with the moderating impact of environmental uncertainty. Strategic IT-business alignment capability, organizational performance, and environmental uncertainty were studied as first-order constructs and organizational agility as a second-order construct with key dimensions as market capitalizing, and operational adjustment agilities. Strategic IT-business alignment capability was operationalized by seven indicators, namely effective communication, use of value analytics, collaborative governance, nature of partnership, dynamic IT scope, IT-business skills development, and IT-business process integration. Organizational performance was studied in terms of four indicators such as strategic operational excellence, enhanced business value from IT investments, improved customer relations and loyalty, and sustainable business performance. Environmental uncertainty was investigated in terms of five indictors named as heterogeneity in product lines, mode of product distribution, nature of competition, customer buying habits, and geographic location.

After a meticulous empirical analysis it was inferred that strategic IT-business alignment capability had a significant positive effect on agility (both market capitalizing and operational adjustment agilities) and performance. This inference suggests that banking firms focus on continuous synchronization of various IT and organizational resources to effectuate the alignment process so as to obtain higher agility and performance, which was further validated by the mediation analysis. However, from the moderation analysis it was obtained that when environmental uncertainties are higher, the banks may not properly utilize their strategic alignment capability to attain both the market capitalizing and operational adjustment agilities. This finding was also supported by the estimated negative (significant) relationships among strategic IT-business alignment capability, agility (both market capitalizing and operational adjustment agilities), performance, and environmental uncertainty as evident from the moderated-mediation analysis.

9.2 Recommendations

Based on the critical research findings the present study proposes several recommendations as presented in the following paragraphs.

It is imperative for the banking firms to effectively utilize both the lower-order and higher-order capabilities so as to realize augmented performance. Since performance is a multifaceted construct as discussed in this research, banks need to focus on achieving both financial (e.g., ROI, ROA, profitability, etc.) and non-financial (e.g., competitive advantage, improved customer relations and loyalty, and sustainability, etc.) performance measures. Appropriate deployment of essential organizational capabilities such as IT capability, human IT capability, KM capability, and strategic IT-business alignment capability are essential for the banks to achieve improved banking agility and performance.

Further, banks need to follow the recent advancements in IT and focus on effective IT management as well as utilization of state of the art contemporary technology infrastructure to attain superior performance. Banks should be proactive in realizing the internal business or operational changes as well as external business environmental changes. Additionally, it is important to make wise IT investment decisions to obtain banking agility, which leads to superior performance in terms greater ROI, sustainable competitive advantage, and overall organizational growth.

Banking firms need to focus on developing the technology management, interpersonal management, and business functional skills of the IT personnel, which facilitate their effective sensing and responding abilities to ascertain unprecedented business environmental changes and thus, banks attain agility. However, in respect to achieve performance in terms of higher ROA, profitability, and organizational success through agility, banks need to improve their responding abilities by effectively utilizing the technology management and business functional skills of the IT professionals. In addition, IT investment in CBS, CRM, and RMS should more focus on building necessary technology management skills among the IT personnel to develop effective market intelligence for quicker identification of changes in customers' preferences and competitors' strategies and further, track new products or services launched by market competitors to maintain competitiveness.

Akin to IT resources, banks should realize effective deployment of knowledge resources to proactively identify imminent business environmental changes, and involve in strategic decision-making relating to radical product/services innovation so as to launch innovative competitive actions. As a consequence, banks will realize IT-enabled as well as KM-enabled enhanced competitive, operational, and innovative performance. Furthermore, banks need to strive for attaining higher performance by taking the required pre-emptive measures to deal with environmental threats and implement strategic movements which foster radical innovation. In addition, when environmental uncertainties are higher banks should effectively channel KM resources into capabilities to promote incremental innovations.

Moreover, effective alignment between IT and business units is greatly desired to enable the banks develop coherence between their strategies and resources. Consequently, banks attain higher agility and performance in terms of higher operational excellence, enhanced business value, improved customer relations and loyalty, and sustainable business performance. Since higher environmental uncertainties diminish the strength of the relationship between strategic alignment capability and agility, the banking firms need to deal with the issues of resource constraints, which are highly prevalent in developing economies like India.

9.3 Theoretical Contributions

So far, the extant literature has investigated various organizational capabilities-agility-performance relationships in dyads and simultaneously all the capabilities such as IT, human IT, KM, and strategic alignment capabilities have not been previously studied to improve agility and performance of organizations. Therefore, taking the existing literature a step further, the current research precisely examines the relative significance of all these organizational capabilities and provides a comprehensive understanding of their overall effectiveness on agility and performance. In addition, this study has empirically investigated the mediating effect of agility on the capabilities-performance linkages and the moderating influence of internally oriented IT spending and externally-oriented environmental uncertainty on the capabilities-agility relationships. Furthermore, this research also examines the moderated-mediation effects of both the moderators on the direct and indirect (via mediator) relationship between capabilities and performance. Moreover, previous literature support various organizational capabilities-agility-performance related studies conducted mostly in the advanced countries such as U.S.A.

(Bharadwaj, 2000; Lu and Ramamurthy, 2011; Tallon and Pinsonneault, 2011), China (Cai et al. 2013; Chen et al. 2014; Liu et al. 2013; Mao et al. 2015a), Australia (Bi et al. 2013), Israel (Fink and Neumann, 2007), etc. Previously Yayla and Hu (2012) have investigated the performance impact of strategic IT-business alignment capability from a developing country perspective i.e., Turkey. However, this kind of study has not been previously conducted in the context of India. In addition, with an aim to diminish the perplexing effects of industrial variation (Chen et al. 2014), this study is conducted on one specific industry i.e., Indian banking industry with special focus on public and private sector banking firms. Although, Broadbent and Weill (1993) and Floyd and Wooldridge (1990) had previously conducted strategic IT-business alignment-performance related studies in the context of Australian and U.S.A. banking industries, this research will provide new insights from Indian banking perspective.

Further, this study has discussed the capabilities-agility-performance contradictions, i.e., this study has examined wheatear capabilities enable or impede agility and performance, and also wheatear agility enables or inhibits performance. Accordingly, the research questions were framed and empirically data were analyzed to find appropriate answers as presented in chapters 5, 6, 7, and 8. Similar IT-agility contradictions were also discussed in the research work conducted by Lu and Ramamurthy (2011). Notwithstanding the present research examines various capability-agility-performance related measures based on a rigorous study of prior literatures, it has its own unique findings particularly from the Indian banking industry perspective and thus, it extends previous studies and greatly contributes to the contemporary literature. The four-folded theoretical contributions are presented in the subsequent paragraphs.

First, IT capability is a critical organizational capability which enables an organization to become agile and facilitate greater performance in the long run. Further, IT capability is considered as a pivotal element in fostering business value and hence, generally can be treated as an enabler of agility and performance. Similar findings were also obtained by Chakravarty et al. (2013), Chen et al. (2014), and Lu and Ramamurthy (2011). Additionally, following Lu and Ramamurthy (2011), this research investigates the moderating role of IT spending on the IT capability-agility relationship and the findings suggest that the effectiveness of IT investment needs to be appropriately channeled for fostering and developing necessary IT capability to augment agility and performance. Further, banking firms need to make rational IT investment decisions and avoid over IT spending.

Second, human IT capability is an imperative organizational capability that enables an organization to enhance its IT personnel's skills/expertise to foster agility, which in-turn generates superior performance. Although, previous researches conducted by Lee et al. (1995) and Lee et al. (2002), have discussed about the critical dimensions of human IT capability, namely, technology management skill, interpersonal management skill, and business functional skill, its until Fink and Neumann's (2007) study where these human IT capability dimensions were empirically examined to explore their influence on agility. Further, research conducted by Fink and Neumann (2009) empirically investigated the effects of human IT elements on the competitive impacts such as strategic alignment and IT-based competitive advantages. Extending these previous studies, this research has investigated the effect of human IT capability on agility and performance, along with the moderating influence of IT infrastructure spending. One of the crucial findings highlights building necessary technology management skills of the IT personnel to develop agility and superior performance.

Third, although, IT capability is an inevitable aspect for enhanced business value, the significance of KM capability cannot be ignored. Consistent with previous researches conducted by Cai et al. (2013) and Mao et al. (2015a), this study infers that both IT and KM capabilities are essential organizational capabilities which enable the organization to mobilize and deploy IT and KM-based resources to attain agility and greater performance. Further, this study infers that in an uncertain environment banking firms do not effectively channel KM resources into capabilities and hence, identification and reaction to market and customer related changes are obstructed which hinder agility.

Fourth, in line with prior studies conducted by Pelletier and Raymond, (2014), Tallon and Pinsonneault (2011) and Yayla and Hu (2012), this research has conceptualized strategic IT-business alignment as a critical dynamic capability, which enables an organization to develop coherence between its resources, capabilities, and competencies to render superior agility and performance. In addition, it is obtained that when environmental uncertainties are higher, the strength of the relationship between strategic alignment capability and agility is diminished.

9.4 Practical Implications

The findings of this study provide numerous implications for the business and IT management practitioners. First, this study underpins the significance of effective IT deployment towards

developing efficient IT capabilities to gain greater agility and performance. Banks need to develop their internal efficiencies through improved managerial and technical IT capabilities to enhance overall business process and market responsive agilities and performance.

Second, in order to augment banking agility, the IT personnel should be able to accurately comprehend organizational plans and policies to understand the overall business functions, environment, and specific organizational knowledge. It is also imperative that they learn new trending technologies and accordingly deal with business issues and provide suitable technical solutions, for example, technological solutions concerning e-banking and risk management. Further, it is essential for the IT executives to maintain effective communication protocols with bank managers and collaboratively work with cross-functional groups to solve business as well as IT issues. For example, they can properly assist and communicate with bank managers to make appropriate technical analysis along with financial and market analysis for selecting suitable projects to finance.

Third, IT personnel need to appraise the estimated return on huge IT investment decisions. For example, in order to ensure complete data integrity, banks need timely technological up-gradation by getting rid of obsolete banking solutions and migrating into the new system. Since the life cycle of the technological products/services is getting shorter and the customers' response to avail services through the new channels is fickle, therefore, IT executives need to assess IT investments associated with this upgradation process vis-à-vis their estimated returns.

Fourth, it is imperative for the IT professionals to make necessary investment plans so that banks achieve competitive advantages with leveraged IT and KM capabilities. In this respect, for rational investment decisions, banks need to recruit and retain high-skilled and knowledgeable IT executives who proficiently develop apposite IT and knowledge competencies and facilitate augmented performance. Further, banks need to comprehend that well developed knowledge capabilities certainly facilitate IT capabilities to make a firm agile and foster its ability to readily identify and respond to unprecedented changes in the business environment.

Fifth, it is crucial for the banks to effectively integrate IT with business processes with a strategic outlook towards building a strong IT governance model, which focuses on augmented agility and performance. In addition, it is important for the banks to create and maintain synergy through appropriate business and IT collaboration by making effective utilization of integrated

IT infrastructure to augment their ability to sense and respond readily to any market changes. Even though most of the developing nations suffer from various resource constraints, effective exploration and exploitation of available IT and business resources is highly essential to suitably deal with environmental uncertainties. By doing so, banks will increase their overall ability to enhance long-term agility and performance.

9.5 Research Limitations

It is inevitable for every research to have encountered with limitations. The present study has the following limitations.

First, the study was conducted in the state of Odisha, in eastern India and confined only to the commercial banks (with special focus on public and private-owned banks), which may restrict its generality. However, the selected participants for this study suitably represent the whole population with a profound understanding about organizational operations, and majority of the target banking firms have been functioning for more than ten years, as a result generate responses of high standard. This justifies the generality of this study to be acceptable for a larger context.

Second, only IT and business executives working in the middle to senior level of management have been selected as a target sample frame for this research, therefore, how crucial organizational capabilities such as IT, human IT, KM, and strategic alignment capabilities are developed by professionals in the lower levels of management to comprehend greater agility and performance is not properly elucidated.

Third, along with the primary information, the present study also required some secondary data relating to various IT, human IT, KM, strategic alignment initiatives, and IT investments in banks, which were seemed to be very confidential in nature and the banking firms were reluctant to provide such information. Henceforth, no such secondary data could have been directly extracted from the samples and therefore, the author has to rely on secondary sources such as research articles published in the Indian banking industry context, Reserve Bank of India (RBI) reports, etc.

Fourth, even though capability building and attaining agility are long-term processes, this study is based on a cross-sectional survey design, that reviewed the responses of the participants at one point of time.

Fifth, this study has utilized different categories of respondents i.e., business and IT executives to collect the responses which may create a risk of apprehension about assessment and social desirability bias. However, the respondents were assured of the confidentiality and anonymity of their answers and the Harman's single factor test suggested that along with the common method bias (CMB) (as explained in chapters 5, 6, 7, and 8) this particular issue was not found to be a serious concern for the study.

Sixth, this study has used the same data set for the exploratory factor analysis (EFA) and hypothesis testing, which may bias the regression results.

9.6 Conclusions

The purpose of this research was to provide empirical evidences for the effects of various organizational capabilities with special focus on IT, human IT, KM, and strategic IT-business alignment capability on attaining organizational agility so as to enhance organizational performance in the context of Indian banking industry. After a meticulous examination of the primary data, it was revealed that effectively managed IT infrastructure is essential for the banking firms to realize greater agility. Thus, the banks are able to reconfigure the internal business processes and develop ready responses to market changes. However, along with acquisition of contemporary IT infrastructures, it is also essential to focus on their effective management as well as develop ability to channel market responsive agility into generating higher performance. Human IT capability components such as technology management skill, interpersonal management skill, and business functional skill enable the banks to enhance the skills/expertise of their IT personnel so as to foster agility and superior performance. Additionally, spending on IT infrastructures essentially enabled the banks' managerial IT capability and human IT capability with (business functional skills) to obtain augmented business process, market responsive, sensing, and responding agilities. However, over IT investments on infrastructures need to be avoided, since banks' technical IT capabilities, and human IT capability with (technology management skill) were found to be negatively influencing business process and sensing agility, respectively. Further, it was also inferred that IT investment is not translated into developing the interpersonal management skills of the IT personnel and hence, does not impact sensing and responding agilities. Although, IT and KM capabilities are essential organizational capabilities, banks tend to focus more on effective

deployment of IT assets compared to KM resources which was evident from the negative relationships estimated between KM capability-performance, and entrepreneurial agility-performance. This study also infers that strategic IT-business alignment capability is a critical dynamic capability for the banks to enable them effectively integrate IT and business units so as to achieve higher agility and performance. Furthermore, in the face of environmental uncertainties banks' KM resources are not channeled into capabilities to attain adaptive agility and the strength of the relationship between strategic alignment capability and both operational and market responsive agilities is diminished.

9.7 Scope for Future Research

In this research only the public and private sector banking firms functioning in the state of Odisha, India have been selected as target samples with IT and business executives as target participants. Therefore, this kind of study may also be conducted in other states of India. Additionally, future research may be extended taking into account for similar kind of respondents from rural and foreign-owned banks, and other industries such as telecommunications, manufacturing, pharmaceuticals, etc. in India. Since the term 'effects' imply the causal relationships among the constructs of organizational capabilities, agility, and performance, instead of a cross-sectional research design a longitudinal research is desirable to examine this causation. Additional research may explore alternative items to better conceptualize and operationalize these multifaceted latent constructs. Further, researches may consider examining the influence of other moderating variables, such as strategic orientation, business orientation, information system (IS) orientation, IT flexibility, etc. to investigate the capabilities-agility-performance linkages. Along with moderation and mediation analyses, more research is warranted on moderated-mediation analysis taking into account for these capabilities-agility-performance measures. Future researches may explore these unique relationships in the context of other developing countries across the world. In addition, further research may consider using separate data set for EFA and hypothesis testing in order to obtain less biased regression results.

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Appendix

QUESTIONNAIRE

Effects of Organizational Capabilities on Organizational Performance: Empirical Evidences from Indian Banking Industry

Declaration: Information collected through this questionnaire will be used for academic purpose only.

Ownership structure	Public-owned		Private-owned
Banks' Age (in years)	0-20	20-40	More than 40
Banks' Size (based on number of employees working across India)	Fewer than 20000	20000- 40000	More than 40000

Please indicate your response on each statement by giving a tick (√) on the number given on the right hand side. SCALE: Strongly Agree = 5, Agree = 4, Undecided = 3, Disagree = 2, Strongly Disagree= 1.

IT Executives' Survey

Section –I

There is a strong partnership between the IT and business executives	**1**	**2**	**3**	**4**	**5**
IT executives plan for IT strategies consistent with business goals	**1**	**2**	**3**	**4**	**5**
IT executives evaluate major IT investments after implementation	**1**	**2**	**3**	**4**	**5**
IT is used as an industry and market practices changer	**1**	**2**	**3**	**4**	**5**

Section –II

Our bank uses hardware i.e., compatible with particular operating system and has a high degree of systems inter-connectivity	**1**	**2**	**3**	**4**	**5**
Based on end-user requests new functionality can be quickly added to existing software modules	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to improve their technical skills	**1**	**2**	**3**	**4**	**5**
Our bank uses user-friendly operating systems	**1**	**2**	**3**	**4**	**5**
Our bank encourages IT-based innovations	**1**	**2**	**3**	**4**	**5**

Section-III

IT executives are knowledgeable about existing business functions	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to learn new business functions and technologies	**1**	**2**	**3**	**4**	**5**
IT executives understand business issues and provide suitable technical solutions	**1**	**2**	**3**	**4**	**5**
IT executives acquire knowledge about market competitors and business environments	**1**	**2**	**3**	**4**	**5**

Section- IV					
IT executives work in collaborative and cross-functional groups to solve business and IT issues	**1**	**2**	**3**	**4**	**5**
IT executives are proactive team players and project positive attitude	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to perform other external IT services by extending their existing knowledge domain	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to develop effective communication skills	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to develop planning, organizing, and leading capabilities	**1**	**2**	**3**	**4**	**5**
Section-V					
IT executives effectively manage technological fundamentals to create competitive advantage	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to develop necessary IT skills and follow modern IT trends	**1**	**2**	**3**	**4**	**5**
IT executives use IT as a medium to attain organizational objectives	**1**	**2**	**3**	**4**	**5**
IT executives properly plan, design, optimize for operation of technological products, services, and processes	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to develop web-based applications to meet up new market challenges	**1**	**2**	**3**	**4**	**5**
Section –VI					
Our bank has advanced IT infrastructure compared to others in the market	**1**	**2**	**3**	**4**	**5**
IT executives are knowledgeable about existing IT systems	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to experiment with new IT trends as necessary	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to effectively manage IT	**1**	**2**	**3**	**4**	**5**
IT executives maintain technology-based links with customers and suppliers	**1**	**2**	**3**	**4**	**5**
IT executives restructure IT processes to leverage opportunities	**1**	**2**	**3**	**4**	**5**
IT executives proactively explore IT to embrace innovative IT applications	**1**	**2**	**3**	**4**	**5**
Section – VII					
IT executives are encouraged to make rational investment on overall IT infrastructure	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on IT innovations	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on internal IT services	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on compatible hardware	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on software applications	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on shared network connectivity	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on delivery channels	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on core banking solution	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on risk management solutions	**1**	**2**	**3**	**4**	**5**
IT executives are encouraged to make rational investment on mobile banking solutions	**1**	**2**	**3**	**4**	**5**

IT executives are encouraged to make rational investment on customer relationship management	**1**	**2**	**3**	**4**	**5**

Both IT and Business Executives' Survey

Section –I

Our bank encourages effective communication between IT and business units	**1**	**2**	**3**	**4**	**5**
The value of IT's contributions into business strategies is acknowledged by both IT and business units	**1**	**2**	**3**	**4**	**5**
Our bank encourages collaboration of business and IT strategies to realize the value of IT in achieving business objectives	**1**	**2**	**3**	**4**	**5**
Our bank defines IT's role in business and vice versa	**1**	**2**	**3**	**4**	**5**
Our bank utilizes IT as a dynamic resource to offer customized solutions to business units	**1**	**2**	**3**	**4**	**5**
Our bank encourages development of necessary business and IT skill to promote alignment	**1**	**2**	**3**	**4**	**5**
Our bank encourages consistent use of IT applications on business processes	**1**	**2**	**3**	**4**	**5**

Section –II

Our bank faces diversity in nature of competition	**1**	**2**	**3**	**4**	**5**
Our bank faces competition in product/service quality	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where products/services get obsolete quickly	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where competitor' moves, and products/services demand changes are not easily predictable	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where there exists heterogeneity in product lines	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where there exists heterogeneity in mode of product distribution	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where there exists heterogeneity in nature of competition	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where there exists heterogeneity in customer buying habits	**1**	**2**	**3**	**4**	**5**
Our bank functions in an environment where there exists heterogeneity in geographic location	**1**	**2**	**3**	**4**	**5**

Business Executives' Survey

Section –I

Business executives are encouraged to acquire knowledge relating to new product development	**1**	**2**	**3**	**4**	**5**
Business executives comprehend changes in customers' demands and buying behaviours	**1**	**2**	**3**	**4**	**5**
Business executives have the required knowledge for overall firm governance	**1**	**2**	**3**	**4**	**5**
Business executives learn to better utilize knowledge resources to deal with uncertainties	**1**	**2**	**3**	**4**	**5**
Our bank promotes individual as well as organizational communication	**1**	**2**	**3**	**4**	**5**

Section –II					
Our bank encourages customization of product and services to meet customers' demands	**1**	**2**	**3**	**4**	**5**
Our bank encourages effective IT deployment	**1**	**2**	**3**	**4**	**5**
Our bank introduces new pricing schedules following competitors in the market	**1**	**2**	**3**	**4**	**5**
Our bank promotes expansion of business into new regional or international markets	**1**	**2**	**3**	**4**	**5**
Section –III					
Our bank makes effective and quick response to changing customers demand and competitors' strategy	**1**	**2**	**3**	**4**	**5**
Our bank develops and markets new products and services	**1**	**2**	**3**	**4**	**5**
Our bank makes required reengineering of business to better serve the market place	**1**	**2**	**3**	**4**	**5**
Our bank tries to broaden it's market outlets	**1**	**2**	**3**	**4**	**5**
Section –IV					
Our bank develops effective market intelligence to identify and track changes in customer preference and competitors' strategy	**1**	**2**	**3**	**4**	**5**
Our bank tracks new products or services launched by market competitors	**1**	**2**	**3**	**4**	**5**
Our bank identifies and builds essential capabilities to foresee market uncertainties	**1**	**2**	**3**	**4**	**5**
Our bank recognizes various changes relating to government regulations, policies, legal affairs, and economic shifts	**1**	**2**	**3**	**4**	**5**
Section –V					
Our bank commences new ventures and modifies existing product lines/features for quick response to changing competitor's strategy and customer needs	**1**	**2**	**3**	**4**	**5**
Our bank creates innovative products to adapt the existing business fulfilling the demand changes	**1**	**2**	**3**	**4**	**5**
Our bank responds to market threats as opportunities to realize enhanced value	**1**	**2**	**3**	**4**	**5**
Our bank quickly responds to customer complaints and resolves issues	**1**	**2**	**3**	**4**	**5**
Section –VI					
Our bank quickly senses and reacts to market and customer related changes	**1**	**2**	**3**	**4**	**5**
Our bank promotes incremental innovation	**1**	**2**	**3**	**4**	**5**
Our bank deals with resilient market responses	**1**	**2**	**3**	**4**	**5**
Our bank strives for continuous business process improvement to enhance business continuity	**1**	**2**	**3**	**4**	**5**
Section –VII					
Our bank proactively identifies environmental uncertainties	**1**	**2**	**3**	**4**	**5**
Our bank takes pre-emptive measures to deal with environmental threats	**1**	**2**	**3**	**4**	**5**
Our bank promotes radical innovation	**1**	**2**	**3**	**4**	**5**
Our bank launches innovative competitive actions to attain greater competitive advantage	**1**	**2**	**3**	**4**	**5**

Section –VIII

Our bank encourages quick decision making in the face of market and/or customer changes	**1**	**2**	**3**	**4**	**5**
Our bank constantly improves it's products/services offerings to quickly respond to and capitalize on changes	**1**	**2**	**3**	**4**	**5**
Our bank promotes superior intellectual ability to cope with market-related chaos	**1**	**2**	**3**	**4**	**5**
Our bank promotes effective IT utilization to discover external environmental changes	**1**	**2**	**3**	**4**	**5**
Our bank introduces products/services that are easily saleable in market	**1**	**2**	**3**	**4**	**5**
Our bank adopts contemporary technologies to react to competitors	**1**	**2**	**3**	**4**	**5**

Section –IX

Our bank promotes IT-business proximity to detect the locus of change	**1**	**2**	**3**	**4**	**5**
Our bank Builds up customers' confidence	**1**	**2**	**3**	**4**	**5**
Our bank has the ability to scale up/down the levels of production/service	**1**	**2**	**3**	**4**	**5**
Our bank encourages quick internal adjustments whenever there is shortage of resources	**1**	**2**	**3**	**4**	**5**
Our bank switches IT vendors to avail of lower cost, improved quality, and better delivery times	**1**	**2**	**3**	**4**	**5**
Our bank encourages effective IT-business coordination to deal with consumer demands	**1**	**2**	**3**	**4**	**5**

Section –X

Our bank strives for high return on investment	**1**	**2**	**3**	**4**	**5**
Our bank has high overall growth	**1**	**2**	**3**	**4**	**5**
Our bank has high competitive advantage relating to market competitors	**1**	**2**	**3**	**4**	**5**
Overall our bank is successful	**1**	**2**	**3**	**4**	**5**
Our bank has high profitability relative to goals	**1**	**2**	**3**	**4**	**5**
Our bank makes effective asset utilization	**1**	**2**	**3**	**4**	**5**
Our bank has high market share relative to goals	**1**	**2**	**3**	**4**	**5**
Our bank performs well relative to competitors	**1**	**2**	**3**	**4**	**5**
Our bank efficiently performs day-to-day business activities	**1**	**2**	**3**	**4**	**5**
Our bank promotes production of innovative products and services to attain product/service differentiation compared to competitors	**1**	**2**	**3**	**4**	**5**
Our bank promotes excellence in internal business processes to enhance it's responsiveness towards customers' needs	**1**	**2**	**3**	**4**	**5**
Our bank promotes IT-business alignment to generate higher business value from IT related investments	**1**	**2**	**3**	**4**	**5**
Our bank strives for improved customer relations and loyalty	**1**	**2**	**3**	**4**	**5**
Our bank strives for long-run sustainable business performance	**1**	**2**	**3**	**4**	**5**

Thank You

Sukanya Panda

Dissemination

Research Publications

1. **Panda, S.,** and Rath, S.K. (2017). Strategic IT-Business Alignment and Organizational Agility: from a developing country perspective. ***Journal of Asia Business Studies*, (Emerald Group Publishing)** (Accepted for publication).
2. **Panda, S.,** and Rath, S.K. (2017). The effect of Human IT capability on Organizational Agility: An empirical analysis. ***Management Research Review,* 40(7), 800-820 (Emerald Group Publishing)** https://doi.org/10.1108/MRR-07-2016-0172.
3. **Panda, S.,** and Rath, S.K. (2016). Modelling the Relationship between Information Technology Infrastructure and Organizational Agility: A Study in the Context of India. ***Global Business Review,* 19(2),** (March - April 2018) **(Sage Publications)** (In Press).
4. **Panda, S.,** and Rath, S.K. (2016). Investigating the Structural linkage between IT capability and Organizational agility: A Study on Indian Financial Enterprises. ***Journal of Enterprise Information Management,* 29(5), 751-773 (Emerald Group Publishing)** https://doi.org/10.1108/JEIM-04-2015-0033.
5. **Panda, S.,** and Rath, S.K. (2015). Investigating the relationship between IT capability and Organizational Performance: An Empirical evidence from Indian Banking Units. ***International Journal of Management Science and Information Technology,* 3(17), 57-69 (NAISIT, Canada)** Available at: http://www.naisit.org/journal/paper/id/142.
6. **Panda, S.,** and Rath, S.K. (2016). Information Technology capability, Knowledge Management capability, and Organizational Agility: the role of Environmental Factors. ***Journal of Management & Organization,* (Cambridge University Press)** (Manuscript ID: JMO-2016-0337.R1:Under Minor Revision).
7. **Panda, S.,** and Rath, S.K. (2016). Modelling the Structural Linkage between Information Technology Capability and Organizational Agility: Exploring the role of Environmental Factors, ***Asian Academy of Management Journal,* (Penerbit Universiti Sains Malaysia)** (Manuscript ID: AAMJ 3325).

Conference Presentations

1. **Panda, S.,** and Rath, S.K. Modelling the relationship between Information Technology Capability and Organizational Performance: In context to Indian Banking units. The **16th Consortium of Students in Management Research (COSMAR), Indian Institute of Science (IISc), Bangalore, India**, 11-12 November, 2016. ***BEST PAPER AWARD.***
2. **Panda, S.,** and Rath, S.K. Investigating the relationship between IT Capability and Organizational Agility: An Empirical Analysis. Proceedings of the **International Conference on Business Management & Information Systems (ICBMIS), National University of Singapore (NUS), Singapore**, 17-20 November, 2015, 146-157.
3. **Panda, S.,** and Rath, S.K. An Empirical Analysis on Impact of Information Technology (IT) Capabilities on Firm Performance. Proceedings of 6th **Conference on Excellence in Research and Education (CERE)**, **Indian Institute of Management (IIM), Indore**, India, 8-11 May, 2014, 49-60.

Curriculum Vitae

Sukanya Panda, MBA, PhD (NET-SRF)
Assistant Professor
School of Human Resource Management, Tata Institute of Social Science (TISS), Hyderabad, 500032, Telangana, India
Ph-8908894315
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CAREER SUMMARY

Research Experience:	4 years + *Skills*: Information system (IS) capability, Knowledge management (KM) capability, Effect of IS and KM capabilities on organizational agility and performance, IS effectiveness, Business value of information technology (IT), Influence of IT spending on IT capability-agility-performance relationship, IT–agility-performance contradiction, IT–organization–environment framework, Effect of IT flexibility on critical IS expertise-agility linkage, Effect of IT generated business value on organizational performance (financial and non-financial), Resource-based-view (RBV), knowledge-based-view (KBV), and dynamic-capability-view (DCV) theories. *Expertise in:* using various statistical data analysis tools such as SPSS, SPSS-AMOS, partial least square (PLS) graphs, soft computing data analysis techniques using artificial neural network (ANN), and basic fuzzy logic.
Research Publication(s):	5 (3 published +2 accepted, ABDC/Scopus)
Research Papers Under Minor Revision:	1
Research Papers Communicated:	1
Conference Publications (Peer Reviewed):	3 (**1 BEST PAPER AWARD:** COSMAR-2016; IISc. Bangalore)

CURRENT EXPERIENCE

Assistant Professor December 2016-Present
School of Human Resource Management,
TISS, Hyderabad, India

EDUCATION

PhD (Information System Management) 2012-
School of Management, NIT, Rourkela, Odisha, India

MBA (Human Resources Management/Information System Management), 2006-2008 **75.9%**
Institute of Business and Computer Studies, BPUT, Odisha

B. Sc (Chemistry as major), **74.9 % with honors and distinction**
Utkal University, Bhubaneswar, India 2003-2006

12th (Physics, Chemistry, Biology, Mathematics), **63.5%** 2001-2003

10th (Odiya, English, Sanskrit, Math, Science, Social science), **73.9%** 2001

Canadian Payroll Compliance Practitioner (PCP), 2011-2012
Canadian Payroll Association, Canada, Score **88.7%**

AWARDS/HONORS

- Qualified **UGC-NET-JRF** (2012), Govt. of India.
- **Best 3rd position** (2006), Utkal University, Odisha, India.
- Awarded with **NRTS (1998),** BSE, Odisha, India
- Awarded with **scholarships** in class 5th (1996) and 3rd (1994)

ESSENTIAL SKILLS

- Documents use, Data Entry, Writing, Oral communication, Working with others, Problem solving, Critical thinking, Internet use.
- Practiced Computer Operating System: Windows 9X, Windows 2000, Windows XP, Windows Vista.
- Practiced Computer Office Package: Microsoft Word, Microsoft Excel, and Microsoft Power Point.
- Statistical data analysis tools such as SPSS, SPSS-AMOS, partial least square (PLS) graphs
- Soft computing data analysis techniques using artificial neural network (ANN), and basic fuzzy logic